



Information Research – Vol. 30 No. CoLIS (2025)

Not all who wander are lost: an argument for searching to browse as a separate information behaviour

Dana McKay, Michael Twidale, George Buchanan

DOI: <https://doi.org/10.47989/ir30CoLIS52351>

Abstract

Introduction. The relationship between search and browse has long been framed as separate, interleaved and sometimes equal activities. With the shift to nearly exclusive online behaviour, this relationship is changing

Method. In light of some surprising incidental research findings, we conduct a critical literature synthesis of literature on search typologies, exploratory search and browsing, especially digital browsing.

Analysis. Based on the results of previous work, we identify a gap in previous models of search, specifically searching to browse.

Results. The notion of searching to browse changes the relationship between searching and browsing, particularly in a digital context. This new form of both searching and browsing creates a need for new interfaces, particularly for collecting items of interest.

Conclusion(s). We argue for searching to browse as a new form of information behaviour, one that is slowly being accommodated by digital information systems. We recommend that more digital information systems take searching to browse into account.

Introduction

The interaction between searching and browsing in information seeking behaviour has long been characterised by approaches that see them as separate, and only sometimes equal. They are discrete activities in many of the major information seeking models, including Marchionini's model (Marchionini, 1997), Kuhlthau's model (Kuhlthau, 1991) and Ellis' model (Ellis, 1989). Where they do co-occur, they are described as *interleaved*.

In this framing, searching is positioned as an approach to information seeking that has a clear goal, while browsing is an approach for people with less well-defined goals (Ellis, 1989; Marchionini, 1997). The underlying assumption is that people mostly browse to increase their confidence in their goals and move towards a search session that will provide a single document that meets their needs (Kuhlthau, 1991). The other use for browsing in this framing is to winnow out irrelevant documents returned by the search (Ellis, 1989; Kuhlthau, 1991). There is a body of literature on searching that does not deal with an explicit goal, the literature on exploratory searching (Marchionini, 2006; Medlar et al., 2024; White and Roth, 2009), but it, too, largely ignores browsing as an activity.

Literature on browsing, though, demonstrates that it can be a primary goal: that people do it for pleasure, exploration or collection sensemaking (Apted and Choo, 1971; Bates, 1989; Dervin, 1998; McKay et al., 2019; McKay et al., 2020). This has often happened in physical spaces, though (McKay et al., 2019; McKay et al., 2020; Rice et al., 2001; Zhang et al., 2022), and dedicated digital browsing tools have largely been unsuccessful as they have not met all of the requirements for successful browsing (McKay et al., 2018). Nonetheless, there is a nascent literature on digital browsing that shows that people co-opt digital tools to create their own browsing structures (Zhang et al., 2022).

The authors of this paper have a century of experience between them studying how people find information, often with a specific emphasis on browsing. Incidental findings in our own research (McKay et al., 2019; Zhang et al., 2022; Zhang et al., 2024) and conversations with colleagues (Witten et al., 2009) hinted at searching to browse as an activity, and a literature scan revealed it to be little discussed in the literature. Throughout this paper we draw together literature on searching, browsing and information seeking to argue for an under-recognised interaction between searching and browsing: the specific act of searching to browse. This activity is important as a key function of digital browsing, but it turns one of the fundamental assumptions of search, that people searching are looking for a single answer (Robertson, 2008), on its head. Understanding searching to browse is a new challenge in information behaviour and information interaction and retrieval, and will be a key driver of digital systems that support online browsing.

The rest of this paper is divided up as follows: first, we present the literature on browsing offering a working definition of browsing, and identifying some of the changes in digital browsing. Next, we look at searching, particularly typologies of search and exploratory search. Third, we cover the interactions between searching and browsing in the literature, first discussing information behavioural models, then turning to digital search. Then, we make a clear case for searching to browse as an explicit information behaviour that has not previously been identified in the literature, and give examples of how it might occur. Finally, we draw the conclusion that this is an important and under-recognised form of information seeking, and point to avenues for future research.

On the nature of browsing

Browsing has often been defined in opposition to searching: a search is a targeted approach to a clearly defined information goal, and browsing is trying to meet loosely defined information needs (Apted and Choo, 1971; Ellis, 1989; Herner, 1970; Kuhlthau, 1991; Levine, 1969; Toms, 2000; Wilson, 1999). The term browsing is also used to describe shopping based activities and sequentially examining web pages (Rice et al., 2001), which again fit with the loosely defined goals: we do not browse when we know we only need milk and bread, or when we need a specific piece of

information. The loosely defined goals, therefore, are a key reflection of the requirements of the information seeker, but do not describe the activity of browsing, nor what is being browsed.

Examining what is being browsed, there are two distinctions made by (Marchionini, 1997). The first is browsing an actual document versus browsing a representation of a document (a distinction also discussed by Apted and Choo (1971). In this paper we are focusing on surrogates, as this encompasses nearly all digital browsing (searching for documents, shopping without a list) with the exclusion of web browsing, which is a learning activity. The second distinction made in *what* people browse is whether they are browsing within a single document or between documents (Marchionini, 1997). Browsing within a document is typically done to assess its suitability to meet an information need (Apted and Choo, 1971; Marchionini, 2006), whereas between-document browsing is browsing between objects to hunt for useful objects (Apted and Choo, 1971; Marchionini, 1997), to seek serendipity, or simply for pleasure (Levine, 1969). The discussion in this paper will focus on this latter, between-object browsing.

Turning to browsing activity, a clear distinction made in every early discussion of browsing is between *purposive* or *intentional* browsing, where the information goal is clear (if not readily described), in comparison to serendipitous, exploratory browsing (Apted and Choo, 1971; Herner, 1970; Levine, 1969). Information needs that used to be met using directed forms of browsing are now commonly addressed using search tools (McKay et al., 2019), as predicted by Bates (Bates, 1979). Even where it is hard for the searcher to formulate a query, more modern search tools are better able to cope with complexity, as predicted by (Belkin et al., 1995). If this complexity is addressed by search, true browsing necessarily requires a loosely defined goal (Toms, 2000), or a desire or willingness to consider more than one object to meet a need (Bates, 2007).

We thus have a loose definition of the kind of browsing we address in this paper: it is not searching (although it may include search), it is between objects and the goal is loosely defined and may be met by more than one possible object. What remains, then, is the activity of browsing, and for that we may begin with Bates' excellent description (Bates, 2007):

1. *glimpsing a field of vision,*
2. *selecting or sampling a physical or representational object from the field,*
3. *examining the object, and*
4. *physically or conceptually acquiring the examined object, or abandoning it.*

This definition captures not just browsing for information objects, such as books or documents, but also other forms of browsing, such as shopping. It does describe examining objects in isolation, though, which is unrealistic in a world where we have limited resources to consume information or acquire objects (Pirolli and Card, 1999). Thus, as Kwasnik notes (Kwasnik, 1992), we also compare objects while browsing, as noted in McKay's definition: '*browsing is an exploration of information objects in the context of their relationship to each other*' (McKay et al., 2019).

This leaves one final component of browsing: *where* it happens. The majority of studies of browsing (e.g. Hancock-Beaulieu, 1993; Kwasnik, 1992; McKay et al., 2019) have been done in physical libraries. Attempts to create digital browsing systems have been largely unsuccessful, because the needs of browsers have not been met in a single system (McKay et al., 2018). Recent research, though, has demonstrated that people do manage to construct browsing experiences online, albeit by co-opting several systems in concert. The first stage in this process is finding a collection: i.e., Bates' field of vision, or a patch for foraging (Pirolli and Card, 1999) or berrypicking (Bates, 1989). Collections may be found in a variety of ways, including returning to a previously used collection (which has analogues with McKay's location seeded browsing (McKay et al., 2019)), constructing a collection (Xia, 2010) or searching to locate a collection (McKay et al., 2019; Rowley, 2002). This search for collections is the seed of searching to browse.

On search

Since the introduction of interactive search in the first publicly accessible library catalogues, how people use search tools has been the subject of extensive research. Even before that point, library and information science was a fundamental contributor to the conception and development of computer-based search technologies (e.g. Hancock-Beaulieu, 1993a, 1993b). That involvement is exemplified by the evolution of the Cranfield methodology (Cleverdon, 1967) that still underpins the evaluation of search engine technologies today (Robertson, 2008). The fundamental assumption of both those experiments and early search technologies was that the sought information existed, and that it could be found in a fixed, small number of documents.

While browsing predates the digital computer, and is possibly almost biological in origin (Bates, 2007), searching is in contrast fundamentally tied to modern computing. Even early conceptions of the potential of search technologies, as seen in 1940s publications such as Vannevar Bush's 'As We May Think' (Bush, 1945) anticipated and depended upon the already understood capabilities of contemporary electronics. From that beginning, the development of search technologies has evolved in lock-step with the capabilities of computing technology. Technology has affected the limitations of each successive generation of search facilities (Baeza-Yates and Ribeiro-Neto, 2011). Search technologies have progressed rapidly because of both advances in computer hardware and increasingly sophisticated evaluation techniques improving upon the underlying Cranfield method, right up to today's AI-enhanced searches.

Once search was no longer a library technology, and instead became an internet technology, what people could search for and how they searched became a more open question. Early examinations of web search took the *what* very literally, and focused on the actual materials people sought (Jansen et al., 1998; Spink et al., 2001); later studies addressed the *what* more conceptually, forming typologies of search (e.g. Broder, 2002). Exploratory search emerged as a form of search that broke many of the assumptions about search; search that cannot be met by a fixed small number of documents, and which may evolve in nature due to the complexity of the task. While researchers in information retrieval have consistently centred the role of search in exploratory search, we argue that it is critical to return the central focus to the goals of the information seeker. In this section we will describe the literature on different kinds of searching, noting relationships to browsing as we progress.

Search typologies

Andrei Broder introduced the earliest and still influential differentiation of search activity (Broder, 2002). He delineated three forms of query: informational, transactional and navigational. Informational queries corresponded closely with the platonic ideal of search that dated from the 1940s: searches done to discover information on a particular topic or theme. The found information would exist (on the Internet) in a static form. The ideal target would either be one or a small set of highly relevant documents. In contrast, transactional search was undertaken to find places (e.g. a database or web-based retail store) where further interactive work would be done, rather than a document or set of documents. Navigational queries were more limited in scope, seeking for a known website, or a website that the searcher had a strong plausible belief would exist. All that they lacked, ultimately, was a known URL to locate the underlying website at. In this type of query, Broder argued, there is almost always a single ideal or correct URL that was the correct result.

While superficially, we might believe that navigational search may be part of browsing, it would be more accurate to say that at best the ideal result is a website which the user may subsequently browse. Consequently, a navigational search may precede someone's browsing activity, but it is not inherently interconnected with it beyond that.

Rose and Levinson (2004) updated this taxonomy to further refine informational search into five categories: directed (where one wishes to learn something about a topic), undirected, in which

people have a *tell me about* information need, advice, locating where a real world product can be accessed, and list, which is to get a list of websites that help to meet some underlying goal. The latter two forms of search may well be associated with browsing, the first physical browsing in the form of shopping, the second digital browsing. This typology further breaks down resource searching (called transactional in Broder's taxonomy) into searches where the person searching is looking to interact or be entertained, both of which fit into the possible experiences of browsing described above.

Those who have drawn on these taxonomies have noted the possible interplay between searching and browsing: e.g. Thatcher (2008). However, they have used the term browsing to denote a searcher's navigation within a website using hyperlinks (i.e. something akin to Marchionini's within-document browsing) rather than in the sense traditionally meant in information science. Browsing in information science would typically involve an information seeker seeking and scanning lists and hierarchical structures that index a large collection (see e.g. Ellis, 1989), in line with Marchionini's between-objects browsing. This focus on browsing as an activity within a conceptual document or work, is reinforced by Thatcher's own words, as he describes the information seeker '*reading over information and selecting information to focus on*', which reflects the web browsing described above. Indeed, Thatcher's use of the term browsing for this is especially confusing, as he covers both within-document browsing and browsing between objects in a large collection.

There are tantalising allusions to behaviour that might be or contain browsing in these typologies, but only limited specific reference to it. This is perhaps unsurprising, as typologies by their nature are intended to reduce complexity, but these typologies also do not capture some of the very complex interactions we see searchers engage in. To begin to see these, we need to turn to Kim's search task classification (Kim, 2009), which includes factual tasks, interpretive tasks and exploratory tasks. This latter describes more open-ended activities, those that are typically assigned to browsing in information seeking models. This draws on conceptions of 'exploratory search, which we will explore in more depth below.

Exploratory search

Marchionini introduced the concept of exploratory search in 2006, noting it was a complex search activity usually made up of multiple queries, where the searcher wanted to explore or learn something (Marchionini, 2006). In contrast to conventional models of search, which focused on finding useful material, he depicted exploratory search as widening the context of search to include learning and investigation. Many conventional search goals could be met effectively by using analytical search strategies (typically planned series of carefully crafted queries). In contrast, Marchionini argued that increasingly a new type of search was emerging in which in-process learning and evaluation mattered at least as much.

In this newly described form of search, there was an extended process of intentional trial and rework as the information seeker learned about the contexts of knowledge related to their interests. In addition, information seekers would knowingly try speculative searches and even likely dead-ends in order to better understand a domain and the information within it. In this original form, exploration through tentative leads, deliberate negation and hypothesis testing went hand-in-hand with learning and moments of more conventional search activity.

What actually constitutes an exploratory search is contested. Marchionini's original definition includes exploration and searching to learn, whereas White's more recent and comprehensive definition moves more explicitly towards learning as a goal (White and Roth, 2009). This focus has led to the notion of *search as learning* (Vakkari, 2016), a concept that has had broad uptake in the information retrieval community, (e.g. Eickhoff et al., 2017). More recent conceptualisations move back towards breadth, with (Palagi et al., 2017) describing it as requiring a '*serendipitous attitude*'

on the part of the searcher, and focusing on open-ended goals with evolving, complex information needs. Complexity is further reinforced as a key feature of exploratory search in (Athukorala et al., 2016), although this discovery is again downplayed in this work.

While Marchionini's definition (Marchionini, 2006) included searches that were specifically exploratory, exploring a topic or problem space, the definition of exploratory search began to narrow in 2009, when White and Roth defined it explicitly as search where information seekers were trying to learn something, rather than merely explore (White and Roth, 2009).

Over time, the formulation of exploratory search has moved closer to a series of searches that follow from each other as the information seeker becomes more aware of a domain: a conception that is much closer to search as learning, and neglects, or by design excludes, browsing other than conventional web browsing.

This phenomenon has been commented on most pointedly by (Medlar et al., 2024), in their extensive literature review on exploratory search. They note that seventy-seven per cent of the literature that they synthesised focused narrowly on novel search interfaces, and a further twenty per cent of papers were themselves purely literature-based. Furthermore, a full half of those literature-based papers drew solely on articles and papers from computer science. This leaves a mere three per cent of studies primarily focused on information seeker behaviours or elements of exploratory search beyond the search specifically. Even there, Medlar et al. (2024) note with disappointment a predominance of university students and staff in the participants of each study, a dearth of qualitative investigations, a limited range of highly stereotyped tasks and that most questionnaires used to assess the systems being studied had not been validated. In general, the burgeoning of a literature on exploratory search has not comprised of a balanced range of methods, participant groups, varieties of tasks and study designs. Rather, we have an abundance of information on novel designs for search interfaces, and precious little on the wider range of activities involved in learning and investigation.

Marchionini's original conception of exploratory search (Marchionini, 2006), included more unconventional, less analytical search strategies, and information discovery methods beyond search. These actions, though, are almost entirely absent from the literature on exploratory search. White and Roth (2009) also set exploratory search within a wider canvas of information behaviours. They highlighted relationships with other concepts such as Marcia Bates' highly-regarded berrypicking model (Bates, 1993), which are technology-agnostic and do not presume the presence or absence of any single information seeking tool. A different perspective on exploratory search notes that it does not map well to traditional information seeking models, such as Marchionini's own model or Ellis' model, which include browsing. This is notable, given that a '*serendipitous attitude*' (Palagi et al., 2017) (strongly associated with browsing (Foster and Ford, 2003)) is a key element of exploratory search, and that discovery and exploration, typically associated with browsing, were part of the early definition. White and Roth explicitly note '*exploratory browsing*' as part of exploratory searching, although they do not define this as an activity. It is clear that exploratory searching and browsing are likely to interact, but how?

The relationship between search and browse

While descriptions of both searching and browsing hint at each other, the two activities are predominantly treated as separate, for example, as portrayed in (Marchionini, 1997). This separation is found in many early models of information seeking (e.g. Ellis, 1989; Kuhlthau, 1991). We will next look at how searching and browsing are depicted in different models and are related to or contrast with each other. As we shall see, this separation further reflects a separation in research communities between, for example, information retrieval versus information science. In turn, that separation has underpinned a dearth of empirical work that explores digital browsing.

Information seeking and behaviour models

Early information seeking models all treat searching and browsing as separate activities, (Ellis, 1989; Kuhlthau, 1991; Marchionini, 1997). Marchionini explicitly notes that searching and browsing are interleaved in the digital information seeking experience, and that information seekers likely cycle between them (Marchionini, 1997). Ellis depicts browsing as '*undirected searching*' and that systems need only to simply surface metadata to facilitate browsing (Ellis, 1989). Kuhlthau's model has an exploratory investigative stage at the beginning of the model, where she notes that interactions between information seekers and systems is awkward (Kuhlthau, 1991). While in her model, information seekers move towards more focused information searching, she does note that they may cycle between these phases. Each of these models allows for the possibility that information seekers may wish to begin with browsing, but they each also have a clear focus on search. This is in contrast to Wilson's overview of models, which, while it does not explicitly mention browsing, does clearly note that information search is not the entirety of information behaviour (Wilson, 2010). Foster's nonlinear model further eschews search as a core component of information seeking, instead putting it on a par with browsing as an opening move. Neither move has to happen, but both might, depending on other features such as the context of the information need and the openness of the information seeker (Foster, 2004).

There are orthogonal models of information seeking and behaviour that may more effectively reflect browsing as an activity. While Pirolli and Card's information foraging model (Pirolli and Card, 1999) is primarily a behavioural economic model of information behaviour, the goal of information seekers in this model is to find a rich patch of information. That said patch might conceivably represent Bates' *interesting scene* (Bates, 2007). Bates' own berrypicking model (Bates, 1989), one of the earliest descriptions of and reflections on the need for digital browsing, is a form of situated action model (Suchman, 1987), where the information seeker and the environment interact in ways that change the trajectory of the information seeking. The information gathering described in Bates' model, though, is explicitly an outcome of browsing, and the comparative selection mirrors the comparison described by both (Kwasnik, 1992) and (McKay et al., 2019). A final clue to the relationship between searching and browsing is found in Foster and Ford's discussion of serendipity in interdisciplinary research, in which they note that, '*paradoxically, researchers may have an idea about where potentially useful material may be found – but be unsure about the exact nature of the content that may be expected*' (Foster and Ford, 2003, p. 333). This suggests that these researchers may engage in navigation to these locations, possibly using search, but that their goals when they reach them are open-ended. This suggests a form of information seeking where searching may be subordinate to browsing, even in a digital context.

Information retrieval and digital browsing

Far and away the vast majority of work on digital interfaces that help find information has focused on search. Search is a natively digital technology, as noted earlier, and therefore the paradigm lends itself better to digital development. The discipline of information retrieval has been born out of mechanisms that quantify the quality of search, and therefore make it easier to compare different approaches to the same problem (Baeza-Yates and Ribeiro-Neto, 1999; Fidel, 2012). The information retrieval community, when browsing is mentioned, typically assumes browsing of a search results page, possibly with facets to narrow a broad, exploratory search space (Ballard and Blaine, 2011; Suominen et al., 2007; White and Morris, 2007). Fundamentally, though, these interfaces, do not provide the rich, search-free experience that browsing requires (McKay et al., 2018), and so the browsing that occurs in them is a very limited simulacrum of what is possible.

The division between information retrieval, which deals in search, and information behaviour, which encompasses browsing, is perhaps most eloquently captured by Raya Fidel in chapter 10 of her book (Fidel, 2012). She notes that search engines get developed because information retrieval folk are instrumentalist, and they have metrics to determine whether changes make a search

engine better. In contrast information scientists, in her view, lack the technical capability necessary to digitally instantiate the behaviours they study, and cannot provide concrete enough goals to interest information retrieval specialists. A clear example of the disjunction in understanding comes from Olston's work on scent trails: browsing is described as '*inefficient*' because of '*weak scent trails*' (Olston and Chi, 2003). This approach fundamentally misunderstands browsing: efficiency is not a core component of the browsing experience, which is about pleasure, serendipity and exploration (Foster and Ford, 2003; McKay et al., 2020). The canon of the one true answer in information retrieval has been repeatedly critiqued (Bates, 1984; Burrows, 2012; Cooksey, 2004; Dörk et al., 2011; Helberger, 2011; McKay et al., 2020), with commentators calling for diversity, visual interfaces and serendipity to support better digital information experiences, including search. The need for search-free interaction is specifically noted as a requirement by some commentators (Kwasnik, 1992; McKay et al., 2018; McKay et al., 2020; Thudt et al., 2012): there is a genuine need for browse-first interactions that focus on browsing and exploration.

Some interfaces have been developed specifically to support exploration (Kleiner et al., 2013; Thudt et al., 2012), but they, too, lack many of the characteristics of successful physical browsing interfaces (and potentially the vast support of information retrieval researchers) to be widely utilised or successful (McKay et al., 2018). This is particularly surprising given the financial incentives to get browsing right: it is a key component of the physical shopping experience (Xia, 2010), and people want it online (Rowley, 2002), but the tools are unsatisfying (Detlor et al., 2003) and limit what shoppers can actually achieve (Detlor et al., 2003). Nonetheless, studies of people actually attempting digital browsing have shown that they are effective at co-opting a series of tools to create broadly satisfying browsing experiences that are recognisably browsing, in the definition offered in this paper (Zhang et al., 2022). One of the key tools in digital browsing is search, perhaps because of its dominance in online interaction. Nonetheless, the use of search as a prop for browsing does not occur in the major information seeking models, which are predominantly search-first, nor in search typologies. This is a previously un- or under-recognised activity, and one that cuts across many classifications of search, as we will see in the next section.

Searching to browse

The literature on interactions between searching and browsing predominantly positions browsing as a subordinate or less-than information activity, a fallback when search does not or cannot work (Ellis, 1989; Kuhlthau, 1991; Marchionini, 1997; Wilson, 1999). Search typologies (Broder, 2002; Rose and Levinson, 2004) and the literature on exploratory search (e.g. Athukorala et al., 2016; Marchionini, 2006; Medlar et al., 2024; Palagi et al., 2017; White and Roth, 2009) barely mention browsing, and digital information interfaces have focused predominantly on search. However, others have noted the relationship between searching and browsing. In digital libraries, Witten's Greenstone project was field leading (all three authors had the privilege of spending time on it). Witten argued that in large collections, search was a vital tool to reduce the quantity of material to browse down to a workable size (Witten et al., 2009). They argued that keyphrases and other indexes were a potential alternative that also could enable browsing, as demonstrated in (Paynter et al., 2000). However, such alternatives are seldom found in today's even larger digital collections.

The contribution of this paper is to add to the search typologies an under-recognised form of searching: searching to browse. In this form of searching, the goal is certainly not to find a single object. Rather the goal is instead a collection of things that can be browsed for selection, serendipity, or leisure (Bates, 2007; Celoria, 1969; Herner, 1970; Rice et al., 2001). Searching to browse has been identified in some previous literature on physical browsing, including McKay's typology (McKay et al., 2019), and Kwasnik's work (Kwasnik, 1992), although only tangentially.

In contrast, when we turn to digital browsing, Zhang's description highlights how important search is for digital browsing, noting that the first action of digital browsing is to select a collection to browse (Zhang et al., 2022). This action is one that is rarely seen in the physical context, as the time

cost of physically moving between collections is often prohibitive: for example, a reader having gone to the British Library would face over an hour's travel to switch to the library of the UK National Archives, although both are in London. When the collections are online, though, searching becomes a key means of locating or generating a collection: for example, one can rapidly relocate from an online collection in the British Library to another related one hosted by the National Library of New Zealand.

Some examples of searching to browse involve simple navigational searches to a known source: Zhang gives an example of a browser searching for a previously seen social media feed (Zhang et al., 2022). Similarly, Rowley describes shoppers searching for a name brand to identify a website where they might shop (Rowley, 2002).

Searching to browse can also be what Rose and Levinson termed an informational list search (Rose and Levinson, 2004), where searchers generate a list of candidates to be consumed. This is described in Zhang's work (Zhang et al., 2022), where one of her participants searched Google for '2021 best sci-fi novels list', which produces both a collection (seen in Figure 1 below), and a list of other collections that may be useful (examples at the bottom of Figure 1). The existence of the Google presented collection is one example of a craft-informed, if not scientifically based, recognition of searching to browse, and shows one way that searching to browse might be incorporated even into the most mainstream interfaces.

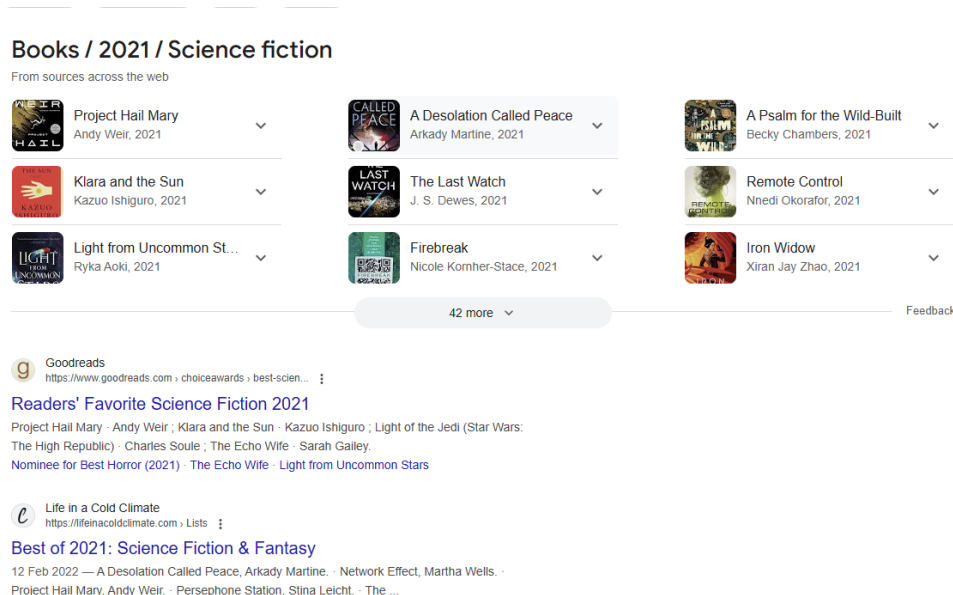


Figure 1. Google results for '2021 best sci-fi novels list'

Finally, some observed searches are exploratory, berrypicking style, searches to generate a candidate list. Zhang notes this in her study, where people used tabs and wishlists to create persistent collections they could go back to and browse at leisure (Zhang et al., 2022). Fan and Chiu also described this phenomenon, calling the created collection an 'intermediate candidate list' (Fan and Chiu, 2022).

As we can see, searching to browse is a cross-cutting search activity, with targets including stores, social media accounts, individual items to be curated into a collection and algorithmically generated collections. Existing search typologies do not adequately account for this behaviour, nor does the distinction between searching and browsing. Discussions of interleaved (Marchionini, 1997) search and browse approach this type of searching, but do not explicitly describe it, and descriptions in the previous literature on physical browsing have been glancing.

The descriptions of searching to browse in this paper are based on empirical data as reported by the authors of the cited papers (Fan and Chiu, 2022; McKay et al., 2019; Rowley, 2002; Zhang et al., 2022), but are unlikely to be comprehensive; it seems likely for example that searchers may turn to generative AI tools to generate candidate lists in the future. We also do not have a clear picture of the process of searching to browse, which is likely to be as complex and detailed as other forms of search. The identification of searching to browse as an information seeking behaviour offers a novel opportunity to further investigate this behaviour, but also to develop search interfaces that specifically recognise and support this kind of search. Better searching to browse interfaces will improve experiences of both digital searching, by supporting an unrecognised goal, and digital browsing, by creating empirically grounded interfaces to support it.

Conclusion

In this paper we have conducted an extensive review of literature on information seeking, searching and browsing. We have closely examined descriptions of the relationship between searching and browsing in the literature, and looked at historical reasons for the lack of support for digital browsing. We have also looked at novel studies of digital browsing, noting previously unrecognised strategies for generating browsing experiences that do not rely on specific tools.

Through our analysis, we have identified a previously unrecognised form of search: searching to browse, where the goal is not an item or items, but instead a (possibly nondeterministic) set of items that allows for the serendipity, selection and pleasure associated with browsing.

The explicit framing of searching to browse affords new opportunities to develop effective digital information seeking interfaces, but also requires further study of this newly identified behaviour. Adequate, much less effective or enjoyable, support for digital between-document browsing has proven a difficult research challenge; one this novel perspective on the relationship between search and browse may help to address. Not all who wander among search results are lost: some are deliberately enjoying the scenery, and digital interfaces can, and must, support this activity.

Acknowledgements

We gratefully acknowledge the generous support of the Australian Research Council, Discovery Project DP210103923.

About the authors

Dana McKay is an Associate Professor and Inaugural Associate Dean at RMIT University, Australia, leading the Interaction, Technology and Information Discipline of the School of Computing Technologies. Dana has been studying information interaction for twenty-five years in both professional and academic contexts. Dana can be contacted at dana.mckay@rmit.edu.au

Michael Twidale is a Professor at the University of Illinois Urbana-Champaign School of Information. His research interests include computer-supported cooperative work, computer-supported collaborative learning, human-computer interaction, information visualisation and museum informatics. Michael can be contacted twidale@illinois.edu

George Buchanan is a Professor and Deputy Dean for Research at RMIT University Australia's School of Computing Technologies. George is an international pioneer of mobile interaction design and advances interfaces for digital libraries. Prof. Buchanan is an Honorary Life Fellow of the Royal Society of Arts. George can be contacted at george.buchanan@rmit.edu.au

References

- Apted, E., & Choo, C. (1971). General purposive browsing. *Library Association Record*, 73(12), 228-230.
- Athukorala, K., Głowacka, D., Jacucci, G., Oulasvirta, A., & Vreeken, J. (2016). Is exploratory search different? A comparison of information search behavior for exploratory and lookup tasks. *Journal of the Association for Information Science and Technology*, 67(11), 2635-2651. <https://doi.org/https://doi.org/10.1002/asi.23617>
- Baeza-Yates, R., & Ribeiro-Neto, B. (1999). *Modern information retrieval* (Vol. 463). ACM Press New York.
- Baeza-Yates, R., & Ribeiro-Neto, B. (2011). *Modern information retrieval: the concepts and technology behind search* (2nd ed.). Addison-Wesley, Pearson.
- Ballard, T., & Blaine, A. (2011). User search-limiting behavior in online catalogs: Comparing classic catalog use to search behavior in next-generation catalogs [DOI: 10.1108/03074801111136293]. *New Library World*, 112(5), 261-273. <http://dx.doi.org/10.1108/03074801111136293>
- Bates, M. J. (1979). Information search tactics. *Journal of the American Society for Information Science*, 30(4), 205-214. <https://doi.org/10.1002/asi.4630300406>
- Bates, M. J. (1984). The fallacy of the perfect thirty-item online search. *RQ*, 24(1), 43-50. <http://www.jstor.org/stable/25827281>
- Bates, M. J. (1989). The design of browsing and berrypicking techniques for the online search interface. *Online review*, 13(5), 407-424. <https://doi.org/10.1108/eb024320>
- Bates, M. J. (1993). The design of browsing and berrypicking techniques for the online search interface. *Online Information Review*, 13(5), 407-424. <https://doi.org/10.1108/eb024320>
- Bates, M. J. (2007). What is browsing--really? A model drawing from behavioural science research. *Information Research*, 12(4) paper 330.
- Belkin, N. J., Cool, C., Stein, A., & Thiel, U. (1995). Cases, scripts, and information-seeking strategies: on the design of interactive information retrieval systems. *Expert Systems with Applications*, 9(3), 379-395.
- Broder, A. (2002). A taxonomy of web search. *SIGIR Forum*, 36(2), 3-10. <https://doi.org/10.1145/792550.792552>
- Burrows, T. (2012). A machine for browsing: beyond the "single search box". *OCLC Systems & Services*, 28(1), 56-58. <https://doi.org/10.1108/10650751211197077>
- Bush, V. (1945). As we may think. *The Atlantic*, 176(1), 101-108.
- Celoria, F. (1969). The archaeology of serendip. *Library Association Record*, 70(1), 251-253.
- Cleverdon, C. (1967). The Cranfield Tests on index language devices. *Aslib Proceedings*, 19(6), 173-194. <https://doi.org/10.1108/eb050097>
- Cooksey, E. B. (2004). Too important to be left to chance—Serendipity and the digital library. *Science & Technology Libraries*, 25(1-2), 23-32. https://doi.org/10.1300/J122v25n01_03

- Dervin, B. (1998). Sense-making theory and practice: an overview of user interests in knowledge seeking and use. *Journal of Knowledge Management*, 2(2), 36-46. <https://doi.org/10.1108/13673279810249369>
- Detlor, B., Sproule, S., & Gupta, C. (2003). Pre-purchase online information seeking: Search versus browse. *Journal of Electronic Commerce Research*, 4(2), 72-84.
- Dörk, M., Carpendale, S., & Williamson, C. (2011). *The information flaneur: a fresh look at information seeking* Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Vancouver, BC, Canada. <https://doi.org/10.1145/1978942.1979124>
- Eickhoff, C., Gwizdka, J., Hauff, C., & He, J. (2017). Introduction to the special issue on search as learning. *Information Retrieval Journal*, 20(5), 399-402. <https://doi.org/10.1007/s10791-017-9315-9>
- Ellis, D. (1989). A behavioural approach to information retrieval system design. *Journal of Documentation*, 45(3), 171-212. <https://doi.org/doi:10.1108/eb026843>
- Fan, C.-H., & Chiu, T.-P. (2022). Study of online shopping behavior differences between goal-directed search and exploratory browsing in intermediate choice list on e-commerce: how do people shop with purpose and without purpose in e-commerce and what role ICL be in the online shopping process. In Proceedings of the 6th International Conference on E-Commerce, E-Business and E-Government, Plymouth, United Kingdom. <https://doi.org/10.1145/3537693.3537717>
- Fidel, R. (2012). *Human information interaction: an ecological approach to information behavior*. MIT Press.
- Foster, A. (2004). A nonlinear model of information-seeking behavior. *Journal of the American Society for Information Science and Technology*, 55(3), 228-237. <https://doi.org/10.1002/asi.10359>
- Foster, A., & Ford, N. (2003). Serendipity and information seeking: an empirical study. *Journal of Documentation*, 59(3), 321-340.
- Hancock-Beaulieu, M. (1993a). A comparative transaction log analysis of browsing and search formulation in online catalogues. *Program: Electronic Library and Information Systems*, 27(3), 269-280. <https://doi.org/10.1108/eb047145>
- Hancock-Beaulieu, M. (1993b). Evaluating the impact of an online library catalogue on subject searching at the catalogue and at the shelves. *Journal of Documentation*, 46(4), 318-338. <https://doi.org/10.1108/eb026863>
- Hancock-Beaulieu, M. (1993). A comparative transaction log analysis of browsing and search formulation in online catalogues. *Program*, 27(3), 269-280. <https://doi.org/10.1108/eb047145>
- Helberger, N. (2011). Diversity by design. *Journal of Information Policy*, 1, 441-469. <https://doi.org/10.5325/jinfopoli.1.2011.0441>
- Herner, S. (1970). Browsing. In *Encyclopedia of Library and Information Science* (Vol. 3). Dekker.
- Jansen, B. J., Spink, A., Bateman, J., & Saracevic, T. (1998). Real life information retrieval: a study of user queries on the Web. *SIGIR Forum*, 32(1), 5-17. <https://doi.org/10.1145/281250.281253>

- Kim, J. (2009). Describing and predicting information-seeking behavior on the Web. *Journal of the American Society for Information Science and Technology*, 60(4), 679-693. <https://doi.org/https://doi.org/10.1002/asi.21035>
- Kleiner, E., Rädle, R., & Reiterer, H. (2013, April 27-May 2). *Blended shelf: reality-based presentation and exploration of library collections* CHI 13, Paris, France.
- Kuhlthau, C. C. (1991). Inside the search process: information seeking from the user's perspective. *Journal of the American Society for Information Science*, 42(5), 361-371.
- Kwasnik, B. H. (1992). *A descriptive study of the functional components of browsing*. In Proceedings of the IFIP TC2/WG2. 7 Working conference on Engineering for Human Computer Interaction, Brighton, England.
- Levine, M. M. (1969). An essay on browsing. *Research Quarterly*, 9(1), 35-93. <http://www.jstor.org/stable/25823562>
- Marchionini, G. (1997). *Information seeking in electronic environments*. Cambridge University Press.
- Marchionini, G. (2006). Exploratory search: from finding to understanding. *Communications of the ACM*, 49(4), 41-46.
- McKay, D., Buchanan, G., & Chang, S. (2018). It ain't what you do, it's the way that you do it: design guidelines to better support online browsing. *Annual Meeting of the Association for Information Science and Technology*, 55(1), 347-356. <https://doi.org/10.1002/pr2.2018.14505501038>
- McKay, D., Chang, S., Smith, W., & Buchanan, G. (2019). The things we talk about when we talk about browsing: an empirical typology of library browsing behavior. *Journal of the Association for Information Science and Technology*, 72(12), 1383-1394. <https://doi.org/10.1002/asi.24200>
- McKay, D., Makri, S., Chang, S., & Buchanan, G. (2020). On birthing dancing stars: the need for bounded chaos in information interaction. In *Proceedings of the 2020 Conference on Human Information Interaction and Retrieval*, Vancouver BC, Canada. <https://doi.org/10.1145/3343413.3377983>
- Medlar, A., Kotkov, D., & Głowacka, D. (2024). Unexplored frontiers: a review of empirical studies of exploratory search. *SIGIR Forum*, 58(1), 1-19. <https://doi.org/10.1145/3687273.3687278>
- Olston, C., & Chi, E. H. (2003). ScentTrails: Integrating browsing and searching on the Web. *ACM Transactions on Computer -Human Interaction*, 10(3), 177-197. <https://doi.org/10.1145/937549.937550>
- Palagi, E., Gandon, F., Giboin, A., & Troncy, R. (2017). A survey of definitions and models of exploratory search. In *Proceedings of the 2017 ACM Workshop on Exploratory Search and Interactive Data Analytics*, Limassol, Cyprus. <https://doi.org/10.1145/3038462.3038465>
- Paynter, G. W., Witten, I. H., Cunningham, S. J., & Buchanan, G. (2000). Scalable browsing for large collections: a case study. In *Proceedings of the Fifth ACM Conference on Digital libraries*, San Antonio, Texas, USA.
- Pirolli, P., & Card, S. (1999). Information foraging. *Psychological Review*, 106(4), 643-675. <https://doi.org/https://doi.org/10.1037/0033-295X.106.4.643>
- Rice, R. E., McCreadie, M., & Chang, S.-J. L. (2001). *Accessing and browsing information and communication*. MIT Press.

- Robertson, S. (2008). On the history of evaluation in IR. *Journal of Information Science*, 34(4), 439-456.
- Rose, D. E., & Levinson, D. (2004). Understanding user goals in web search. In *Proceedings of the 13th International Conference on World Wide Web*, New York, NY, USA. <https://doi.org/10.1145/988672.988675>
- Rowley, J. (2002). 'Window' shopping and browsing opportunities in cyberspace. *Journal of Consumer Behaviour*, 1(4), 369-378. <https://doi.org/https://doi.org/10.1002/cb.81>
- Spink, A., Wolfram, D., Jansen, M. B. J., & Saracevic, T. (2001). Searching the web: The public and their queries. *Journal of the American Society for Information Science and Technology*, 52(3), 226-234. [https://doi.org/10.1002/1097-4571\(2000\)9999:9999](https://doi.org/10.1002/1097-4571(2000)9999:9999)
- Suchman, L. A. (1987). *Plans and situated actions: the problem of human-machine communication*. Cambridge University Press.
- Suominen, O., Viljanen, K., & Hyvönen, E. (2007). User-centric faceted search for semantic portals. In *The Semantic Web: Research and Applications: 4th European Semantic Web Conference, ESWC 2007, Innsbruck, Austria*. http://dx.doi.org/10.1007/978-3-540-72667-8_26
- Thatcher, A. (2008). Web search strategies: the influence of web experience and task type. *Information Processing & Management*, 44(3), 1308-1329. <https://doi.org/https://doi.org/10.1016/j.ipm.2007.09.004>
- Thudt, A., Hinrichs, U., & Carpendale, S. (2012). The bohemian bookshelf: supporting serendipitous book discoveries through information visualization. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, Austin, TX.
- Toms, E. G. (2000). Understanding and facilitating the browsing of electronic text. *International Journal of Human-Computer Studies*, 52(3), 423-452. <https://doi.org/https://doi.org/10.1006/ijhc.1999.0345>
- Vakkari, P. (2016). Searching as learning: a systematization based on literature. *Journal of Information Science*, 42(1), 7-18. <https://doi.org/10.1177/0165551515615833>
- White, R. W., & Morris, D. (2007). Investigating the querying and browsing behavior of advanced search engine users. In *Proceedings 30th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, Amsterdam, The Netherlands. <https://doi.org/10.1145/1277741.1277787>
- White, R. W., & Roth, R. A. (2009). Exploratory search: Beyond the query-response paradigm. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, 1(1), 1-98.
- Wilson, T. D. (1999). Models in information behaviour research. *Journal of Documentation*, 55(3), 249-270.
- Wilson, T. D. (2010). Information sharing: an exploration of the literature and some propositions. *Information Research*, 15(4), n4.
- Witten, I. H., Bainbridge, D., & Nichols, D. M. (2009). *How to build a digital library* (2nd ed.). Morgan Kaufmann Publishers Inc.
- Xia, L. (2010). An examination of consumer browsing behaviors. *Qualitative Market Research: An International Journal*, 13(2), 154-173. <https://doi.org/10.1108/13522751011032593>

- Zhang, H., Buchanan, G., Kelly, R., Twidale, M., Chang, S., & McKay, D. (2022). It's still rock and roll to me: a model of online browsing behaviour. In *Proceedings of the Association for Information Science and Technology*, 59(1), 381–392. <https://doi.org/https://doi.org/10.1002/pra2.761>
- Zhang, H., McKay, D., Twidale, M., & Buchanan, G. (2024). Something just like this: a secret history of the role of analogues in information seeking. In *Proceedings of the 2024 Conference on Human Information Interaction and Retrieval*, Sheffield, United Kingdom. <https://doi.org/10.1145/3627508.3638317>

© CC-BY-NC 4.0 The Author(s). For more information, see our [Open Access Policy](#).