User Experiences and Impressions of Recommenders in Complex Information Environments

Juha Leino and Kari-Jouko Räihä
University of Tampere, Department of Computer Sciences
Tampere Unit for Computer-Human Interaction
kjr@cs.uta.fi

Abstract

We studied how actual users find items of interest in today's complex, recommender-rich information environments, what role recommenders play in it, and if recommenders increase perceived social presence. We used applied ethnography, on-location observation and interviewing, and Amazon as the environment to get an accurate picture of user activity. We found that users are increasingly relying on recommenders in finding items of interest. Since they have developed strategies to combine keyword searching with recommenders for discovery, recommenders should not be developed in isolation of the whole because users do not use them in isolation. In addition, while some users feel that recommenders add to the sense of social presence, others feel that they are not enough to create a sense of others being present.

1 Introduction

> *And I think that this feature is good, this 'those who have bought this book have also bought that book.' I have found some books by that. For instance, I think that when I was looking for a book on these mercenaries, it gave me a good list. I found [by keyword searching] something that had something to do with it, and then I could search through it, and it works very quickly, because I can do kind of a cross-search, search for books on mercenaries. Then when I read about some of them, some that I might be interested in, and then I take one and then I go to this 'who bought this also read these,' and it shows books with similar themes.* – Participant 4

Recommender systems have become omnipresent in e-commerce. As Brent Smith, Amazon's director of personalization, says: "Personalized recommendations are at the heart of why online shopping offers so much promise" [10]. Already today, recommenders are affecting where we go for holidays, what newspaper articles we read, and what movies we watch, and there seems to be no limits to how they will be used in future.

While searching is seen as a way to help us find items that we know, recommenders are seen as means to discovery [5]. Combining the two is even touted as a "next Google" concept, and punters see in their mind's eye a future where such applications know more about us than we do ourselves [10].

Consequently, recommender systems have been frantically researched in both academia and industry. At the beginning, the research focused heavily on the algorithms and different accuracy metrics for them [6] while

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the user issues were not widely researched, perhaps to the detriment of the whole field [9]. Today, however, various user-related aspects are receiving increased attention. Our study is, as far as we know, the first that takes a detailed look on the combined use of user recommendations and searching by keywords.

One interesting user aspect is that of social presence. Research has focused on social presence as a precedent to trust and loyalty in e-commerce [1, 3] since lack of trust is seen as one of the greatest hindrances to the growth potential of e-commerce [3, 4]. E-loyalty, in turn, has been called a "competitive necessity" in e-commerce and shown to boost sales [11].

Nevertheless, the concept of social presence has not been well defined in the literature. In a study of Kalas [14], a social navigation system for food recipes, social presence was defined as a perception of "not being alone in the space", and we use this definition here. Social texture, features that indicate synchronous or asynchronous presence of others in the environment, was seen to provide the basis for social presence [14]. Furthermore, Kumar and Benbasat [8] showed that recommender systems, including customer reviews, increase the perception of social presence in addition to increasing the perception of usefulness.

Much of the research effort still focuses on different aspects of recommenders instead of complete recommender systems, and even less attention is paid to recommenders as parts of complex information environments where different ways of finding items compete for user attention, a scarce resource to begin with. Such e-commerce sites as Amazon offer various ways to browse the items, and recommenders are only one of many. As it is, we know little about how users actually use such complex environments. Research that deals both with search and social aspects has focused on social navigation (e.g., [2]), not on user recommendations. In fact, the only research done within the researcher community on the integral wholes that we know of is that of Kalas, "one of the most complete social navigation systems ever built" [12].

There are various reasons for this lack of research into the complex information systems as integral wholes. First, studying complex information environments is challenging for a number of reasons independent of the methodology used [8]. In addition, the environments need to be used for prolonged periods by numerous users to start to deliver the goods [14]. Even in the Kalas study, where 302 active users used the system for six months, the recommender system never actually started to work properly due to the sparsity problem [14]. Building complex information environments is an onerous task to begin with [8], and the difficulty of finding large numbers of motivated users is enough to discourage even the most intrepid researcher. Arranging financing is another complicating factor in such prolonged studies. Finally, while the commercial systems tend to be superior to the ones built by researchers, their data is not available to researchers [8].

Consequently, we have little knowledge of how users actually use complex information environments and what role recommenders have in finding items of interest. Where Kalas provided quantitative insight into what users did in the complex information environment in question, we were interested in seeing the actual use unfold and peak into the motivations and perceptions behind the actions. In addition, we wanted to see if the environment was indeed perceived as inherently social and if the perceived social presence affected the behavior in the environment. Thus, we used applied ethnography, in our case a combination of on-location observation with verbal protocol and interviewing, to study how six Finns found items of interest in Amazon, the world's biggest online retailer.

We chose Amazon to represent complex information environments because it has consistently been an early adopter and innovator of new e-commerce approaches [7, 8]. In particular, Amazon has used a wide array of recommender approaches for years. Moreover, Amazon has a very rich social texture.

Although our method limited us to six participants, thus limiting us to observing trends at general level rather than at subgroup level, our participants were genuine users with genuine motivation, and thus enabled us to see clear trends and interesting examples of actual user behavior in a complex information environment.

We found that while recommenders play an important role in finding items of interest and that users find them reliable, searching by keywords is not threatened by them. Recommendations are used both opportunistically and strategically. Opportunistic use refers to users using recommenders unpremeditatedly when seeing them while strategic use refers to recommenders being used intentionally even to the point of intentionally ma-

nipulating what gets recommended. In fact, while punters are talking of approaches combining recommenders with searches as the next Google, users are already combining searching and recommenders by seeding recommendations with searches.

On the perceived social presence, our participants divided into two distinct groups: Half felt that the social texture in Amazon did result in social presence while the other half felt that it did not. Nevertheless, we did see evidence that the actions of others made visible in the social texture affected the behavior of at least some users.

The rest of the paper is organized as follows. After discussing our method and participants, we take a look at how items of interest were found and what role recommenders played in it. Then we look at how the recommender use can be described as opportunistic or strategic, and the implications of this. Finally, we discuss the perception of social presence and how it affected the use.

2 Method and participants

2.1 Participants

The participants were six Finnish males, aged between 33 and 44. We refer here to Participant 1 as P1, Participant 2 as P2, etc. All were in working life, had at least polytechnic-level education, and were experienced Internet users.

A book purchase from Amazon was required for recruitment to ascertain that all were actual users of Amazon. On average, participants had purchased 10 books (between 2 and 30) from Amazon prior to the study. For the participants, the main reason for using Amazon was the availability of books. Four participants had also bought other items from Amazon. Participants had used Amazon for 4.5 years on average. Thus, our participants were actual users of Amazon. In contrast, many studies have used students acting as consumers [4, 13], which raises questions of external validity [3].

However, while our participants were all "genuine," they were all male, and men and women are known to have at least some differences as e-commerce customers [1]. Additionally, the number of our participants was low, and they ended up using Amazon only for buying non-fiction books during our observation sessions. Finally, cultural issues prevent us from generalizing the results too widely.

2.2 Method

We used applied ethnography, in this case a combination of observation with verbal protocol and interviewing at the participants' homes with them using their own computers, as our method to get an authentic view of real use.

While observation gives a picture of what users do and how they do it, it does not reveal their motivations and other reasons behind their actions. Verbal protocol, in spite of its limitations and potentially behavior-altering influence, is still our only way to get inside the participant's head during the action without the clouding of reflection that interviewing introduces. Thus, verbal protocol provides on-line insight while interviewing provides reflective insight into the actions of the participant. Combining interviewing with observation also avoids the say-do problem, the human tendency to describe what they do differently from what they actually do.

The observation-interview sessions, one per participant, lasted 2–3 hours each. The participants were given four tasks and asked questions before, during, and after each task. Care was taken not to direct participants' attention with the questions: during the tasks only some clarifying questions were asked when a user stayed on a page for a long time without visible or verbalised actions. After the tasks, a semi-structured interview was conducted. Finally, the participants filled in an online demographic questionnaire.

The sessions were videotaped with the video camera pointed at the computer screen to provide the context for verbal protocol. The video camera also recorded the interviews.

The tasks were given to the participants on a web site made for the study with each task on its own page. However, only the first two tasks are within the scope of this paper.

Task 1: "Buy a book (or books) from Amazon. Do not buy a book that you have already decided to buy. Instead, you should find a book that you have not decided to buy beforehand." On average, the participants used 23 minutes on Task 1.

Each participant was given 15 euros towards purchasing the book(s) in Task 1 to make sure that they selected a book they really wanted. This is significant because research suggests that people use "affect or other simple heuristics to guide their decisions" when the task does not involve them, the task is trivial, or they are not motivated, while in high-involvement situations, when people have something to lose or are simply deeply engaged, people use "cognitive analytical processing" [13]. In our study, the users were not paid *per se* or given a chance to win something by participating, which might have motivated them to take part in the study but not engage them any deeper in the tasks. Instead, what they received depended on how they did the task, involving them deeper in the task itself.

The participants were instructed to use the Amazon site that they most typically used. Three participants used .co.uk, two used .com, and one used both .com and .co.uk. The choice of site was given to preserve normal conditions although there are differences between the two interfaces.

Task 2: "You have bought a good digital camera and now you would like to buy a photography guide from Amazon. Which one of the books on the list would you buy?" The task page provided a link to the list page that was constructed to look like a list page in Amazon.co.uk. The page included books with high star rating, low star rating, no star rating, and one book with Search inside function available. A mock-up page was used to make sure that all these different conditions were present. The links on the page led to actual item pages in the .co.uk site. On average, 11 minutes were used on Task 2.

All sessions were transcribed and then contrasted for analyzing. No analysis software was used. Because the study method produced qualitative data, the goal of the analysis was to describe the observed behavior and to find patterns.

3 Results and discussion

3.1 The role of recommenders in finding items of interest

> *I don't know where this Kerouac thing came from. It came some weird route. The system kind of drove me to it. I kept getting closer and closer all the time and when I eventually was about to take the other book that was more at general level, it pushed this Kerouac's memoirs at me [laughs] and I couldn't resist it or ignore it. If I were in a bookstore, how the hell would I end up with something by Kerouac? I'd be there looking at some painting books and the link between Kerouac and tankha-paintings would be hard to draw, it just wouldn't happen, and in that sense I'd be there, probably looking at some impressionistic painting guides [laughs], and think that maybe this is not quite what I wanted.* – P4

In Task 1, seven books were bought. Three were found by recommendations and four by keyword searches. P3 used directly personalized recommendations and found his book. P2 also started with personalized recommendations but he already owned the only interesting book in them and continued with keyword search. Three participants, P1, P4, and P5, used keyword searches directly while P6 started with categories but moved to keyword searching after failing to locate any interesting books.

P1 found a book with keyword searches but after putting it into the shopping cart, he saw an impulse item recommendation for another book and went to its item page. When seeing an offer to buy the book in the basket with the new book ("Perfect Partner" recommendation), he decided to buy both for about £40 even though he had earlier on mentioned wanting to get a book on the subject for about £10. P5 was also interested in the

"Perfect Partner" recommendation, but he already had the recommended book. P4 found the book to buy from "Customers who bought this item also bought" list after a few searches.

In practice, all participants used recommendations in the item-finding process. Table1 summarizes the recommender use in Task 1. Interestingly, all three books found by recommendations could be characterized as serendipitous. Participants found items that they would not have found otherwise and that were exactly what they wanted. Thus, the recommenders were clearly providing discovery.

Task 1	P1	P2	P3	P4	P5	P6	Total
Bought a book offered by algorithmic recommender	•		•	•			3
Bought a book found by keyword searching	•	•			•	•	4
Used keyword search	•	•		•	•	•	5
Used categories for searching						•	1
Used "Perfect Partner"	•			•	•		3
Used personalized recommendations (at the beginning)		•	•				2
Used "Customers who bought/viewed this item…"	•			•		•	3
Used "Explore similar items"						•	1

Table 1: Recommendation use in Task 1 by the participants.

Furthermore, two participants used personalized recommendations as the starting point and several comments by participants showed that they were actively looking for recommendations. Consequently, recommenders have become an integral part of complex information environments in users' minds, and play a significant role in their item-finding strategies. Consequently, our findings are in line with the studies that suggest that recommender systems are necessary and useful in finding items in the era of information overload.

Meanwhile, keyword searching, once the standard tool for item-finding, has clearly given some ground to recommenders. However, it is still a natural starting point when the topic is known but not much more.

The major problem with searching is naturally to come up with correct keywords. For instance, P4 used as keywords "phone tapping government." That search produces 22 results in Amazon.com while a search with "wiretapping government" produces 215 results (March 18, 2008). However, P4 did not come up with "wiretapping," and so he concluded wrongly: "*Perhaps a book with that stuff in the way that I want it has not been written.*"

Finding the right keywords can be even further complicated when the system is not in the native language of the user, as with our participants. For instance, names—many participants used author's name as keyword—and concepts with foreign words caused spelling problems. Some participants had strategies to deal with such situations. For instance, when P6 failed to remember the spelling of an author's name, he instead searched for a book by the author, as he knew how to spell the words in the book's title. Finding a book by the author helped him to access relevant recommendations.

Interestingly, some participants simply searched for a book they knew on a topic to access similar books through recommendations, thus seeding the recommendations with searches. Thus, recommenders can complement searches and inspire new searches, just like searches can be used to seed recommendations.

In the light of our study, searching and recommenders do not compete with each other but complement each other in many ways. However, it is Amazon's ability to make recommendations based on just one item viewed that makes this possible. If recommendations were simply based on previous purchases and did not react to the item at hand, it would be impossible to integrate them into the item-finding process the way the participants did. Thus, to allow recommenders and searches to complement each other, recommenders have to be responsive to the current task context.

Our findings are in line with Hangartner [5] who concludes that searching is not disappearing because of recommenders but can be enhanced with recommenders, and that recommender industry will continue to grow in sophistication and importance.

3.2 Opportunistic use of recommenders versus strategic use

> *Oh, hey, hey, hey! Now I'll still, yeah, now I found a really good one! I mean true enough. I was kinda left feeling a bit vexed about Kerouac. I mean Kerouac is for me kinda like, I mean I notice that I'm chasing after him here. This "Customers Who Bought This Item Also Bought" is throwing at me this* Windblown World: The Journals of Jack Kerouac 1947-1954*. . . . Well, this showed itself to be useful, you know, something like this can pop up out of nowhere at you.* – P4

The participants used recommendations in two ways, strategically and opportunistically. Strategic use refers to using recommenders intentionally as a part of the current item-finding strategy. The strategy might be accessing personalized recommendations, as P2 and P3 did, or searching for a particular book to see "Customers Who. . . " recommendations, as P6 did by finding a book by an author to see what other book was recommended on the item page of one of his books. He had no interest in buying that particular book, but he wanted to see similar books. Intentionality shows in two ways in this strategy: in P6's deliberate intention to go to the recommender to see what was recommended and in an attempt to influence the type of books to be recommended.

Opportunistic use refers to users stumbling upon recommendations and using them there and then. It lacks the intention that characterizes the strategic use. Opportunistic use is possible only if recommender features are displayed at the right point of the searching process.

Recommendations that require us to access them intentionally, such as personalized recommendations ("Recommended for You") can only be used strategically. However, recommenders that are displayed as a part of the interface, such as "Customers Who. . . ", can and are used strategically in addition to being used opportunistically.

The secret to helping users use recommenders opportunistically is to deliver them when users are predisposed to attending to them. For instance, when P5 when was vacillating between two books, a "Perfect Partner" recommendation that recommended the two books together at what appeared to be a slight discount (it was not) helped P5 to decide to take both. In the same way, delivering recommendations to P1 when he had put one item in the cart caught him at the moment he was not about to do anything else, and so he was pre-disposed to check the suggestions out.

"Customers Who. . . " recommendations work in a similar manner. If the user is not sure about the book on the item page, he or she is likely to be interested in other options available. Thus, designing recommenders for a complex information environment includes positioning them in the process that they are supposed to support.

Both opportunistic and strategic uses of recommenders are ephemeral, and users cannot be categorized by them. Although P3 did simply look at the personalized recommendation in Task 1 and found a book, thus using recommenders only strategically, in any longer item-finding process users are likely to move from strategic use to opportunistic use and back again. How smooth the transitions are depends on how well the environment is designed to support discovery and what user strategies can emerge from that environment.

3.3 Recommenders and perceived social presence

The participants divided into two groups as far as perceived social presence of the environment was concerned. P1, P2, and P5 felt that they were alone in an online shop and that the social texture did not make the environment any more social. P1: "*It is more like a convey belt than a social environment. . . . I don't really see it as social environment and the reviews by anonymous people don't help to make it any more humane.*"

While P2 and P5 found no social aspects whatsoever in Amazon, P1 did relent his position a bit. He remembered having looked at the other reviews of reviewers once or twice and having had a feeling that "*he's interested in the same things as me.*" He thought that if he bought more books, spent more time in Amazon, and consequently looked more at other reviews by reviewers and used other similar features, he might begin to perceive the environment as more social.

For P3, P4, and P6, on the other hand, the social texture made the environment inherently social. P3 felt that the recommendations "*enlivened*" the environment and that without personalization and personalized rec-

ommendations it would appear "*dead.*" Likewise, P6 felt that the presence of the community was very positive: "*It's like that, you know, ok, yes, others had felt the same thing about it, about this book, and oh, ok, he thought like that, I don't agree but it's good to know that people can see it like that, too. It goes like that; the community emerges out of it.*"

P4 perceived the environment as even more social than the other two. He explained how the social aspect affected his behavior when he found a review that 95 people out of 95 had found Helpful: "*I felt that it wasn't helpful, but like I said, I won't click the button because then I'd be a killjoy. That's where the sociability kicks in. Then there was one where three had read it, I mean, had evaluated it and all agreed that it was not helpful. So I somehow thought that I'll rebel against it and be the first to think that it is helpful. Then I'd actually do something positive [laughs]. That I didn't click the [first] button or that I would have clicked the [second] button, the motivation didn't have anything directly to do with the book or even the review but all to do with the social context and how I perceived that social situation. . . . the critical mass of Joe Blows, then the social dimension kicks in and those who disagree no longer have the face to disagree [laughs] and do it [vote a review Helpful or not] when the critical mass has been reached.*"

All the participants did use social skills and social cues available to assess the needs, level of expertise, and even personality of the Customer Reviews writers to mirror them against their own to assign relevance and reliability to the reviews. Furthermore, decisions influenced by Customer Reviews to buy or not to buy a book, or to look in more detail a book because it had five stars, were all actions that were influenced by the social texture.

However, we feel that what makes an environment social or not is the perception. If a user perceives that other users are present because of the recommendations, then the environment is social for that user, and if a user perceives recommendations are part of the convey belt shopping environment, then the environment is not social for that user.

Consequently, the arguably rich social texture in Amazon is not alone enough to make a user to perceive the environment as inherently social. How easily people perceive an environment as social is probably related to their personality and personal definition of sociability. For instance, P5 did not even see going to a brick-and-mortar bookstore as social activity: "*I don't go to a bookstore to be social.*" Furthermore, what constitutes social texture might differ from one user to another. Nevertheless, it seems that some people need only a slightest of hint to perceive an environment as social while others require synchronous conversations with video image.

4 Conclusions

Recommenders are integral parts of complex information environments, and their importance is likely to continue to increase in e-commerce as well as in other information environments. While not replacements for keyword searches, they are already an integral part of user strategies for finding items of interest.

Recommenders are used both strategically (intentionally as a part of the item-finding strategy) and opportunistically (when seen without prior intention to use or influence the recommendations). Giving users better ways to influence recommendations and their presentation, such as the order in which Customer Reviews are displayed, is one way to assist users in using recommenders efficiently. The better we understand the underlying and overall process, the better we can assist users to make use of the features in the environment and tailor the tools for actual use.

Recommenders are parts of the social texture that increases the perception of social presence that in turn influences user behavior. However, the effect is not uniform as only half of the participants perceived Amazon as a social environment and half did not. While we saw examples of the social aspects influencing user behavior, the "social effect" cannot be generalized to all users. The behavioral effects and what constitutes social texture to different users require further study, but based on this study, we know that such effects do take place.

While punters talk about combining searching and recommenders, users are already doing it in practice

by seeding recommendations with searches to generate discovery. Studies that concentrate in parts need to be accompanied with studies that study the environments as integral wholes. Otherwise, the actual use and predicted use may not meet.

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