

First-Mover Advantage in a Social Q&A Community

Rich Gazan
University of Hawaii
gazan@hawaii.edu

Abstract

Aggregate answer ratings serve as a metric of collective intelligence in social Q&A communities. The patterns by which participants in a social Q&A community rate and recommend answers are analyzed through the lens of first-mover advantage, to address the question of whether the first answer posted has a ratings advantage over those subsequently submitted. As part of a long-term participant observation, ratings for answers submitted to the Answerbag social Q&A site were compared by order of submission and normalized for page views and answer quality. The results suggest that the first-submitted answer consistently accumulates roughly 17% more rating points than the second answer submitted, and that the rating points of each subsequent answer tend to decline. Social factors influencing rating activity and implications for interpreting future social Q&A data are discussed.

1. Introduction

Posting “first!” as the first comment to an article or blog post has become a common if minor Web annoyance. Beyond the momentary thrill a person might get from seeing his or her post as the only one on the page, the motivations and benefits of making the first response post have not been well explored in the computing literature. While it may appear to be a trivial issue, software has been written specifically to allow users to be instantly notified of updates to high-traffic sites, so they can be the first to comment [7]. The assumption is that readers will usually scan the first few comments, allowing the fastest posters to make their message of support, dissent, self-promotion, parody or anarchy reach a significant fraction of the site’s readership.

The benefits and drawbacks of being the first to act have been explored in a wide range of environments and literatures, from economics to marketing to game theory and martial arts [20, 35]. This paper applies the concept of first-mover advantage to a collaborative filtering environment, specifically a social Q&A community, to investigate the extent to which the first

person to post an answer to a question benefits from their first-mover position.

While the financial rewards of being the first market entrant are clear, the advantages of being the first to post in a social Q&A community are less tangible. In a collaborative filtering environment, content is rated by other users and presented in order of descending popularity. Top-rated answers thus receive highest placement on the page, creating a situation of cumulative advantage, where the top-rated answer is best positioned to receive still more rating points in the future. In many social Q&A sites, content ratings accrue to a user’s overall profile and lead to more site privileges, such as a rise in level and/or title, the ability to give or take away more rating points, and public acknowledgment of one’s contributions on leaderboards. Social functionality such as friend lists and selective notification of content submitted by particular users makes accumulating points a rational strategy, both to filter one’s interactions to users one deems worthy, and to earn passage through the filters of others.

Assessing how people interpret and express answer quality in social Q&A sites has been the focus of much recent research [17, 18, 19, 30]. However, few studies blend quantitative and qualitative analysis of user activities and interactions, or attempt to account for social factors, which are important components of user motivation, participation and persistence [14]. Current research in Q&A systems has called for more holistic and critical approaches [30]. Rating points are designed to indicate relative answer quality in social Q&A sites, but whether they accomplish this task is open to question. How and why first-posted answers gain a rating point advantage is the focus of this study.

2. Background

Studies of large complex networks such as social Q&A sites regularly encompass research in computer science, economics and social sciences [4, 21]. Information retrieval systems research is undergoing a shift from purely systems-centered evaluation to a model encompassing both system-user and user-user

interaction [3, 5]. From this perspective, information is both situational and user-defined, necessitating more naturalistic research about the mechanisms by which users evaluate content.

To support the investigation of the benefits of being the first to post a response in an online environment, this section discusses some relevant background literature in the areas of first-mover and cumulative advantage, recommender systems and social Q&A.

2.1. First-mover advantage

First-mover advantage, also called pioneer advantage, is a concept from economics and management science, referring to the advantage the first entrant in a market segment enjoys as a virtual temporary monopoly. With a niche to themselves and a head start on competitors, an organization can assume a dominant, long-lasting market position. In extreme cases, a brand with first-mover advantage can become synonymous with the niche itself [27].

While it is best known in the domains of management and marketing, and usually measured by market share, traffic or simple earnings [22], the concept of first-mover advantage has also been applied to scholarly activity and large- and small-scale social situations, and measured in terms of social capital. The general theory of cumulative advantage processes [29], posits that early success tends to compound in any arena of limited good. Building on the early work of Price [28], Merton [25] introduced the “Matthew effect” to describe common trajectories of scientific careers, where early success in research, funding or publication creates more favorable conditions for continued success. Scholars are evaluated by their contributions to the field, many of which can be the fruits of first-mover advantage: being the first to conceive, develop, debunk or apply ideas to problems in the field in a novel way. Rewards and citations accrue, along with the selective attention (or “mindshare”) of being one of the experts or gurus in a discipline or area of study.

Relevant here is the limited good of attention, with which interface designers have long been familiar. The role of a well-designed user interface is to attract, focus and direct attention toward the appropriate area of the screen or device at the appropriate time, that users might most efficiently carry out their activities. In an environment of information overload, a familiar resource enjoys a cumulative advantage over successive entrants—the more successive entrants, the higher the attention cost to evaluate them all. The known entity thus maintains, and often extends, its differential advantage. Researchers have explored

cumulative advantage processes in diverse areas such as strategic management [8], social equity [9, 36], and journalists who win the Pulitzer Prize [37].

However, some literature challenges the universality of first-mover advantage. While market entry order has generally been found to be the strongest determining factor tied to market share, many first-mover disadvantages have been identified as well [34, 35]. The cost to break trail and innovate need not be borne by successive entrants, and competitors have an existing model to target and improve upon.

If there is a first-mover advantage in a social Q&A environment, there must be a measurable benefit to having the equivalent of a dominant market position, in terms of some desirable limited good. In a social Q&A community, even when interactions are largely cooperative and harmonious, answerers still compete for rating points, and are rewarded with selective attention in many forms: the privileged “Top answer” position immediately beneath the question, more readers, respondents, friend invitations and expressions of appreciation. Also, the only downside risk to being the first mover is losing a few points of the thousands one might accumulate each week by posting a wrong or unpopular answer, which might have been avoidable by waiting for others to answer first. But regardless of the rationale and rewards, if the first answer posted to a question on a social Q&A site consistently receives more points than subsequent answers, our understanding of—and trust in—user-rated content must account for this effect.

2.2. Recommender systems

Recommendation is central to information retrieval [12]. Since their primary function is to use collaborative filtering mechanisms to recommend the best answers, social Q&A sites are instances of recommender systems. While the underlying algorithms to gather and express aggregate opinion have evolved rather quickly [32], and the collections of items range from Web bookmarks to photos to restaurants, literature in social information filtering has consistently evaluated the success of a system by its ability to recommend one or a few most-relevant items above the rest.

Borlund [5] proposed a framework for interactive information retrieval evaluation that has as a major component an interface that allows user participation in the retrieval process, and for non-binary relevance assessments. The presentation of results is a statement of relevance, and a ranked list of highest rated answers to a question in a social Q&A site is precisely that—an aggregate set of previous users has attested that this

answer will be accurate, entertaining, or otherwise worth reading.

Social bookmarking systems also share characteristics of recommender systems, and a wide range of research has identified power law distributions in user behavior, including tag frequency in del.icio.us [6], tag usage in Flickr [24], shared tags in the Connotea scientific social bookmarking system [23], and the distribution of users who submit tags in CiteULike [10]. Relatively few users, tags and content do a disproportionately large share of the work, and get a disproportionate amount of user attention, which underscores the attraction of cultivating and maintaining a top position.

2.3. Social Q&A

Social Q&A sites [16] allow anyone to ask and answer questions, and through proprietary algorithms that vary from site to site, generate a collaborative assessment of the quality of the content submitted by all.

In social Q&A sites, aggregate rating points communicate a sense of the “best answer.” Systems such as Yahoo! Answers [38] allow askers to declare an answer the best and close a question to new responses, while others like Answerbag [2] aggregate ratings and responses indefinitely, and present answers in descending order of user ratings, whether or not the asker has declared one or more responses to be “Asker’s Pick.”

The social aspects of Q&A sites directly influence how content is evaluated, ranked and presented within them. While transaction log analysis can provide useful data, qualitative methods including content analysis and social network analysis can lead to a more subtle understanding of patterns of participation and content evaluation. In a previous study of Answerbag [13], answers from “synthesists,” those who claim no topic expertise but provide links and supporting evidence, tend to be rated more highly than answers from “specialists,” who claim expertise and provide no supporting evidence in their answers. In their comparative study of five Q&A sites (not including Answerbag), Harper et al. [18] also found evidence to support the notion that answers from synthesists tended to receive higher ratings than those of specialists. These results suggest a social aspect to information quality assessment, yielding both emergent standards about what constitutes a good answer, and the social customs surrounding the awarding of rating points.

The social reward structures of Yahoo! Answers have been identified as critical to the site’s success, such as the levels and ranks achieved by contributing

answers voted best by other users [31]. Adamic et al. [1] also studied Yahoo! Answers, and point out that using its native ‘best answer’ tool as a means of analysis must be approached with caution, since more than one answer may be objectively correct, and the standards by which users judge answers best are idiosyncratic. They found that answer length and the track record of the user were related to whether a given user’s answer was chosen best. These findings echo those of Smith [33], who studied social accounting metrics on Usenet and found that a mutual awareness of participants’ contributions and relationships is critical to a cooperative outcome, and Fiore et al. [11], who found that revealing author histories correlates with trust, and a user’s desire to read more content posted by those contributors.

Naver’s Knowledge-iN, a popular South Korean Q&A site, allows multiple answers to be chosen as best. Nam et al. [26] found that the best answers in Knowledge-iN were associated with consistent participation, and that a point-based reward structure motivated participation. Jeon et al. [19] also studied Knowledge-iN, and used a combination of 13 non-textual features related to answer quality, including answer length, answer rating, and ratings of content previously submitted by the user.

Answerbag [2], the setting of this study, is a social Q&A site that launched in 2003 and has accumulated roughly 2 million questions, 9 million answers and receives roughly 8 million unique visitors per month. Answerbag was initially designed as a portal to collect frequently-asked questions and allow users to append and rate multiple answers. However, when social functions were added to the site, such as level titles and badges, personal profiles and friend lists, users became at least as interested in interacting with one another as with the site content [14].

This paper extends previous investigations by considering the variable of answer submission position as a possible factor in user assessment of answer quality.

3. Method

To investigate the effect of first-mover advantage in answer submission, the Answerbag database backend was queried in several stages, to create a sample set of questions for analysis. Administrator-level access to Answerbag transaction logs and other detailed site data was available. Research was conducted as a participant observation.

Answerbag users uprate answers they find useful via a “Like” function similar to Facebook, and the highest-rated answers are listed first, while still

allowing users to view every answer to a given question. Every “Like” equals one rating point, and as users’ questions and answers accumulate rating points, they accrue to the user’s overall profile, allowing them to progress through ranks and levels which are prominently displayed on their personal profile pages (Figure 1).



Figure 1. Answerbag point total, level title and achievement badge from user profile page.

Analyzing point totals for individual answers carries several caveats. Users can edit previously posted content, even after it has been rated by others, and they can change their ratings at any time. Similarly, moderators and site administrators sometimes remove content for violations of site policies, or as a result of a site malfunction. On this or any Q&A site, point-based metrics are best understood as snapshots of dynamic conversations. Therefore, results are presented in raw form, and no deeper statistical analysis is attempted. The parameters for inclusion in the sample were:

- Questions must have received four or more answers.
- Each of the answers must have received 20 or more page views.
- Each of the answers must have been rated by at least five different users.
- None of the answers or ratings had been edited after initial posting.
- None of the answers received “Asker’s Pick” from the asker, which immediately promotes the selected answer to the top of the list. Only about 24% of askers use this function.
- None of the questions, answers or ratings had been subject to review by site administrators for inappropriate content or other violations of site policies.

This first pass yielded well in excess of 50,000 candidate questions, out of the roughly 2 million total. Of these, 600 questions were randomly selected, with

3216 total answers, which were analyzed for order of submission, content and rating points. Particularly relevant to this study is the friend feature, which allows users to follow others, and be selectively notified when their friends have posted new content. This adds complexity to data collection and analysis; since friend notifications can effectively filter out content from people users have not friended, not all answers have an equal chance to be viewed or uprated. Also, users may uprate their friends’ content without regard to its relative quality. Thus, to isolate the effect of first-mover advantage, page view and answer quality normalizations were undertaken.

3.1. Page view normalization

In a non-social Q&A system, the first answer posted to a question would always tend to have more page views, thus more potential rating points, than subsequent answers, simply by being accessible for a longer period of time. However, the social elements of Answerbag and many other Q&A sites create a situation where the competition for attention is not equal. When a high-ranking user with dozens of friends or followers submits an answer, any user who has chosen to subscribe to that user’s updates receives an immediate notification, via a graphic if they are presently logged into the site, or a review list if they log in later. Importantly, these notifications include direct links to the answer submitted by the friended user, not a link to the overall question page where they can review answers submitted by others as well.

Q&A sites become communities when they transcend the simple exchange of facts and provide a place for expressions of social connection [14]. However, just as in the real world, both the benefits and the drawbacks of social interaction manifest themselves in online behavior [15]. When acknowledging the work of others, from upratings on a social Q&A site to formal scholarly citations [28], many of the same social factors come into play. People cite and uprate for reasons of courtesy, status, and expectation to name only a few, and indeed Answerbag appends the username of the first uprater to every answer. Social factors must also be accounted for to isolate the effect of first-mover advantage.

Conversely, a new user with no social connections must rely on their content being discovered largely by chance, either discovered at the time of submission by users monitoring a new arrivals feed, or by a fortuitous keyword search or category browse.

As mentioned, Answerbag’s URL architecture is such that a question page contains the question and all answers in descending rating order. Depending on an individual’s browser and screen resolution settings,

generally only the top two or three answers can be viewed from the question page without scrolling down. Alternatively, there is also a direct URL to the answer page, which is returned in search results as well as notifications. Users may also view submissions of new questions and answers from the home page, and from a new arrivals feed. Thus, an accurate page view count is difficult to determine. For the purposes of this study, a page view was counted as a unique hit on the answer page, and half a page view was credited for a unique hit on the question page after the answer had been submitted. To normalize for this difference in page views, rating points for answers submitted in the first through fourth positions are reported both as raw numbers, and per page view. This data is summarized in Table 1.

3.2. Answer quality normalization

The fundamental assumption of content evaluation in social Q&A sites is that the best answers accumulate the highest ratings, thus creating a useful recommendation system. However, in order to isolate the effect of the first-posted answer relative to those subsequently submitted as much as possible, it is critical to make some effort to normalize answer quality. Otherwise, the system may be working precisely as designed, and answers will be accumulating higher or lower ratings based on their relative merit, regardless of the order in which they were submitted. To normalize answer quality, factual/informational Q&A were eliminated from the main sample, yielding a subsample of social/conversational questions for which there were no objectively correct answers.

In the initial planning for this study, finding a sample of purely factual questions meeting the criteria for inclusion in the main sample proved elusive. If one, two or three people have already responded to a factual question with the correct, identical answer, few users will take the time to add a fourth iteration. Those who do are sometimes accused of cribbing existing answers to accumulate points, attracting negative attention and punitive comments.

However, many questions posted to social Q&A sites are conversational, not factual [17]. In these cases, there is no right answer, or more accurately, one

answer is as correct as any other, as in the following examples:

- *Which song do you want played at your funeral?*
- *Look around, what is the first red object you see?*
- *What is the most beautiful thing you have ever seen?*
- *What are you “known for” by people that are close to you?*
- *What is still a mystery to you?*
- *What is the hardest thing to walk away from?*

Conversational questions like these provide natural answer quality normalization. To isolate the effects of first-mover advantage from considerations of answer quality, a sub-sample of 303 questions, with 1897 answers, was analyzed in Table 2.

4. Results and analysis

The results of this study suggest that the first answer posted to a question in a social Q&A site receives approximately 17% more rating points than the second answer submitted, even after normalizing for page views. The effect was slightly less pronounced in a subsample normalized for answer quality. The results of the raw data analysis and those of both normalizations also suggest that each subsequent answer beyond the second is decreasingly likely to be the highest rated answer.

Since there was an extremely wide range of raw rating point totals, for clarity all rating data are represented as a decimal fraction of the first submitted answer.

4.1. Page view normalization

In the raw data, a consistent reduction in average rating points was observed with each successive answer submitted. After normalizing for rating points per page view, the difference decreased, but still suggested a first-mover advantage.

Answer submit order <i>n</i> =600Q, 3216A	Average rating points relative to first answer (raw data)	Average rating points relative to first answer (page view normalized)
1st	1.0	1.0
2nd	0.71	0.83
3rd	0.61	0.80
4th	0.53	0.77

Table 1. Average raw and page view normalized points for first four answers submitted.

Some of these results may be attributable to the participation patterns of Answerbag users. Those who do not enter the site through a targeted notification tend to enter through question or category pages, and read existing content before posting their own. The analysis revealed several dozen instances of answers submitted fourth and later simply echoing previous posts. For example, if User X had the top-rated answer to a question, later-submitted answers sometimes took the form of “I agree with User X’s answer,” even though the answer comment and ratings functions beneath User X’s original answer are specifically designed for this purpose.

By definition, the first answer submitted has more opportunity to garner rating points, both positive and negative. However, even with page views normalized, the results of this component of the study suggest that the first answer to a question can expect to receive an average of 17% more points than the second submission, 20% more than the third, and 23% more than the fourth.

Normalizing page views to account for unequal answer ratings from friends of the poster yielded several unexpected results. While the general pattern of first-mover advantage remained consistent overall, in a few cases where very high ranking users submitted an answer in the third or fourth position, their network of friends and followers tended to elevate the ranking of their submission above even the first-posted answer. While a straightforward interpretation may be that a strong friends network simply has a greater effect than being first to post, reviewing the question content and interaction patterns around these outliers revealed, somewhat surprisingly, that there was inconsistent participation by the highest-ranking users. This supports the findings of Nam et al. [26], who report that high-ranking users commonly have long lulls between their participation sessions, then catch up in bursts of activity.

A well-connected user who arrives late to a thread may have their answer uprated by their friends to approach the rating of earlier submitters, and the quality of their contribution may indeed warrant the high ranking. However, when an attempt is made to level the playing field and filter out social rating patterns not available to all users, stronger evidence of first-mover advantage appears.

4.2. Answer quality normalization

In terms of answer rating points, limiting the analysis to social/conversational questions seemed to “lift all boats”—answers submitted in all positions

Answer submit order <i>n</i> =303Q, 1897A	Average rating points relative to first answer (raw data)	Average rating points relative to first answer (answer quality normalized)
1st	1.0	1.0
2nd	0.77	0.85
3rd	0.72	0.82
4th	0.66	0.78

Table 2. Average raw and answer quality normalized points for first four answers submitted.

received higher ratings than those from the broader sample where answer quality was not normalized (Table 2). Similarly, ratings for subsequently submitted answers fell off at a slightly more gradual rate than in the page view normalization.

This result may be an artifact of the sample, in which factual/informational Q&A was eliminated. Users in a social/conversational mode may be more inclined to scroll down and read all answers to a question, and more likely to view and rate an answer submitted later.

A pattern that appeared within this subsample was the existence of extremely long comment threads around highly-rated answers, where users interacted socially, made jokes and meandered on and off the original topic, creating an impromptu chat room. Often, these extended conversations did not involve the poster of the answer, or took place weeks or months after the original answer had been posted. This suggests that some of the answer upratings may have reflected users’ appreciation of the subsequent conversation, not the answer itself.

5. Discussion

The results of both the raw rating data and the page view and answer quality normalizations suggest that a rational strategy to maximize rating points on Answerbag is simply being the first to answer questions. And in fact, Answerbag does offer a filter to view only unanswered questions (Figure 2).

QUESTIONS. All questions in the Answerbag database.

Show:

<input checked="" type="radio"/> Everything	Type ▼ All selected <input checked="" type="checkbox"/> Community <input checked="" type="checkbox"/> Professionally Researched	Status ▼ All selected <input checked="" type="checkbox"/> Unanswered <input checked="" type="checkbox"/> Answered
---	---	---

Figure 2. Answerbag unanswered questions filter.

If a user submitted answers only to unanswered questions, guaranteeing themselves first-mover advantage, the results of this study would predict that they would accumulate rating points roughly 17% faster than a user who posted only second answers, even after normalizing for page views.

However, the social nature of the site may provide natural circuit breakers against using such overt strategies to game the rating system. Several instances of a social Q&A community downrating what it perceives to be behavior that goes against the spirit of the site have been mentioned here and in other studies [14, 15]. Taking an overly strategic approach can give the impression that the chronic first-answerer is there for the points, not the content or interactions, which can result in a poor reputation and negative ratings outweighing any benefit from first-mover advantage.

5.1. Future research

In 2006, Answerbag introduced a feature allowing users to append images and video to their answers, or to submit an image/video answer with no text at all. While less than 2% of the answers in the sample and subsample in this study included embedded images and video, functions like this make it more difficult to discern the intent of a user's update. For example, is the video itself being updated, or the video's cleverness as an answer to the question? Future points-based assessments of social Q&A content should account not just for differences in page views, social ratings and answer quality, but also the extent to which embedded non-textual content—and as

mentioned earlier, surrounding conversational content—may all be components of the criteria by which a rater makes an evaluation.

While problematizing the use of rating points as a gold standard for answer quality is a core focus of this paper, future research might consider the question of whether rating points, like social Q&A answers themselves, are more reflective of quality in the aggregate than in any small sample of a few hundred or thousand questions and answers. A person's answers may receive unusually high ratings because of their submission order, or the influence of their many friends on the site, but it may also be the case that their consistent, high-quality contributions resulted in such numerous and diligent followers in the first place.

6. Conclusion

As social Q&A sites increase in popularity, so too does the need for ways to predict how users perceive and evaluate content. This study addressed the question of first-mover advantage in a social Q&A community by analyzing the ratings of answers by the order in which the answers were submitted, and proposes a process by which first-mover advantage can be identified and normalized in future assessments of answer quality in Q&A sites. The results suggest that even after controlling for page views, the first answer posted tended to receive roughly 17% more points than the second answer submitted, with ratings of subsequently submitted answers diminishing in kind. A similar effect was observed in a subsample normalized for answer quality.

Even with precise transaction log data and the ability to track in fine detail the activity patterns of individual users and groups, quantitative data presents only a partial insight into why people rate social Q&A content as they do. Taking social factors into account, such as the affective rewards points can confer and the self-generated norms of online communities, yields a more complete picture of the content evaluation and vetting processes in social Q&A environments.

7. References

- [1] Adamic, L., Zhang, J., Bakshy, E. and Ackerman, M. Knowledge sharing and Yahoo Answers: Everyone knows something. In Proc. WWW 2008, ACM Press (2008), 665-674.
- [2] Answerbag. <http://www.answerbag.com/>.
- [3] Belkin, N.J. Some(what) grand challenges for information retrieval. ACM SIGIR Forum 42, 1 (2008), 47-54.
- [4] Borgs, C., Chayes, J., Daskalakis, C. and Roch, S. First to market is not everything: An analysis of preferential

- attachment with fitness. In Proc. STOC 2007, ACM Press (2007), 135-144.
- [5] Borlund, P. The IIR evaluation model: A framework for evaluation of interactive information retrieval systems. *Information Research* 8, 3 (2003), <http://informationr.net/ir/8-3/paper152.html>.
- [6] Catutto, C. Semiotic dynamics in online social communities. *Eur. Phys. J. C.* 46, (2006), 33-37.
- [7] Comment Sniper. <http://comment-sniper.software.informer.com/>.
- [8] Denrell, J., C. Fang and Z. Zhao, "Inferring superior capabilities from sustained superior performance: A Bayesian analysis," *Strategic Management Journal* 34(2), 2013, pp. 182-196.
- [9] Diprete, T.A., and G.M. Eirich, "Cumulative advantage as mechanism for inequality: A review of theoretical and empirical developments," *Annual Review of Sociology* 32, 2006, pp. 271-298.
- [10] Farooq, U., Kannampallil, T.G., Song, Y., Ganoe, C.H., Carroll, J.M. and Giles, C.L. Evaluating tagging behavior in social bookmarking systems: Metrics and design heuristics. In Proc. GROUP 2007, ACM Press (2007), 351-360.
- [11] Fiore, A.T., LeeTiernan, S., and Smith, M.A. (2002). Observed behavior and perceived value in Usenet newsgroups: Bridging the gap. *Proc. CHI 2002*, ACM Press (2002), 323-330.
- [12] Furner, J. On recommending. *Journal of the American Society for Information Science & Technology* 53, 9 (2002), 743-762.
- [13] Gazan, R. Specialists and synthesists in a question answering community. *Proc. ASIS&T 2006*, Information Today (2006).
- [14] Gazan, R. When online communities become self-aware. *Proc. HICSS 2009* (2009).
- [15] Gazan, R. Redesign as an Act of Violence: Disrupted Interaction Patterns and the Fragmenting of a Social Q&A Community. *ACM Conference on Human Factors in Computing Systems (CHI 2011)*, 9-13 May 2011, Vancouver, BC, pp. 2847-2856.
- [16] Gazan, R. (2011). Social Q&A. *Journal of the American Society for Information Science & Technology* 62(12), 2301-2312.
- [17] Harper, F.M., Moy, D. and Konstan, J.A. Facts or friends?: Distinguishing informational and conversational questions in social Q&A sites. In Proc. CHI 2009, ACM Press (2009), 759-768.
- [18] Harper, F.M., Raban, D., Rafaeli, S. and Konstan, J.A. Predictors of answer quality in online Q&A sites. In Proc. CHI 2008, ACM Press (2008), 865-874.
- [19] Jeon, J., Croft, B., Lee, J.-H. and Park, S. A framework to predict the quality of answers with non-textual features. In Proc. SIGIR 2006, ACM Press (2006).
- [20] Kim, W.C. and Mauborgne, R. *Blue ocean strategy: How to create uncontested market space and make competition irrelevant*. Harvard Business School Press, Boston, MA, USA, 2005.
- [21] Kleinberg, J. The emerging intersection of social and technological networks: Open questions and algorithmic challenges. In Proc. FOCS 2006, ACM Press (2006).
- [22] Liang, T.P., Czaplewski, A.J., Klein, G., and Jiang, J.J. Leveraging first-mover advantages in Internet-based consumer services. *Communications of the ACM* 52, 6 (2009), 146-148.
- [23] Lund, B., Hammond, T., Flack, M. and Hannay, T. Social bookmarking tools II. *D-Lib Magazine* 11, 4 (2005).
- [24] Marlow, C., Naaman, M., boyd, d. and Davis, M. HT06, tagging paper, taxonomy, Flickr, academic article, to read. In Proc. HT 2006, ACM Press (2006), 31-40.
- [25] Merton, R.K. The Matthew effect in science. *Science* 159, 3810 (1968), 56-63.
- [26] Nam, K.K., Ackerman, M.S. and Adamic, L.A. Questions in, Knowledge-in?: A study of Naver's question answering community. In Proc. CHI 2009, ACM Press (2009), 779-788.
- [27] Niedrich, R.W. and Scott, D.S. The influence of pioneer status and experience order on consumer brand preference: A mediated-effects model. *Journal of the Academy of Marketing Science* 31, 4 (2003), 468-480.
- [28] Price, D.J.D. Networks of scientific papers. *Science* 149, 3683 (1965), 510-515.
- [29] Price, D.J.D. A general theory of bibliometric and other cumulative advantage processes. *Journal of the American Society for Information Science* 27, 5-6 (1976), 292-306.
- [30] Shah, C., V. Kitzie and E. Choi, "Modalities, motivations, and materials – investigating traditional and social online Q&A services," *Journal of Information Science*, 2014, doi:10.1177/0165551514534140.
- [31] Shah, C., Oh, J.S. and Oh, S. Exploring characteristics and effects of user participation in online social Q&A sites. *First Monday* 13, 9 (2008).
- [32] Shardanand, U. and Maes, P. Social information filtering: Algorithms for automating word of mouth. In Proc. CHI 1995, ACM Press (1995), 210-217.
- [33] Smith, M. Tools for navigating large social cyberspaces. *Communications of the ACM* 45, 4 (2002), 51-55.
- [34] Suarez, F. and Lanzolla, G. The half-truth of first-mover advantage. *Harvard Business Review* 83, 4 (2005), 121-127.
- [35] Urban, G.L., Carter, R., Gaskin, S. and Mucha, Z. Market share rewards to pioneering brands: An empirical analysis and strategic implications. *Management Science* 32, 6 (1986), 645-659.
- [36] Van De Rijt, A., S.M. Kang, M. Restivo, and A. Patil, "Field experiments of success-breeds-success dynamics," *Proceedings of the National Academy of Sciences of the United States of America* 111(19), 2014, pp. 6934-6939.
- [37] Volz, Y.Z., and F.L.F. Lee, "Who wins the Pulitzer Prize in international reporting? Cumulative advantage and social stratification in journalism," *Journalism* 14(5), 2013, pp. 587-605.
- [38] Yahoo! Answers. <http://answers.yahoo.com>.