

Interaction Design Based on Web 2.0 User Information Retrieval Behavior: A Meta-Analysis and Questionnaire Survey Study

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Abstract

Designing interactive digital libraries relies on descriptions of user characteristics, behaviors, work habits, and needs. This process comprises two components: a meta-analysis of user behavior survey reports, and subsequently, a questionnaire survey administered to doctoral and master's students at the Graduate University of Chinese Academy of Sciences. The survey findings stimulate further discussion regarding various possible approaches to integrating digital libraries with blogs, instant messaging, social networking software, social tagging, and personalized libraries. The conclusion recommends which digital library functions are essential for users.

Full Text

Preamble

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Designing interactive digital libraries depends on characterizing user characteristics, behaviors, work habits, and needs. This process consists of two parts: first, a meta-analysis of user behavior survey reports, and second, based on this analysis, a questionnaire survey of doctoral and master's students at the Graduate University of the Chinese Academy of Sciences. The survey results stimulate further discussion on various possible ways to integrate digital libraries with blogs, instant messaging, social networking software, social tagging, and personalized libraries. The conclusion recommends which digital library functions are truly necessary for users.

Keywords: Web 2.0, user behavior, meta-analysis, questionnaire survey, information seeking behavior

1. Introduction

In an era of equipment upgrades, falling prices, and universal Web 2.0 participation, only digital libraries that respect users, integrate user experience, and save training time can win user preference and adoption. This requires separating programming from design. Past practices that prioritized programming and mixed functional design due to storage, operation, and transmission constraints have created many practical difficulties in application. There is reason to believe that poor product design, rather than technical or training issues, is what causes users to avoid digital libraries.

The production process of transforming understanding of user behavior into interaction design and then into programming is the proper way to build digital libraries that suit users. However, the immediate difficulty is: what functions, new technologies, and new services do Web 2.0 users need when using digital libraries for information retrieval? For cost-conscious, efficiency-oriented, service-committed digital libraries, this know-how is urgently needed!

Foreign institutions such as OCLC, ProQuest, and PEW have conducted many meaningful user studies, but these were not aimed at digital library interaction design; rather, they studied the behaviors of their knowledge service targets. Domestically, CNNIC has surveyed Chinese netizens, Tsinghua University Library has surveyed university students, and the Documentation and Information Center of the Chinese Academy of Sciences has surveyed graduate students. The *Digital Library Forum* has even translated OCLC reports. Most of these surveys have investigated “already occurred” behaviors while paying little attention to “future or possible” user behaviors.

For digital library design, a practical challenge remains: how to effectively “predict” user needs three to five years ahead? The fastest software development cycle is two years, while the quickest user research requires a year of work, yet computer technology cycles every six months. How can librarians know in advance what services libraries should provide? This is actually also a requirement for librarian competency. This paper uses existing research reports from domestic and international sources to conduct a meta-analysis, screening what is known from what is unknown. For the unknown aspects, a questionnaire survey provides deeper understanding of Web 2.0 user behavior. Finally, conclusions are drawn: what can theoretically be basically completed, and what still requires practical understanding.

2. Meta-Analysis

The meta-analysis adopts the standards from Harris M. Cooper’ s *Integrating Research* [5]. It first analyzes research on information seeking behavior, then

surveys research on user behavior in network environments, including CNNIC, OCLC, and PEW. The purpose is to provide an integrated framework for questionnaire survey design.

2.1 Theories and Methods Related to Research Questions

(1) Research Concepts. Web 2.0 is a sharing platform for universal participation [6]. Information retrieval is the process of obtaining information [7]. Information retrieval in the Web 2.0 environment is the process and manner through which research results can be easily integrated into network platforms and used through personalized queries [8].

(2) Problem Context. Research on network user behavior is relatively broad and diverse, while research on information seeking behavior is relatively focused and in-depth. The reason for discussing both together is that current user information seeking behavior has moved from standalone operations to network searches, and among various network user behaviors, information retrieval is most relevant to digital libraries [9].

(3) Importance of New Research. Advances in network technology and changes in user behavior pose time-pressured challenges for digital libraries in understanding user information seeking behavior.

2.2 Methods

(1) Literature Sources. Literature from Google was extensively used. However, before this, the LISA database was searched using the keyword “Information Seeking Behavior,” yielding 1,885 relevant records for analysis. Subsequently, subject terms were organized, the top ten descriptors from the past five years were selected, and these descriptors along with “Survey” were searched in Google Scholar to obtain relevant literature.

(2) Relevance Criteria. Literature containing fewer than three of the following terms was filtered in the first round: “college,” “student,” “academic,” “user,” “network,” “need,” “retrieve,” “search,” “seek,” “online.” Literature unrelated to surveys was filtered in the second round, and literature with little relation to Web 2.0 was subjected to a third manual filtering by the researcher.

2.3 Related Research and Themes

(1) Information Seeking Behavior (see [Figure 1: see original paper], [Figure 2: see original paper],)

(2) Network User Behavior Surveys (see)

2.4 Discussion

(1) Effect Size and Substantive Significance. For non-experimental design research, relative internal validity and reliability cannot be used to integrate

findings. However, in terms of external validity, the OCLC report reflects general user phenomena, and reference to other studies can determine whether it fits the situation of Chinese Academy of Sciences graduate students. Regarding attitudes and cognition, there is reason to believe [16] it is not suitable for comparison with Chinese Academy of Sciences doctoral and master's students. The RIN and CNNIC reports exactly compensate for this shortcoming: the RIN report tends to understand the behaviors and cognition of scientific researchers, while the CNNIC report explains the basic attitudes of Chinese Web 2.0 users. Additionally, there is evidence that Chinese Academy of Sciences graduate students, whose education level and average internet experience exceed those of ordinary Chinese netizens, show higher network dependency than Beijing citizens and American undergraduates in the PEW and Rochester reports [17, 18] (see).

(2) Differences from Past Review Studies and Reasons. Comparing the content of Table 2 with Table 1 reveals that the limitation of traditional information seeking behavior research is that traditional information seeking behavior models struggle to explain the information sharing patterns under Web 2.0, though they still help increase research depth on new environment sharing patterns.

(3) Results of Theoretical Disputes and Conditions Limiting Research Inferences. The advantage of information seeking behavior models lies in having indicators and content for observing overall user behavior; the disadvantage is their inability to well explain the diversity of current network users and the multiple choices of network tools. The advantage of Web 2.0 sharing patterns lies in conforming to general network user behavior; the disadvantage is difficulty explaining how to apply them to science, education, and learning [19]. Choosing the superior and avoiding the inferior exactly illustrates what theoretical foundation “Web 2.0 information seeking behavior” should use, what network phenomena to observe, and what potential research design pitfalls to avoid.

(4) Possible Directions for Exploratory Research. In summary, exploratory research on next-generation digital library user behavior should focus not inside libraries but in the Web 2.0 world [20, 21]. Using ISBM to sort out surveys of Web 2.0 user behavior can yield deeper explanations and uncover new questions. Phased survey results have two meanings: proposing new insights for traditional information seeking behavior models, and, compared with current network user behavior survey results, proposing digital library response strategies for the next stage.

3. Questionnaire Survey Design

Based on conclusions from the meta-analysis, a user study was designed with the purpose of “digital library interaction design,” and a questionnaire survey was developed as follows:

(1) **Research Methods and Tools.** SAS version 8.1 was used for data analysis, employing descriptive statistics, ANOVA, and one-sample t-tests.

(2) **Sampling Design.** Research subjects: doctoral and master' s students of the Chinese Academy of Sciences. Sampling objects: doctoral and master' s students enrolled in the second semester of 2008 at Chinese Academy of Sciences institutions in Beijing. Sample: personnel who completed valid questionnaires that were returned.

(3) **Questionnaire Design.** The questionnaire contained 82 items in 7 sections: personal information, Web 2.0 attitudes, Web 2.0 behaviors, Web 2.0 cognition, instant messaging and blogs, social bookmarking and social networks (questionnaire title: online community participation willingness), and learning habits.

(4) **Data Collection.** Based on student data provided by the co-organizer, the Graduate University of the Chinese Academy of Sciences, a stratified random sampling questionnaire survey was conducted. Under the name of the Documentation and Information Center of the Chinese Academy of Sciences, questionnaires were distributed and collected from June 9, 2008, to July 20, 2008. A total of 3,058 questionnaires were mailed, 501 were returned, and 497 were valid.

4. Questionnaire Survey Results

4.1 Basic Data (see)

Age groups and majors were consolidated in the data. The reliability test showed 98 items with a Cronbach' s Alpha of 0.883, exceeding 0.5, indicating acceptable reliability.

4.2 Chi-Square Test of Correlation

Using four categorical variables—gender, age, education level, and major—it was hypothesized that they were independent of the other 94 variables. The chi-square distribution table was consulted, with significance level $= 0.05$. Comparing variance values with critical values, the conclusion is that although scattered results rejected the hypothesis (for example, some relationships exist between gender and community), the vast majority did not reject the original hypothesis of independence between the two variables.

4.3 Respondent Age

According to one-sample t-tests, within a 95% confidence interval, the respondents' birth years fell between 1981.53 and 1982.02. In other words, this survey represents graduate students aged between 27.5 and 28 years old.

4.4 Blogs (see)

Users showed strong willingness to use blogs for: writing mood diaries (87.5%), writing work reflections (87.1%), having channels to share photos (87.3%), having channels to share videos (79.1%), discussing politics and social news (80.5%), publishing articles or briefings (76.7%), and promoting academic papers (64.6% and 45.1% respectively).

4.5 Instant Messaging (see)

Users identified instant messaging primarily for: communicating with family or friends (91.5%), maintaining existing interpersonal relationships (91.8%), establishing new interpersonal relationships (67.0%), experiencing virtual life (40.4%), becoming part of daily work (58.8%), quickly exchanging academic viewpoints (64.4%), and quickly exchanging academic information (68.0%).

4.6 Social Communities (see , ,)

Willingness to Become Community Leaders: Very unwilling (23.5%), unwilling (11.5%), don't know (10.7%), willing (11.7%), very willing (7.4%).

Willingness to Become Experts: Very unwilling (2.2%), unwilling (14.9%), don't know (7.2%), willing (63.8%), very willing (10.5%).

Influence on Product Selection: Books (45.3% influenced by general netizens, 61.8% by community leaders, 61.8% by community experts), articles (39.6%, 56.5%, 63.8%), videos (33.8%, 39.6%, 45.1%), courseware (23.7%, 39.6%, 45.1%), software (51.5%, 31.0%, 31.0%), games (31.0%, 7.4%, 4.2%).

4.7 Learning Habits (see , ,)

Entering Internet Learning State: Search engines are highly used (63.8% high usage, 24.3% medium usage), while portal websites (73.2% non-use), Q&A services (64.8% non-use), and quick search toolbars (84.9% non-use) are largely unused.

Importance of Academic Information Sources: Library websites (64.2% important), professional society websites (21.1% important), online bookstores (15.1% important).

Willingness to Record Personal Information After Service: Register real name (19.7% willing), register email (76.5% willing), register mobile number (5.4% willing), write usage feedback (20.9% willing), add URL to favorites (62.0% willing), create demand list on website (10.5% willing).

5. Comprehensive Discussion

5.1 Integration of Research Findings and Survey Results

Combining the meta-analysis with survey results, the basic characteristics of Web 2.0 information seeking behavior among Chinese Academy of Sciences graduate students are described as follows:

- (1) Chinese Academy of Sciences graduate students show low library usage rates but high search engine usage rates, consistent with the OCLC report [22]. However, the difference is not as dramatic as with university students because, as the RIN report [23] shows, graduate students are more “afraid” of missing important information by not using libraries than undergraduates.
- (2) Web 2.0 has characteristics of high entertainment value and low work orientation [24]. Most people use search engines and library websites for learning, but use search engines along with blogs, instant messaging, and community websites for entertainment.
- (3) Because graduate students need to tackle technical challenges and track cutting-edge research, foreign society websites account for some portion of their information seeking, reducing the relative importance of search engines.
- (4) In the Web 2.0 world, charging fees is difficult. Users will not pay for SNS services [25], and unless necessary, they will not consider obtaining academic information from online bookstores (see).
- (5) Based on mobile phone ownership, personal computer ownership, internet frequency, long-term network experience, and frequency of using network tools like Email, there is reason to believe Chinese Academy of Sciences graduate students have already entered the Web 2.0 world. However, most have not exhibited specific academic activity behaviors, such as information retrieval through Web 2.0 service mechanisms.
- (6) Users hold optimistic but conservative attitudes toward Web 2.0 information retrieval. These differ from foreign survey results from OCLC, RIN, and PEW, which suggest most people do not tend to approve of libraries establishing new services like communities. This may be due to national conditions and systems, as Chinese students more readily trust authoritative public institutions (like libraries) to solve their problems for free.
- (7) From the Web 2.0 world perspective, users’ real-world social attributes (gender, age, education level) do not significantly reflect in their Web 2.0 behaviors.

5.2 Blogs, Instant Messaging, Communities, Learning Habits, and Information Retrieval

What interactions occur between Web 2.0 users and blogs, instant messaging, and communities during information seeking behavior? Do daily learning habits align with the theoretical assumptions of information seeking behavior? How can libraries appropriately embed themselves in user spaces? These questions concretize the “prediction” difficulties mentioned in Section 1.4.

As C. C. Kuhlthau stated, information seeking behavior models can still explain reader information behavior and psychology in network environments, but require additional observation variables for environmental factors [26]. In electronic environments, user choice diversity and retrieval system complexity are increasing [27]; in the Web 2.0 era, the principle of “Less is More” emerges [28]. Using Google as an example, the surface appears quite simple, but the underlying technology is extremely complex. However, this “Minimalism” [29] faces the problem that as selectable options increase and minimalism is maintained, the complexity of issues to consider grows exponentially.

Obtaining overall objective data from web logs to analyze user behavior is a method for observing overall trends. However, relying solely on web logs loses the opportunity to consider individual user needs [30]. This is why observing Web 2.0 phenomena based on information seeking behavior theory can provide concrete suggestions for truly improving digital libraries.

5.3 Known Recommendations Favorable to Digital Libraries

- (1) **Adopt Blogs.** They should integrate photo and social networking functions, and even provide audio and video space according to available capacity. Because 87.3% of respondents agreed that blogs are channels for sharing photos, and 79.1% saw them as channels for sharing videos. Releasing network hard drive space is also the opinion of most Chinese blog users [31].
- (2) **Adopt Instant Messaging.** It should fully utilize its characteristic of maintaining interpersonal relationships, as 91.8% of users identified this as its function. Using it to establish new relationships shows conservative attitudes (67% approval, 19.7% neutral). Whether it becomes part of daily work remains to be observed (58.8% approval, 24.1% neutral). However, few oppose using it to exchange academic information and viewpoints (14.3% and 11.5% opposition respectively).
- (3) **Adopt Social Networking Software.** It should establish academic review mechanisms. Because 44.1% of users are willing and 10.7% are very willing to become leaders of academic review communities, organizing, managing, and maintaining discussion communities. Even more users (47.1% willing, 25.4% very willing) hope to become expert-level figures in academic communities, answering professional questions from other in-

quirers and occasionally accepting invitations from community leaders for academic activities in cyberspace. Considering that in a study distributing 3,000 questionnaires with 497 valid returns, one-tenth are proactive individuals, establishing competitive mechanisms with two communities for each professional type is highly feasible.

- (4) **Adopt Social Tagging.** It should fully utilize librarians' influence on users regarding books, articles, and courseware. The survey shows 73.4%, 64.6%, and 47.1% of users would consider librarians' suggestions on books, articles, and courseware. If librarians collaborate with academic community leaders (61.8%, 56.5%, 39.6%) and academic community experts (61.8%, 63.8%, 45.1%), they can influence user behavior and even predict users' information resource needs in academic activities. Then, information services can be provided to users from "third-layer metadata" (user behavior) [32].
- (5) **Establish Personalized Libraries.** They should start with Email, as 76.5% of users are willing to leave their email with service providers after receiving satisfactory service. Similarly, there is no need to assume digital library Email will be rejected by users. Using Email to contact users is an effective and common practice; the key lies in content management and user information confidentiality measures.

5.4 Known Recommendations Unfavorable to Digital Libraries

- (1) **Adopt Blogs.** They should not contain only academic or homework content, nor should they emphasize only academic exchange or publishing academic works, because compared to discussing entertainment and sports (80.5% approval) and politics and society (76.7% approval), the approval rates for publishing articles (64.6%) and promoting papers (45.1%) are too low. An effective method to reduce Web 2.0' s high entertainment value and increase its low work orientation is to allow entertainment factors into the work environment; after promoting interaction in the work environment, users will naturally understand the real tasks in academic exchange environments.
- (2) **Adopt Instant Messaging.** It should not be limited to academic exchange, because most people use instant messaging to communicate with family or friends (91.5%), meaning it has private characteristics. Since Chinese Academy of Sciences graduate students come from all over the country, instant messaging provides them with a cheap and convenient channel to communicate with distant family and friends. However, over 60% of users consider it a way to quickly exchange academic viewpoints (64.6%) and academic information (68.0%). Therefore, it should become a side communication tool rather than a primary means for academic exchange.
- (3) **Adopt Social Networking Software.** It should not involve political

commentary, as 41.2% of users are unwilling and 23.5% are very unwilling to become community leaders, while 21.5% are unwilling and 45.7% are uncertain about becoming political commentary experts. This may be because national conditions or systems discourage graduate students from discussing national affairs. However, in commercial website communities, complaining about politics, expressing feelings, advertising consumption, and psychological counseling are often the reasons for their profit or success. In this survey, opinions on political commentary, entertainment, shopping consumption, and psychological counseling were less enthusiastic than expected. Yet, academic commentary related to library business, without informing respondents that libraries were considering arranging academic communities, received highly interested responses.

- (4) **Adopt Social Tagging.** It should not merely satisfy and be limited to librarians' potential influence on users, because community leaders and experts have considerable influence on users' selection of books, articles, and videos. Moreover, general netizens have stronger effects on users' selection of software (51.5%) and videos (33.8%). Therefore, when providing online reference services, librarians should also reference opinions from general netizens, community leaders, and experts on similar issues. It is difficult to effectively persuade Web 2.0 users' product choices from only the librarian' s professional perspective.
- (5) **Establish Personalized Libraries.** They should not require users to register names, passwords, and other tedious processes, as 61.2% of users hold negative attitudes when asked whether they are willing to leave their real names. Network real-name systems reduce user participation. Even when real-name systems are necessary, they should be technically implemented for identification rather than requiring them at the user interface. Furthermore, although M-library is a personalized approach more favorable to mobile phone users (89% of Chinese Academy of Sciences students) than computer users (65%) [33], the survey shows 82.5% of users are unwilling to disclose their mobile numbers. Therefore, even strong enforcement would not achieve good interaction effects and feedback.

5.5 Unknown Variables for Digital Libraries

- (1) **Adopt Blogs.** Attention should be paid to national conditions, systems, and organizational management. From discussing entertainment and sports (80.5% approval) and politics and society (76.7% approval), to publishing articles (64.6% approval), usage gradually declines, and then promoting papers (45.1% approval) drops rapidly, showing blogs focus on non-serious topics. However, why do 64.6% still see article publishing as a function? Possibly because research institutions have priority disputes over first publication, and blogs can immediately publish latest research results. However, because blogs may not benefit organizational assessment, opinions on promoting papers (45% approval, 28.6% neutral, 26.4%

opposition) clearly decrease.

- (2) **Adopt Instant Messaging.** Attention should be paid to the difficulty of promoting such services. Although 91.8% of users use it to maintain interpersonal relationships, only 67% use it to establish new relationships. Before Web 2.0 becomes part of daily work consensus, it is overly optimistic for librarians to unilaterally require readers to establish relationships with them. Because users do not find such services novel (only 40.8% support it as a way to experience virtual life), and they tend to form subculture groups (75.7% approve of being a member of an organization), compared with stereotypes of libraries [34], they may not consider it a service.
- (3) **Adopt Social Networking Software.** Attention should be paid to how to distinguish between rational public space and emotional private space [35] and their overlapping phenomena in Web 2.0 environments, particularly in digital libraries. Theoretically, digital libraries are public spaces serving academic research, and the language used should be rational, logical, and event-based text. However, the grassroots characteristic of Web 2.0 is emotional, passionate, implicit, and ideological text in public space. Comparing users' views on five dimensions—political commentary, academic commentary, shopping consumption, entertainment, and psychological counseling—the tendency of low political but high academic interest shows that half the functions of public space do not work, and what fills the gap is likely irrational consumption, entertainment, and psychological content, possibly resulting in the absence of regular rational communication in public space.
- (4) **Adopt Social Tagging.** Attention should be paid to role differentiation and rating issues. Because general netizens influence books (45.3%), articles (39.6%), videos (33.8%), courseware (23.7%), software (51.5%), and even games (31.0%), their ratings and comments should be lower than community leaders in books (61.8%), articles (56.5%), and courseware (39.6%). Community leaders' influence and comment value should be lower than community experts. Whether librarians' comments and ratings should be above everyone else is another normative issue requiring discussion.
- (5) **Establish Personalized Libraries.** Attention should be paid to the fact that 50.3% of users are unwilling and 39.2% are uncertain about establishing demand lists on websites, with only 10.5% willing to create lists after using and being satisfied with services. Building personal libraries that rely on users creating lists in network libraries runs counter to most people's habits. Moreover, only 20.9% of users write usage feedback, so relying on their opinions cannot represent other users. The good news is that 62% of users will bookmark pages in their browsers after enjoying good service, so this service still has expansion potential.

5.6 Position of Digital Libraries in Web 2.0 Information Retrieval

According to the survey, when users enter learning environments, their first step is mostly search engines (high usage 63.8%, medium usage 24.3%, total 89.1%). Portal websites (73.2% non-use), Q&A services (64.8% non-use), and quick search toolbars (84.9% non-use) are hardly adopted. Therefore, digital library service models likely need to align with search engines. However, considering webpage bookmarks (41% medium usage) and desktop tools (39.8% low usage), embedding user space through these methods is also an information service challenge that stays close to user behavior.

Throughout the learning and research process, search engines remain highly used (64.2%), but users will enter digital libraries (50.5%) to find “possibly missed information” [36] and obtain literature that cannot be directly read through search engines (even if libraries provide database resources through API ports to search engines, users still do this). Additionally, professional society websites (51.9% low usage) are another way to observe latest research trends [37]. Although theoretically online bookstores can provide considerable basic knowledge sources, the survey suggests they seem unrelated to graduate students’ research and learning.

The research process and information retrieval process are continuous, repetitive, and intermittent. If RSS push services can be obtained later, users will be willing to log in Email addresses (or blogs), and if the webpage is truly needed, they will record it in their browser’s “My Favorites.” However, excessive information login requirements—such as personal information, mobile numbers, demand lists, opinions, tags, etc.—will cause most users to close the page directly.

5.7 Rethinking Digital Library Interaction Design

In summary, now that we know what is favorable and unfavorable to digital libraries, can we begin designing—deciding which functions are needed and which are not? The answer is: inappropriate. Because there are too many unknown variables for digital libraries, and these unknowns could be decisive factors for digital library success. Despite time pressures, these unknown factors need clarification through practice. After all, the purpose of digital libraries is not to “show” technology but to serve unpaid users with specific needs, which differs greatly from general software design. We cannot follow business strategies of binding users to make trial-and-error feedback for our upgrades, wasting researchers’ information retrieval time. Therefore, fully considering “practical significance” and “research limitations” is essential for truly implementing future research recommendations.

6. Conclusion

Through meta-analysis of other institutions’ research, this study reveals what valuable reference materials these institutions have provided for the library community and how to use them, thereby combining them with survey research. The

questionnaire survey reveals what problems exist in actual services. Integrating both forms a theoretical framework that allows new thinking and planning for digital library interaction design.

Undoubtedly, network changes, user behavior changes, and competition from other information service institutions force us to face these new challenges [38]. Although this exploratory investigation contributes to knowledge accumulation, it cannot yet constitute a theoretical system. It can only be said to have temporarily obtained a set of hypotheses and exploratory conclusions applicable to actual situations. Furthermore, the meta-analysis lacks tests of internal validity and reliability, the questionnaire survey's effective response rate was 16.2% (though exceeding the general standard of 10% for mailed questionnaires and thus providing a basis for research inference), and the survey subjects were doctoral and master's students mainly in natural sciences, limiting research generalization. Therefore, when applying research conclusions in practice, other studies should be consulted; preferably, interview surveys should be conducted to save time and funding while verifying hypotheses and deeply understanding users.

In Section 4.2, we explained that Web 2.0 user behavior may be independent of their gender, age group, and degree level. This raises the question: can Web 2.0 users be grouped? Do Web 2.0 groups exist? If they exist, how can they be identified and observed? Moreover, this study only described the surface behavior of Web 2.0 users. What are their internal mechanisms? What is their relationship with the external environment? Are there other ways to measure them? These are all questions worthy of further analysis and even separate investigation.

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Note: Figure translations are in progress. See original paper for figures.

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