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The interplay of affective and cognitive factors in information seeking and use: comparing Kuhlthau´s and Nahl´s models

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Introduction

In the modeling of information behaviour, researchers have traditionally placed the main emphasis on its cognitive dimensions while the role of affective factors such as emotions and feelings has remained secondary (Case, 2012, pp. 133-162). Wilson (1999) reviewed thirteen major models of information behaviour; of them, however, only four explicitly refer to affective or psychological factors. Importantly, these four models provide examples of more balanced approaches. Wilson (1981) conceptualized the drivers of work-related information seeking as a set of physical, cognitive and affective needs. Later on, Wilson (1997) identified psychological factors such as self-efficacy that affect the extent the person feels able to seek information from a source. Dervin´s (1983) Sense-making theory provided a novel perspective on information seeking and use by devoting equal attention to the cognitive, affective and situational factors. The pioneering approaches include Kuhlthau´s (1991) Information Search Process model that incorporated three realms: affective (feelings experienced), cognitive (thoughts concerning both process and content of information search), and conative (actions taken).

The pioneering studies are valuable in that they have identified a variety of affective and cognitive factors triggering information seeking; these factors include, for example, information need, gap and uncertainty (Savolainen, 2011). Choo (2006, pp. 43-67) provides a useful summary view on the ways in which affective and cognitive factors have been categorized in the studies on information needs, seeking and use. According to Choo, affective factors of information seeking include motivation and interest, while the perceived source quality is one of the cognitive factors of information seeking. Further, cognitive style can be categorized as a cognitive factor of information use while the affective factors of information use include, for example, information avoidance.

In reviews such as these, the affective and cognitive factors tend to be approached as separate entities. However, it is evident that in real-world situations of information behaviour, affect and cognition are interrelated. The present study is inspired by the question of how have researchers approached such interrelationships in the context of information seeking and use, and to what extent have they succeeded in their attempts? These questions are relevant because they deal with the attempts to create a more holistic picture of information behaviour by devoting equal attention to its cognitive and affective factors. More specifically, the significance of this research topic lies in the analysis of the interplay of the above factors. Our understanding about

the nature of information behaviour can be deepened by scrutinizing the assumptions about the temporal order of these factors (e.g., cognitive appraisal precedes the affective evaluation of information) or their causal connections (e.g., cognitive uncertainty causes negative feelings).

To explore this issue further, the major models of information seeking and use were scrutinized by devoting attention to how they approach the interplay of the affective and cognitive factors. The preliminary analysis revealed that this topic is largely neglected among information scientists. Further support for this assumption was obtained from Wilson´s (1999) review of thirteen major models in information behaviour referred to above. The examination of more recent literature resulted in the conclusion that in fact there are only two models providing sufficiently detailed conceptualization of the cognitive and affective factors: the Information Search Process Model developed by Carol Kuhlthau (1991; 2004), and the Social-Biological Information Technology model elaborated by Diane Nahl (2007a; 2007c). The present study concentrates on these models. More specifically, they were chosen for review for two main reasons. First, different from other major models of information seeking and use (for example, Ellis, 2005; Wilson, 1997), they explicitly conceptualize both affective and cognitive factors. Second, the above models characterize the interplay of these factors.

Kuhlthau´s model is one of the classic frameworks of information-seeking behaviour (Case, 2012, pp. 145-146). So far, Nahl´s Social-Biological Information Technology model is probably less widely-known among researchers focusing on the issues of information seeking and use. This may be due to that Nahl has mainly approached the interplay of affective and cognitive factors in the contexts of information retrieval and web searching. However, as the present article suggests, her model is also relevant for the study of information seeking and use. As Kuhlthau and Nahl approach the affective and cognitive factors from different perspectives, their models can be examined from a comparative point of view. This, in turn, enables the specification of the picture of the interplay between affective and cognitive factors in information seeking and use.

The present study is structured as follows. First, to provide background, the overall nature of affective and cognitive factors, as well as their interplay is characterized. Then, the research design is specified. The findings are reported in subsequent chapters focusing on the ways in that the interplay of affective and cognitive factors have been conceptualized in Kuhlthau´s and Nahl´s models. The last chapters discuss the main findings and draws conclusions of their significance.

Literature review

What are affective factors?

There are a number of competing approaches to affective phenomena and no consensus has been reached among researchers about their nature (Cowie *et al*., 2011). This is partly due to the various denotations and connotations of the terms *affect, emotion,* and *feeling*, as well as a host of other terms such as *preference*, *emotional attitude*, and *mood* (Mulligan and Scherer, 2012, p. 346).

To clarify the terminological tangle, Davidson and his associates (2003, p. xiii) provide a useful overall characterization of the affective factors or phenomena. They identify six major *affective phenomena* as follows:

- *Emotion* refers to a relatively brief episode of coordinated brain, autonomic and behavioural changes that facilitate a response to an external or internal event of significance for the organism.
- *Feeling* is a subjective representation of an emotion. Feelings can reflect any or all of the components that constitute emotion.
- *Mood* typically refers to a diffuse affective state that is often of lower intensity than emotion but considerably longer in duration.
- *Attitudes* are relatively enduring, affectively coloured beliefs, preferences and predispositions toward objects and persons.
- *Affective style* refers to relatively stable dispositions that bias an individual toward perceiving and responding to people and objects with a particular emotional quality, emotional dimension, or mood.
- *Temperament* refers to particular affective styles that are apparent early in life and thus may be determined by genetic factors.

Of the affective phenomena, psychologists have devoted particular attention to the category of *emotion* (Frijda, 1986). Even though there is a lack of consensus regarding the structure and manifestations of emotion, two main theoretical perspectives can be identified. *Discrete emotion theories* suggest the existence of six or more basic emotions (happiness, sadness, anger, fear, disgust, and surprise), which are universally displayed and recognized (Lopatovska and Arapakis, 2011, p. 576). *Continuous approaches* assume the existence of two or more dimensions that describe and distinguish between different emotions. From this perspective, emotions can be better approached by using dimensions such as pleasant versus unpleasant rather than drawing on a small number of discrete emotional categories (Ellsworth and Scherer, 2003, p. 574).

Since the 1990s, the *appraisal approach* has become a major theoretical perspective in the study of emotion (Moors *et al.*, 2013). The basic premise of appraisal theories is that the organism's evaluation of its circumstances (current or remembered or imagined) plays a crucial role in the elicitation and differentiation of its emotions (Ellsworth and Scherer, 2003, p. 573). Generally, the first appraisal in the sequence is that of novelty - something in the environment (physical, social, or mental) changes, and the organism's attention is attracted. An orienting response may occur, and the organism is in a state of readiness for further emotional responding. If whatever attracted the organism's attention cannot be disregarded as irrelevant to its well-being, further appraisal will take place. Usually, the next step is a sense of intrinsic pleasantness or unpleasantness, often occurring so quickly that it is subjectively indistinguishable from the experience of attention. Especially when the valence is negative, further appraisals ensue, and the emotional experience changes from "feeling good" or "feeling bad" to some more differentiated state (Ellsworth and Scherer, 2003, pp. 573-574). Most appraisal theorists propose that the appraisals essential to emotions must be part of the emotion (Ellsworth and Scherer, 2003, p. 575). This perspective is compatible with the idea of emotions as continuous processes, changing as appraisals are added or revised.

Main features of cognitive factors

Similar to the affective phenomena reviewed above, researchers have reached no consensus about the nature of the cognitive factors. The term *cognition* is generally used to describe the intellectual or perceptual processes occurring within the mind when an individual analyses and interprets both the world around herself and her own

thoughts and actions (Petri and Govern, 2004, p. 248). To examine issues such as these, cognitive scientists have identified four major sub-domains of study (von Eckardt, 1996, pp. 58-95):

- human intelligent behaviour or action
- human propositional attitudes
- human knowledge representation and use
- human cognitive capacities whose exercise is sensitive to the subject´s goals and general knowledge.

However, as von Eckardt (1996, pp. 58-95) demonstrates, researchers have reached no consensus about the primary domain of cognitive science. Similarly, there are competing definitions of key concepts such as "human intelligent behaviour" or "human propositional attitudes". Thus, given the multiplicity of views on the cognitive factors, no attempt will be made here to provide an overall definition of concepts such as human cognitive capacities, for example.

Cognitive psychology focuses on similar issues. It approaches cognitive factors as a group of mental processes that includes attention, memory, and activities such as producing and understanding language, learning, reasoning, analyzing, concluding, planning, evaluating, problem solving and decision making (Sternberg, 2009).

Cognitive factors have also been approached by identifying cognitive styles of diverse kinds (Ford, 2004, pp. 189-190). Cognitive styles are tendencies displayed by individuals consistently to adopt a particular type of information processing strategy. For example, *field-independent* individuals tend to experience the components of a structured field analytically, as discrete from their background, and to impose structure on a relatively unstructured field. By contrast, *field-dependent* individuals tend to be less good at such structuring and analytic activity, and to perceive a complex stimulus globally as a gestalt.

The interplay of affective and cognitive factors

Fascination with the question of how feeling and thinking (affect and cognition) are related can be traced throughout the Western philosophical tradition. For example, Aristotle, Descartes and Kant have been intrigued by this issue (Forgas, 2000, p. 3). A key idea has been that human mental life can be separated into three distinct and complementary faculties: feeling, knowing and willing (affect, cognition and conation). A tripartite classification of this kind can also be found in the tradition of psychology. One of the unfortunate consequences of the above division is the tendency to treat these three mental faculties as if they were fundamentally distinct entities that can be studied in separation from each other. Since the 1960s, however, critical voices have been raised against the traditional approach. For example, Kelly (1963) and Bruner (1973; 1986) emphasized the importance of examining affect and cognition as interwoven dimensions of human social life.

One of the controversial issues is whether affective factors should be seen as integral parts of the cognitive-representatational system, or should they be considered as a separate, and in some ways, primary response system in its own right? Some researchers argue for a separate-systems view, proposing that affective reactions often precede, and are neuroanatomically and psychologically distinct from cognitive processes, while others espouse a more interactionist conceptualization. As Forgas (2000, p. 5) reminds, the position in debate depends on how broadly the domain of cognition is defined. Affect can be considered a primary and separate response system only is cognition is defined as excluding early attentional and

interpretational processes that are inevitably involved in stimulus identification before any response is possible. Ultimately, therefore, the question of whether and to what extent cognition and emotion can be identified as separate categories is a conceptual and definitional issue that cannot be solved by means of empirical research. According to Lazarus (1999, pp. 10-11), a substantial number of researchers have taken the position that cognition and emotion are seamlessly conjoined or fused in nature. For example, Bruner (1986), one of the main theoretical figures behind Kuhlthau´s Information Search Process model, has advocated this viewpoint.

Research questions

The literature review demonstrated that there is no consensus among researchers about the definition of the affective and cognitive factors or the nature of their interplay. Despite the multiplicity of alternative views, the above section provided useful background for the formulation of the research questions addressed in the present study:

RQ1. In which ways are the affective and cognitive factors in information seeking and use conceptualized in the models developed by Kuhlthau and Nahl?

RQ2. In which ways have Kuhlthau and Nahl conceptualized the interplay of the affective and cognitive factors?

RQ3. What kind of similarities and differences with regard to the interplay of the above factors can be found in Kuhlthau´s and Nahl´s models?

Even though both models draw on the findings of empirical studies, the models cannot be regarded as fully empirically validated approaches to the interplay of the cognitive and affective factors in information seeking and use. Therefore, the above research questions focus on the conceptualization of the affective and cognitive factors in the particular context of modelling human information behaviour. Due to this limitation, the present study cannot solve the theoretical and methodological ambiguity about the relationships between cognition and affect in general.

To strengthen the focus of the study, the affective and cognitive factors will not be discussed in relation to the activities constitutive of information seeking and use, for example, accessing information sources and reading texts. Second, these factors will not be examined in relation to the situational factors of information seeking and use, for example, urgency of work task. Third, since Kuhlthau and Nahl approach the interplay of the affective and cognitive factors from different theoretical perspectives, the models will not be approached as rivals by evaluating their strengths and weaknesses. The main attention will be devoted to the unique features of the models by acknowledging that they are relevant in their own right.

Research material and analysis

To create a preliminary picture of the conceptualizations of the affective and cognitive factors in information seeking and use, an extensive literature search was conducted by using databases such as EBSCO, LISA and ERIC. The keywords used in the search included, for example, affect, affective factors, cognition, cognitive factors, emotion, emotional factors, information searching, information seeking and information use. In addition, major review articles focusing on information needs, seeking and use were consulted; these articles were mainly published in the volumes of the Annual Review of Information Science and Technology (ARIST) since 1966.

To strengthen the focus of the study, main attention was finally directed to the analysis of the seminal models developed by Kuhlthau and Nahl. For this purpose, their studies published since the 1980s were scrutinized with a specific emphasis on the affective and cognitive factors of information seeking and use. The material was analyzed by means of conceptual analysis by devoting attention to the ways in which Kuhlthau and Nahl (or fellow researchers drawing on their ideas) have defined affective and cognitive factors and their relationships. In the first phase of the conceptual analysis, relevant parts of the documents characterizing the affective factors such as feeling and mood and cognitive factors such as cognitive appraisal and thoughts in the context of the above models were identified. Then, attention was devoted to how the elements of such factors and their relationships are generally defined. In this context, attention was also paid to how the affective and cognitive factors and their relationships are illustrated by drawing on the findings of empirical studies. Finally, the conceptualizations and their empirical illustrations were compared to find similarities and differences.

Since Kuhlthau has thoroughly characterized her model in the second edition of her book *Seeking Meaning* (Kuhlthau, 2004), it was used as a main source. Nahl (2007a; 2007b; 2007c) has described her model in slightly different versions. Her extensive article titled "Social-biological information technology: an integrated conceptual framework" (Nahl, 2007c) was used as a main source because it characterizes her model in the most detailed way.

Findings

Information Search Process Model (Kuhlthau)

The first empirical studies drawing on the ideas of the Information Search Process (ISP) model were conducted in the 1980s; the model was introduced in 1991 (Kuhlthau, 1991). The model describes feelings, thoughts, and actions in six stages of information seeking: Task initiation, Topic selection, Prefocus exploration, Focus formulation, Information collection, and Search closure. Fulton (2009, p. 246) aptly characterizes Kuhlthau´s model as a "cognitive-affective approach". Its main strength lies in a holistic view on how people seek and use information in work task-related contexts in particular.

The nature of affective and cognitive factors

In the ISP model, the conceptualization of the affective and cognitive factors draws heavily on the psychological theories developed by Kelly (1963) and Bruner (1973; 1986). These theories concentrate on the nature of human thinking and learning as a construction process. Kuhlthau (2004, p. 13) acknowledges her intellectual debt to Kelly and Bruner by pointing out that she employed their frameworks as "borrowed theories" to understand the user´s perspective on information seeking. In the Personal Construct Theory, Kelly (1963) specified how individuals create patterns to make sense of the world and to anticipate future events. These patterns were labeled as *personal constructs*. They are developed in a five-phase process based on the interplay of cognitive and affective factors. In this process, the individual forms new personal constructs and assimilates them into one´s existing system of personal constructs. Kelly (1963) also characterized *mood* as an attitude that determines one´s approach to information during the construction process and thus influences on the

nature of choices made by the individual during the construction process. He identified two moods in any constructive process: invitational and indicative. *Invitational mood* leaves the person open to new ideas and receptive to change and adjustment according to what is encountered, while *indicative mood* causes the person to depend on the construct he or she presently holds and to reject new information and ideas (Kuhlthau, 1991, p. 363).

Bruner´s (1973; 1986) studies on perception, human thinking and learning corroborated and elaborated Kelly´s ideas about the creation of the personal constructs. Bruner devoted particular attention to the role of the interpretive task in the construction process. He identified five phases constitutive of the construction process: Perception, Selection, Inference, Prediction, and Action. Of these phases, Prediction is particularly important because it incorporates the main interpretive task of "going beyond the information given". As discussed in more detail below, this idea appeared to be particularly important for the conceptualization of information use taking place during the ISP. Although the labels of the above phases, for example, Inference and Prediction suggest that construction would primarily be a cognitive process, Bruner emphasized the importance of studying emotion and cognition as a unified whole.

While characterizing the affective and cognitive factors of information seeking and use, Kuhlthau remained faithful to the ideas obtained from the borrowed theories. The ISP model is structured into diverse stages by following the idea of the phases of construction. However, Kuhlthau operated on a more concrete level by identifying six stages (not phases) characteristic of the process of task-related information seeking and use in particular. Following Kelly, Kuhlthau (1991, p. 363; 2004, p. 98) defined mood as a stance or attitude that a user assumes toward opening or closing the range of possibilities in a search. An invitational mood leads to expansive actions, allowing the user to assume a posture of expectancy and enabling him or her to take risks and to profit from mistakes. In contrast, an indicative mood leads to conclusive actions, that is, giving priority to closure by limiting expectations and confining the user to the task at hand. Interestingly, Kuhlthau does not discuss whether mood should be classified as an affective or cognitive factor; mood is approached as an individual category (Kuhlthau, 2004, pp. 44-50). In psychology, however, mood is commonly defined as an affective category (Davidson *et al*., 2003, p. xiii). As a compromise, mood is categorized in the present study as an affective-cognitive factor. Figure 1 below provides an overview of the ISP model.

	Cognitive factors	Affective factors	Affective-cognitive factors
STAGES	THOUGHTS	FEELINGS	MOOD
Task initiation		Uncertainty	Primarily invitational
Topic selection	Ambiguity	Optimism	Primarily indicative
Prefocus exploration		Confusion, frustration doubt	Primarily invitational
Focus formulation		Clarity	Primarily indicative
Information collection		Sense of direction/ confidence	Indicative and invitational
	Specificity		
Search closure		Relief, satisfaction dissatisfaction	Indicative

Source: Modified from Kuhlthau (2004), pp. 44-50

Figure 1. Affective and cognitive factors in information seeking and use.

Kuhlthau´s model suggests that thoughts develop from general or vague to focused, as the information search process progresses through six stages. Concomitantly, the feelings experienced by information seekers progress from negative to positive. However, the progress of feelings is not linear from the negative to the positive since at stage 2 (Topic selection) the feelings of uncertainty may change to temporary optimism. However, negatively coloured feelings become dominant at stages 3 (Prefocus exploration) and 4 (Information collection). At the final stages, however, the feelings are predominantly positive. The nature of mood also varies at the diverse stages of the ISP. An invitational mood tends to be more common at the initial stages of the ISP while an indicative mood is preferred at the final stages.

Figure 1 provides only an overview of the features of the cognitive and affective factors without specifying the nature of their interplay; this issue will discussed in greater depth later on. Although Kuhlthau´s model primarily focuses on information-seeking behavior, there are elements of information use embedded in the ISP. Information use manifests itself most clearly at stages 4 (Focus formulation) and 6 (Search closure). According to Kuhlthau (2004, p. 94), the information search process involves using information, not merely locating it. She draws here on Bruner´s (1973) idea suggesting that the interpretive task involves ”going beyond the information given”. Focus formulation in particular requires thinking that leads to interpreting and creating from the information encountered in the search process.

Thus, no matter the amount and quality of the information gathered, the problem is not solved or the topic understood until the information has been interpreted.

The interplay of the affective and cognitive factors

Bruner (1973; 1986) and Kelly (1963) emphasized that the construction process is based on the interplay of thinking, feeling and acting. According to Bruner (1986, p. 117), "cognition is not a form of pure knowing to which emotion is added". Kelly (1963) characterized the formative role of the affective factors by suggesting that feelings of confusion influence the construction processes when individuals are involved in the process of constructing meaning from the information they encounter. Drawing on these ideas Kuhlthau (2004, p. 25) assumed that affective experiences play a significant role in directing cognition throughout the process of information seeking. The overall picture of the interplay between the affective and cognitive factors is crystallized in the Uncertainty Principle formulated by Kuhlthau (1993, p. 347): "Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the ISP. The affective symptoms of uncertainty, confusion and frustration are associated with vague, unclear thoughts about a topic or question. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning, or a limited construct initiates the process of information seeking".

Interestingly, Kuhlthau assigns a double role to the category of Uncertainty (Wilson *et al*., 2002, p. 707). On the one hand, it is defined as a "cognitive state" in the Uncertainty principle. On the other hand, uncertainty is referred to as one of the negative feelings characteristic of Stage 1 (Task initiation) in particular (Kuhlthau, 2004, p. 44) The formulations of the Uncertainty Principle suggest that the interplay between the cognitive factors (thoughts) and affective factors (feelings) may be based on relationships of three kinds. First, strong causality: cognitive uncertainty causes affective symptoms of anxiety and lack of confidence. Second, loose causality: as knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. In this case, too, cognitive factors (thoughts) bring about affective factors but in a less determined way so that positive thoughts parallel with positive feelings. Third, associative relationship: the affective symptoms of uncertainty, confusion and frustration are associated with vague, unclear thoughts about a topic or question. In this case, the negative cognitive and negative affective factors appear together but the former do not bring about the latter.

Kuhlthau (2004, pp. 19-20) makes use of Kelly´s (1963) idea that mood (affective-cognitive factor) is closely related to the ways in which an individual makes choices (cognitive factor). Such choices are based on the prediction of the outcome of the choice. The invitational mood impacts such choices by assuming the posture of expectancy, thus encouraging the person to expand the range of action, to take risks and profit from mistakes. The indicative mood, in contrast, limits the predictions that one can make and tends to close down or confine the task at hand.

The above setting can be elaborated further by examining the interplay of the affective and cognitive factors at the various stages of the ISP. The review conducted below is based on the empirical characterization of the students´ information seeking and process (Kuhlthau, 2004, pp. 44-50). For analytical reasons, the stages are

discussed separately although stages 3, 4 and 5 can partly overlap (Kuhlthau, 2004, p. 83).

- Stage 1: *Task Initiation*. The cognitive factors (thoughts) concentrate on comprehending task, contemplating assignment, relating prior experience and learning, and considering possible topics. Thinking over task assignment typically leads to negatively coloured feelings of uncertainty and apprehension at the work ahead. The mood is primarily invitational; it opens the possibilities within the comprehensive topic or problem and keeps at bay any tendency toward early closure based on insufficient information. (Kuhlthau, 2004, p. 44)

The above assumptions about the interplay between the cognitive and affective factors correspond to everyday intuition: thoughts about a (non-trivial) work task waiting ahead tend to give rise to feelings of worry. Interestingly, Kuhlthau does not characterize the relationship between short-lived affective factors (feelings) and moods (relatively enduring affective-cognitive factors understood in terms of attitudes). Further, the question remains about why would negatively coloured feelings such as apprehension and uncertainty appear together with an invitational mood that is positive in nature? We may think that negative feelings are more probably related to an indicative mood because the feelings of uncertainty and apprehension may lead to narrowing rather than broadening the range of alternative viewpoints to the forthcoming task. Further, at the stage of task initiation, the relationship between thoughts and mood is not explicated. However, it is evident that the relationship is not causal in nature, similar to cognitive uncertainty => negative feelings. Following the ideas of Kelly (1963, p. 64), mood has been assigned a more central role in the ISP model because it allows the range within which the cognitive factors can operate to broaden or narrow. Cognitive factors of these kinds deal with making choices, for example considering three alternative essay topics instead of only one.

- Stage 2: *Topic Selection*. At this stage, thoughts center on weighing prospective topics against the criteria of personal interest, assignment requirements, information available, and time allotted. The outcome of each possible choice is predicted, and the topic judged to have the greatest potential for success is selected. As a consequence, feelings of uncertainty often give way to optimism after the selection of the topic has been made, and there is a readiness to begin the search. The main feelings include confusion, sometimes anxiety, brief elation after selection, and anticipation of the prospective task. At this stage, the mood is mainly indicative. A more indicative stance prompts the decision to be made. However, if the users are overly invitational at this point, they are likely to have difficulty settling on a general topic to get their search underway. On the other hand, if they are excessively indicative they tend to choose topics without sufficient investigations and reflection, which frequently result in obstacles later on. (Kuhlthau, 2004, p. 46; p. 98)

As the above characterization indicates, thoughts concentrating on the choosing of a topic with potential success tend to give rise to mixed feelings. They may range from optimism to anxiety and confusion. Kuhlthau does not, however, discuss how the mixed feelings are related to the preference of indicative mood: could such feelings shape in some way the mood which is understood as a relatively enduring stance to issues and events? At this stage, indicative mood is posited as preferable on

a practical basis because it is a better guarantee that an individual can choose one of the alternative topics and exclude others. This preference may also be explained by referring to contextual factors. Given the time frames characteristic of the performance of most work tasks, closing the range of possibilities is a necessity.

- Stage 3: *Prefocus Exploration*. At this stage, thoughts concentrate on becoming informed about the general topic to form a focus of personal point of view. This tends to be a cognitively demanding task giving rise to negative feelings such as confusion, uncertainty, threat and doubt, which frequently increase during this time. An invitational mood is preferred because it opens the search for accomplishing the task of investigating and learning about the general topic to form a focused perspective. An indicative mood at this point may be less productive since it prompts the person to collect rather to explore. (Kuhlthau, 2004, p. 47)

In contrast to the stage of Topic selection, the picture of interplay of the cognitive and affective factors is clear: negative feelings predominate as symptoms brought about by cognitive uncertainty. Similar to stage 1 (Task initiation), the connections between feelings and mood are not specified in the ISP model. However, Kuhlthau describes the role of mood more analytically by characterizing the adequacy of the invitational mood versus indicative mood from the perspective of successful prefocus formulation. To succeed, the person has to draw on an invitation mood, despite temporary feelings of confusion, uncertainty, threat and doubt. Again, similar to stage 1, mood is given the role of the primary driver of the ISP process. Ultimately, mood – invitational or indicative – defines the range within which the cognitive factors can operate while choosing between alternatives.

- Stage 4: *Focus Formulation* tends to be the turning point of the ISP. Thoughts concentrate on predicting outcome of possible foci using criteria of personal interest, requirements of assignment, availability of materials and time allotted to the project. This stage may sometimes be characterized by a sudden moment of insight. Even though focus formulation may require a lot of cognitive efforts, increasing personal interest in the topic is reflected in the change of the affective factors. Feelings of uncertainty diminish and confidence increases. At the formulation stage, an indicative mood is preferred because it fosters the closure essential to accomplish the task of narrowing and focusing the general problem area. (Kuhlthau, 2004, p. 48)

At the stage of focus formulation, the cognitive factors are coloured positively since they deal with the individual´s ability to identify a relevant, yet sufficiently focused perspective on the task at hand so that the choice meets his or her personal interest.

Given the assumption of the parallel connection between the cognitive and affective factors, it is logical that the "affective" symptoms are positive, too. Optimism and confidence appear together in the indicative mood even though this assumption is counter-intuitive. One might think that positive feelings such as confidence are primarily related to an invitational rather than indicative mood because the latter discourages the broadening of the range of possibilities in a search. However, similar to the stage of Prefocus formulation, mood takes the dominant role over temporary feelings; mood defines the overall affective-cognitive rationality of

the process at this stage. Apparently, Kuhlthau has taken a functionalist perspective here. An indicative mood is assigned a leading role because such a mood is more optimal with regard to the successful outcome of the focus formulation. In other words, a basic requirement for successful focus formulation is the ability to narrow the range of alternative choices so that the person can concentrate on the most essential issues and avoid detraction from the topic.

- Stage 5: *Information Collection*. Cognitive factors mainly deal with seeking information to support the focus, as well as defining and extending the focus through information. Since the thoughts can be focused on a relatively well-defined area, the cognitive factors are coloured positively. Feelings of confidence continue to increase as uncertainty subsides, with interest in the project deepening. The feelings include realization of extensive work to be done, confidence in the ability to complete the task, and increased interest. The indicative mood is also effective in the collection stage when the task centers on gathering information specific to the focused perception of the topic. If the focus is extended, however, invitational mood may serve better the ends of information collection. (Kuhlthau, 2004, p. 49)

Compared to the cognitively demanding and affectively stressful stages of Prefocus exploration and Focus formulation, Information collection seems to be a relatively unproblematic stage of the ISP. Because the cognitive and affective factors are predominantly positive, their interplay is harmonious. Confidence and increasing interest can appear together with both types of mood although an indicative mood tends to be preferred, similar to the stage of Focus formulation. Again, from the functionalist and pragmatic point of view, this preference is reasonable because the information seeking process cannot be broadened endlessly, given the time frame of work task performance.

- Stage 6: *Search Closure*. At the final stage of the ISP, thoughts focus on identifying need for any additional information, considering time limit, diminishing the relevance of additional sources of information and increasing their redundancy. Cognitive factors such as these give rise to the feelings of satisfaction if the search has gone well or disappointment if it has not. The feelings include some relief, sometimes satisfaction, and sometimes disappointment. For a student preparing an essay, an indicative mood is preferable because it aids him or her to seek closure in preparation for presenting the information during the last stage of the ISP. (Kuhlthau, 2004, p. 50)

As the above characterization suggests, the final stage of the ISP tends to be fairly harmonious. Positively coloured cognitive factors predominate, giving rise to positive feelings, although the negative thoughts leading to experiences of disappointment are not necessarily excluded. Similar to stages 4 and 5, an indicative mood is preferred. Again, there seems to be implicit functionalistic ideas behind this assumption: practical necessities such as meeting an essay the deadline explains the preference for an indicative mood.

Kuhlthau´s empirical findings have confirmed the main assumptions of the ISP model about the nature and interplay of the affective and cognitive factors (for an overview, see Kuhlthau, 2004; Kuhlthau *et al*., 2008). These studies have focused on

learning and studying among students in particular. Hyldegård (2006; 2009) explored the applicability of the ISP model in the context of collaborative information seeking among university students. Her findings indicate that the affective experiences reported in collaborative contexts may differ depending on the nature of personal relationships within a work team, for example. Hyldegård showed that in the collaborative contexts, the feelings experienced by the students do not necessarily progress from the negative to the positive in ways predicted by Kuhlthau´s model because negative feelings were common at the final stages of the ISP. However, Hyldegård´s studies do not elaborate the picture of the interplay of the affective and cognitive factors because her findings concentrate on the nature of feelings experienced at the different stages of the ISP.

Social-Biological Information Technology model (Nahl)

Diane Nahl has significantly contributed to the study of the affective factors in information searching in particular. In the early 1990s, she developed a three-dimensional model of learning information structure (Nahl-Jakobovits and Nahl-Jakobovits, 1990). The model proposed that every information skill is constructed from affective, cognitive and sensorimotor (ACS) behaviours acting together as a unit within a hierarchical behavioral system. Later, the ideas of ACS behaviours were elaborated into a coherent Social-Biological Information Technology model (Nahl, 2007a; 2007c). For brevity, her model is henceforth referred to as the SBIT model, even though Nahl does not use this acronym in her writings. The development of the model is informed by ideas received from diverse theoretical sources, for example, studies on human-computer interaction, psychology, and cognitive science (Nahl, 2007c). Thus, different from Kuhlthau, Nahl´s model is not built upon particular theories.

The main goal of the SBIT model is to demonstrate how the cognitive and affective domains of humans are organically interdependent in processing and using information (Nahl, 2007c, p. 2023). Different from Kuhlthau´s model, the SBIT model draws on a taxonomic approach to information seeking and use. To this end, Nahl defines domains of affective, cognitive and sensorimotor behaviour. As a whole, these domains correspond to the three realms of the ISP model:

- affective domain (Nahl) – feelings, (mood) (Kuhlthau)
- cognitive domain (Nahl) – thoughts, (mood) (Kuhlthau)
- sensorimotor domain (Nahl) – actions (Kuhlthau).

The development of the taxonomic approach has been supported by a series of empirical studies focusing on affective and cognitive searching behaviour of the users of a full-text database (Nahl and Tenopir, 1996), as well as web searchers (Nahl, 2004) and Internet users (Nahl, 2005b). Due to its generic nature, however, the SBIT model is also relevant for the study of the affective and cognitive factors of information seeking and use. The model connects information behaviour to two particular biological functions of the human affective system: information reception and information use. Of these, information reception denotes the processes of information searching or seeking, including information encountered incidentally. The model demonstrates that information behavior consists of a continuous dynamic flow of individual biological procedures in an attempt to adapt and cope within a context

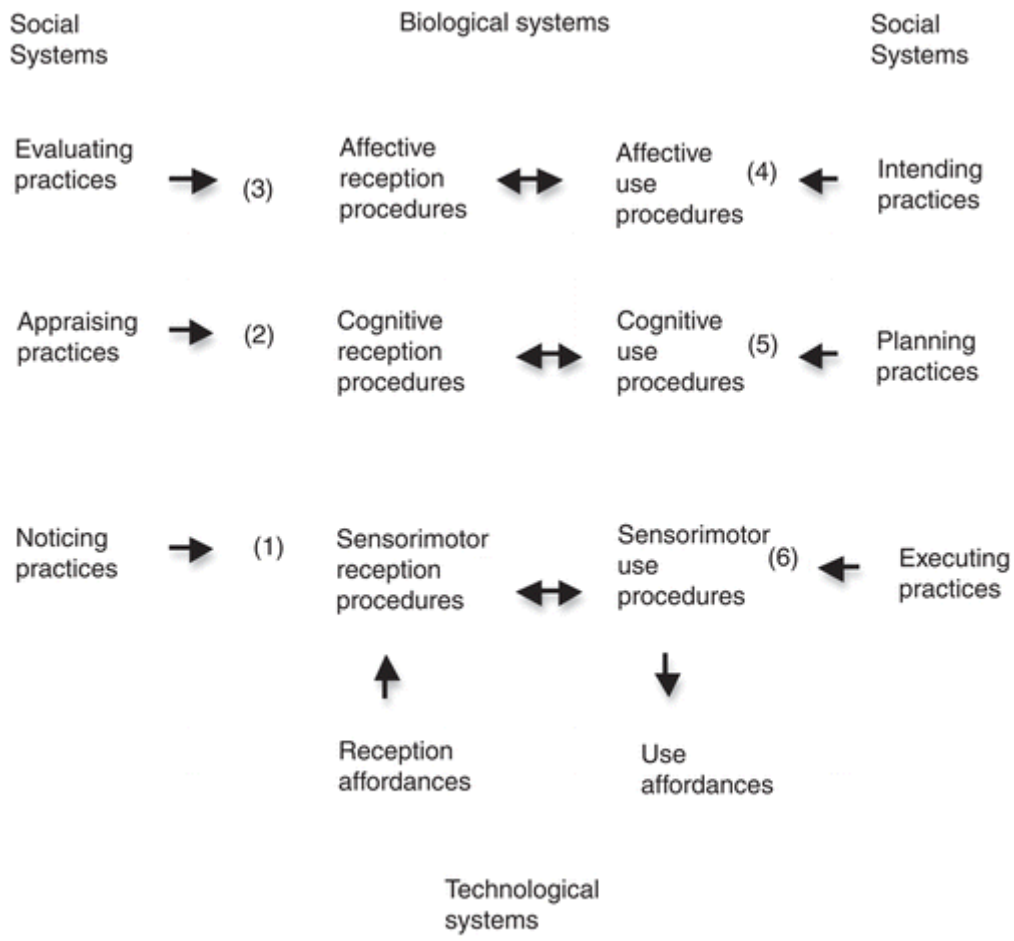
(Nahl, 2007a, pp. 3-4). To this end, individuals perform sensorimotor, cognitive and affective procedures.

The adjective of s*ocial* is used in the name of the SBIT model because of social settings, which culturally define the content of information, its normative evaluation or comparative frame of reference, and its relevance to group sanctioned norms and values (Nahl, 2007c, p. 2023). Further, the adjective of *biological* refers to biological organs, which are capable of interacting with technological devices through the sensorimotor system (eyes, hands, voice, and ears). Such organs can process information through the cognitive system (appraising or planning) that is under the direction of the affective system (evaluating and intending and striving to pursue goals) (Nahl, 2007c, p. 2023). Finally, *technology* denotes technological systems, which display information and receive commands from users through an interface that is engineered for symbiotic interactions with the user's biological capabilities. Of the three components of the framework, the biological system is fixed whereas the social and technological systems adapt to human biological capabilities.

The nature of affective and cognitive factors

Different from the ISP model, Nahl´s framework does not primarily approach the affective and cognitive factors in terms of individual categories such as feelings, mood and thoughts. Instead, Nahl prefers the terms *sensorimotor, cognitive* and *affective domains, subsystems* or *procedures*; sometimes the terminology is slightly confusing because the terms procedure, domain and subsystem are used interchangeably. Because the cognitive and affective subsystems are most relevant for the present study, they will be characterized in more detail below.

The cognitive subsystem functions to appraise incoming information by constructing meaning for it through performing analytic procedures such as providing a context for the information and associating it in memory, as well as expanding on its implications for goal planning (Nahl, 2007c, p. 2013). In particular, the cognitive subsystem is involved in understanding concepts (Nahl and Tenopir, 1996, p. 278). Interestingly, in this context, Nahl (2007c, p. 2023) refers to the main ideas of the appraisal theories suggesting that emotions are elicited by the individual's cognitive interpretation or assessment of perceived information about the environment. The affective subsystem deals with emotions and motivations, and it determines the consummatory value of the information first appraised by the cognitive subsystem. More specifically, the affective subsystem is involved in promoting the information seeker´s confidence and satisfaction. The affective subsystem also includes the continuous motivational energy provided by one's intent, goal, purpose, use, as well as the emotional dynamic features that determine the quality of the search process. The emotional features include perseverance, frustration, hope, disappointment, excitement, and disbelief, for example. The SBIT model is depicted in Figure 2. below.



Source: Adapted from Nahl (2007c), p. 2026

Figure 2. Social-biological information technology model.

Figure 2 depicts a slightly simplified version of the SBIT model. The original model was modified by taking out the technical codes referring to the individual components, for example, AR denoting "affective reception procedures". Figure 2 shows that the functions of information behaviour are performed by means of sensorimotor, cognitive and affective procedures in the context of social, biological and technological systems. Technological systems, for example, search engines provide information seekers with reception or use affordances. They enable access to information resources such as websites and make it possible to use them by means of browsers, for example. Because the present study focuses on the interplay between the affective and cognitive factors of information seeking and use, the technological features of "reception affordances" and "use affordances" are not discussed in greater detail. More importantly, Figure 2 identifies the three biological procedures of information reception or seeking with upward arrows (steps 1-3, left column) and the three biological procedures of information use with downward arrows (steps 4-6, right column). Thereby, Nahl specifies six consecutive phases of information behaviour. Finally, as the two-way arrows indicate, the information behaviours can interact at the levels of sensorimotor, cognitive and affective procedures constitutive of information seeking and use.

The interplay between affective and cognitive factors

We may first have a closer look at the procedures dealing with information reception or more broadly: information seeking. The SBIT model suggests that information-seeking behavior is composed of three sequential procedures: sensorimotor, cognitive and affective procedures (steps 1-3 in Figure 2 above) (Nahl, 2007a, pp. 5-6; Nahl, 2007c, p. 2031). First, the sensorimotor system transforms the complex physical signal into a coherent and recognizable sensation that we may call "noticing something": once we have noticed some information, we immediately strive to make sense of it (step 1). Second, by means of a cognitive procedure, the information thus noticed is evaluated in order to understand it (step 2). This activity is referred to as "appraising" the incoming information. This assumption concurs with the main ideas of the nature of the appraisal process presented by appraisal theorists (Ellsworth and Scherer, 2003, pp. 573-575).

When the cognitive appraisal of information is completed, the meaning is assigned to the information, including its context or implications. The third step incorporates the affective evaluation of the information. According to Nahl (2007c. p. 2027), biological adaptation to the information environment requires a built-in connection between cognitive procedures that count as appraising, and affective procedures that count as evaluation. Transition from step 2 to step 3 indicates the point at which the interplay between the cognitive and affective factors in information seeking takes place. At step 3, evaluation is conducted through an affective procedure: the affective system allows the evaluative consummation of the information appraised cognitively. The consummatory feelings and emotions that people attach to information constitute the end point of information reception (or information seeking).

Importantly, regarding the interplay of the affective and cognitive factors, the SBIT model suggests that the cognitive domain is functionally dependent on the affective although the cognitive appraisal precedes the affective evaluation of information. The affective procedures prioritize and select from among the cognitive alternatives available. Nahl (2007b, p. 328) assumes that the cognitive procedures involved in appraising information are spontaneously followed by the affective procedures that we experience as an emotional reaction or value judgments. Moreover, all affective valuing of information performed by means of affective reception procedures occur on bi-polar scales such as good – bad, too much – too little, fun – boring, relevant - not relevant, useful - not useful, and balanced –biased. In addition, the degree of intensity can be indicated in such evaluation, for example, very satisfied – somewhat satisfied (Nahl, 2007c, pp. 2027-2028). Positive reception-feelings such as "useful" influence on the acceptance of a source of information. In contrast, the negative feelings, for example, "too much" indicate reactions to uncertainty (Nahl, 2005b).

Once the affective value is attached to the information (e.g., feeling of satisfaction or frustration), the reception or information seeking process is complete, and the information use process can begin (step 4). In reality, information use continues "steplessly" from which information seeking ends but analytically, individual steps can be identified. The transition from step 3 to step 4 is facilitated because both the information seeking as well as the information use procedures are based on affective evaluation. In the initial phase of information use (step 4), the affective evaluation is directed by an individual´s goal-feelings and intentions; therefore, this phase is termed as "intending practices" (Nahl, 2007c, p. 2028). The

main evaluations focus is on issues such as whether the individual is definitely going to do something with a particular source of information that was evaluated at step 3. He or she may consider, for example, that this information "leaves me cold," or "I can't stay away from it". (Nahl, 2007c, p. 2028)

Goal-feelings initiate and direct the next phase of information use (step 5) termed as "cognitive use". Analogous to information seeking procedures at steps 2 and 3, the transition from step 4 to step 5 indicates the point at which the interplay between the cognitive and affective factors in information use takes place. According to Nahl (2007c, p. 2028), cognitive use is based on "planning practices" because it tends to follow learned patterns of reasoning that are given coherence and direction by the goal-feeling. For instance, people may plan a search query by thinking of words they know that fall within the desired or intended topic. The sequence of planning thoughts (cognitive factor) is constrained by the affective factor, that is, goal-feeling of what the person wants, what the person intends that thinking will accomplish. Cognitive use of information may take place in the context of problem solving, for example. If the goal-feeling is inhibited by a competing goal-feeling, then problem solving stops or changes direction to align with the new goal-intention. When the goal-feeling changes, planning is modified accordingly; when the goal-intention stops, planning ceases. Finally, in information use, there are performing practices (step 6). They refer to performing sensorimotor procedures, for example, keyboarding a sentence that summarizes the main idea of information source accessed during steps 4 and 5.

Nahl (2005a) also characterizes the interplay between affective and cognitive factors in the context of affective load theory (ALT). This theory may be conceived as a component of the SBIT model that is particularly relevant to the second and third phases of information seeking (Nahl, 2007a, p. 16). ALT draws on the idea that cognitive processes cannot operate independently of affective procedures. For a cognitive operation to occur, it must be in interaction with an affective procedure, which provides the energy, motive, and regulation for carrying out the cognitive operation (Nahl, 2007c, p. 2030). The notion of "load" refers to biological limitations to ecological adaptation and coping needed for the reception of incoming information. Affective load is operationally defined as uncertainty multiplied by felt time pressure (Nahl, 2005a, p. 41). Uncertainty is defined as the combined degrees of irritation, frustration, anxiety, and rage.

According to Nahl (2005a, p. 41), affective load is high when people operate with ineffective cognitive behaviours. For example, cognitive ambiguity, uncertainty, or information overload attract affective behaviors that are negative and counter-productive to the searcher´s goal. Nahl's (2007b) empirical study demonstrates that successful information behavior depends on counterbalancing procedures to regulate the negative and positive affective forces operating on individuals in information intense environments.

ALT also proposes that all information behavior involves affective states that provide specific goal-directionality and motivation to support cognitive activity (Nahl, 2005a, pp. 40-41). More specifically, affective behavior initiates, maintains and terminates cognitive behaviour. The interplay between these factors manifests itself, for example, in cases in which searchers lose the motivation to continue a task; they begin thinking about something else, or they unexpectedly find some new information they want, they switch activity midstream. The new affective behavior interrupts and takes over the ongoing activity and continues in a new direction with a new cognitive activity.

The contextual features of such behaviours are manifested in that affective coping strategies draw on learned cultural habits; they can be termed *learned affective norms* (LANs) (Nahl, 2005a, pp. 41-42). Negative LANs disrupt cognitive strategies, interrupt the search and often terminate it prematurely, while positive LANs provide persistence and integration to cognitive strategies. Interestingly, the construct of positive LAN has some similarities with Kuhlthau´s concept of indicative mood in that both factors serve the ends of strengthening the focus of information seeking. However, indicative mood also parallels with negative LANs since both factors may prompt premature termination of information seeking. All in all, Nahl (2005a, pp. 41-42) has defined negative LANs very broadly since they are assumed to increase affective load and appear in numerous forms such as uncertainty, anxiety, frustration, pessimism and low self-efficacy.

Discussion

So far, Kuhlthau and Nahl have developed the most sophisticated conceptualizations of the interplay of affective and cognitive factors in information seeking and use. As they draw on different theoretical traditions, their models approach the affective and cognitive factors as well as their interplay differently. The models have been developed independently since the early 1990s. Interestingly, there are no references to the SBIT model in Kuhlthau´s studies. Nahl refers to Kuhlthau´s (2004) book Seeking Meaning, but just in passing by noting that in her model, as well as Kuhlthau´s approach, "cognitive uncertainty … frequently accompanies particular phases of information seeking" (Nahl, 2007a, p. 26).

Kuhlthau draws heavily on the psychological theories "borrowed" from Kelly and Bruner. From the viewpoint of current theories on cognition and emotion, Kuhlthau´s theoretical sources are fairly traditional. On the other hand, they have been used very systematically in the development of the ISP model. Remaining faithful to Kelly´s and Bruner´s ideas, Kuhlthau approaches the cognitive and affective factors as integral constituents of the six-stage information search process. Nahl´s model is less dependent on individual theories. By combining ideas obtained from diverse fields such as psychology, cognitive science and human-computer interaction Nahl has developed a taxonomic viewpoint to information behavior. In the SBIT model, the affective and cognitive factors are defined as components of a biologically determined process that serves the functions of adaptation to information ecology. Nahl´s model specifies the nature of the affective and cognitive factors within a six-step process of information seeking and use typically taking place in the context of a search session. The ISP model approaches information seeking and use as a process whose six stages are spread into a longer period of time. In addition, different from the SBIT model, the seeking and use of information is not confined to sources that are accessible through information technological tools only.

Table 1 below summarizes the main findings of the present study and compares the main features of the ISP and SBIT models.

	ISP (Kuhlthau)	SBIT (Nahl)
Affective factors	"Symptoms" caused by cognitive factors, manifesting themselves in negative and positive feelings such as anxiety, apprehension, doubt, relief and satisfaction Mood (an affective-cognitive factor), defined as an attitude or stance towards a task, allows the broadening or narrowing the range of possibilities in the definition of the topic and selection of information sources Feelings and mood are specific of an individual stage of the ISP	Defined in terms of affective domain, subsystem or procedure serving the function of affective evaluation of information Appear in the last phase of information seeking and in the first phase of information use Affective feelings on bi-polar scale used in the evaluation of information, for example, good – bad, too much – too little, and balanced – biased
Cognitive factors	Thoughts related to the task at hand Choices made on the basis of invitational or indicative mood Thoughts and choices are specific of an individual stage of the ISP	Defined in terms of cognitive domain, subsystem or procedure serving the function of cognitive appraisal of information Appear in the second phase of information seeking and in the second phase of information use
The interplay of affective and cognitive factors	Cognitive uncertainty causes negative feelings Positive cognitive factors (thoughts) parallel with positive feelings Negative cognitive factors (thoughts) are associated with negative feelings Mood (invitational or indicative) defines the range within which the choices are made	Cognitive appraisal precedes the affective evaluation of information in information seeking, while in the context of information use, the order is reversed For a cognitive appraisal to occur, it must be in interaction with an affective procedure, which provides the energy, motive, and regulation for carrying out the cognitive operation Learned affective norms integrate or disrupt the cognitive strategies in information seeking and use

Table 1. The comparison of ISP model and SBIT model.

Table 1 highlights the differences between the ISP and SBIT models with regard to the conceptualization of the affective and cognitive factors, as well as their interplay. However, there are a few similarities as well. Occasionally, in both models, the affective and cognitive factors are characterized in the context of a process with six stages or steps. On the other hand, Nahl explicitly differentiates between the steps of information seeking and use, while Kuhlthau discusses the issues of information use only implicitly at stages 4 and 6 of the ISP. Further, in both models, affective factors are characterized by referring to feelings or emotions such as uncertainty. Finally, common to both models is that they characterize the cognitive factors in lesser detail than the affective ones. Nahl employs the terms "cognitive reception procedures" and "cognitive use procedures". In the ISP model, the cognitive factors are generally referred to as "thoughts"; in addition, mood can partially be regarded as a cognitive category.

However, there are major differences in the definition of the affective and cognitive factors, as well as their interplay. Kuhlthau approaches the above factors as individual entities (feelings, thoughts, and mood). Their interplay is approached in three major ways. First, cognitive uncertainty is assumed to cause negative feelings. Second, loose causality is assumed in cases in which positive thoughts are parallel with positive, as thoughts become more focused at the later stages of the ISP. Third, in the case of an associative relationship, negative cognitive

and negative affective factors appear together but the former do not bring about the latter. Nahl characterizes feelings (and emotions) in the context of the performance of affective procedures. Feelings and emotions are factors by which information sources are evaluated as balanced or biased, for example. In Nahl´s model, however, no assumption is made on the progression of the feelings or emotions. This is because the affective evaluation of an individual information source is performed on a bi-polar scale, for example, balanced – biased.

The models also differ in that Nahl emphasizes more strongly the energizing role of the affective factors with regard to the cognitive ones. It is assumed that cognitive reception and use procedures only occur in interaction with the affective procedures, which provide the energy, motive, and regulation for carrying out the cognitive procedures. In the ISP model, no such priority is given to the affective factors. In fact, cognitive factors (thoughts) and affective-cognitive factors (mood) occupy the leading roles. Thoughts causing or giving rise to feelings and mood define the range within which the choices are made at various stages of information seeking and use. Nahl does not use the category of mood; to some extent, however, learned affective norms (LANs) - positive or negative - are assumed to serve similar functions as factors that integrate or disrupt the cognitive strategies in information seeking and use.

In the conceptualization of the interplay between the affective and cognitive factors Kuhlthau and Nahl depart from the assumption that these factors more or less seamlessly conjoined (Lazarus, 1999, pp. 10-11). In Nahl´s model, the above factors presuppose each other and are concatenated as integral constituents of information seeking (cognitive, step 2 and affective, step 3), as well as components of information use (affective, step 4 and cognitive, step 5). In Kuhlthau´s model, each stage incorporates both affective and cognitive factors; their interplay is primarily conceptualized within individual stages, not between steps as in Nahl´s model.

Conclusion

Kuhlthau´s and Nahl´s models provide pioneering approaches to the interplay of the affective and cognitive factors in information seeking and use. The models complement each other in that the ISP model is more applicable while examining the interplay in the context of an ongoing task process within a longer period of time. The SBIT model may capture better the features of the interplay occurring in an individual situation of information seeking and use.

Since the present study focused on two models only, there is a need to elaborate the conceptual issues by examining in greater depth how the interaction of the affective and cognitive factors is approached in other fields such as cognitive psychology and within the appraisal theories, for example (Moors *et al*., 2013). It is apparent that the findings of studies such as these can be applied in the development of holistic conceptualizations of information behaviour, too.

Further, it would be particularly useful – though highly demanding – to test such conceptualizations empirically to capture the dynamics involved in the interplay of cognitive and affective factors in real-life situations of information seeking and use. In particular, the SBIT could be enhanced in this way. The ISP model has already progressed somewhat farther in this regard. Kuhlthau's empirical findings indicate that the interplay between cognitive and affective components depends on contextual factors such as the requirements of a research assignment at hand, time allotted to the information seeking and the information available

(Kuhlthau, 1991, p. 363; Kuhlthau, 2004, pp. 195-199). For example, at stage 2 of the ISP, the weighing of alternative topics against project requirements (cognitive factor) may be associated with a higher level of anxiety (affective factor) if the time frame of the project is very narrow (contextual factor). Interestingly, however, similar ideas are incorporated in Nahl´s (2005a) Affective Load Theory proposing that time pressure influences how strongly the affective and cognitive load is experienced. Importantly, these assumptions imply that the picture of the interplay of cognitive and affective factors can be elaborated best by examining how such an interplay occurs in specific contexts of information seeking and use.

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