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Pick Me! Link Selection in Expertise Search Results

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ABSTRACT
Expertise locator systems have been designed to help find experts within organizations. While there are many examples of these systems in the literature, there has not been any systematic analysis of the factors that predict whether a particular expertise search result will be selected for further exploration. This paper describes a study of 67 employees from 21 countries that performed a specific expertise search to find an expert using an expertise locator system. Rank order and social connection information displayed in snippets of search results were found to significantly predict whether a user considers a particular search result for further exploration. Implications for the design of expertise location systems and future research directions are discussed.

ACM Categories and Subject Descriptors
H.5.0. Information interfaces and presentation (e.g. HCI): General.

General Terms
Design, Experimentation.

Authors Keywords
Expertise search, people search, social networks

INTRODUCTION
Several research prototypes have been designed to allow users to search for experts (e.g. [1, 13, 14, 19]). While there is a broad range of systems available to a user, there has not been a commensurate advance in our understanding of user behavior associated with searching for expertise.

At least superficially, searching for experts is similar to searching for web pages. In both cases, the search results usually contain a link to a personal web page or email address, accompanied by the name, a picture, and a "snippet" of summary information about the person or web page. Previous research on web searches has highlighted the importance of accompanying information such as captions [2], snippet length [4] and rank order of results [9, 11, 17] for which items users will select for further exploration. Given the growth of expertise location tools, it is worth exploring whether similar patterns of behavior characterize expertise searching.

There is reason to believe that searching for people is different than searching for documents or web pages. In an extensive review of systems designed to match people to each other, Terveen & McDonald [19] describe the benefits of utilizing social network information. In particular, the connection chain between the searcher and target provides an idea of mutual acquaintances that may act as social conduits to facilitate the interaction. Although systems are beginning to use social network information [12-14], there has not been any detailed study of how people utilize social network information in selecting experts.

This paper describes a study in which we examined the factors that predict the likelihood of clicking on a particular search result for further exploration. We start by reviewing related literature and then describe our study design and results.

RELATED LITERATURE
Much of the work on user selection from search results has looked at searches for documents. Clarke et al. [2] looked at the influence of captions - the title, URL, and snippet of text that summarized the contents of the page. They analyzed logs of the Windows Live search engine and found that relatively simple features such as presence of query terms, readability of the snippet and length of the URL significantly influenced clickthrough patterns. In an eye-tracking study, Cuttrel & Guan manipulated snippet length for informational and navigational searches and found that longer snippets led to an increase in performance for informational searches but a decrease for navigational searches [4]. In the same eye-tracking study, Guan & Cuttrel looked at the effect of rank order on informational and navigational searches [9]. For both types of searches, they found that there was a decrease in click rates as most users only focused on the first few results at the top of the page. Such findings are similar to eye tracking studies which revealed a bias for higher ranked results, even when the snippets of those results were less relevant [11, 17].

To the best of our knowledge, there is no comparable research on searches for people. However, it is reasonable

to think that rank order matters since relevance is closely related to skill and other matches in expertise search engines [5, 19]. With respect to people search, Fiore & Donath found that users of an online dating site preferred similar others when looking for a romantic partner [7]. However, they could not look at the intermediate step of selecting potential dating partners from the set of search results displayed. The literature on social ties is mixed when it comes to predicting the effect of social connectedness on link selection. Some research suggests that people might go to weak ties because such ties provide information different than that found in one's own social circle [8]. Yet other studies show that people go to those they know directly [15] and that weak ties are adequate when seeking technical information [3]. Still other studies have suggested that people will go to those they know well for complex information but weak ties are sufficient when the information is not complex [10].

OUR STUDY

The data we report was collected as part of a larger study conducted in a global information technology services company investigating what factors predict whom a person will contact for specific expertise. In this paper we focus more narrowly on the question of what predicts users' initial choice from a search result list.

System used

The system used in this study was SmallBlue [13] (later renamed to Atlas™). SmallBlue gathers expertise and social network data by analyzing the content of outgoing email messages and instant messaging transcripts. It then runs a Google PageRank-like algorithm to associate names with topics to derive its expertise rankings. SmallBlue allows users to search for experts by typing in a query term. It returns a relevance ranked list of search results with 10 names per display page. Figure 1 shows a sample results page for the search term "ajax". For every person, there is a picture (A), name (B), business unit (C) and job description (D). One of the innovations in this system is that it also adds in the connection chain, up to 3 degrees, to indicate whether the person listed is a direct contact, 2 degrees away or 3 degrees away from the searcher. In Figure 1, (F) shows the person is 2 degrees away by displaying 'Ask: [Person name]', (E) shows that the person is 3 degrees away by displaying 'Ask: [Person name] > [Person name]', and (G) shows that the person is a direct contact by displaying 'Your direct contact'. From this initial results list, users can click on any name to be taken to a page that contains more information about the person. The design of the system is described in more detail in [6].

Participants

Sixty seven full time employees located in 21 different countries that had performed at least 20 searches using SmallBlue participated in our study. Majority of participants were from the United States and worked in the services division of the company. Their average tenure was 10.5 years.

Procedure

Due to the geographic spread of participants and to facilitate ease of setup, we conducted this study over the phone. Conversations were recorded with the permission of participants.

Each participant was instructed to imagine they were on a committee evaluating a new project proposal that was proposing to use AJAX for part of the project. They had to find an expert who could provide a second opinion on the suitability of using AJAX. We chose AJAX as the query term since it was one of the most frequently searched keywords found in the search logs of SmallBlue. As the

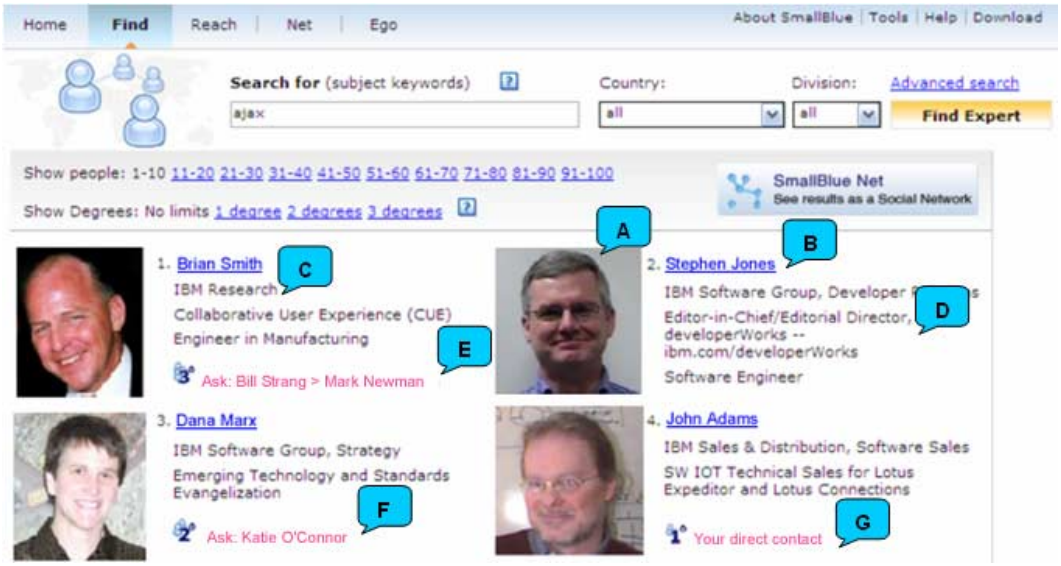

Figure 1. The first four of the top ten experts for AJAX. Pictures and names have been randomly used to protect privacy.

participant entered the search term, the researcher would do the same. Anyone typing in the same search term in SmallBlue will see the same results. Only the social connection information is personalized to each user.

Once the results appeared, participants were given time to review the set of names. The researcher then asked which of the 10 experts, displayed on the first page, the participant would like to find more information about. There was no limit on the number of choices.

Measures

Whether a person is considered

Our dependent measure was a dichotomous variable measuring whether or not a participant clicked on a name to get more information on that person. We did not have access to live log data and relied on the participant telling us who they selected.

Rank order

The rank order of experts in the search results were coded as a categorical variable with 5 levels representing the 5 rows of the search results. This variable was then dummy coded with row 5 as the base category.

Social connection information

We coded social connection information categorically as either present, if there was a connection of any degree, or absent. We relied on participants telling us this information. Forty (59.7%) of our participants had social connection information displayed for at least one expert. Nine (13.43%) knew at least one expert directly. There was no correlation between rank order of expert and having social connection information displayed ($r = 0.061$, $p = 0.12$).

Familiarity with AJAX

Upon completion of the study, participants were asked to rate their familiarity with AJAX on a scale of 1 to 5 where 1 = I have not heard of AJAX before, and 5 = I use it regularly. This was used as a control variable. The average rating was 3.81 with the majority of participants reporting that they had heard of AJAX but had no training in it.

RESULTS

Each participant had 10 choices to consider. A choice of the same participant could be related to her other choices. Choices were thus clustered by participant, making our observations non-independent of each other. To account for this, we analyzed data using the generalized estimating equations (GEE) method [16]. GEE controls for within-cluster correlation in regression models with binary outcomes. The results of the analysis are summarized in Table 1. The odds of considering a person increase roughly 4 times when there is social information available in the snippet ($Exp\,\beta = 3.93$, $p < 0.001$). The odds of considering a person increase roughly 5.5 times when going from row 5 to row 1 in the result set ($Exp\,\beta = 5.64$, $p < 0.001$). Familiarity with AJAX ($\beta = 0.2$, $p = 0.27$) dropped out of the model. Figure 2 shows the number of times an expert was considered as a function of their rank order in the search result list.

	β (SE)	95% CI for Exp β		
		Lower	Exp β	Upper
Constant	- 2.5** (0.41)			
Social Info.	1.37** (0.26)	2.4	3.93	6.5
Row 1	1.73** (0.42)	2.46	5.64	13.1

Table 1. Results of GEE (only significant predictors shown). Note: $N = 670$, $^{**}p < 0.001$

DISCUSSION

Our results indicate that when considering experts, people prefer others they share a social connection with over a complete stranger. This has important implications for expertise search. Prior research suggests that interacting with those outside one's social circle provides access to different and unique perspectives [8]. However, our participants did not consider experts that were more than 3 degrees away who could potentially be a source of diverse expertise. Social context outweighed the potential of obtaining diverse expertise in the minds of our participants. Although prior studies have suggested the benefits of using social information [19], ours is the first to empirically demonstrate the role of social connections in expertise selection choices.

Interestingly, majority of participants did not select names of people they knew directly (of which there were very few), since the profile page would not have provided any additional information. Information regarding who were 2 or 3 degrees away was thus very influential in link selection decisions. This has important implications for the design of displaying results in expertise locator systems. Individuals

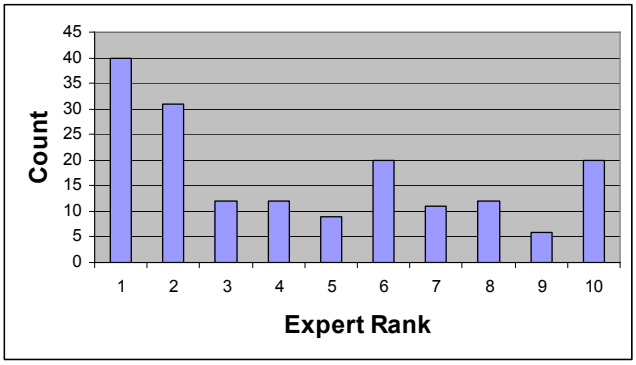

Figure 2. Number of times an expert was considered

valued information about who they have a connection path to. A system that makes this information explicit and easily available is thereby increasing its utility in the eyes of users. When looking for specific expertise, if 'name dropping' of mutual acquaintances increases common ground and the probability of response from an expert, then displaying information regarding which expert one has mutual acquaintances with is extremely valuable.

The results also show that rank order predicted whether a search result was considered for further exploration. This is consistent with prior research on document search which shows a bias towards selecting search results higher in the list [9, 11, 17]. Since the majority of our participants had heard of AJAX but had no training in it, it is entirely possible that they put more trust in the expertise rankings. The impact of rank order on expertise search results when the seeker is familiar with the topic is a topic for future research.

An interesting variable we did not account for was the role of pictures. Anecdotal evidence from our study suggests that having a picture is an important element of whether an expert is considered for further exploration.

CONCLUSION

This paper described a study that investigated the factors that predict which search results will be considered for further exploration when looking for specific expertise. It extends prior studies of web searches to show that some of the same effects, namely rank order, hold when looking for people. However, other factors, in this case, social connection, indicate there may be additional factors to consider in expertise searches. Searching for experts may superficially look like any other kind of search but searching for people takes place in a social context such that the relationship between the searcher and the expert is an important variable in the decision process [6, 19]. In this paper we did not explore why social connections matter but other research has suggested that selection decisions must also weigh the likelihood of response [18]. There is clearly much more research needed to understand the full implications of how and why social connections influence the search for people.

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