

The Information Flaneur: A Fresh Look at Information Seeking

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ABSTRACT

We introduce the information flaneur as a new human-centred view on information seeking that is grounded in interdisciplinary research. We use the metaphor of the urban flaneur making sense of a city as an inspiring lens that brings together diverse perspectives. These perspectives shift information seeking towards a more optimistic outlook: the information flaneur represents curious, creative, and critical information seeking. The resulting information-seeking model conceptualizes the interrelated nature between information activities and experiences as a continuum between horizontal exploration and vertical immersion. Motivated by enabling technological trends and inspired by the information flaneur, we present explorability as a new guiding principle for design and raise research challenges regarding the representation of information abstractions and details.

Author Keywords

Information seeking, human-computer interaction, flaneur.

ACM Classification Keywords

H.5.2 Information Interfaces and Presentation: Miscellaneous

General Terms

Design, Human Factors.

INTRODUCTION

The World Wide Web has stimulated social and technological transformations that are arguably comparable to those from the invention of the printing press. Both inventions have triggered strikingly similar reactions. Scholars of that historical era were worried about keeping up with the rapid publication of books, yet were also intrigued by growing information access [45]. Today's overabundance of digital information—as exemplified by our email inboxes, news feeds, and web search results—can be viewed similarly, as both overwhelming information overload and fascinating information access. This issue is triggering research across a wide variety of fields such as cognitive science, psychology, library information science, human-computer interaction, and information visualization.

In this paper, we draw upon this wealth of related research to conceptualize a new approach to information seeking. While our paper is philosophical in flavour, many of the ideas are well-grounded in prior inter-disciplinary research, which we highlight and quote throughout the paper. We also argue that many of the trends in the Web today, including increased browser functionality, enriched media formats, semantic data, and user mobility, provide the enabling technologies for a fresh approach to information seeking, particularly one that better utilizes human perceptual and cognitive skills.

Information seeking research strives for a human-centred understanding of the search process [4, 14, 35, 48, 63]. However, even though information seeking research is intentionally focused on the human aspects, they are typically contextualized along tasks—considering utilitarian goals of overcoming information needs, knowledge gaps, uncertainty, and problems [5, 14, 35, 48]. Despite the use of casual terms like 'surfing', traditional information seeking is predominantly a 'serious' endeavour, where factors such as accuracy and efficiency are crucial. Besides a few studies [21, 46], 'casual' perspectives that incorporate play and pleasure, for example, are rarely considered in information seeking research.

Research on everyday [40, 48], serendipitous [18, 46, 62], and exploratory [39, 61] information seeking suggests that it is time to go beyond keyword search and '10 blue links' [7]. To make this shift, a holistic and positive perspective on information seeking is needed that brings together the mind, heart, senses, and soul of the information seeker. Recent work on aesthetics in human-computer interaction [57] and visualization [44] provides such a perspective, highlighting experience, imagination, and reflection as important factors in interface design. We aim to explore these experience-based considerations in the context of information seeking.

In this work, we introduce the *information flaneur* as a new way of thinking about information seeking. The information flaneur is informed by three human-centred perspectives and inspired by the literary figure of the urban flaneur. The human-centred perspectives provide established insights about cognitive, perceptual, and affective aspects of information seeking. The flaneur is an urban wanderer, who leisurely walks through streets and squares interpreting and re-imagining the city [6]. Following the flaneur's attitude toward the city, the information flaneur sees beauty and meaning in growing information spaces. By envisioning the information flaneur as a curious, creative, and critical persona, we promote a shift from negative concepts such as needs and problems towards positive information experiences [30].

As concrete examples, consider reading news, following microblogs, and exploring a library catalog. How could interfaces be designed to support open-ended and enjoyable interaction with overviews of entire information spaces and details of particular resources? The information flaneur provides a vision to design such interfaces. We formulate a model for information seeking that conceptualizes interaction with information spaces at varying levels of exploration and immersion. Motivated by enabling technological trends and inspired by the information flaneur, we present explorability as a new guiding principle for design and raise research challenges regarding information abstraction and detail.

PREMISES

We first outline three basic premises that guide this work. Since information spaces form the backdrop of many human activities today they have a dual complexity, concerning both their technical realization and their social adoption. On the one hand, growing information spaces raise technological challenges around scale, heterogeneity, and dynamics that are driving many innovations in computer science. On the other hand, growing information spaces imply a social complexity with regard to communities and their representation, which is typically addressed in the humanities and social sciences. This dual nature between technical challenges and social implications is seldom considered in concert. For example, search can be seen as an engineering challenge to optimize precision and recall, yet it is important to realize that rankings can also have embedded values with social or political ramifications [23]. Following from this, we posit that *information spaces and their interfaces are not inevitable technical solutions, but cultural artefacts that need to be open for reflection, critique, and appropriation.*

To develop a holistic view of information seeking, we take aesthetics as an analytical basis. While there is no universal definition, a literature survey of aesthetics in computer science by Udsen and Jørgensen reveals four main approaches: ‘cultural’, ‘functionalist’, ‘experience-based’, and ‘techno-futurist’ [57]. The experience-based approach generally rejects the primacy of utilitarian considerations in favour of a wider angle that includes emotions of enjoyment and surprise. In the context of information seeking, where problem-oriented paradigms such as Kuhlthau’s information search process [35] are prevalent, aesthetic considerations have been largely absent. *Information seeking is an inherently complex human experience that includes a wide range of emotions and motivations beyond a particular problem or need.*

The Web, arguably the most significant information space today, is undergoing considerable transformations that enable entirely new ways for information seeking. In particular, developments around web-based semantics, graphics, and interaction allow new ways for exploring information. More and more structured data are embedded into existing web pages [33] and even entire information spaces such as the Wikipedia [3] are exposed as semantic information spaces. With the HTML standard maturing [58], rich interactive graphics (bitmap and vector) are becoming natively supported by web browsers. The Web is increasingly accessed via mobile devices [51], so that input methods are diversi-

fying considerably, including touch input and implicit input such as location and orientation. While it will take some years until these developments affect the majority of web users, *these ongoing and projected technological trends on the Web enable the design of novel interfaces for exploring growing information spaces* (see Figure 1).

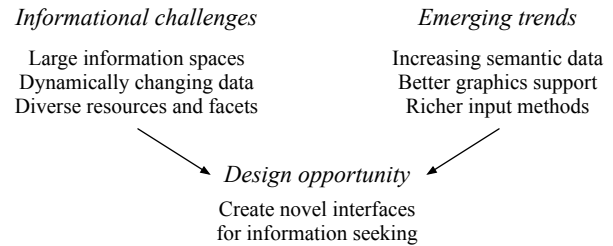


Figure 1. Emerging trends in the Web and the informational challenges of growing information spaces provide a unique design opportunity.

THE FLANEUR

The computing and information sciences are shaped by analogies derived from work settings such as offices and libraries. This leads to an emphasis of corresponding metaphors such as the desktop with its files and folders and databases with indices and keys. Our goal is to reach beyond these analogies and develop a new perspective that highlights curiosity, reflection, and imagination. For this, we assume that cities can be places of creative exploration and borrow the concept of the flaneur from cultural studies as an inspiring, human-centric perspective that can help us envision novel interfaces that are more playful, pleasurable, and provoking.

Observer and Painter of the Modern City

Curious Explorer

Derived from the French masculine noun ‘flâneur’, the flaneur is an urban character who makes himself at home in the boulevards, arcades, and cafes of Paris in the 1840s [6]. The flaneur appears to have no goal; rather, experiencing city life is his primary aim. Without becoming fully part of it, he passes through squares and crowds making sense of the city. While the cityscape may be teeming with crowds and commerce, the flaneur opens his senses and paints his own picture of the city [6]. The growing disparity between the large city population and the individual makes it unlikely to meet personal acquaintances by chance [6]. While city life becomes more accelerated, the flaneur keeps a leisurely pace, resisting the growing speed of emerging capitalism. The flaneur moves “through space and among the people with a viscosity that both enables and privileges vision” [29]. He explores the city following “whatever cue, or indeed clue, that the streets offer as enticement to fascination” [29].

Critical Spectator

The flaneur also has a critical side that allows him to create his sense of what is happening around him. Fascinated by the commercial spectacle, he is also aware of the accompanying social realities [6]. The approach of the flaneur toward the city can be seen as a critical method of seeing modernity, “an analytic form, a narrative device, an attitude towards knowledge and its social context” [29]. The flaneur can be

seen as a contradictory figure torn between fascination and rejection. While he sees poetry and beauty in the urban landscape, he is also a cultural critic resisting the commercialization and acceleration by taking his time and “walking out of step” [29]. One can see in him the growing opposition to the late-modern city that becomes more “rational, predictable, visually coherent, but emotionally alienating” [22].

Creative Mind

The flaneur’s critique of urban alienation is accompanied by a creative “aestheticisation of everyday life” [29]. Viewing the urban story as epic heterogeneity, the flaneur is an interpreter making the “urban landscape legible and meaningful” [22]. While there was no particular flaneur who came to fame for his artistic works, one can see in the flaneur a collective “spectator and depicter of modern life” [29]. An avant-gardist interpretation of the flaneur sees in him “radical creativity” dismantling, re-assembling, and re-imagining the urban form, while being “deliberately selective in focus and aestheticizing in technique” [22]. Instead of turning the world into a set of categories, the flaneur has the unique “capacity to relate to the world through multiple facades” [22].

The Flaneur and Information Seeking

There are several striking similarities between growing cities of the 19th century and today’s information spaces, especially with regard to the relation between the individual and the whole (see Figure 2). As cities have become the cultural backdrops of daily activities for the majority of people in the world, digital information spaces increasingly assume a similar role. In the following, we briefly highlight growth, significance, and struggles as important commonalities:

- *Growth.* The city of the flaneur and today’s information spaces continuously grow. In both cases, there is a significant discrepancy between the individual and the disproportionately large—urban or digital—environment.
- *Significance.* Like the late-modern city can be seen as a grandiose cultural artefact, information spaces arguably form the culturally significant phenomenon of our times. They are becoming an important context for our daily activities as part of work, play, and community.
- *Conflict.* Cities and information spaces are also contexts for social struggle and negotiation. Urban issues such as acceleration and alienation do not remain uncontested. Similarly, information spaces pose issues such as copyright, network neutrality, and information poverty.

Considering these parallels between cities and information spaces, we see the flaneur as a lens through which to envision new perspectives on information seeking. We are particularly interested in his exploratory mindset. In order to experience the city, the flaneur does not methodically navigate streets, checking each edifice like a building inspector in search of code violations. Nor does the flaneur hastily interrogate each city-dweller, like a police officer in search of a thief. Because the flaneur does not accurately scrutinize everything that crosses his path, he is able to sense what city life is about. The flaneur is the embodiment of exploration and serendipity, while the police officer and building inspector personify traditional search and browsing.

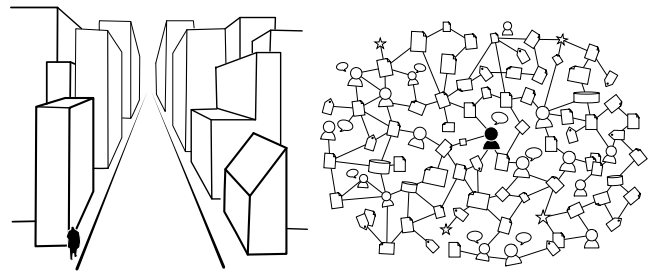


Figure 2. The relationship between a flaneur and the large city (left) bears some similarity to the relation between information seekers and growing information spaces (right).

HUMAN-CENTRED PERSPECTIVES

In order to gain a better understanding of information seeking, we draw upon interdisciplinary research on cognitive, perceptual, and affective perspectives. We are particularly interested in empirical insight informing novel interfaces.

Information Behaviour

Information seeking has been conceptualized using a range of models. An early attempt to describe information seekers was the analogy of the *informavore*, a living being whose “mind survives by ingesting information” from the surrounding world [41]. Dervin’s notion of *sense making* focuses on the interaction with such a world through situations and structures [14]. Important premises are that “reality is neither complete nor constant” and that information is not “independent of and external to human beings” [14]. Information seekers are creators of the world engaging in a “circling of reality” including a multitude of observations and perspectives. Central to Dervin’s approach are discontinuities in the real world and gaps in the knowledge of the information seeker. The challenge is to help information seekers turn information gaps and discontinuities into sense-making opportunities. Bates characterized interaction with online information systems as berrypicking, an evolving search using a wide variety of sources and techniques [4].

Since early on, *searching and browsing* were identified as basic forms of information seeking. While the former is typically characterized as purposeful and goal-directed the latter is seen as more open and casual. This distinction finds resemblance in different types of reading as either locating information towards a certain task or open-ended reading for general comprehension [25]. In order to support varying degrees of goal orientation in the browsing of online information, a retrieval system needs to provide adequate information structures and interaction techniques [12]. Conceptually browsing can be seen as “movement in a connected space” [37] and as the “scanning [of] its content (objects or representations) and/or structure, possibly resulting in awareness of unexpected or new content or paths” [9]. Toms has shown how a retrieval system’s information representation and an information seeker’s needs are highly influential on the browsing process [54, 55].

Kuhlthau’s *information search process* is a linear model that describes information seeking as a progression of stages for the information seeker’s feelings, thoughts, and actions [35]. In an information search process, a person starts out with

vague thoughts and feelings of uncertainty, and then moves towards clearer, more focused thoughts and feelings of confidence and satisfaction. Kuhlthau highlighted a conceptual mismatch between a person's information problems ("uncertainty and confusion") and a system's view of information ("certainty and order"). Based on an interview study of 45 interdisciplinary researchers, the linear nature of information seeking has been disputed and contrasted with a non-linear model capturing three cognitive processes: opening, orientation, and consolidation [19].

Another line of research considered the costs involved in sense-making tasks, in particular with regard to the use and cost of external representations [47]. Following from this, *information foraging* describes how the searcher weighs the cost of retrieving a given resource against its perceived information value [43]. One approach to indicate the potential value of information is to enrich result lists with visual cues, such as *information scents* [10], which guide the information seeker from one resource to the next. Other forms of information seeking include monitoring and recommending information (via a system or person). Information streams on community sites such as Digg and Twitter allow for hybrids between recommending and monitoring.

Orientation

An important aspect of information seeking is having a sense of *orientation* (i.e., where one is, and where one seeks to go next). The notion of orientation combines a sense of overview (having an idea of the lay of the information landscape, in a map-like fashion) and direction (having an idea of where one has been, how to move forward, and how to return). In an information space, this notion of map and directionality typically refers to an information need or interest. A diary study on email, file, and web search revealed *orienteering* as an information seeking style in its own right that includes small situated steps toward a target [53]. Situated information seeking required less cognitive effort than explicit search, and also provided the searcher with a sense of context, control, and trust. This finding suggests that step-wise interactions can help information seekers gain a greater sense of orientation. However, existing search interfaces often exhibit abrupt changes of context between result lists. The challenge is to design search interfaces that help information seekers gain and maintain a sense of orientation.

Serendipity

Occasionally, we find interesting and inspiring information by accident. That is, we did not explicitly look for it, or expect to find it. This property is referred to as *serendipity*. In several studies on people's information practices, it has been observed that serendipitous information encountering constitutes a key component of acquiring relevant information and resources. For example, a study on the information practices of 202 elderly people revealed how participants typically learned important information from family, friends, and media without actively seeking it [62]. A study of 194 people reading books for pleasure has shown how book readers actively monitored libraries, magazines, and their friends, in order to increase the probability of information encounters [46]. A study on the information practices of

interdisciplinary researchers has shown how 45 researchers regarded serendipity as a purposive activity [20]. The authors suggest that information systems should help the information seeker develop a mind that is open towards new information, encouraging people to "step back and take a broader view" [20]. These studies provide interesting insight into how people engage in open-ended information practices that help keep them informed, while encountering new information, and cultivating an open mind. However, existing interfaces centred around keyword search and filtering have been identified as a threat to such serendipitous information encounters [20, 49]. Approaches to designing for serendipitous information encountering include similarity-based suggestions [54] and visual information surrogates [32].

Exploratory Search

Exploratory search is an attempt to broaden information seeking from simple lookup towards knowledge building [39], aiming to support "users [to] explore, overcome uncertainty, and learn" [60] without specific questions or tasks in mind. The issue is how to create interfaces that help the searcher freely engage in information exploration. While there are few interaction techniques or approaches that are explicitly designed to support exploratory search, faceted navigation is a notable exception. *Faceted navigation* could be viewed as an exploratory search technique because it provides the searcher with multiple ways to navigate an information space without entering explicit search queries [17]. A comparative usability study with 32 art students has shown higher levels of confidence, satisfaction, and recall with a faceted versus a search-based interface [66]. Researchers observed how the facets on the start page would provide "ideas about what to search for". In another study, eye gazing information from 18 university students using a faceted library interface indicated that the facets were crucial during the exploration process [36]. The faceted interface helped the study participants to orient themselves in an unfamiliar information space, and provided guidance for proceeding with their search.

Everyday Life

Information seeking is often portrayed as an activity carried out by knowledge workers interacting with information systems. However, there is a wider range of information practices in everyday life. An interview-based study with 11 workers and 11 teachers from Finland has revealed interesting insights into everyday information seeking [48]. Participants sought both *orienting* and *practical* information, with the former referring to finding appropriate or relevant sources and the latter consuming the actual information. A study on the information practices of 19 women pregnant with twins has shown how participants engage in two information seeking stages: *connecting* and *interacting* [40]. During the connecting stage, participants established an association with people, locations, and institutions, which gradually led into the interacting stage, during which they actually requested or encountered information. One can see parallels between these two studies, considering the connecting stage as a way to find orienting information and the interacting stage to access practical information. An interesting question is how novel interfaces could support this dual nature found in everyday information seeking.

Visual Perception

While our perceptual system was trained by our distant ancestors looking for food and predators, we are now exploring how to utilize our vision for today's challenges.

Element Detection

An interesting aspect of visual perception is the ability to rapidly discern certain elements based on different visual features. Early research attributed this ability to *preattentive* processing, which functions across the whole visual field in parallel, followed by attentive processing that works serially on individual locations [56]. More recent research associates preattentive processing with higher-level more attentive functions, as part of a two-way mechanism [64]. Experiments utilizing our preattentive capabilities for visualization show that certain perceptual tasks can be accelerated, such as element detection, grouping, and value estimation [27]. Further studies on reaction time during visual search have shown that previously scanned locations within a scene have a slower response time than those not yet attended [34]. This phenomenon, called *inhibition of return*, explains how our perceptual system relishes novel information, and thus facilitates visual foraging behaviour [59]. These studies on preattentive processing and inhibition of return provide important insight into how our perceptual system favours both visually salient and newer elements. This has interesting implications for the design of novel information seeking interfaces.

Visual Momentum

Search interfaces are characterized by several discrete display changes. That is, a changed query is often followed by a blank screen, and then another screen with the new search results. The cognitive experience of display changes can be examined using visual momentum as the reciprocal of “mental effort required to place a new display into the context of the total data base and the user's information needs.” [65]. Higher levels of visual momentum, i. e., less mental effort, can be achieved by providing more gradual display transitions, helping the viewer to comprehend the new display state more quickly. Current search interfaces have low visual momentum, since they require a lot of mental effort to relate successive displays. Recurring results are only indicated if they were actively visited, which does not include those items that a searcher has already mentally discarded on a previous screen. Relatively established techniques such as animated transitions, detail-on-demand overlays, and zoomable interfaces improve visual momentum.

Information Visualization

Result listings typically convey a ranking, which is often opaque to the information seeker, who does not know the criteria behind the ordering of selections portrayed. On the other hand, information seeking interfaces could benefit much more from our perceptual capabilities to help distinguish and relate resources. Building on our perceptual capabilities, information visualizations are “computer-supported, interactive, visual representations of abstract data to amplify cognition” [8]. Important functionalities to be supported in information visualization include overviews, zooming, filtering, and detail-on-demand [50]. Considerable research has been devoted to the use of visualizations during information seek-

ing, however, they are still centred around search queries and results. For example, several techniques have been developed to explore the use of interactive visualization for query formulation [52] and result representation [28]. For the exploration of databases, it has been shown how interactive sliders can act as visual filters that are tightly coupled with visualizations [2]. Subsequent research has shown how a web-based multiple-view interface can be used for filtering and visualization of blogs and photos along time, location, and tags [15]. Considering growing information spaces and diverse information interests, the challenge is to represent a range of perspectives and venture beyond the query-response paradigm. For example, horizontally-centred stacked graphs of topics over time can be used to represent topical development of news topics [26] and ongoing backchannel conversations during events [16]. Initial attempts have been made to introduce aesthetic considerations to visualization design and research [44], however, more work (and play!) is needed to understand the role of aesthetics in representing and exploring growing information spaces.

Emotion and Motivation

In addition to information behaviour and visual perception, information seeking involves a wide range of emotional experiences and personal motivations. A small selection of the relevant literature is discussed in the following.

Higher Things in Life

The typical starting point of information seeking is the information need, also known as ‘anomalous state of knowledge’ [5] or knowledge gap [14]. These negative notions characterize the information seeker along two deficiencies: inadequate knowledge to solve a problem, and an inability to specify the information need itself. Kuhlthau follows this deficiency-oriented approach, and sees confusion and uncertainty at the beginning of an information search process [35]. However, recent research suggests that this emphasis of deficiencies is not representative for a wide range of information practices. It can be argued that information seeking research emphasizes “lower things of life” such as problems. In contrast, Kari and Hartel suggest a greater emphasis of “higher things in life”, which they see as “positive human phenomena, experiences, or activities that transcend the daily grind with its rationality and necessities” [30]. Within the set of higher things, they distinguish between “the pleasurable”, such as art, fiction, and play, and “the profound”, such as creativity, ethics, and personal growth.

Pleasure and Leisure

Pleasure constitutes a particularly underrepresented aspect of information seeking. A study of avid readers choosing books for leisurely reading reveals a diversity of perspectives and motivations for selecting the next book—including its title, blurb, and cover, as well as the reader's competencies, preferences, life experiences, and mood [46]. The study participants saw their reading as a way of making sense of themselves and the world. They found that “wide and frequent reading” helped them answer current problems without engaging in deliberate information seeking [46]. A study of 24 hobby genealogists reveals how feelings of enjoyment, enthusiasm, and dedication were an integral part of their infor-

mation seeking experience [21]. Instead of feeling anxious or uncertain, the genealogists saw unfamiliarity with a topic as an inviting challenge to increase their knowledge. The researchers observed how positive emotions further increased “confidence with an evolving information landscape” [21].

Flow and Curiosity

The aforementioned genealogists often found themselves immersed in the hobby “to the point of losing track of time” [21]. Such levels of absorption have been referred to as “flow”, a mental state in which a person is fully immersed in an activity that brings a sense of harmony and satisfaction [13]. A survey of 288 college students and their opinions of the Web revealed a similarly deep involvement with information technologies, but accompanied by high levels of playfulness [1]. Based on multiple studies, Kashdan et al. formulate a model of curiosity that links perceived novelty and challenge with opportunities for personal growth [31]. The curiosity model consists of two complementary tendencies: 1) exploration: “tendencies to seek out new information and experiences”, and 2) absorption: “tendencies to become fully engaged in these rewarding experiences” [31]. These two tendencies have some similarities with the previously discussed dual nature of everyday information seeking, in that they also have a sense of higher-level navigation and lower-level interaction. The challenge is to envision interfaces that support both broad and deep interaction with information spaces.

ENVISIONING THE INFORMATION FLANEUR

With the *information flaneur* we propose a human-centred model for positive information practices neglected by previous information seeking approaches. It is inspired by the literary character of the urban flaneur, and grounded in empirical research on the cognitive, perceptual, and affective aspects of information seeking. While the practices of the information flaneur have been observed in several studies, they are not well considered in the design of interfaces and systems. It is not our intention to propose a comprehensive theory for information seeking, but instead a fresh vision for future interfaces that support a range of information activities and experiences. The model consists of a poetic persona, an interaction schema, and an illustrative scenario. We also compare it with existing information seeking models.

The Information Flaneur as a Poetic Persona

We see the information flaneur as a poetic persona inspired by a literary figure and informed by empirical research. Congruent with personas in interaction design [11], the information flaneur is a descriptive model of a user that is based on extensive research. The information flaneur does not represent all forms of information seeking, but a particular class of practices, goals, and motivations involving exploration, reflection, and imagination. In this sense, we do not ‘invent’ the information flaneur, but observe and characterize emerging information practices that are underrepresented by existing models. We are using the urban flaneur as a lens to view exploratory attitudes of information seekers and characterize a coherent persona (see Figure 3). We describe the information flaneur as vividly as possible to engage the empathy (and creativity) of designers and researchers.

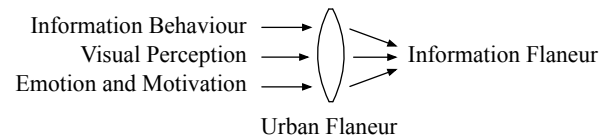


Figure 3. The information flaneur is grounded in prior research on information practices (left). Gathering these perspectives, the urban flaneur serves as a lens that brings out the information flaneur.

Exploration

Similar to the urban flaneur’s appreciation of the city [6], the information flaneur is intrigued by “evolving information landscapes” [21]. While the urban flaneur feels at home in boulevards and cafes [6], the practices of the information flaneur are embedded into her daily activities and environments [48]. She monitors her surroundings to pursue her interests [21, 46], encounter new information [18, 31], and stay informed [62]. As the urban flaneur perceives “the world through multiple facades” [22], the information flaneur explores unfamiliar information using several tools and facets [4, 36, 66]. Sometimes she navigates information spaces using step-wise interactions toward information targets [53]. At other times, she uses visualizations that make use of her perceptual capabilities [8] providing her with perspectives that are related to the privileged views of the urban flaneur [29]. Visualizations allow her to detect salient and novel elements in information landscapes [27, 59].

Reflection

Resisting the growing specialization and acceleration of modern capitalism [6], the urban flaneur becomes a cultural critic and chooses to walk “out of step” [29]. Similarly, the information flaneur’s practices run counter to common emphases on gaps, problems, and uncertainty. Instead, she foregrounds ‘higher things in life’, such as pleasurable and profound experiences [30]. As the urban flaneur confronts a city that becomes more predictable and rational [22], the information flaneur avoids interfaces that constrain serendipitous information encounters through excessive filtering and ranking [20, 49]. Instead, she enjoys “bumping into information” [18]. Similar to how the urban flaneur is not blinded by the spectacle to ignore the social realities of capitalism [6], the information flaneur cultivates an “open and questioning mind” as a strategy to find “hidden connections” [20].

Imagination

Analogous to the urban flaneur recognizing the real and imagined character of the city [29], the information flaneur scans her real and fictional environment to make sense of herself and the world [46]. By engaging in “wide and frequent reading”, the information flaneur finds answers to problems without actively engaging in information seeking [46]. The urban flaneur’s “amusement, excitement, adventure and enchantment, unavailable to ordinary spectators” [22] resembles the information flaneur’s enjoyment and personal meaning in exploring unfamiliar information spaces [21]. As she experiments with novel technologies [1] and becomes deeply engaged with new information discoveries [31], she loses a sense of time, yet gains a sense of fulfillment [13].

	<i>Information Behaviour</i>	<i>Visual Perception</i>	<i>Emotion and Motivation</i>
<i>Horizontal Exploration</i>	explore information space along several facets	gain sense of overview and orientation	follow interest, mood, and clues for new information
<i>Vertical Immersion</i>	make sense of information space and resources	see details of information space and resources	engage in pleasing, profound, and/or provoking experiences

Table 1. Two dimensions of the experience-based interaction schema: experience (top) and activities (left).

An Experience-based Interaction Schema

The information flaneur’s exploratory behaviour is not captured by current information seeking models. Our goal is to gain a better understanding of her information practices on the basis of empirical research and inform the design of new interfaces. To that end, the following schema uses evidence from previously discussed studies that examined people’s information practices in the context of everyday life [40, 48] and curiosity [31]. Furthermore, the schema draws on established insights about orientation, visual momentum, serendipity, and perception during information seeking. The interaction schema has two dimensions: experience and activity (see Table 1). The experience dimension resembles the three human-centred perspectives on the cognitive, perceptual, and affective aspects of information seeking. The activity dimension contains two intertwined information activities: horizontal exploration and vertical immersion, between which the information flaneur gradually shifts depending on information encounters and personal interests.

Horizontal exploration is a broader type of information activity during which the information flaneur monitors and explores information spaces on a high level. This activity is based on the ‘connecting’ stage [40] when ‘orienting’ information [48] was accessed in studies on everyday information seeking. Furthermore, in the context of the curiosity model, horizontal exploration corresponds to an information flaneur’s tendency to “seek out new information and experiences” [31]. During horizontal exploration the information flaneur makes use of interactive visualizations to gain overviews of information spaces and see information patterns [50]. Exploring diverse facets and perspectives on information spaces [4, 14], the information flaneur follows her own personal inclinations and is guided by visual cues along the way [27, 59]. The information flaneur cultivates her desire to find both inspiring and challenging information by following a playful approach to information seeking [1, 20, 31]. When a visualization reveals a particularly interesting piece of information, the information flaneur may gradually shift into the information activity of vertical immersion.

Complementing the higher-level activity of horizontal exploration, *vertical immersion* is a more absorbing activity during which the information flaneur follows her interest or curiosity at a more detailed level. This activity corresponds to the everyday information practices of ‘interacting’ with ‘practical’ information [40, 48]. In the context of the curiosity model, vertical immersion represents the tendency “to become fully engaged” in enjoyable experiences [31]. Practically, this means that the information flaneur accesses detailed views [50] of resources and actively makes sense of

information [14] in the context of an information space. This may include randomly flipping through the pages of a book to get a sense of what it is about [46] or the challenging, yet pleasing interaction with a new insight [21].

Vertical immersion and horizontal exploration form a continuum as intertwined activities that support each other. For certain sub-activities the information flaneur shifts from vertical immersion to horizontal exploration to find related information or make connections between new and previously visited resources. Shifting between exploration and immersion may involve step-wise navigation [53] and gradual display changes that sustain visual momentum [65].

Scenario

In order to illustrate the persona of the information flaneur and the interaction schema, we are going to describe an example scenario of an information flaneur called Frances.

For Frances, a range of information spaces provide the context for making sense of the world. She particularly enjoys exploring the daily news and her friends’ status updates by looking at topical patterns over time using interactive visualizations. Sometimes she links weather and mood information from different data sources providing unique views of occasionally interesting relationships; for example, she noticed the other day how people complain less about work when it rains. Frances is fascinated by digital information spaces, yet, she criticizes the commercialization of information spaces and rejects centralized collection of personal data. However, she is very engaged in demanding the release of data concerning environmental pollution and public spendings. Furthermore, she is not only an information consumer, but she typically shares her own opinions on current issues, public discourse, and works of art. While the default views created by professional interface designers give her basic ways to access information, Frances enjoys creating her own visualizations that are based on her own preferences and perspectives. She regularly explores the personal data patterns of her friends, which they share with her privately, in order to receive personal data paintings in return.

Sometimes when exploring the news, Frances encounters information about issues she is passionate about. One evening, she finds unsettling information about a recent oil spill that was close to her city, detailing the companies involved and their environmental track records. After some investigation, Frances finds incident logs from one of the implicated companies. Employees concerned about their company’s environmental practices anonymously leaked these logs, revealing several critical incidents in the recent past. Frances is outraged that the company has not informed the public. Get-

ting more absorbed by the issue, she decides to write an opinion piece and create a mashup visualization of the incident data with photos of the oil spill. When she sends her article to an environmental community blog, she is surprised to notice that it is already well past midnight.

Comparison with Previous Models

Building on top of prior information seeking research and related domains, the information flaneur constitutes a move away from models based on deficiencies and tasks towards positive traits and information practices.

Most information seeking approaches model the information seeker as a person with information needs [4, 5], the need to survive [41], knowledge gaps [14], and feelings of uncertainty [35] weighing resource value against sense-making cost [43, 47]. However, studies on serendipitous [18, 20, 62], leisurely [21, 46], and everyday information seeking [40, 48] have shown that many information practices are driven by interest, desire, and an open mind. Based on this evidence and the mindset of the urban flaneur we conceptualized the information flaneur with positive attitudes and experiences such as exploration, reflection, and imagination, i. e., as a mirror image of how information seekers are typically portrayed.

It is generally assumed that searching and browsing co-occur in a complementary fashion as part of an evolving [4], multifaceted [9], linear [35] or non-linear [19] information seeking process. The duality of searching and browsing describes a gradient between directed and undirected information seeking. However, in studies on everyday-life information seeking [40, 48] and curiosity [31] another distinction emerged, namely between high-level, exploratory and low-level, immersive activities. The interaction schema of the information flaneur is the first attempt to conceptualize exploratory and immersive information experiences at multiple levels of interaction with information spaces. Regardless whether driven by specific goals or general curiosity, the information flaneur shifts between high-level and low-level activities that are not supported by today’s information seeking interfaces.

IMPLICATIONS FOR RESEARCH AND DESIGN

The experiences of the information flaneur cannot be designed and our model is not a recipe to induce certain behaviours. Instead, we see the information flaneur as a visionary model inspiring innovation. Well-grounded in research, the information flaneur suggests a shift towards a positive notion of the information seeker engaging in horizontal exploration and vertical immersion. In the following, we outline a high-level recipe for future work by providing concrete design goals and research challenges, in the hope that researchers and designers find new ways for the information flaneur to make sense of growing information spaces.

Explorability

A new set of guiding principles is needed to guide innovative design of information seeking interfaces. We pose explorability as an umbrella goal that integrates principles that have evidence for supporting the information flaneur in cultivating her curiosity, reflection, and imagination. As an initial set of explorability principles, we suggest the consideration

of orientation, visual momentum, and serendipity—concepts that can directly inform interface design.

- *Orientation* within an information space denotes having a sense of overview and direction. Orientation can be supported through situated navigation, faceted navigation, and information visualizations.
- Higher levels of *visual momentum* need to be supported in order to ease the shifting between horizontal exploration and vertical immersion. Visual momentum can be increased through a range of techniques including animated transitions, zoomable interfaces, and detail-on-demand.
- Opportunities for *serendipity* could be increased by juxtaposing resources that share unusual facets or relate to one’s previous interactions. The visual saliency or novelty can be used to emphasize a resource in the display.

Explorability deliberately lacks established usability principles [42]. While they are important and should be considered in later design phases, we share the concern that they may impede the initial creation of novel interfaces [24]. Furthermore, usability typically centres around specific goals and tasks, a perspective that may constrain the possibilities for finding innovative interfaces for information seeking.

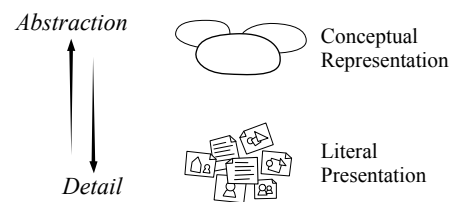


Figure 4. In order to support horizontal exploration and vertical immersion, novel interfaces need to bring together abstraction and detail.

From Gaps to Continuities

Information spaces considered for information seeking are typically discrete data sets containing individual resources with possibly inconsistent metadata. Novel interfaces in support of the information flaneur need to be designed to expose commonalities. By using reoccurring facets and data patterns, information visualizations can represent discrete, inconsistent information spaces as continuous information landscapes. Such visual information landscapes should be designed to be as inviting, inspiring, and informative as possible. The challenge is to integrate the abstract nature of information visualization with the detail of visual previews. Analogous to the continuum between horizontal exploration and vertical immersion, abstraction and detail should not be seen as discrete and separated. We need to find new interaction and representation techniques that bring these two views of information spaces and resources closer together, supporting a more integrated information experience. As illustrated in Figure 4, we suggest that the space between abstraction and detail can be designed as a gradual continuum.

- *Abstraction*: At the level of conceptual representation, entire information spaces can be shown as visualizations. Representation techniques could be timelines, maps, and graphs, depending on the facets of interest.
- *Detail*: Literal presentations provide detailed previews of

a few information resources, using thumbnails, movie trailers, and audio snippets, for example.

While previews provide higher level of detail, there are limits to the number of resources that can be shown. Abstract visualizations, however, can summarize large sets of resources along interesting facets, while sacrificing some level of detail. The challenge is to make visualizations that encourage horizontal exploration and provide a diverse range of facets and representations that invite vertical immersion.

CONCLUSION

Information seeking is a complex human activity and as such it is a great challenge to design powerful interfaces to support it. Considering growing information spaces, technical advances, and positive information practices, we have developed new ways to think about information seeking by making the following contributions:

1. First use of the urban flaneur's mindset towards the city as an inspiring analogy for information seeking.
2. An interdisciplinary literature survey on cognitive, perceptual, and affective aspects of information seeking.
3. A human-centred model for positive information practices featuring a poetic persona, a novel interaction schema, and an illustrative scenario.

There are some caveats with our approach, among which we briefly discuss two here. First, the comprehensive consideration of interdisciplinary research provided us with a broad view. However, such a wide angle may have sacrificed the depth and completeness for those perspectives. We tried to compensate for this by focusing on information experiences that inform a positive approach to information seeking. Second, we 'borrowed' the urban flaneur from cultural studies as an inspiring lens. This poses the risk of constraining the understanding of a phenomenon to its analogy [41] and reducing a rich philosophical school of thought [38]. We attempted to retain both the complex and critical aspects of the urban flaneur in our vision of the information flaneur.

We see this work as part of an emerging trend towards better understanding of and support for positive information practices. The information flaneur poses many exciting challenges of which we outlined a few with regard to interactive explorability and issues of representation. We ultimately need novel ways to support the practices embodied by the information flaneur in curiously and critically moving through information landscapes and creatively constructing meaning.

ACKNOWLEDGEMENTS

We thank the InnoVis group at the University of Calgary for their ideas and advice, and Lindsay MacDonald, Nicolai Marquardt, and David Monteyne for their feedback on drafts of this paper. We are also very grateful to the reviewers for their constructive feedback and suggestions. Funding was provided by SMART Technologies, NSERC, and AITF.

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