

“I’m Feeling Lucky” : The Role of Emotions in Seeking Information on the Web

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Workshop Topics

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INTRODUCTION

Absent from current web design theory and practice is a pattern for emotive criticism. This article outlines a framework for understanding users’ emotional states as they seek information on the web. It is inspired largely by Carol Kuhlthau’s (1991, 1993, 1999) work in library services, which is adapted to web-based search systems.

Cognitive Paradigms

Established disciplines influencing the design of web-based search systems, such as HCI, ergonomics, or information and library science, traditionally take a rational, analytic approach to understanding users and to designing interfaces. For instance, the notion of search relevance in information retrieval is generally measured in terms of effectiveness (Saracevic, 1996). Another example is the GOMS approach to interface analysis and design. Emotions are a blind spot in such formal disciplines.

Not surprisingly, approaches in contemporary web design are also cognitive in nature, focusing on practicality and utilitarian benefits. This risks neglecting aesthetics and emotions when designing web-based search and navigation systems. For example, the concept of “findability” (Morville, 2002) is centered on the rational task of locating information. Further, a widespread belief of “usability at all costs” has created a tension between aesthetics and usability (see Cloninger, 2000).

Research in psychology and neuroscience, though, reveals a tight connection between affect and cognition: emotions are essential in human thought (see Goleman, 1996 and Wong, 2001). With this knowledge, people can no longer be modeled as purely goal-driven, task-solving agents: they also have affective motivations for their choices and behavior, which can drive rational decision making. This implies an extended mandate for search interface design that includes affective considerations.

New Directions

Don Norman has recently investigated the role of affect on design. He concludes “aesthetics matter: attractive things work better” (Norman, 2002). Others have also called for more holistic perspectives of usability (Dillon, 2001; Carroll & Thomas, 1988; Hassenzahl et al., 2001) and

information seeking (Kuhlthau, 1991). There seems to be an increasing recognition of the role of emotions in search design.

INFORMATION SEEKING

Information seeking on the web is an emotional experience. Unfortunately, confusion and uncertainty tend to dominate feelings of enthusiasm and optimism. In general, people seeking information on the web have difficulty, particularly early in a search (Sullivan, 2000).

Many studies in information seeking behavior take a staged approach to explaining the search process. A seminal work is Ellis’ (1989) model of information seeking. Marchionini (1995) proposes a similar model of the information-seeking process in electronic environments. Others show how such models apply to the web (Choo, Detlor & Turnbull, 2000; Kalbach, 2000).

Kuhlthau (1993) takes a more holistic approach to explaining information seeking, including affective considerations. Influenced by Kelly’s (1963) personal construct theory, she views searching as a constructive process on three levels: actions, thoughts, and feelings.

From her research, Kuhlthau observed a “dip” in user confidence after a search has begun. This contradicts the assumption that confidence steadily increases from the beginning of a search to its end. A seeker “in the dip” can experience uncertainty, confusion, and anxiety until a focus is formed or a search is broken off.

Table 1: Summary of Kuhlthau’s ISP:

Search Stage Goal	Feelings	Thoughts	Actions
1. <i>Initiation</i> - Recognize need	Uncertainty, apprehension	Vague	Seeking background information/ starting
2. <i>Selection</i> - Identify sources	Optimism	General	
3. <i>Exploration</i> - Investigate topic	Confusion, frustration, doubt	More specific, but mixed	Seeking relevant information
4. <i>Formulation</i> - Formulate a focus	Clarity	Narrowed, clearer	
5. <i>Collection</i> - Gather information	Sense of direction, confidence	Increased interest	Seeking more focused information
6. <i>Presentation</i> - Complete search	Satisfaction, or disappointment	Clear and very focused	

Kuhlthau's major findings can be summarized as follows:

- Information seeking is holistic process.
- Acquiring more information can increase uncertainty.
- A gap exists between users' natural information use and search design: systems often assume certainty and order, whereas users' problems are characterized by uncertainty and confusion.

Uncertainty and Complexity

Kuhlthau's (1993) proposes uncertainty as a principle for information seeking:

"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 problem. 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" (Kuhlthau, 1993, p. 111).

Complex search situations are associated with uncertainty. However, it is the *perception* of complexity, rather than the actual objective complexity of a task, that causes feelings of uncertainty (Kuhlthau, 1999). Recently, Wilson et al. (2002) found that the Uncertainty Principle indeed serves as a useful variable in understanding information-seeking behavior.

Example 1: Uncertainty in Breadth vs. Depth

Most breadth vs. depth studies test symmetrical structures, for example 4x4x4 (e.g. Snowberry et al. 1983). In comparing irregular shapes, however, others have found that the concave structures (e.g. 8x2x2x8) perform best (Norman & Chin, 1988; Bernard, 2002). Bernard (2002) shows that 4x4x4x4 structures perform not only worse than asymmetrical shapes of the same depth (e.g. the concave 6x2x2x12) but also worse than deeper concave structures (e.g. 3x2x2x2x12). He concludes that the performance of the structures is determined in part by the perceived complexity and information uncertainty.

A concave structure indeed seems to match a decrease in certainty users often experience when seeking information: The level of a concave structure provides orientation without overwhelming. The middle levels are restricted in breadth, thus reducing uncertainty and feelings of doubt. The broader, bottom level of a concave structure, however, provides a sense of "arrival" as the seeker gains confidence again. As Bernard (2002) writes, "at the terminal level, broad menus reduce the information uncertainty." The performance of varying hypertext shapes, then, is in part explained by perceived complexity and uncertainty.

AFFECTIVE SEARCH DESIGN

The ISP framework presented here makes the following assumptions:

- Information seeking on the web can be characterized by a staged process.
- An ISP in web-searching environments can be viewed on different scales: from a very narrow perspective, for a single search session, for example, or for broader search situations over time.
- Reducing uncertainty and complexity at key points in the search process can improve the overall experience.
- Affective considerations are critical to evaluating and developing search interfaces on the web.

The ISP Framework

Kuhlthau's ISP serves as the basis for a framework for search interface design. There are five basic steps to arriving at an ISP for a given situation.

1. *Users* - The first step is defining the users of a given system. Here a scenario approach similar to Alan Cooper's concept of *personae* (see Cooper, 1999) is helpful.

2. *Information Seeking Process* - Established behaviors and stages, as outlined above, serve as a starting point for identifying specific scenarios of use, but they must be adapted to the given situation.

3. *Common Feelings, Thoughts, Actions* - Once the basic stages of an interaction process are identified, typical user feelings, thoughts, and actions should be determined.

4. *Uncertainty and Complexity* - Once a model of the search process is created, an examination of uncertainty and perceived complexity should be made.

5. *User Requirements* - These are not necessarily system requirements or features, rather they are high-level needs. The goal is to summarize each stage with a user need that encompasses emotions, thoughts, and actions.

Mapping To Features and Goals - Finally, specific features, business goals, and other project requirements can be mapped back to the ISP.

Example 2: Evaluation Search Results

The ISP framework can be used to evaluate search engine results. In this example, we will assume an intermediate web user with about three years of online experience. She is not an information worker professionally, but goes online daily. She has access to the Web at the office and sometimes uses Email and the Web for her work. She also has online access at home and typically uses the Web for news, shopping, online banking and travel arrangements.

Below is a hypothetical, but typical, model of the user's interaction with on-site search engines.

Table 2: Example ISP for Site Search

Search Stage and Goal	Feelings	Thoughts	Actions	Requirements
1. <i>Initiation</i> – Recognize problem or gap	Uncertainty, apprehension	Vague, unclear	Identify problem and solving strategies	Reflection time
2. <i>Selection</i> – Choose a search engine	Optimism, trust	General, task oriented	Locate starting point; Typing URL	Reliability; accuracy
3. <i>Search</i> – Formulate query and submit	Anticipation, “I’m feeling lucky”	Thinking ahead to solution	Type search string, Click “GO”	Ease of use
4. <i>Differentiation</i> – Prioritize search results	Uncertainty, confusion, feeling overwhelmed	Unclear, mixed	Scan and prioritize results	Guidance, reduced complexity
5. <i>Deciding</i> – Determine which results are most relevant	Clarity, confidence, sense of direction	Narrowed, clearer, Increased interest	Select resource (click on link)	Help selecting
6. <i>Extract</i> – Read or use information	Relief, , or disappointment	Clearer, focused	Read, download, print	Usable, readable formats

Feelings of optimism before clicking the “GO” button (“I’m feeling lucky”) give way to confusion and feelings of being overwhelmed once the results are displayed.

In the first example (Fig. 1 – www.intelihealth.com), the results page retains all navigation elements and even animated banner advertisements. The results list itself is afforded only a small percentage of the screen. Result are also separated into hits within site topics and hits directly from page content, which not clear initially. The accompanying link “go to document results” is also unclear: this *is* the results page. The perceived complexity is high, leading to feelings of being overwhelmed.

The second example is from BBC (Fig. 2 – www.bbc.co.uk). The initial impression is one of simplicity. Redundancy (repeating search term) maintains confidence and a simple results list contains only crucial information. Our user has positive feelings, as well as an increased interest to further explore.

A key feature is the “BBCi Best link.” This is referred to as a manual recommendation, where human-selected hits are matched to the search string, if possible, and are displayed at the top of the list. Microsoft is reported to have innovated this technique with their “Best Bet” links (see www.microsoft.com). Manual recommendations are a good design solution because they potentially reduce uncertainty. The BBC site, however, improves Microsoft’s solution in two respects. First, manual recommendations on the BBC site are not visually separated from the rest of the results, thus reducing complexity. Second, the terminology is more direct: a “bet,” as Microsoft refers to it, was already made with the user’s initial query. Our user does not want to “bet” again here, but rather expects

answers. The term “BBCi Best link” better matches this expectation and provides a comfortable safety net.

Overall, the BBC search results page conveys a feeling of confidence, trust, and security. It seems to have answered questions while offering needed guidance. This can help overcome secondary feelings of uncertainty after a search has begun. In the end, the overall search experience is improved, not only on a behavioral or cognitive level, but also when emotions are taken into consideration.

Example 3: Designing a Career Portal

In this scenario, an online job portal for a large insurance company is to be relaunched. This is a separate website where vacant positions and career-related information are posted. Compounding the objective of expanding the current job portal is the company’s poor image. The company is perceived as old fashioned and “stuffy,” thereby reducing its ability to draw applicants. Therefore, a key goal is to attract better qualified applicants.

Table 3 (below) shows the ISP for the main target group of the site. It not only gathers findings from user research, it also galvanizes a common user-centered perspective for the design team. It shows a typical pattern for finding information on the site while taking affective considerations into account. A key observation is a secondary peak of uncertainty while searching for an open position and a possible tertiary period of uncertainty when applying for a job. A coordination of the search phases with the design features of the site is likely to increase the chance of reaching the original business goals.

CONCLUSION

Three aspects the ISP framework as presented here are important to the design of search solutions on the web:

- Scenarios of use are best understood and documented as a holistic search process.
- Uncertainty and complexity are introduced as heuristics in evaluating and creating search interfaces.
- Emotions should be addressed by interface design.

Advantages of the framework are as follows:

- The framework is user-centered.
- An ISP for a given situation enjoys longevity.
- This framework addresses the entire information seeking experience.
- The framework is flexible and can scale up or down.
- This model ties user needs to design goals, which can be mapped to other relevant objectives.

Future areas of investigation include the following:

- A deeper understanding of the relevance of affective considerations in information seeking is needed.
- Research should demonstrate that the ISP and the Uncertainty Principle apply to web searching
- Viewing an interface as an intermediary, specific zones of intervention need to be identified.

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Figure 1: Search results for “emotions” from IntelliHealth (<http://www.intelihealth.com>)

Two animated banners add to complexity and nervousness of the page.

These results are difficult to recognize as such at first and the page conveys a sense of complexity and tension. This page is unnecessarily overwhelming.

Advertisement: Do I need a genetic test?

Featuring HARVARD MEDICAL SCHOOL'S Consumer Health Information

02/22/03

Entire Site | emotions | Search

Home	Diseases & Conditions	Healthy Lifestyle	Your Health	Look It Up
<ul style="list-style-type: none"> Top Health Catalog Virtual Health Drug Resource Center Ask The Expert Interactive Tools Immunities/Chats Today's News InteliHealth Policies 	<ul style="list-style-type: none"> Addiction Allergy Alzheimer's Disease Anemia Arthritis Asthma 	<ul style="list-style-type: none"> Complementary & Alternative Medicine Fitness Nutrition Weight Management Workplace Health 	<ul style="list-style-type: none"> Children's Health Men's Health Seniors' Health Teens' Health Women's Health More 	<ul style="list-style-type: none"> Symptom Scout Medical Dictionary Tests & Procedures Health A-Z Drug Resource Center More

Check out our FREE Health E-MAILS >>

The prominence of the complete site navigation detract from the actual search results.

Unclear functions increase uncertainty.

Advertisement: Do I need a genetic test?

Search term(s): emotions
The term "emotions" occurs 2 times in 2 topics. [Go to document results](#)

Advice For New Moms
With all the emotions and excitement after your baby's birth, you may be feeling a little overwhelmed.
[Pregnancy Guide -> Caring For Children](#)
[Caregiving -> Basics](#)

A Parent's Guide: What To Do If... You Think Your Child Is Using Drugs.
The belief that a child is using drugs leads to a host of emotions for a parent. Most experts agree that parents shouldn't blame themselves. Drug use cuts across all economic, social and educational backgrounds.
[NVSUBSTANCEUSE.C18MF](#)
[Recycle Bin -> Drugs and Medications](#)

Search term(s): emotions | Documents: 1 to 25 listed. **Next 25 results**
The term "emotions" occurs 74 times in 53 pages.

It is not obvious why search results are broken up into two groups (one for topics, one for page content). This adds to complexity and uncertainty.

The actual results are afforded only a small portion of the page. This screenshot was taken from a monitor with a resolution of 1024x768. At 800x600 only the first result is initially visible without scrolling

Figure 2: Search results for emotions from BBC online (<http://www.bbc.co.uk>)

The image shows a screenshot of the BBC website's search results page for the query "emotions". The page features a navigation bar with categories like TV, RADIO, and COMMUNICATE. Below the navigation bar is a search input field containing "emotions" and a "SEARCH" button. The results are displayed in a yellow background area, starting with "Your 6,470 search results for 'emotions'". The first result is "Emotional Health homepage" with a "BBCi Best Link" indicator. The second result is "Radio 4 - Emotional Rollercoaster" also with a "BBCi Best Link" indicator. Below these are news snippets from BBC News and Sci/Tech. Annotations in white boxes with black borders point to specific elements: one points to the search bar area, another to the "BBCi Best Link" indicator, and others to the text of the search results.

These search results are clear and simple, and they provide all relevant information and options. Interest in continuing to seek is increased.

Redundancy (repetition) of search term adds to a sense of security.

Search domain is extremely clear.

The language used conveys a sense of "questions answered."
"Your search ... results" is direct and unambiguous. The term "BBC Best Link" also addresses uncertainty

Clear, meaningful hit list with only relevant information

Only a subtle bold headline and the "BBC Best Link" indicator separates manual recommendations from the rest of the results. Manual recommendations can be comforting and offer a sense of security to an uncertain user.

Table 3: Example search process for using a career portal

Search Stage and Goal	Feelings	Thoughts	Actions	Requirements	Possible Features	Business Goals
1. <i>Initiation</i> – Recognize need to seek a job	Uncertainty, apprehension	Vague, unclear	Identifying problem and solving strategies (internalized)	Call to action; Confirmation	<ul style="list-style-type: none"> On- and off-line campaign to raise awareness and improve image 	Raise awareness of the company for job seekers
2. <i>Selection</i> – Choose appropriate resources	Curiosity, impatience; Skepticism	General, task oriented, open to new ideas	Locate starting point; Typing URL; Using web search engine; Using online job search services	Starting Point; Credibility	<ul style="list-style-type: none"> High-quality, professional graphic design “We are looking for...” message 	Attract highly-qualified job seekers
3. <i>Searching</i> – Locate relevant vacancies	Anticipation, optimism	Positive, thinking ahead to finding a job	Entering query or navigating job listings	Overview; Orientation	<ul style="list-style-type: none"> Filtered searching Ability to browse vacancies Faceted navigation Search by target group (employee type) 	Make job openings publicly available over on the web
4. <i>Differentiation</i> – Prioritize search results	Uncertainty, confusion, feeling overwhelmed	Unclear, mixed	Scanning results; Prioritizing	Possibilities; Reduced complexity	<ul style="list-style-type: none"> Uncomplicated search results “Shopping cart” for relevant openings 	
5. <i>Deciding</i> – Determine which positions are most relevant	Feelings of clarity, confidence, sense of direction; Satisfaction or dissatisfaction	Narrowed, Increased interest and understanding	Making a decision	Guidance; Trust in the company	<ul style="list-style-type: none"> Job descriptions Ability to sort by certain criteria Facts, figures about company Employee profiles and case studies Attractive, engaging visual design Day at the office, photos of office, work hours City and local information Self-assessment tool 	Gain trust of potential applicants
6. <i>Monitor</i> – Check status/ availability of positions over time	Hope, feelings of attachment	Remembering details	Visit site again	Reminder services	<ul style="list-style-type: none"> News Saved job list Show new jobs since last visit Memorable URLs Bookmarkable pages Newsletter Contact information 	Develop relationship with potential future employees
7. <i>Action</i> – Apply for a job	Relief, nervousness	Clear, focused on completing tasks accurately	Reading or extracting information; Filling out forms online or offline; Collecting necessary personal data	Time; Privacy and discretion;	<ul style="list-style-type: none"> Online and offline application Downloadable application form Information about the interview Login and profile (save application) Downloads and print-friendly pages 	Get highly-qualified applicants