Information Seeking through Microblog Questions: the Impact of Social Capital and Relationships

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ABSTRACT
This paper investigates how users of Sina Weibo, a popular microblogging service in China, request information by posting questions to their online social networks. The fast development of social networks and social media such as microblogging sites has greatly impacted how people access and share information. Previous research has focused on how users share information on microblogging sites, but relatively less is known about how users use such networks to seek information. This paper addresses the gap. The data set contains 1969 question messages from 1939 users (information seekers) and 7997 responses to these questions from 3296 users (information providers), the profiles of the information seekers and providers, and their immediate social network (followings and followers). This paper examined the social capital and demographic characteristics of the information seekers, and the relationships between the information seekers and providers with regards to response rates and number of responses as indicators for information and social benefits of information seeking. Results show that 1) questions posted by female users and verified users and messages using the “@” sign have higher response rates; 2) about 70%-80% of information seeker-provider pairs are physically close and have reciprocal relationships. The study demonstrates the impact of the information seekers’ social capital and their relationships with the information providers in regards to the outcomes of information seeking in Weibo social networks.

Keywords
Information seeking; microblogging; social capital; social Q&A.

INTRODUCTION
Microblogging services such as Twitter have experienced a rapid growth in the past a few years. They have made great impact on how people access and share information. As a matter of fact, microblogging sites and other types of online social networks are used as sources of information in addition to catching up on personal information and activities of social connections. Most research on microblogging sites has focused on information sharing and monitoring, while little is known about how people seek for information through their microblogging social networks.

Personal contacts are a primary source for information in many situations (Case, 2002), and online social networks provide a source that is different from offline networks and online search engines. Microblogging services provide mechanisms to support two major modes of everyday information seeking (Savolainen, 1995): passive monitoring of events (by following RSS feeds of a selected group of users) and active seeking of practically effective information (by posting messages and requests to individual users or a network of users). Questioning is found to be an effective way to actively seek for information from a social network (Morris, Teevan, & Panovich, 2010).

Research in organization information seeking seem to suggest that organizational and social factors influence information seeking in social contexts (Borgatti & Cross, 2003; Cross, Rice, & Parker, 2001) and the information seeker receives some combination of informational and social benefits (Cross et al., 2001; Zhao & Rosson, 2009).

Building on previous research, this study examines the active seeking of information by questioning the microblogging networks with the following research questions:

RQ1: What are the social and demographic characteristics of information seekers and providers that are related to information seeking in microblogging networks? How are the information seekers and providers related?

RQ2: How do the information seekers’ social capital (resources, access and use of the resources) and relationships with the providers impact the outcomes of information seeking?
There has been a rapid increase in microblogging services in China in the past a couple of years. According to the China Internet Network Information Center (CNNIC)\(^1\), microblogging sites attract 2,500 million users by December 2011, a 296% increase from December 2010. About 48.7% of all Chinese Internet users use microblogging services, comparing to 13.8% in December 2010. QZone, Sina Weibo, Tencent Weibo are the top 3 most used microblogging services in China. There have been sporadic studies on Chinese microblogging sites, for examples, how Sina Weibo is compared to Twitter (Gao, Abel, Houben, & Yu, 2012), and how Chinese used microblogging for emergency response (Qu, Huang, Zhang, & Zhang, 2011). An extensive literature search does not yield any research on information seeking in the Chinese microblogging sphere. This paper uses Sina Weibo as the site of study to explore the impact of social capital and relationships on information seeking outcomes.

The paper first reviews related work on topics including people as information sources, social search, questions and questioning in online social networks, and social capital theory. It then describes the data sampling and analysis methods, followed by detailed results demonstrating the impact of social capital and relationships on information seeking outcomes through microblog questions.

**RELATED RESEARCH**

**People as Information Sources**

It is generally agreed that information seekers choose personal sources over other formal sources since they are usually easier and more readily accessible (Case, 2002). When seeking information from other people, the information seeker receives some combination of the following benefits (Cross et al., 2001):

1. answers or solutions to problems;
2. meta-knowledge (pointers to documents, databases or other people);
3. problem reformulation;
4. validation of plans or solutions;
5. legitimation from contact with a respected person.

These benefits may be divided into informational/personal (1-4) and relational benefits (5). Research shows that users of microblogging as informal communication channels received both personal, i.e., gaining information and expertise) and relational benefits, i.e., establishing common grounds and a sense of connectedness (Zhao & Rosson, 2009).

Research in information seeking in offline professional context found that two categories of factors may influence information seeking from people through a social network (Cross et al., 2001), including organizational factors (such as occupational similarity, task interdependency, and physical proximity) and social factors (such as friendship, trust, influence, and gender). In work settings, organizational factors may play a bigger role in influencing information seeking behavior. People who are chosen as sources in social networks generally have better social resources and are weakly-tied to the information seekers; they tend to be older and have better education than the information seekers (Johnson, 2004).

**Social Search**

Social search refers to the general process of finding information online with the assistance of social resources (Morris et al., 2010). It may include broadcasting a question to one’s social network such as Twitter or Weibo, or posting a question on an online Q&A system such as Yahoo Answers, and searching for social resources such as tweets or blogs. Sometimes searching may also be done collaboratively by a group of users (i.e., collaborative search). This paper focused on the type of social search that involves posting requests for information to one’s social network for assistance.

Research comparing social and non-social conditions of information seeking found that major tactics for information gathering in social conditions include targeted asking, network asking, and searching (Evans, Kairam, & Pirolli, 2010). Questions posed in a public venue such as an organized social networking site (e.g., Twitter, Facebook) received more answers, while questions to specific friends or colleagues through email, instant messaging (IM), or phone conversations received in-depth answers.

**Questions and Questioning in Online Social Networks**

One of the most convenience ways to seek for information from personal sources is to propose a question to them. Folger and Puck (1976) define questions as requests for action, permission, or information/opinion. This study limits questions of interest to the subset of questions that request informative responses without necessarily phrased in an interrogative form (Krone, 1993) and exclude rhetorical questions (for example, “Who knows?” with the implication “Nobody knows.”), and requests for actions (for example, “could anyone lend me a copy of the CS 201 textbook?”).

Questions and questioning seem to be effective in requesting for information in online social networks. For example, research found that a large number of questions asked on Twitter requests for factual or opinion information (Efron & Winget, 2010). Questions posted to Q&A sites include both conversational questions that to carry on discussions, and informational questions to solicit specific facts (Harper, Moy, & Konstan, 2009).

Questions may be directed to a targeted individual(s), or broadcasted to a wider audience. Questions posted on microblogging sites are somewhere in between targeted and public questions (Efron & Winget, 2010). The use of “@”

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\(^1\) http://www.cnnic.cn
symbol signals the attention of a particular user(s), while all others who follow the information seeker can see the question even if they are not mentioned by the “@” sign. It is unclear whether network questions or targeted questions draw more responses because while the “@” sign signals the attention of specific users who may be more likely to know the answer in the opinion of the information seeker, it may lower the intention of the not-mentioned audience (usually a bigger size) to response when they see the question is targeted to others.

**Social Capital Theory and Social Information Seeking**

Social capital, defined by Lin (2001) as “resources embedded in a social structure which are accessed and/or mobilized in purposive actions”, contains three fundamental elements:

1) resources in one’s social network,
2) access to the resources through relationships, and
3) use of these resources for action.

According to Lin, the quality of social resources in a person’s network influences the success of achieving desired goals. When seeking for new information, people tend to use their weak ties to access people with better resources than theirs (Granovetter, 1973; Johnson, 2004; Li & Thompson, 1989). People tend to communicate and interact more with similar people than with dissimilar people, referred as homophily (McPherson, Smith-Lovin, & Cook, 2001). For example, Twitter networks show certain degree of homophily, i.e., reciprocal friends are geographically close and have similar degree of popularity (Kwak, Lee, Park, & Moon, 2010).

Three factors related the access of social resources are found to influence social information seeking (Borgatti & Cross, 2003):

1) know: knowing what the other person knows,
2) value: valuing what that other person knows in relation to the information need, and
3) access: being able to gain timely access to the other person’s knowledge.

**METHODS**

**Data Sampling**

There are a large number of question-bearing phrases in Mandarin Chinese (Li & Thompson, 1989). The phrase “may I please ask who knows” (请问谁知道) is used as the search phrase for questions, since it is less ambiguous and less likely to include rhetoric questions. A crawler program together with SINA Weibo’s API\(^2\) are used to collect information-seeking microblogs containing the keywords during the month of February 2012, the responses (comments) made to these questions, profiles the question and response authors, and their relationship information.

The full data set contains 2183 questions from 2072 users with 8852 replies (comments) to these messages from 3525 users. Users with a large number of followers are more likely to be organizations, media, or celebrities, so users with more than 2000 followers and their questions or replies were excluded from the analysis. The subset of questions and response by authors with no more than 2000 followers includes 1969 questions and 7997 responses, about 90% of the full data set. Table 1 shows a summary of the data.

<table>
<thead>
<tr>
<th>All</th>
<th>Followers≤2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Questions</td>
<td>2183</td>
</tr>
<tr>
<td>Question authors</td>
<td>2072</td>
</tr>
<tr>
<td>Responses</td>
<td>8852</td>
</tr>
<tr>
<td>Response authors</td>
<td>3525</td>
</tr>
</tbody>
</table>

**Table 1: Data Summary**

**Data analysis**

**Working Definitions**

In this paper, a “question” is defined as an original (as opposed to re-post or re-tweet) microblog post/message requesting informative responses without necessarily phrased in an interrogative form. In the rest of the paper, “question” is used interchangeably with “request”, since the search phrase limited the questions to “informational requests”.

A “response” is a comment or reply made to a “question” message. A response may be an attempted answer to the question, or it may be a follow-up question to clarify the original question. Sometimes it provides a pointer to an answer. Users may carry on conversations in response to a question by making comments and replies to each other’s postings.

Accordingly, an “information seeker” is defined as a user who posts a “question” on Weibo; and an “information provider” is a user who posts a “response” to a “question” and is not the author of the question.

**Analysis Framework**

**Social capital.** When the “purposive action” as described by Lin (2001) is to request for information through one’s microblogging network, one’s social capital may be viewed as composed of the following:

1) **Resources**: the union set of users in one’s immediate network (followers and followings).

2) Three ways of **access** to the resources:

   - following other people: the information seeker will be able to see their posts and know what the other person knows;

\(^2\) http://api.weibo.com
being followed by other people: the other person will be able to see the request posted by the information seeker;
reciprocal following: the information seeker will know what the other person knows and the other person will be able to see the information request posted by the information seeker.

3) **Use of resources:** posting a request to either
   - specified user(s) by using @ sign, or
   - a general audience of all followers.

**Outcomes of information seeking.** The informational and social benefits the information seeker receives from the responses to his or her question determine whether the information seeking is successful and how successful it is. For the ease of automated analysis, this study measures the outcomes of information seeking by:

1) whether a question received response(s);
2) the number of responses a question received.

The above two indicators are a simplified measurement of the outcomes of information seeking. It does not differentiate the social and informational benefits outlined in previous research (Cross et al., 2001; Zhao & Rosson, 2009).

**Question Types**

There are two types of questions (targeted or network) based on whether the targeted audience is an individual(s) or network (Efron & Winget, 2010; Morris et al., 2010). A question is targeted to an individual or individuals if it uses “@” to mention individuals from whom an answer is expected; it is a network question if it is posted to the network without mentioning any particular user. Examples of each types of question were given in Table 2:

<table>
<thead>
<tr>
<th>Type</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Targeted | *May I ask who knows the phone number of professor Shaocheng Li? Urgent…@培正风云*
           | *How to activate the blog service using a Weibo account? @轻轻吵吵@lionwitch* |
| Network  | *Does anyone know the flight number from Zhoumi to Shenzhen today?*
           | *May I ask who is the author of the art work “Di Zi Gui” at the Huixinjiejiebeikou Station of Beijing Subway Line 5?*

**Table 2: Example Questions**

**Information Seeker and Provider Analysis**

Both social and demographic characteristics of the information seekers and providers are examined, including:

- demographic: gender, location
- social features: number of followers, followings and microblog messages, and verification status

The following types of relationships between the information seekers and providers are examined:

1) Following types:
   a) reciprocal friends
   b) provider follows seeker
   c) provider is followed by seeker
   d) provider is out of network of seeker

2) physical proximity:
   a) same city
   b) same province, different city
   c) different provinces (countries)

3) Gender relationship:
   a) same gender
   b) different gender

**RESULTS**

**Response Rates and Influencing Factors**

**Characteristics of the Information Seeker**

Social and demographic characteristics of the information seeker are examined to see if they influence the response rates of the questions. Among them, verification status (VIP vs. regular users), numbers of followers, followings, and messages, and gender have significant impact on response rates.

**Verification status.** Only 41 questions (2.1%, n=1969) are posted by verified (VIP) users. Verified users have a higher response rate (73.2%) than unverified users (58%). Chi-square test suggests that the response rates for questions from verified users and regular users were significantly different ($\chi^2=3.98$, $P<.05$).

<table>
<thead>
<tr>
<th>Type</th>
<th>Subtotal</th>
<th>Gets responses</th>
<th>No responses</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verified</td>
<td>41 (2.1%)</td>
<td>30 (73.2%)</td>
<td>11 (26.8%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular</td>
<td>1928 (97.9%)</td>
<td>1119 (58.0%)</td>
<td>809 (42.0%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3: Question Response Rate by Verification Status of Information Seeker**

It may be speculated that this difference is due to larger numbers of followers verified users usually have. However, a correlation test suggests that the correlation between a user’s verification status and his/her number of followers is relatively low ($r=.18$, $P<.01$). Since verified (VIP) users are often known for their expertise in certain areas, verification status reflects a social status that is not always reflected in
the number of followers one has. An alternative account for
the difference in response rates for verified and regular
users may be that, when answering questions from VIP
users, people achieve a stronger sense of accomplishment
related to visibility of expertise, gratitude, and feeling of
making a contribution (Beenen et al., 2004).

**Numbers of followers, followings, and messages posted.**
A Chi-square analysis was conducted to investigate the
relationships between response rates and the information
seekers’ social resources including numbers of followers,
followings, and messages. The numbers of followers, followings and messages are divided into 4 groups of
similar sizes at their quartile values.

The results in Table 4 show that there are significant
differences in response rates in relation to the information
seekers’ number of followers ($\chi^2=415.5$, $P<<.001$), number
of followings ($\chi^2=197.2$, $P<<.001$), and number of
messages ($\chi^2=209.1$, $P<<.001$). Information seekers with
more followers, followings and messages, get higher
response rates than those with less followers, followings and messages.

<table>
<thead>
<tr>
<th># of Followers</th>
<th>Freq</th>
<th>Responses?</th>
<th>df</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-42</td>
<td>497</td>
<td>114</td>
<td></td>
<td>383</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>22.9%</td>
<td></td>
<td>77.1%</td>
<td></td>
</tr>
<tr>
<td>43-175</td>
<td>491</td>
<td>281</td>
<td>3</td>
<td>210</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>57.2%</td>
<td></td>
<td>42.8%</td>
<td></td>
</tr>
<tr>
<td>176-474</td>
<td>489</td>
<td>357</td>
<td></td>
<td>132</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>73.0%</td>
<td></td>
<td>27.0%</td>
<td></td>
</tr>
<tr>
<td>475-2000</td>
<td>492</td>
<td>397</td>
<td></td>
<td>95</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>80.7%</td>
<td></td>
<td>19.3%</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th># of Followings</th>
<th>Freq</th>
<th>Responses?</th>
<th>df</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-65</td>
<td>495</td>
<td>161</td>
<td></td>
<td>334</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.5%</td>
<td></td>
<td>67.5%</td>
<td></td>
</tr>
<tr>
<td>66-151</td>
<td>491</td>
<td>295</td>
<td></td>
<td>196</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.1%</td>
<td></td>
<td>39.9%</td>
<td></td>
</tr>
<tr>
<td>152-284</td>
<td>494</td>
<td>353</td>
<td></td>
<td>141</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>71.5%</td>
<td></td>
<td>28.5%</td>
<td></td>
</tr>
<tr>
<td>285-2000</td>
<td>489</td>
<td>340</td>
<td></td>
<td>149</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>69.5%</td>
<td></td>
<td>30.5%</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th># of Messages</th>
<th>Freq</th>
<th>Responses?</th>
<th>df</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-133</td>
<td>494</td>
<td>156</td>
<td></td>
<td>338</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>31.6%</td>
<td></td>
<td>68.4%</td>
<td></td>
</tr>
<tr>
<td>134-555</td>
<td>491</td>
<td>299</td>
<td></td>
<td>192</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60.9%</td>
<td></td>
<td>39.1%</td>
<td></td>
</tr>
<tr>
<td>556-1452</td>
<td>492</td>
<td>339</td>
<td></td>
<td>153</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>68.9%</td>
<td></td>
<td>31.1%</td>
<td></td>
</tr>
<tr>
<td>&gt;1452</td>
<td>492</td>
<td>355</td>
<td></td>
<td>137</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>72.2%</td>
<td></td>
<td>27.8%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4: Response Rates by # of Followers, # of Followings, and # of Messages**

The number of followers can be an indicator for access: the
more followers an information seeker has, the more widely
his question can be seen and the more widely he can access.
The number of followings can be an indicator for knowing:

the more people an information seeker follows, the more
she knows about the expertise people have. The number
of messages can be an indicator for activeness in one’s social
network: the more messages an information seeker posted,
the more active she is. The results confirms the “know” and
“access” factor social information seeking (Borgatti &
Cross, 2003).

**Gender.** The proportion of questions posted by female
and male information seekers (62% vs. 38%, n=1969) is similar
to the proportion of female and male users reported by Sina
(65% female vs. 35% male active users). Questions from
female information seekers get a higher response rate (65%)
than questions from male information seekers (47.7%). Chi-
square test suggests that the response rates for female
information seekers and male information seekers were
significantly different ($\chi^2=57.2$, $P<<.001$).

<table>
<thead>
<tr>
<th></th>
<th>Get responses?</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Y</td>
<td>N</td>
<td>$\chi^2$</td>
</tr>
<tr>
<td>Female</td>
<td>1216</td>
<td>790</td>
<td>426</td>
</tr>
<tr>
<td></td>
<td>(61.8%)</td>
<td>(65.0%)</td>
<td>(35.0%)</td>
</tr>
<tr>
<td>Male</td>
<td>753</td>
<td>359</td>
<td>394</td>
</tr>
<tr>
<td></td>
<td>(38.2%)</td>
<td>(47.7%)</td>
<td>(52.3%)</td>
</tr>
</tbody>
</table>

**Table 5: Question Responses by Gender of Information Seeker**

The results in Table 5 indicate that females seem to be more
“inviting” for responses. There might be alternative explanations for this phenomenon. It may be related to the
linguistic features of questions that females phrased.

Research in language and gender seems to suggest that
females tend to speak tentatively and less ascertian (Lakoff,
1973), which might be a reason for others to feel a stronger
need to help. Furthermore, women are said to be socialized
to actively engage their conversational partners and use
questions as a means of engaging others’ conversational
contribution, whereas men uses questions as a genuine
request for information (Freed & Greenwood, 1996).

Another possible explanation may be related to the topics
of questions male and female users ask their social network.
Research found that men ask more technology questions
while women ask more home and family questions (Morris
et al., 2010). Technology questions require certain degree
of expertise on the topic to be able to provide an answer,
while most people may be able to provide information to
home and family questions from their life experiences. The
number of possible information providers in one’s social
network who is capable to answer a home or family related
question is probably much larger than the number of users
who has the specialty to answer technical questions.

**Use of resources by different question types**
Chi-square tests are conducted to examine the relationships
between question types (targeted to individual vs. network)
and response rates. Table 6 shows the results.
399 questions (20.3%, n=1969) were posted to targeted individuals by using the “@” sign to signal the attention of particular users that the information seeker wish to get answers from. Questions targeted to individuals get a higher response rate than questions posted to a general network. Chi-square test suggests that the response rate for questions targeted at individuals differ significantly with network questions ($\chi^2=5.794$, P<.05).

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Get responses?</th>
<th>$\chi^2$</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual (use @)</td>
<td>399</td>
<td>254 (63.7%)</td>
<td>145 (36.3%)</td>
<td>5.794</td>
</tr>
<tr>
<td>Network (no @)</td>
<td>1570</td>
<td>895 (57.0%)</td>
<td>675 (43.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Question Responses by Question Type

This finding suggests that the way the social resources (followers and followings) in one’s social network get used influences the outcomes of information seeking. When signaling the attention of particular users, those users may feel a stronger sense of obligation to respond and thus result in a higher response rate.

This proportion of question posts with an @ sign is much higher than the general original posts in Twitter’s trending topics, which ranges from about 4% to 8% for different topics (Kwak et al., 2010). Including re-tweets and replies, the proportion of posts with an @ sign is about 12% in Twitter’s general corpus (Java, Song, Finin, & Tseng, 2007). It seems that users are more likely to mention specific people as their intended audience when posting questions than sharing information.

Number of Responses and Influencing Factors

A correlation analysis is conducted to test the correlation of the factors described in the methodology section to the number of response an information seeker received. The only factor that is (weakly) correlated with the number of responses is the number of followers the information seeker has ($r=.33$, p<.001). Figure 1 shows the relationship of response numbers and follower numbers.

The result seems to suggest that the number of responses a question receives does not correlates much with the types of question (individual vs. network) or the features of the information seeker (except for the number of followers of information seeker). Other factors such as the topic of the question, expected answer types of the question (single fact, or multiple interpretations), and perceived urgency or importance of the question may impact the number of response a question receives.

<table>
<thead>
<tr>
<th>Response by</th>
<th># of Responses</th>
<th># of Responded Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self</td>
<td>2293</td>
<td>667</td>
</tr>
<tr>
<td>Others</td>
<td>5704</td>
<td>1028</td>
</tr>
<tr>
<td>Total</td>
<td>7997</td>
<td>1058</td>
</tr>
</tbody>
</table>

Table 7: Composition of Responses and Responded Questions by Authorship

Note that there is a large overlap with questions that is responded by the information seeker herself and others. Figure 2 shows a Venn diagram of the questions responded by information seeker and others.
The blue area in Figure 2 are the 30 questions replied by the information seeker only (2.8%), and yellow area are the 39 questions replied by others only (37%). The 637 (60.2%) questions in the green area received responses from the information seeker him or herself and others, suggesting communication and social exchange between the information seeker and providers.

To examine the relationships between information seekers and their providers, 5704 information-seeker provider pairs are analyzed based on the relationship types:

1) types of following relationship (S→P, S←P, S↔P, and out-of-network)

2) physical proximity (same city, same province, different province)

3) gender relationship (same vs. different gender).

The frequency distributions of the seeker and provider pairs are shown in Table 8:

<table>
<thead>
<tr>
<th>Relationship Type</th>
<th>S-P Pairs</th>
<th>S-P Pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Freq.</td>
<td>%</td>
</tr>
<tr>
<td><strong>Following type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S→P</td>
<td>4533</td>
<td>79.5%</td>
</tr>
<tr>
<td>S←P</td>
<td>321</td>
<td>5.6%</td>
</tr>
<tr>
<td>S↔P</td>
<td>117</td>
<td>2.1%</td>
</tr>
<tr>
<td>Out-of-network</td>
<td>733</td>
<td>12.9%</td>
</tr>
<tr>
<td><strong>Physical proximity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same city</td>
<td>2615</td>
<td>45.8%</td>
</tr>
<tr>
<td>Same province</td>
<td>1433</td>
<td>25.1%</td>
</tr>
<tr>
<td>Diff. province</td>
<td>1656</td>
<td>29.0%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same gender</td>
<td>2968</td>
<td>52.3%</td>
</tr>
<tr>
<td>Diff. gender</td>
<td>2718</td>
<td>47.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5704</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 8: Seeker-Provider Pairs by Relationship Type

**Following type.** 79.5% of the other-made responses were from reciprocal friends (the seeker follows the provider and the provider follows the seeker), this is remarkably high considering the low degree of reciprocity in the one-way relationships in microblogging networks. According to Kwak et al. (2010), 78% of user pairs with any link between them are connected one-way, and only 22% have reciprocal relationships between them. If we assume that Sina Weibo has a similar proportion of reciprocal relationships, these about 20% reciprocal relationships contribute to about 80% of all responses a user received when asking a question to his/her social network, which is another example of the application of the power law distribution.

At the first glance, the results do not seem to be in line with the strength of weak-ties that previous research recognized (Granovetter, 1973; Johnson, 2004). It seems that most of the relationships between the information seekers and providers are relatively close (79.5% are reciprocal, 7.7 one-way, and 12.9% with no links in between). A closer look needs to be taken to compare the closeness of these reciprocal relationships with other reciprocal relationships in the information seekers’ network that did not respond to the question. The closeness may be measured by the number of common rriends between a pair. It might be possible that these reciprocal relationships that contribute to responding to questions are among the weaker reciprocal ones in one’s network.

Notably, about 12.9% of the provider-seeker pairs are consisted of users who are not in each other’s immediate network; meaning about 12.9% responses are from people that the information seeker is not acquainted previously. This may be achieved by the forward (re-tweet) mechanism of microblogging, which is quite difficult (if not impossible) in offline social networks.

**Physical proximity.** About 46% of the seeker-provider pairs are from the same city, and 71% from the same province. Only 29% information providers are from a different province than the information seeker.

This seems to suggest that the information seeker and provider are quite close physically. Research about other microblogging networks such as Twitter found that r-friends seems to be physically close (Kwak et al., 2010) – a phenomenon referred as “homophily” (McPherson et al., 2001) may count for this finding.

In addition to homophily, questions of certain topics can be quite local. For example, “when does school starts next semester?” can only be answered by people who attend the same school with the information seeker, and they tend to live in close proximity. Other topics may be closely related to location, for example, “where can I find a pet shop on Zhongshan Rd?” is most likely to get responses from people who live close to that road, mostly in the same city.

**Gender.** Same gender pairs contain 52.3% of all seeker-provider pairs, suggesting that whether being the same or different gender with the information seeker has little impact on responding to a question.

**CONCLUSION AND DISCUSSION**

This study investigated the social and demographic characteristics of the information seekers and providers and their relationships to see how the social capital of the information seeker influence the outcomes of information seeking in microblogging networks through questions. A sample of 1969 questions and 7997 responses to these questions were analyzed. A summary of the findings is listed below:
1) **The social nature of information seeking on microblogging networks**: 60.2% of all responded questions received responses from the information seeker and other providers, indicating activities of communication and social exchange.

2) **Several factors that influence the response rates of the questions**, including:
   a. **social resources** the information seeker processes: the more resources the information seekers have in terms of the numbers of followings, followers and messages posted, the higher response rates they get with their questions;
   b. **the way of using the resources** by posting questions to targeted individuals or networks: questions that use the “@” sign to signal attentions of particular individuals get higher response rates than questions posted to the general network of the information seeker;
   c. **gender** of the information seeker: female information seekers receive higher response rates than male information seekers.

3) **Relationships between the information seekers and providers**:
   a. the information seekers and providers tend to be mutually connected by the following relationships
   b. the information seekers and providers tend to live in close physical proximity.

The contributions of this paper are: 1) this is the first study investigating the social capital of the information seeker in relation to success of information seeking in microblogging networks; 2) it identifies several factors that influence the outcomes of information seeking by questioning microblogging networks.

There are limitations with the study. Response rate is only one indicator for whether an information seeker succeeds in requesting for information by questions. A question gets responded does not necessarily mean that the information seeker gets the desired answer. It also does not reflect the different types of benefits one receives by seeking information in information seeking, including both personal and social benefits (Cross et al., 2001; Zhao & Rosson, 2009). The benefits an information seeker received can be a better measure for success in information seeking, and manual analysis of the responses will be needed to have a closer look at the benefits. Several other factors, such as response time, may also be useful indicators for how successful the information seeking is (Morris et al., 2010).

Although it seems the information seekers and providers are reciprocal friends and live close by, confirming the phenomenon of “homophily” (Kwak et al., 2010; McPherson et al., 2001), it is unclear whether the information seekers and providers are strongly or weakly tied from this analysis. A comparison of reciprocal relationships that yield responses with those that do not yield any response will be needed.

Other factors, such as types of questions (Gaesser, Person, & Huber, 1992), trust (Morris et al., 2010), and effort (Johnson, 2004) may also affect the information seeking in online social networks. And future investigation is needed to explore these dimensions and their relationships with the factors examined in this paper.

This study is a first step in examining information seeking in social networks and social media. In-depth understanding of why and how users use social networks and social media to seek for information will lead to better use and design of such services.

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**REFERENCES**


presented at the annual meeting of the International Communication Association, Portland, Oregon.


