Social Feedback Efficiency and Social Bookmark Usage¹

BRIAN WHITWORTH AND JINGNING LI

Institute of Information & Mathematical Sciences Massey University at Albany, Auckland, New Zealand

Bookmarking, a basic feature of Internet Web browsers, lets users save and collect their favourite web page locations, but not use those bookmarks on other computers or share them with others. Social bookmarking lets people share bookmarks on the Internet. The term was first used by del.icio.us in late 2003, who found that letting users store, organize and access bookmarks online also reveals community favourite web sites and the common tags they are organized by. This research investigates the factors that affect social bookmark usage. A social bookmarking simulation was created to see how various levels of cognitive effort and social feedback affected use. At first, effort was significant and feedback was not, but when social feedback effort was controlled for, it became significant. That personal cognitive effort enables community feedback activation has implications for current social bookmark design. It also marks it as a current "sleeper", a community killer app of the future.

Keywords: Social bookmarking, sociotechnical, cognitive effort; social feedback; likelihood of use

Introduction

Bookmarking, a basic feature of web browsers, lets users store their favourite web page locations and manage them in folders to find them easily. As the data is held on a local computer, the bookmarks aren't available on other computers nor are they shared. *Social bookmarks* let users manage bookmarks publicly or privately on the Internet (Educause, May 2005) and subscribe to the lists of other users. On the World Wide Web, social bookmark buttons appear on many websites, e.g. the BBC website shows them under each news story (Figure 1).



Figure 1: Social bookmark buttons

Social bookmarking advantages like user created tags and rankings (Ivory and Megraw, 2005) make it increasingly popular (Millen, Feinberg & Kerr 2006), e.g. in April 2009 about 38 million people visited digg.com². Yet this was only 0.41% of all

¹ Published as: Whitworth, B. and Li, J. (2013), Social Feedback Efficiency and Social Bookmark Usage, IADIS International Conference, ICT, Society and Human Beings 2013, 24 – 26 July, Prague, Czech Republic.

² Retrieved May 25, 2009, from <u>http://siteanalytics.compete.com/digg.com+facebook.com/</u>

Internet users, compared to 18% visiting Facebook in May (Alexa, 2009). In Internet terms, relatively few people use social bookmarking.

In general, social bookmarking involves clicking on a bookmark button, registration (if not already done), login, submitting a bookmark website, then community feedback for that site. Current systems differ greatly in how this is done: some like Digg register many details while others like Reddit need few; some like Delicious require a click for social feedback but others like StumbleUpon give it right away; for some login and register are separate pages and for others the same; some auto-fill fields like title and description; etc. There is little agreement on what designs are best.

Others have analysed social bookmarking functions like tagging (Sen et al. 2006), filtering (Bateman 2009), ranking Heyman et al, 2008) and searching (Yanbe, 2007), but these benefits need contributed bookmarks to work from. So why do people social bookmark in the first place? In an experiment, subjects new to social bookmarking tried out various buttons then reported how likely they were to continue to use the service. It was hypothesized that cognitive effort and social feedback affect social bookmark usage based on the literature that users seek the most effect for the least effort (Clark and Wilkes-Gibbs, 1986). The results will interest those who wonder why social bookmarking works and the designers and operators of social bookmark systems.

Cognitive Effort

Ease of use is well a known application usage factor, defined as the cognitive effort a user must expend to get what they want from a web service (Whitworth, Banuls, Sylla & Mahinda, 2008). A social bookmark system that is hard to use is expected to be used less often. Cognitive effort is important because only 16% of users have the time to read all of a web page to get to information they want – the rest just scan it (Underwood, 2001). Each user may have a specific threshold and if it is exceeded they click-on to another site. So even just one extra click can stop some people using an application.

The web interface model shown in Figure 2 suggests element, page and site interface aspects, where element covers text, links and graphics, page covers loading and transitions and the site aspect is the overall experience (Ivory and Megraw, 2005, p.468). Page effort involves users navigating between pages (Sklar, 2009), e.g. clicking on to get information. So cognitive effort includes things like:

- 1. Font styles and sizes (Watrall and Siarto, 2009).
- 2. Length of link text (Sawyer and Schroeder, 2000).
- 3. Number/types of links (Spool, Scanlon, Schroeder, Snyder and DeAngelo, 1999).
- 4. Number/types of graphics (Flanders and Willis, 1998).
- 5. Use of color (Watrall and Siarto, 2009).

Finally, the overall site experience affects cognitive effort, as doing what we enjoy is naturally "easier". Cognitive effort can be reduced by having fewer colours and fonts, consistent layouts, information chunking, use of graphics, faster loading, fewer click and scroll-down acts, intuitive interfaces and community help and advice.



Figure 2: A conceptual model of web interfaces

Social feedback

Social bookmarking uses tags, comments and ratings to summarise the web sites a community is looking at (Park, Fukuhara, Ohmukai, Takeda, & Lee, 2008). The number of users bookmarking a web page measures its authoritativeness (Chen, Scripps, & Tan, 2008), so social bookmarking can identify quality sites better than a web search if it is less susceptible to marketing (Bian, Liu, Agichtein, & Zha, 2008).

Social feedback is also a key element of social change as illustrated by the hundredth-monkey effect:

Scientists observing Macaque monkeys in the wild saw a young female monkey washing potatoes in a stream before eating them. The skill spread to the whole island, to other island colonies and to the mainland. Old monkeys didn't copy the new trick, but young ones did. (Blair, 1975)

In this theory, the hundredth-monkey discovers a new skill that is passed on socially. The young copy it because it works, until it becomes part of a culture taught by one generation to the next, as "what we do". So while physical evolution is passed on by genetics *social evolution* is passed on by culture, by what the brain inherits by learning not by what the cell inherits from sex. It is implied that humanity went from minor plains scavenger to global dominance in a few thousand years by social not biological evolution, though our progress may be by the hundred-millionth not hundredth.

The primitive but powerful psychological mechanism that allows communities to learn is *normative influence*, defined as the effect of the group on its members (Whitworth, Gallupe and McQueen, 2001). Normative influence generates agreement to keep groups together and let them act as one. For individuals, it manifests as a need to belong to a group, go where it goes and not be different. While groupthink diminishes individual creativity, without it there is no social unit to learn anything at all.

In people, the instinct that keeps herds together also works for ideas, art and fashion, but the innovation paradox is that new forms may replace old ones. If an individual learns something new it will be locally copied if it works, but is not yet the norm. Only at a "tipping point", when a majority of the group goes that way (Gladwell, 2000) does normative influence pull the rest of the group into the new norm that passes from generation to generation in its culture, e.g. the Internet, a quirk of computer nerds in the seventies, is today for everyone.

In social activity the "law of the few" applies, that 80% of the activity is done by 20% of the people, with the rest indisposed, disinterested or just watching. The ratio of online "lurkers" to posters is about the same. By Gladwell, the active 20% includes connectors who know people, mavens who hold knowledge and salesmen who sway others. They, plus of course the hundredth-monkey who makes a breakthrough, create tipping points. The rest of us contribute to social evolution by *following*, which isn't doing nothing because we *are* the group.

The success of micro-blogs like Twitter is their ability to quickly reveal where a group is going. Social bookmarks that show the web sites "everyone" likes do the same. Both are *socio-technical systems*, social systems emerging from a technology base (Whitworth and Ahmad, 2012). So the technology must support social requirements, e.g. for normative influence to work, people need to know what the others are doing, i.e. get social feedback. Without followers there is no social evolution and without social feedback there are no followers. Social feedback, as a community "talking" to itself, is the basis of social belonging³, unity and evolution.

The experiment

If people begin using social bookmarking by trying buttons on the web, simulating that should predict actual usage. Social bookmarking was simulated for various values



Figure 3. The simulation task

of cognitive effort and social feedback. Cognitive effort was how many clicks, scrolls or text entries were needed to bookmark a web site, and social feedback was the amount of

³ The opposite of belonging is *alienation*, to not feel part of a community.

community information given in return for submitting a bookmark. The biggest bang for the smallest buck was then high social feedback for low cognitive effort. The research question was how cognitive effort and social feedback affected expected usage?

Phase 1 simulation

		Low Cognitive Effort	High Cognitive Effort
Register Loss Presonal Details Userum** Userum** Personal Details Personal Details Personal Details Presonal Code:* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Defaire* Personal Details Personal Details P	Register	Low Cognitive Effort	High Cognitive Effor:

Figure 4. Low versus high cognitive effort

To avoid any bias, a new social bookmark system called *Bligg* was built, with register, login, bookmark and feedback features. Sixty subjects, selected randomly from

		Low Cognitive Effort High Cogn	nitive Effort
	Low Social Feedback	String for dr. Manager, dr. Market, and the string for and the string dark for the string for any dark for the string dark for th	
Feedback	High Social F ee dback		State State State Conser State Conser

Figure 5: High and low social feedback

computer rooms in a New Zealand University, were invited to learn about social bookmarking by trying out a social bookmark system we had developed. They were selected to have Internet but not social bookmarking experience. Subjects in groups were introduced to social bookmarking, showed examples, then tried out two variants, with usage questions after each. All six versions of the Bligg social bookmark button were trialled, but each subject only tried two cognitive effort versions with the same social feedback.

The task was to bookmark preferred Beatles songs in a group (Figure 3). The Bligg buttons varied by high and low cognitive effort, and high, low and no social feedback. High cognitive effort was primarily more registration (Figure 4). No social feedback just said thank you after a submission, low social feedback gave basic song details while high social feedback gave the group response (Figure 5). High social feedback also had high-low cognitive effort versions. The experimental design was repeated measure for cognitive effort, so the button effort presentation order was randomized to avoid bias. After subjects tried each Bligg button type, the expected usage dependent variable was measured by these questions:

"I would like to use social bookmarking in the future"

"I think I will use social bookmarking in the future".



on a 10-point semantic differential scale. The software also measured the time taken.

Figure 6: Cognitive effort breakdown by detail (N=60)

Phase 1 Results

In the first stages of explaining social bookmarking and seeing examples, attitude to social bookmarking showed no significant differences between the participant groups, but after trying the Bligg variants, cognitive effort significantly affected expected social bookmark usage (paired t-test, p<0.001). High cognitive effort also actually took significantly longer to complete: nearly ten times as long overall; three times as long for registration and 1.5 times as long for the result comment section. Figure 6 breaks down the cognitive effort by detail, with captchas, URL description, URL, making a comment, postal code, birth date and topic being seen as onerous, in that order. In contrast, users seemed happy to provide the greatest effort : full name, gender, country, URL and were seen as effort, with and especially onerous.

Yet while less effort increased expected future usage, as predicted, social feedback had no significant effect (ANOVA, p=0.352). In the social feedback detail, bookmark number, details and top in music were the most useful (Figure 7). Subjects were less interested in other's comments or what people who saved this also saved.



Figure 7: Social feedback breakdown by detail (N=60)

However low effort alone is not a reason to use social bookmarks in the first place, so if social feedback level didn't positively affect usage, what did? On review it became

clear that increasing social feedback also increased cognitive effort, as subjects getting more feedback had to do more reading, and spent more time on it, i.e. the treatment

Feedback Type	Interface
None: No feedback	Bligg Social Bookmarking Website - Mozilla Firefox Image: Control of the set o
Low: Song details	Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Submitted Bookmark Details Close Image: Social Bookmark Details Image: Social Bookmark Details Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox Image: Social Bookmarking Website - Mozilla Firefox </th
Medium: Details & bookmark number	Other Bligg Users Also Bookmarked This Song! IWant to Hold Your Hand IWant to Hold Your Hand is a song by the English pop and rock band The Beatles. Written by John Lennon and Paul McCartney, and recorded in October 1963, it was the first Beatles record to be made using four-track equipment. McCartney and Lennon did not have any particular inspiration for the song. User 6 submitted 1 sec ago in Pop Music
High: Details, bookmarks and links	 Bligg Social Bookmarking Website - Mozilla Firefox Firefox Here is the feedback from Bligg about this URL or website. Please use Close button to shut this window down. Submitted Bookmark Details Other Bligg Users Also Bookmarked This Song! I Want to Hold Your Hand I Want to Hold Your Hand is a song by the English pop and rock band The Beatles. Written by John Lennon and Paul McCartney, and recorded in October 1963, it was the first Beatles record to be made using four-track equipment. McCartney and Lennon did not have any particular inspiration for the song. User 6 submitted 1 sec ago in Pop Music See other bookmarks related by Keyword

Figure 8. Social feedback value, for same cognitive effort

confounded cognitive effort and social feedback. If more social feedback to increase usage also involved more cognitive effort to decrease it, the two effects could have cancelled. Phase 2 extended the study to eliminate this confound.

Phase 2 simulation

This phase varied social feedback but controlled for reading effort. The method was the same, but the feedback variants had the same reading length, images and layout (Figure 8). No social feedback just thanked the user, low added song information, medium was the bookmarker number and high gave links to more data. The feedback cumulated but the reading length was the same. Twenty-four bookmark newcomers tried out these Bligg buttons in a random order.



Figure 9: Intention to use social bookmarks by social feedback (N=24)

Phase 2 results

When effort was controlled for, social feedback significantly affected likelihood of use and future intention to use social bookmarks (ANOVA, p<0.001). Intention to use increased for every value (Figure 8). For the high social feedback level, 71% of subjects clicked on feedback links: 82% clicked on "See other bookmarks in Pop Music" and 18% clicked on "See other bookmarks related by Keywords". Male subjects were more

Table I. Actual time taken by feedback

Feedback Level	Time Taken (Secs)
None	14.3
Low	9.2
Medium	11.3
High	26.2

willing to click the links than the female subjects and found doing so less effort. While subjects spent about twice as much time on the high social feedback system (Table 4), they still found the system easiest to use, i.e. giving feedback links increased actual time taken but not perceived cognitive effort.

Conclusions

A review of current systems, plus these results, suggest that the cognitive effort users are willing to put into social bookmarking is less than most current designers suppose. Adding "Are you human?" captcha requests probably just lowers usage and social value, as does asking for web site details, comments, birthdates or post codes. The keep it simple motto applies to the feedback itself, as more feedback for more visual detail was a wash for our subjects. Only more feedback as optional links added value, as it increased actual time taken but did not add to perceived cognitive effort.

The thesis that social bookmarking systems with more social feedback for less cognitive effort are more likely to be used is supported. The relatively slow uptake of social bookmarks compared to say social networks may then relate to this efficiency, i.e. the amount of social feedback received for the cognitive effort given. If social feedback is the activating factor and cognitive effort the enabling factor, social bookmarking may be a "sleeper" community application of unrealized potential. There is a need for a grass roots mirror on community used websites that can't be bought, manipulated or biased as say search engines can. To realize this role, social bookmark systems may need to:

- 1. Focus on community level not individual level feedback (like user comments).
- 2. Significantly reduce cognitive effort, including for feedback delivery.
- 3. Specialize in smaller communities of interest, rather than all web users.

The challenge for social bookmarking today is to find innovative ways to increase social feedback delivered while at the same time reducing cognitive effort.

Acknowledgements

Thanks to Dr. Beatrix Jones, Massey University, for checking the mathematics.

References

- Alexa. (2009). *Facebook*. Retrieved May 25, 2009, from http://alexa.com/siteinfo/facebook.com+digg.com
- Bateman, S., Muller, M. J., & Freyne, J. (2009). Personalized Retrieval in Social Bookmarking [Electronic version]. Conference on Supporting Group Work: Proceedings of the ACM 2009 international conference on Supporting group work, 09, 91-94.
- Bian, J., Liu, Y., Agichtein, E., & Zha, H. (2008b). Finding the right facts in the crowd: factoid question answering over social media [Electronic version]. *In WWW '08: Proceeding of the* 17th international conference on World Wide Web, 08, 467-476.
- Blair, Lawrence (1975). Rhythms of Vision: The Changing Patterns of Belief. London: Croom Helm Ltd
- Chen, F., Scripps, J., & Tan, P. N. (2008). Link Mining for a Social Bookmarking Web Site [Electronic version]. Web Intelligence and Intelligent Agent Technology, 2008. WI-IAT '08. IEEE/WIC/ACM International Conference on, 1(9-12 Dec. 2008), 169-175.
- Clark, H. H., & Wilkes-Gibbs, D. (1986). Referring as a collaborative process [Electronic version]. Cognition, 22(1), 1-39.
- Educause. (2005, May). 7 Things You Should Know About Social Bookmarking. Retrieved March 16, 2008, from http://www.educause.edu/ir/library/pdf/ELI7001.pdf

- Flanders, V., & Willis, M. (1998). Web Pages That Suck: Learn Good Design by Looking at Bad Design. San Francisco, CA: SYBEX Inc.
- Gladwell, M. (2000). *The Tipping Point : How Little Things Can Make A Big Difference*. Boston: Little, Brown.
- Heymann, P., Koutrika, G., & Garcia-Molina, H. (2008, February). Can Social Bookmarking Improve Web Search? [Electronic version].WSDM '08: Proceedings of the international conference on Web search and web data mining, 08, 195-206.
- Ivory, M. Y., & Megraw, R. (2005). Evolution of Web Site Design Patterns [Electronic version]. ACM Transactions on Information Systems (TOIS), 23(4), 463-497.
- Millen, D. R., Feinberg, J., & Kerr, B. (2006). Dogear: Social Bookmarking in the Enterprise [Electronic version]. Proc. CHI'06, 06, 111-120.
- Park, Jaehui ; Fukuhara, Tomohiro; Ohmukai, Ikki; Takeda, Hideaki; Lee, Sang-goo: Web content summarization using social bookmarks: a new approach for social summarization. Web Information and Data Management (WIDM), 2008: 103-110
- Sawyer, P., & Schroeder, W. (2000). Report 4: Links that give off scent. *In Designing Information-Rich Web Sites*. Bradford, MA: User Interface Engineering.
- Sen, S., Lam, S. K. T., Rashid, A. M., Cosley, D., Frankowski, D., Osterhouse, J., et al. (2006). Tagging, Communities, Vocabulary, Evolution [Electronic version]. CSCW '06: Proceedings of the 2006 20th anniversary conference on Computer supported cooperative work, 06, 181-190.
- Sklar, J. (2009). *Principles of Web Design (4th ed.)*. Clifton Park, N.Y. : Delmar Learning ; London : Cengage Learning [distributor].
- Spool, J. M., Scanlon, T., Schroeder, W., Snyder, C., & DeAngelo, T. (1999). *Web Site Usability: A Designer's Guide*. San Francisco, CA: Morgan Kaufmann Publishers.
- Underwood, L. (2001). *Page Content: The Long and the Short of It*. Retrieved May 21, 2010, from http://www.wdvl.com/Internet/Content/
- Watrall, E., & Siarto, J. (2009). Head First Web Design. Beijing; Cambridge: O'Reilly.
- Whitworth, B., Gallupe, R. B. and McQueen R., 2001, *Generating agreement in computer-mediated groups*, Small Group Research, 32:5, p625-665
- Whitworth, B., Banuls, V., Sylla, C., & Mahinda, E. (2008). Expanding the Criteria for Evaluating Socio-Technical Software [Electronic version]. *IEEE Transactions on Systems, Man and Cybernetics, Part A: Systems and Humans, 38*(4), 777-790.
- Whitworth, B., 2009, The Social Requirements of Technical Systems, Chapter 1 of Whitworth, B., and Moor, A.d. (eds.) Handbook of Research on Socio-Technical Design and Social Networking Systems. IGI, Hershey, PA, 2009
- Whitworth, Brian and Ahmad, Adnan (2012): Socio-Technical System Design. In: Soegaard, Mads and Dam, Rikke Friis (eds.). Encyclopedia of Human-Computer Interaction. Aarhus, Denmark: The Interaction-Design.org Foundation. Available online at http://www.interaction-design.org/encyclopedia/socio-technical system design.html
- Yanbe, Y., Jatowt, A., Nakamura, S., & Tanaka, K. (2007). Can Social Bookmarking Enhance Search in the Web? [Electronic version]. JCDL '07: Proceedings of the 7th ACM/IEEE joint conference on Digital libraries, 07, 107-116.