

Understanding Complex Casual Leisure Information Needs: An Analysis of Search Requests for Books, Games, Movies and Music (Extended Related Work)

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EXTENDED RELATED WORK

Casual leisure & complex information needs

Over the past decades, search engines—as well as other information access technology and paradigms—have grown to play an important role in our everyday lives. As a result, there has been a commensurate increase in research into how people search for information, what they search for, and how we should design search engines to best support this behavior. Understanding the *information needs* that give rise to our information seeking behavior is of special importance (Taylor 1968; Belkin et al. 1982; Savolainen 1995, 2017; Borlund and Pharo 2019; Byström and Kumpulainen 2020). For instance, different types of information needs may require different (meta)data sources to solve them and a better understanding of these dependencies could help improve the quality of search engine results.

Taylor (1968, p. 392) was the first to introduce the concept of information needs and argued how they can exist at four different levels:

- (1) The *visceral* need, which represents what (Taylor 1968) calls the “ideal question”—a representation of the actual, but unexpressed need for information. If the user was able to express this need perfectly, then an ideal system would return exactly what the user desired.

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- (2) The *conscious* need, where the user creates a conscious mental description of their visceral need, typically in the form of an “ambiguous and rambling statement”. At this stage, the user could talk to someone else in the field to get an answer and hopefully get rid of some of the ambiguities in their statement.
- (3) The *formalized* need, which is a “qualified and rational” statement and an unambiguous description of the information need. This is what the user typically likes to believe the search engine will help answer.
- (4) The *compromised* need, where the formalized need has been constrained and transformed to match input into a specific information system. This corresponds to, for instance, the actual queries entered into a Web search engine.

(Taylor 1968) considered these four types to represent different stages in the development of an information need, although others have proposed that they are not necessarily sequential stages, but rather different levels of understanding of the same need (Cole 2011). According to (Taylor 1968), the assessment of information needs can vary radically from person to person and change with each step taken by an individual user.

This allows users to make predictions about future information needs, which is essential when they evaluate keeping decisions for easier future re-finding of information (Bruce 2005). Recently there has been a resurgence of studies that discuss what drives search behavior and the roots of information needs (Savolainen 2017; Borlund and Pharo 2019; Byström and Kumpulainen 2020). Savolainen (2017) presents a systematic overview of how certain human information behavior models defined *information need* and what kind of strengths and limitations can be identified in these approaches. Borlund and Pharo (2019) performed a study on everyday life information needs in order to obtain a deeper understanding and insight of what constitute information needs, and how they can be characterised. Byström and Kumpulainen (2020) develop a conceptual framework of task-based information needs, which accounts for sequential, vertical and horizontal relationships between information needs. All these studies hint at the fact that a complete conceptual understanding of what characterizes information needs is still missing and empirical studies validating the concepts are lacking.

Despite its influence on the field of information science, Taylor’s work has mostly been used at a conceptual level. Ruthven (2019) performed one of the first empirical investigations of Taylor’s information need classification by analyzing the linguistic differences between conscious and formalized needs present in 1,149 posts from four UK-based Internet forums devoted to different areas of life: diabetes, finance, mothers, and sexuality. After identifying 462 conscious and 689 formalized needs in his sample, his analysis revealed that conscious needs tend to be longer than formalized needs, more emotional in tone, and involve more sensory perception. The work we present in this article is similar to that of Ruthven (2019) in that we also analyze information needs posted to dedicated Internet discussion forums. While some of our needs resemble conscious information needs—often in the form of what Taylor called “ambiguous and rambling” statements (Taylor 1968, p. 392)—many of them are formalized representations of the users’ known-item needs. The nature of the Reddit discussion groups that we have targeted is likely responsible for this, as they are aimed specifically at answering known-item requests. Our analysis does not focus on the differences between conscious and formalized needs. The domains covered in our work also differ from those by Ruthven (2019) and exclusively cover casual-leisure situations. Finally, our analysis also focuses more on the relevance aspects expressed in these needs than on their linguistic properties.

While the concept of information needs has seen widespread adoption, there have also been diverging opinions. For example, (Wilson 1981) took a more behaviorist approach by suggesting abandoning the concept in favor of focusing exclusively on observable information seeking behavior. Nevertheless, information needs remain a core concept in information (seeking) behavior research, because of their usefulness in assessing effective search tactics as well as

connecting design suggestions for search engine tools to the motivations behind and desired outcomes of the seeking activities.

Another popular strand of research related to information needs has been to propose various conceptual and data-driven taxonomies of information needs in different domains. Early work on information needs mainly deals with indexing, classification and retrieval approaches (Allen 1996). More recently, the analysis and classification of information needs and tasks have been investigated in the context of the effective development of online public library catalogues (OPACs) (Lewandowski 2010) and digital libraries (Marchionini et al. 2003). Studying usage data from WorldCat.org, the world's largest bibliographic database, Wakeling et al. (2017) observed three main information needs: known-item, unknown-item (topical), and institutional information searches, with known-item requests being most common.

The rise of the Web prompted many studies of Web search behavior and subsequent taxonomies of Web search needs. One of the more influential ones was the trichotomy proposed by Broder (2002), who distinguished between (1) informational needs, where users want to find information about a topic; (2) navigational needs, where the user is trying to reach a particular known website, either because they have visited it before or because they assume it exists; and (3) transactional needs, where users are trying to “perform some web-mediated activity”. This taxonomy was later revised to informational, navigational, and resource finding by Rose and Levinson (2004), and further refined by Jansen et al. (2008), who proposed a hierarchical, three-level taxonomy with 14 subcategories of Web-related information needs.

The increased popularity of mobile devices also resulted in many studies of mobile information seeking behavior and how it differs from regular Web-based information seeking behavior. Both Church and Smyth (2008) and Sohn et al. (2008) proposed different taxonomies of mobile information needs based on diary-based studies of mobile information behavior. The taxonomy proposed by Church and Smyth (2008) comprised three *search types*—(1) informational, (2) geographical, and (3) personal information management—which was later expanded by Tate and Russell-Rose (2012) to include transactional needs. The taxonomy proposed by Sohn et al. (2008) focused more on lower-level tasks and domains, e.g., weather, travel, recipes. In addition to distinguishing between search types, Tate and Russell-Rose (2012) also proposed four *search motives* as a way of classifying information needs: (1) casual, (2) lookup (or known-item searching), (3) learn, and (4) investigate. Finally, another domain with specialized taxonomies of information needs is that of serious leisure (Stebbins 2007), which is especially relevant given our focus on casual-leisure needs collected from Reddit.

A growing body of research on this special type of everyday-life information seeking has shown that people's motivations, needs, and behavior are significantly different from, for instance, work-related information seeking behavior (Elsweiler et al. 2012). Studies on information behavior for successful living (Bates 1974), sense-making (Dervin 1983) and everyday life information seeking (Savolainen 1995) moved the focus away from work-tasks in information seeking to the importance of information behavior in everyday mundane and leisure contexts. Hartel (2019) refers to this shift of interest as *the everyday life turn*. Following Hartel et al. (2016), Vakkari noted a strong increase in everyday life information seeking studies. Between 1996 and 2008, an increase in everyday life information seeking studies could be noted with many focusing on serious, project-based or casual leisure information seeking scenarios (Stebbins 2001; Hartel et al. 2016). Hartel (2002), in a series of studies, investigated the role of information needs and behaviors in gourmet cooking. Elsweiler et al. (2010) collected and classified information needs in the context of television viewing, while Wilson et al. (2012) studied the information needs of book readers.

Our study is not only related to everyday-life information seeking, but is also part of a growing research community in information retrieval that focuses on complex search tasks (Belkin et al. 2017). Complex search tasks are characterised

by information seeking processes that usually include several search and discovery stages (Kuhlthau 1991; Marchionini 2006; Hyldegård 2009). Many known-item related information needs require users to not only rely on a single search engine, but instead combine different information sources and search strategies in order to satisfy their information needs. Research has shown that other people frequently serve as information sources to collaboratively fulfill information needs. Such social and collaborative information seeking activities include conversational aspects that are usually not covered by traditional search engines (Evans and Chi 2008; Shah 2010).

Collaborative information seeking activities have been studied for web search (Morris 2008) as well as for domain specific tasks (Hansen and Järvelin 2005). Golovchinsky et al. (2009) propose a taxonomy of collaboration in information seeking (systems) consisting of four dimensions: intent (explicit or implicit), depth of mediation (interface or algorithms), concurrency (synchronous vs. asynchronous) and location (co-located vs. distributed). While a number of tools and systems have been proposed to support collaborative information seeking (Capra et al. 2012; Morris and Horvitz 2007), less work has been done to evaluate those. Kelly and Payne (2014) studied the use and efficiency of two collaborative tools. Similar to re-finding tasks, persistence has been identified as a crucial element allowing collaborative search independent of time and space. However, an information overload has been reported when search histories are entirely stored without filtering options. Shah and González-Ibáñez (2010) analyzed and coded chat messages during a collaborative search tasks according to Kuhlthau's ISP stages (Kuhlthau 1991). While the occurrence of all stages could be confirmed it has been shown that collaborative aspects add another dimension to the ISP not covered by Kuhlthau's model (Hyldegård 2009).

Social media and social question-answering services have been proven to be a good alternatives to simple keyword search. Morris et al. (2010a) compared search engine and social network information seeking behavior with 12 participants. While all of them preferred and could solve their requests using a search engine more than half reported to use social media in addition to receive personalized information and validation. Search engine and social searching appeared complementary at different stages of the information seeking process. Other studies have investigated user motivations (Choi and Shah 2015) as well as needs and query types (Harper et al. 2010; Morris et al. 2010b) confirming that the majority of questions in social media are for recommendation or opinion needs expecting subjective information. Although the majority of questions posted to social Q&A services quickly receive one or more answers—this does not mean all answers are useful or of high-quality. Therefore, several studies have focused on user satisfaction and quality assessment of answers either from a user perspective, through automatic detection, or a combination of both (Harper et al. 2008; Shah et al. 2014; Kim and Oh 2009; Liu et al. 2008). Shah et al. (2014) argue that the quality of questions is directly related to its answer-ability, the selection of appropriate answers and the quality of answers. In contrast, Yang et al. (2011) analyzed unanswered questions on Yahoo! Answers based on their content, length, category match, askers' history, time, subjectivity, and politeness with the goal to predict and avoid low-quality questions. However, there is no clear answer yet to the question of how to identify the best answers out of a variety of community responses (Molino et al. 2016). It has been shown that complex information needs pose special challenges for search and recommendation systems (Gäde et al. 2015; Koolen et al. 2017) and are one of the reasons people turn to alternative sources like forums.

In our analysis of information needs posted to forums, our focus is exclusively on information needs in the casual leisure domain. A previous study focused on the known-item requests for five domains, including the ones reported here (Meier et al. 2021). In the following sections we focus on the four selected domains of books, games, movies and music and summarize selected previous work and findings.

Books

In comparison to other information seeking domains, book search and discovery has been studied more extensively. Some studies focus on book selection (Reuter 2007; Ross 1999; Serantes 2009; Mikkonen and Vakkari 2016) rather than on the search process. Also analog books search tactics are studied in physical bookshops (Buchanan and McKay 2011) or libraries (Mikkonen and Vakkari 2012; Pejtersen 1992).

For example, Serantes (2009) describes a small-scale study of selection behavior of comic books. She found that the genre of comic book and the importance of other readers' recommendations were particularly important. This suggests that search and recommendation support both comic book selection. Buchanan and McKay (2011) investigated search activities of customers in bookshops. They find that enquiries often arise from cultural context and reading with others, references and reviews in media and argue that customers mental models may deviate from the standard bibliographic metadata. Mikkonen and Vakkari (2012) asked 1000 Finnish public library patrons about their search tactics, which were mostly for known books or authors.

Analyzing the same source of search requests as parts of this study (LibraryThing forums), Koolen et al. (2012) already described the complex nature of these search requests. Our categorization scheme is based on and adapted from relevance aspects in previous studies in the domain of books (Koolen et al. 2015; Ross 1999; Reuter 2007), but with the aim to cover multiple, related domains. The eight relevance aspects identified by Koolen et al. (2015) were elicited from LibraryThing book requests. They annotated the relevance aspects of 944 LibraryThing book search requests and analyzed their distribution. They find that book content and familiarity are the most frequent aspects in complex books search requests. They find that book content and familiarity are the most frequent aspects in complex books search requests. This study adapted their categorization scheme in order to allow for cross-domain comparisons.

Ross (1999) examined information behavior in the context of reading for pleasure. Through a study of 194 participants she found that readers select what books to read based on different aspects, such as (1) how their mood affects the desired reading experience; (2) recommendations from different sources, such as friends, bestseller lists and promotional campaigns; (3) and properties and elements of the book itself, such as the subject, characters, author, and the physical appearance. There is another strong overlap with the coding scheme for books by Mikkonen and Vakkari (2016), which is based on selections from library catalogs, using four simulated search tasks. Similarly, the classification scheme reflecting users' multifaceted reading goals developed by Pejtersen (1992), based on user-librarian conversations was considered.

Reuter (2007) studied the book selection behavior of children in a digital library setting. She identified a total of 46 different influencing factors, grouped along seven dimensions: accessibility, content, engagement, familiarity, metadata & physical entity, novelty, and socio-cultural aspects. These dimensions overlap partially with those mentioned by Ross (1999) and partly influenced our own coding scheme.

Other work (Bogers and Petras 2015, 2017) builds on the annotated book search requests in order to compare how the metadata of book descriptions supports a book searcher in finding different relevance aspects. Apart from some content elements (such as title, author and some character or plot elements), complex book search as analyzed here cannot succeed with current book metadata descriptions, even if user-generated content such as tags is added. Social book search applications like Goodreads¹ build on the importance of recommendations for discovering new books.

We base our coding scheme on naturally occurring search requests in forums to avoid the constraints introduced by existing systems and simulated tasks. This resulted in additional aspects, different grouping choices as well as a category for search task type.

¹<https://www.goodreads.com/>

Games

Although games represent the most recent casual leisure domain, a rather large body of game studies can be observed either dealing with classification or genres (Apperley 2006; Lee et al. 2014), description (Lee et al. 2016), experience with and motivation for playing games (Cairns et al. 2014; Hochleitner et al. 2015). Traditional metadata schemes seem only partly suitable to describe games in their complexity and interactive character. Alternative classifications and recommendation strategies for different types of games have been proposed focusing either on game characteristics (Aarseth et al. 2003; Elverdam and Aarseth 2007) or motivations for game selection based on engagement scales or player experiences (Ryan et al. 2006) as well as user appeal (Lee et al. 2017). Ryan et al. (2015) propose a clustering approach to relate different games based on a variety of characteristics instead of simple genre classification.

However, in contrast to most of the other domains mentioned in this section, game requests are less investigated, both in terms of studying game-related information needs as well as information seeking behavior with regard to games. To the best of our knowledge, the first approach focusing on games is the work by Bogers et al. (2019), who collected a set of 2,266 threads from three gaming-oriented Reddit subreddits (*'gamingsuggestions'*, *'gamesuggestions'*, and *'tipofmyjoystick'*), developed a coding scheme for the relevance aspects expressed in game requests posted to those subreddits, and annotated 521 of these requests. Their coding scheme contained five top-level categories of relevance aspects—content, metadata, experience, context, and interactivity—one category representing the type of information need and one representing the search process already undertaken by the user trying to re-find the known-item. Of the 521 requests, 50.8% consisted of game re-finding requests, which contained references to game content and metadata over 90% of the time. Focusing on game re-finding requests from the Reddit subreddit *'tipofmyjoystick'*, Jørgensen and Bogers (2020) found the majority of posts describe game metadata content and structure.

Movies

Movie information needs have not been given the same level of attention as books. In media studies and psychology, the relationship between watchers and movie choices has been studied, for example, the role of age or gender in movie genre selection (Banerjee et al. 2008). For movie selection, Austin (1979, 1985) found that high school students choose movies first based on plot, followed by the actors and then based on friend recommendations.

In the last two decades, there have been several studies on information seeking behavior related to videos in general and how users assess their relevance in results lists of video search engines. Studies of *movie-related* information seeking behavior—where the term ‘movie’ refers to a motion picture intended for some form of cinematic or home release, as opposed to shorter video clips or TV programs—are much rarer. Even rarer is a focus on movie re-finding. A first categorization of complex requests was performed by Bogers (2015), who annotated 400 IMDB forum threads into eight broad relevance categories with 30 sub-level categories. He developed a coding scheme for the relevance aspects expressed in these movie requests, which contained seven top-level categories of relevance aspects—comparisons, content, known-item, metadata, people, recommendation, and secondary properties—with 30 sub-level categories. Known-item requests made up 50.5% of the 275 requests, which were mostly posted to the *“I need to know”* message board dedicated to known-item needs. Bogers et al. (2018) expanded on this work by combining the 2015 crawl of the IMDB message boards with a non-overlapping crawl in February 2017 before the IMDB message boards were shut down later that month. They independently developed a coding scheme for the relevance aspects expressed in a sample of 538 movie requests and then compared and merged it with a similar coding scheme for book requests. Their coding scheme contained four top-level categories of relevance aspects—content, metadata, context, and experience—as well as a category for

classifying the type of information need. Known-item requests made up 86.4% of the 538 movie requests, which was due to the fact that threads from the “*I need to know*” message board outnumbered the other threads by an order of magnitude. The studies by [Bogers \(2015\)](#); [Bogers et al. \(2018\)](#) served as a motivation and background for our analysis of movie requests here.

In a related study also focused on movie re-finding, a corpus of known-item questions and answers collected from Yahoo! Answers by [Hagen et al. \(2015\)](#) contains 1,160 questions out of a total of 2,755 questions. [Hagen et al.](#) only annotated a sample of their total data set that contained false memories, for which they developed a coding scheme containing 15 different codes—character, lyrics, title, format, artist, time, origin, actor, plot, setting, company, scene, prop, mix-up, and URL—although this coding scheme was developed to describe movies, music and websites.

Later, [Zamani and Croft \(2020\)](#) linked the movies in the data set collected by [Hagen et al.](#) to the well-known MovieLens 20M benchmark data set² used in recommender systems research. They then used this augmented data set³ to evaluate a joint model for search and recommendation that combined MovieLens user ratings with unigram models for movie re-finding.

Music

In comparison to more well-known domains, research on music information retrieval (MIR) is still underrepresented lacking empirical data for system design and evaluation. However, information seeking and retrieval for music is a complex task often related to known-item and in particular to re-finding searches requiring additional access points next to general bibliographic data descriptions ([Lee 2010](#); [Itoh 2000](#)). For example, title searches are less effective for music pieces. Especially classical music appears in several different manifestations and often single pieces are part of a compilation ([King 2007](#)).

Some work investigates query logs in specific MIR systems or catalogues ([Itoh 2000](#)) or the potential of music reference services to better understand user intentions and needs ([Dougan 2013](#)). However, these studies are limited to specific systems and features. In order to overcome these limitations, research was expanded to everyday life natural language queries from different Q&A services ([Downie and Cunningham 2002](#); [Bainbridge et al. 2003](#); [Fu and Fan 2016](#); [Lee 2010](#)). Although bibliographic data are included in the vast majority of requests (75-80%), users often expressed uncertainty in remembering the right data and instead relied on individual and contextual information related to their information need ([Bainbridge et al. 2003](#); [Downie and Cunningham 2002](#)). Furthermore, requests are often very specific with no clear or easy answer ([Fu and Fan 2016](#)). [Lee \(2010\)](#) proposes a sophisticated taxonomy of information needs and relevance aspects. The study categorizes 1,705 queries from the Google Answer service with respect to form and topic. The majority of requests were re-finding searches to identify works (49.1%) or artists (36.4%). Most of these known-item requests however do not contain specific information about the target but rather include vague descriptions of an object. Searches are often triggered by a specific situation or person, for example, remembering a background song encountered in a restaurant or during childhood ([Lee 2010](#)). A large proportion of verifying and identifying tasks with contextual and social elements were confirmed by a user survey ([Lee and Downie 2004](#)).

Other researchers investigated music collections and organization strategies. [Kim and Belkin \(2002\)](#) asked 22 people to describe classical music pieces and how they would want to search for this kind of music. It appears that specific occasions, events or complementary material as well as emotional or social connections are used to organize and remember music.

² Available at <https://grouplens.org/datasets/movielens/20m/>, last visited June 13, 2024.

³ Available at <http://ciir.cs.umass.edu/downloads/movie-search-ml20/>, last visited June 13, 2024.

Descriptive aspects such as mood, feelings or other social experiences are subjective and changing, but play an important role when searching for existing music to accompany movies or other media ([Inskip et al. 2010](#))

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