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# Knowledge Adoption in Online Communities of Practice

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# Knowledge Adoption in Online Communities of Practice

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### ABSTRACT

*In this study we investigate how members of text-based, asynchronous online Communities of Practice (COPs) adopt knowledge contributed by other COP members. Previous studies of knowledge adoption in computer-mediated settings have drawn on dual-process theories of information processing to understand the role of heuristic cues and elaboration likelihood in this process. Here we extend this research stream, exploring two potential new heuristic cues:* genre conformity *and* information consistency. *In addition, we examine the factors* focused search *and* disconfirming information *to understand how they may induce non-heuristic cognitive processes. Survey data were collected from an online COP and findings support the hypotheses generated from our research model.*

*This study advances our understanding of knowledge sharing in online COPs. Findings suggest that the context of an online COP can play a dynamic role in how members process the content component of that COP. Focusing on the* pull *technology of online COPs, it offers another theoretical link between Computer-Mediated Communications and knowledge management. Practically, it also provides us with insights into online COPs as a potential means for improving organizational knowledge management.*

**Key-words**: Knowledge adoption, Online Communities of Practice, Dual-process theories of information processing, Genre conformity, Information consistency, Focused search, Disconfirming information.

*Nous investiguons comment les membres d'une communauté de pratiques (CP) de textes en ligne adopte des connaissances d'autres membres. Les études précédentes portant sur l'adoption des connaissances dans des environnements informatisés se sont appuyées sur les théories du processus dual du traitement de l'information pour comprendre le rôle des indices heuristiques et des probabilités d'élaboration. Ici nous étendons ce courant de recherche en explorant deux nouveaux indices heuristiques : la conformité de genre et la cohérence de l'information. De plus, nous examinons le rôle de la recherche focalisée et de l'information disconfirmatoire pour comprendre comment elles pourraient induire des processus cognitif non heuristiques.*

*Cette étude avance notre compréhension du partage de connaissance dans les CP en ligne. Les résultats suggèrent que le contexte d'une CP en ligne peut jouer un rôle dynamique sur la façon dont les membres traitent la composante contenu de cette CP. En se concentrant sur des technologies de type « pull », elle offre un autre lien théorique entre les communications médiatisées par ordinateur et la gestion des connaissances. Pratiquement, elle apporte aussi des éclairages sur les CP en ligne comme moyen d'améliorer la gestion des connaissances dans les organisations.*

**Mots-clés** : Adoption des connaissances, Communautés de pratique en ligne, Théories du processus dual de traitement de l'information, Conformité de genre, Cohérence de l'information, Recherche focalisée, Information disconfirmatoire (ou désaccord de l'information).

# INTRODUCTION

Communities of Practice are "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger & Snyder, 2000, p. 139). In a COP, practice describes what community members do, and identity defines who the community members are. Through the interweaving of practice and identity, COPs provide an environment for community members to share distributed knowledge as it is created, validated, and understood (Brown & Duguid, 1991; Wenger, 1998). Thus far, most research in COPs has addressed conventional COPs, assuming physical proximity and face-to-face interaction between members (Brown & Duguid, 1991; Lave & Wenger, 1991; Storck & Henderson, 1999; Wenger, 1998). However, today's fast-growing global business environment has made it necessary to expand the geographical scope of COPs, and advances in information technologies have made this possible (Brown, 1998).

Online COPs are great tools for knowledge management in that they integrate two diverse knowledge management strategies: technology-focused knowledge repositories and human-centered conventional COPs (Hansen *et al.*, 1999). Members of online COPs can proactively *pull* knowledge from the repository created by the collective contributions of all community members. Online COPs also enable efficient access to and interaction with knowledgeable community members. Drawn by the many potential benefits of online COPs, companies have been aggressively investing in building and maintaining online COPs (Millen *et al.*, 2002). In the three years prior to 2000, companies had spent $300 million in online communities (Schoenberger, 2000). It is estimated that by 2005, more than half of Fortune 1000 companies will have launched electronic communities (Zetlin, 2001).

Despite their practical significance, we still have only a limited theoretical understanding of online COPs. We know that they differ from conventional COPs (Zhang & Storck, 2001). Anecdotal qualitative studies have demonstrated that they can play an important role in promoting organizational knowledge sharing. Successful knowledge sharing involves both *giving* and *taking*. Researchers are beginning to understand the *giving* side: what motivates people to contribute their knowledge to online COPs (e.g., Rafaeli & LaRose, 1993; Wasko & Faraj, 2000). However, less research effort has been directed toward the knowledge *taking* side of the equation. In this study, we investigate *knowledge adoption* (Watts Sussman & Siegal, 2003) in text-based, asynchronous online COPs (characteristics typical of the majority of online COPs). In order to identify factors that affect member's knowledge adoption and understand how these factors work, we construct a theoretical model based on dual-process theories of information processing.

# I. THEORETICAL DEVELOPMENT

## I.1. Dual-process Theories of Information Processing

Dual-process theories of information processing originated from individual-

level, laboratory-based social psychology research. Over the past 20 years they have been applied to many domains as a way of understanding how people process received information, including IS research (Briggs *et al.*, 2002; Dijkstra, 1999; Ferran-Urdaneta, 2000; Mak *et al.*, 1997; Watts Sussman & Siegal, 2003).

Dual-process approaches to information processing encompass a family of theories, all of which examine the role played by both the information content of the received message and the factors surrounding its context affecting message validity assessment (Gilbert, 1999). The two most prominent theories that use this approach are the Heuristic-Systematic Model (HSM) (Eagly and Chaiken, 1993) and the Elaboration Likelihood Model (ELM) (Petty and Cacioppo, 1986). HSM posits two information processing modes that people use when assessing the validity of a message: *systematic processing* and *heuristic processing*. During systematic processing, people carefully scrutinize all relevant information and try to incorporate it into what they already know. During heuristic processing, people utilize heuristics and cues to assess content validity, using simple decision rules such as "credibility implies correctness" (Chaiken *et al.*, 1989). Likewise, ELM posits two types of information processing: the *central route* and the *peripheral route*, the central route being akin to systematic processing and the peripheral route echoing heuristic processing. For both HSM and ELM, peripheral/heuristic processing takes place whenever people are not able or motivated to undertake the additional cognitive effort

of central/systematic processing (Eagly & Chaiken, 1993). Although theoretically each processing mode can independently lead to positive or negative assessments of message validity, in practice both modes tend to co-exist. This is particularly true in our research setting, online COPs, where message content is displayed side by side with various cues. ELM uses the term *elaboration likelihood* to capture the probability of taking the central processing route. The higher the information processor's elaboration likelihood, the more likely he or she is to take the central processing route, and consequently the greater the role played by the information content during assessment of message validity. Similarly, Lower elaboration likelihood tends to increase peripheral processing and use of heuristic cues during validity assessment.

Several contextual factors are known to have an effect on elaboration likelihood (Petty & Cacioppo, 1986, chapter 4) and they function in two ways: by influencing one's motivation to engage in elaboration, and by affecting one's ability to engage in elaboration. For example, if a person is highly involved in the message content, he will be highly motivated to undertake the effort required by the central route. However, even if he is highly motivated to take the central route, he is not necessarily able to do so (Petty & Cacioppo, 1986, chapter 3). Lack of expertise in the subject, limitations in terms of time and energy, distractions and disruptions, and so on can push people to utilize peripheral processing.

Although there are subtle yet important differences between ELM and

HSM (for reviews, refer to Chen & Chaiken, 1999; Eagly & Chaiken, 1993; Petty & Wegener, 1999), for this study both theories bear the same implications. Thus, we use the more general term *dual-process theories of information processing* instead of either ELM or HSM. For simplicity, we refer to the dual processing modes as heuristic and systematic, consistent with HSM.

## I.2. Applying Dual-process Theories to Online Communities of Practice

This research explores knowledge adoption in online COPs from a dual-process perspective, conceptualizing the extent of knowledge adoption from a message as attitudes towards the message. The dual-process theories have been widely applied in social psychology, but since they have never been applied to online COPs we begin by verifying the validity of this theoretical framework in the online COP context. We do so through replicating previous studies. Previous studies in dual-process theories of information processing have all examined the role of argument quality during systematic processing. Message recipients that spend much effort attending to the quality of the arguments presented in the message are understood to be undertaking systematic processing (Chaiken, 1980; Petty & Cacioppo, 1986; Petty *et al.*, 1983). Thus when one is both able and motivated to elaborate on the message, argument quality will be the dominant predictor of one's attitude toward the message. We follow this research tradition and include argument quality in our theoretical model, positing that it

positively affects knowledge adoption in online COPs.

In addition to argument quality, previous researchers have also worked to understand which cues and heuristics are most important during heuristic processing. They have repeatedly demonstrated that source credibility functions as a heuristic cue. Moreover, source credibility is particularly important in the knowledge domain (for a review, see Watts Sussman & Siegal, 2003). We also include source credibility in our research model to capture heuristic processing, and hypothesize that it positively affects knowledge adoption. Our research model (Figure 1) also includes factors of recipient involvement and recipient expertise, since these factors are typical elaborators in previous studies of dual-process information processing (for reviews, see Eagly & Chaiken, 1993, Chapter 6; Petty & Cacioppo, 1986). That is, message recipients that are highly involved in the message topic are more motivated to undertake the effort of systematic processing than those that are less involved in the message topic. Similarly, message recipients that have more expertise in the message topic are more able to undertake the additional effort of systematic processing than are those with less expertise in the message topic. Below we enumerate the hypotheses included in figure 1:

**H1a**: Argument quality positively affects knowledge adoption.

**H1b**: Source credibility positively affects knowledge adoption.

**H2a**: For members with a higher level of recipient expertise, argument quality will affect knowledge adoption more

than it will for members with a lower level of expertise.

**H2b**: For members with a higher level of recipient expertise, source credibility will affect knowledge adoption less than it will for members with a lower level of expertise.

**H2c**: For more involved members, argument quality will affect knowledge adoption more than it will for members that are less involved.

**H2d**: For more involved members, source credibility will affect knowledge adoption less than it will for members that are less involved.
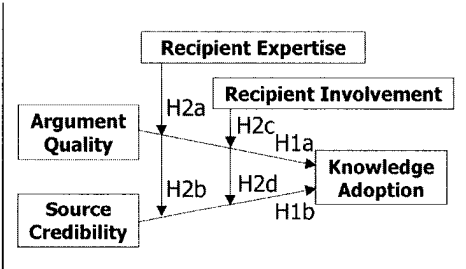


**Figure 1: Verifying Dual-Process Information Processing in Online COPs.**

## I.3. Potential New Heuristic Cues in Online COPs

We now build theory that identifies factors affecting knowledge adoption in online COPs, under the guidance of dual-process theories, beginning with potential new heuristic cues. The effectiveness of a cue depends on whether it is present in the assessment environment, whether it is noted (Haugtvedt et al., 1994), and whether the information processor is aware of the heuristic rules associated with it (Eagly & Chaiken, 1993). *Genre conformity* and *information consistency* are potential heuristic cues for information processing in online COPs because they meet all three of these conditions.

### I.3.1. Genre Conformity

Genres are "socially recognized types of communicative actions that are habitually enacted by members of a community to realize particular social purposes" (Orlikowski & Yates, 1994, p. 542). Serving as templates for communications (Orlikowski & Yates, 1994), they represent the association between communication formats and communication purposes (Yates et al., 1999). A genre comes into being because it has been proven in practice to be efficient and effective for a certain purpose. Its emergence and evolution reflect the community's continuing efforts to choose the most appropriate communication form for that purpose (Yates, Orlikowski, & Okamura, 1999). It increases the ease of use, reduces the communication cost, and improves both the efficiency and effectiveness of communications.

Message genres can be an important part of an online COP's shared repertoire (Zhang & Watts, 2002). They reflect those cognitive perspectives jointly held by all community members (Boland & Tenkasi, 1995). Within an online COP, members are accustomed to using a certain genre for knowledge sharing, and the norms of using this genre for knowledge sharing are reinforced by the community in its practice. A competent member needs not only to possess valid domain knowledge, but also to be able to use the correct genre to communicate knowledge.

We define genre conformity in the context of online COPs as reflecting how closely the composition of a message follows the relevant knowledge-sharing genre, and contend that the co-occurrence between communicating valid knowledge and using the correct genre makes *genre conformity* a heuristic cue. Community members, after observing such co-occurrences repeatedly, may develop a heuristic suggesting that the higher the *genre conformity*, the more likely it is that the message is consists of valid knowledge, and hence the more likely it is that the knowledge embedded in the message is adopted. When this occurs, the knowledge adoption decision is based more on the appearance of the message and less on the message content.

## I.3.2. Information Consistency

Online COPs often serve as repositories of large quantities of information. Since messages posted to online COPs are saved and easy to retrieve, members can access others' previous postings for additional learning opportunities. As members peruse posted messages, they acquire relevant information, but this does not happen in a vacuum. Rather, newly acquired information must be integrated into members' current knowledge base. *Information consistency* refers to the extent to which the current message is consistent with the prior knowledge of the member accessing it. It serves as a heuristic cue in online COPs as follows. When newly acquired information is consistent with a member's prior knowledge, this invokes the heuristic

that "this is likely to be true because it is consistent with what I already know to be true", and triggers the members to assess the message validity favorably, thus leading to knowledge adoption. As with other heuristic cues, elaboration likelihood affects the magnitude of the influence of both genre conformity and information consistency on perceived message validity (see Figure 2). Below we list hypotheses for testing whether genre conformity and information consistency function as heuristic cues in online COPs.

**H3a:** Genre conformity positively affects knowledge adoption.

**H3b**: Information Consistency positively affects knowledge adoption.

**H4a**: For members with higher levels of recipient expertise, genre conformity will affect knowledge adoption less it will than for members with lower levels of recipient expertise.

**H4b**: For members with a higher level of recipient involvement, genre conformity will affect knowledge adoption less than it will for members with lower levels of recipient involvement.

**H5a**: For members with higher levels of recipient expertise, information consistency will affect knowledge adoption less than it will for members with lower levels of recipient expertise.

**H5b**: For members with higher levels of recipient involvement, information consistency will affect knowledge adoption less than it will for members with lower levels of recipient involvement.
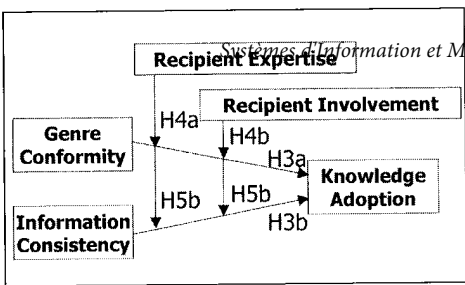
7

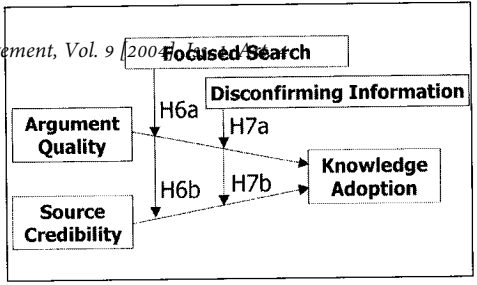**Figure 2: Potential New Heuristic Cues in Online Communities of Practice.**



**Figure 3: Potential New Determinants of Elaboration Likelihood in online COPs.**

## I.4. Potential New Determinants of Elaboration Likelihood in Online COPs

As discussed above, elaboration likelihood is altered through motivation and ability. Recipient expertise and involvement are the two most researched determinants of elaboration likelihood. In this section, we propose two new determinants of elaboration likelihood that we believe are of particular importance to the domain of online COPs – focused search and disconfirming information.

Focused search describes how focused the involved member is when searching for information. It is one of the two fundamental ways to acquire information, the other one being scanning (Vandenbosch & Huff, 1996). When people do not know exactly what they are looking for, they scan for relevant information. In contrast, focused search takes place· when people are looking for specific information. Focused search is a particularly popular information acquisition mode in online COPs since the hypertext systems used in most online COPs invite focused search (Cook & Brown, 1999; Marchionini & Schneiderman, 1988). Focused search

incurs higher elaboration likelihood because it mobilizes more cognitive resources than scanning, which largely depends on "human perceptual abilities to recognize relevant information" (Marchionini, 1995, p. 103) and requires fewer cognitive resources. It is also easier to decide the merit of information when one can anticipate what the right information will look like. Therefore, when focused search takes place, elaboration likelihood will tend to be higher.

Disconfirming information refers to the extent that the newly acquired information in the current message disconfirms what a member already knows. While the message repositories of online COPs provide extra opportunities for members to learn from other members' contributions, it is the job of the knowledge seeker to *internalize* messages read and to generate a holistic and integrated understanding of the messages (Nonaka, 1994; Watts Sussman & Siegal, 2003). Piaget describes this learning process as adaptation, which consists of assimilation and accommodation of new knowledge (Piaget, 2001). When a message contains information that is in accord with what the involved member already knows, assimilation takes place.

When a message contains disconfirming information and conflicts with previous beliefs and preferences of the knowledge seeker, accommodation is required to adapt the existing knowledge in order toaccommodate the to-be-acquired information: either the existing knowledge is deemed to be insufficient and hence modified to incorporate the new information, or the existing knowledge is kept intact and the new information is believed to be untrue and discarded (Vandenbosch & Higgins, 1996).

Empirical research on consumer behavior has found that disconfirming information increases elaboration likelihood (Lee & Mason, 1999; Sengupta & Johar, 2002). For example, Jain and Durairaj (2000) demonstrated that when the to-be-acquired information is inconsistent with an information processor's preference, the inconsistent information is processed in greater depth. In the IS area, Vandenbosch and Higgins suggest that mental model building to handle discomforming information takes more effort than mental model maintenance since "model building is much riskier and its benefits more remote" (1996, p. 202). From the dual-process perspective, disconfirming information promotes systematic processing because the contradictions between the to-be-acquired information and prior knowledge have to be resolved before the member can comfortably integrate the information to reach a confident conclusion (Maheswaran & Chaiken, 1991).

Figure 3 offers a graphic representation of our discussion of the potential new elaboration likelihood determinants of focused search and disconfirming information, and the relevant hypotheses are listed below. The hypotheses utilize the established heuristic cue of source credibility rather than the new heuristic cues proposed above, for measurement purposes:

**H6a**: Higher levels of focused search increase the use of systematic processing, and hence the effects of argument quality on knowledge adoption.

**H6b**: Higher level of focused search decrease the use of heuristic processing, and hence the effects of source credibility on knowledge adoption.

**H7a**: Higher levels of disconfirming information increase the use of systematic processing, and hence the effect of argument quality on knowledge adoption.

**H7b**: Higher levels of disconfirming information decrease the use of heuristic processing, and hence the effect of source credibility on knowledge adoption.

## II. METHODOLOGY

The hypotheses were tested using survey data collected from an online COP. We chose the survey method because it allows for quantitative hypotheses testing and enables us to capture the inherent complexity of the field-based phenomenon of knowledge adoption in online COPs.

The selected research site is an online travel forum hosted by a major Chinese Internet portal company. It utilizes a simple yet effective text-based, asynchronous messaging mechanism. In

a previous qualitative investigation of this online community, we found that *Systems The Journal of Information technology Management* Vol 9 Iss 1 exhibits all three essential characteristics of a COP: joint enterprise, mutual engagement, and shared repertoire (Zhang & Watts, 2002). The travel forum is dedicated to promoting backpacking in China and to facilitating knowledge-exchanges between backpackers. The members work together to ensure that this joint enterprise is not compromised by newcomers or malicious users. The mutual engagement is reflected in the dialogue between community members. During a 6-week observation window, 2123 threads were initiated and about two-thirds of these threads received reply message. The average number of messages per thread was 4.86 for the threads that received replies. Most member interactions in the travel form involve knowledge-based activities (Zhang & Storck, 2001). For example, the most prominent form of such knowledge-based activities follows a question-and-answer pattern: A thread starts with a message requesting certain knowledge, followed by reply messages that attempt to provide the requested information.

In its daily practice, the forum also has developed a unique shared repertoire that consists of forum logo, local language, help files, frequently-asked-questions (FAQs), and a collection of best articles. It has also developed a genre that is used for knowledge sharing, An example of this is the "gonglue". Literally meaning "attacking strategy," a *gonglue* message embeds detailed information in personal experiences. Many messages in the best article collection follow the gonglue format. For example:

*…The government guesthouse locates on Shengdong Road (before known as Beijing North Road), against the government hall across the street. After a long, rough way, you can take a good rest here. A standard room in the new building, with bathroom and TV, is price at RMB$80 per day in the off-season, and $100 in the peak-season. A dish with meat in its restaurant cost $7, and you can feed yourself well with $12. It is safe and quiet. Compared with other crowded hotel, this guesthouse, in my humble opinion, is really a good place for midway break…*

Thus the travel forum is indeed a online Community of Practice, and is an ideal site for our current research. A pre-test and a pilot survey were conducted before the final survey. The pre-test consisted of a series of semi-structured phone interviews of members of the travel forum. Its purpose was to discover possible missing important constructs, to verify the research model, and to provide insights into survey design. No missing important constructs were found, and the qualitative data were consistent with the research model. The survey instrument was developed after the pre-test. Whenever possible, items used in previous research were adopted. Where necessary, new items were developed from insights gleaned in the pre-test (Appendix I). Since the survey was to be administered to a Chinese population, the instruments were translated into Chinese by a native Chinese speaker. The translation was then reviewed by one of the researcher who is also a native Chinese speaker. Disagreements on the

translation were resolved through discussions between the translator and the reviewer. The survey was pilot-tested. Based on the results of the pilot survey items were refined and the questionnaire was modified. An active member of the travel forum reviewed the modified version of the questionnaire before the final survey was administered.

In our observation of the travel forum, we noticed that it is a common practice for the forum members to make travel plans before they leave for a trip. The pre-test suggests that travel plan making resembles knowledge work in organizations in that it involves a lot "acquisition, creation, packaging, or application of knowledge" (Davenport et al., 1996, p. 54). Therefore, we chose travel plan making as the focal task. A web-based online survey was used to reduce participation costs for respondents (Read, 1991; Sproull & Kiesler, 1986) and to speed data collection (Couper et al., 2001). Also, past experience in online surveys suggest that they do not appear to create response bias (Boyer et al., 2002; de Leeuw & Nicholls, 1996; Tanriverdi, 2001).

The survey questionnaire started with a cover page, in which we welcomed the prospective participants and described the current research as intended "to explore how members of the Travel Forum make use of information found in the forum." Brief instructions on how to fill out the survey and incentive information were also included on the cover page[1]. The first page of the survey asked for demographic information and had recipient expertise and recipient involvement items. At the beginning of second page, we requested that informants answer the rest of survey as it pertained to the most recent message (rather than the most useful message, for example) they had read when making their travel plans. This served to maximize both recency and variation across construct answers. Informants were encouraged to retrieve the actual message to refresh their memories before answering questions. Questions on knowledge adoption, focused search, and disconfirming information were asked on page 2, followed by questions on genre conformity. The fourth page concerned source characteristics. A fifth page asked for some other information that was not relevant to the current research. Once the fifth page was submitted, a thank-you note was displayed to conclude the survey.

Data collection began four days prior to the beginning of a 7-day national holiday in China when many members planned trips. The sampling pool consisted of members who posted messages recruiting travel partners and who provided their email addresses as means for contact. Each potential respondent was sent a personalized invitation email containing the hyperlink to the survey home page. The hyperlink was also put on the home page of the travel forum.

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1. For each received response, we will send two forum logos to the respondent.

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# III. DATA ANALYSIS

Data analysis used both first- and second-generation regression techniques. This study is exploratory to the extent that it applies a well-known body of theories to a new research context. Established measures for some involved constructs are not readily available. To accurately assess measurement properties, we used Confirmatory Factor Analysis (CFA) (Bagozzi, 1984; Bagozzi & Phillips, 1982). Due to the limited sample size, we use Hierarchical Regression Analysis (HRA) for hypotheses testing. Our hypotheses can be classified as testing main effects (H1a, H1b, H3a, and H3b) and moderation effects (H2a-d, H4a-b, H5a-b, H6a-b).

## III.1. Response Analysis

Our sampling strategy was dictated by the unique characteristics of the travel forum, which did not allow us to contact forum members freely and directly. Nevertheless, it served our research purpose well since it was reasonable to assume that members who were recruiting travel-partners either had finished or were about to finish their travel plan making.

In total, 342 invitation emails were sent. We received 84 complete responses that could be tracked back to invited members, resulting in a response rate of 25.23%. In addition to these responses, we also received 61 unsolicited responses (possibly from members who followed the hyperlink to the survey on the forum homepage). Inclusion of these created a possible source of response bias (Walsh *et al.*, 1992). To examine whether any systematic biases exist between responses from invited and non-invited participants, a series of t-tests were performed in which scores of all non-moderator variables were compared between the group of invited members and those of self-selected members. No significant differences ($p < 0.05$) were found, and therefore the two sets of responses were pooled together for further data analysis.

## III.2. Demographics and Measurement Statistics

Respondents were generally young (mean age = 28.2; std. dev = 6.3) and well educated (69.7% had a college education or higher). 83 of the final 145 respondents were male. By the time of the survey, on average, the informants had surfed the Web for 51.8 months (std. dev. = 20.0). Their average experience with the travel forum was 16.6 months (std. dev. = 11.5 months). During travel plan making, respondents reported visiting the forum frequently (mean = 7 times per week; std. dev. = 12.1) and staying there an average of 6.4 hours per week (std. dev. = 10.7).

Confirmatory factor analysis (CFA) was used to verify the following measurement properties of all constructs in this study: reliability of individual items, convergent validity, dimensionality when applicable, and discriminant validity. Due to space limitations, we omit reporting details on measurement properties, since all measurement models fit well and discriminant validity is supported. The means and standard deviations of all constructs, as well as their Cronbach

| Variable | No. of Items | Cronbach's alpha | Mean | S.D. | KA | AQ | SC | GC | IC | RE | RI | FS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Knowledge Adoption | 3 | 0.83 | 14.70 | 3.93 | | | | | | | | |
| Argument Quality | 5 | 0.86 | 24.89 | 5.19 | 0.70** | | | | | | | |
| Source Credibility | 9 | 0.92 | 42.61 | 8.26 | 0.54** | 0.63** | | | | | | |
| Genre Conformity | 3 | 0.80 | 12.60 | 3.77 | 0.44** | 0.44** | 0.45** | | | | | |
| Information Consistency | 3 | 0.81 | 14.22 | 3.83 | 0.73** | 0.63** | 0.49** | 0.40** | | | | |
| Recipient Expertise | 3 | 0.85 | 12.41 | 3.94 | 0.01 | -0.07 | -0.07 | -0.03 | 0.05 | | | |
| Recipient Involvement | 3 | 0.78 | 16.41 | 3.51 | 0.45** | 0.44** | 0.35** | 0.11 | 0.44** | 0.12 | | |
| Focused Search | 4 | 0.87 | 20.97 | 5.04 | 0.66** | 0.63** | 0.50** | 0.32** | 0.63** | 0.04 | 0.52** | |
| Disconfirming Information | 2 | 0.72 | 5.04 | 2.30 | -0.11 | -0.27** | -0.18* | -0.08 | -0.19* | 0.04 | -0.12 | -0.20* |

Table 1: Descriptive Results, Correlation Matrix, and Internal Consistency of Constructs.

alphas, are reported in Table 1. T-tests were conducted to evaluate response differences on non-moderator variables between respondents of different profiles. A few differences were identified and subsequently controlled for during hypotheses testing.

## III.3. Hypotheses Testing – Main Effects

Main effect hypotheses proposed in this research include hypotheses H1a, H1b, H3a and H3b. Theses hypotheses posit that an independent variable (*argument quality, source credibility, genre conformity,* and *information consistency* respectively) positively affect knowledge adoption. To test them, a series of hierarchical regression models were built for each independent variable, with knowledge adoption as the dependent variable. For each series, the base model included only the control variables as the independent variables. These control variables were those identified in the response analyses as being associated with differences in scores of the dependent variable, knowledge adoption, and the corresponding independent variable. The focal independent variable was then added to the base model to build the final model. The change in R-square was examined to see if there was a significant improvement from the base model to the final model. The results are presented in Table 2.

As the F-stats indicate, adding each of the four independent variables to the base model significantly improves the regression model ($p < 0.001$). Moreover, the coefficients for the variables are all significant and positive. Therefore, the data collected from the Travel Forum showed strong support for all four main effect hypotheses.

| Independent Variable | Adj-$R^2$ | $\Delta R^2$ | F for $\Delta R^2$ | B |
|---|---|---|---|---|
| Argument Quality | 0.560 | 0.160 | $F(1,138) = 50.06$ *** | 0.388 *** |
| Source Credibility | 0.458 | 0.079 | $F(1,139) = 20.97$ *** | 0.152 *** |
| Genre Conformity | 0.438 | 0.074 | $F(1,138) = 18.99$ *** | 0.298 *** |
| Information Consistency | 0.621 | 0.204 | $F(1,136) = 76.53$ *** | 0.636 *** |

Note: *** $p < 0.001$

**Table 2: Results of main effect hypotheses testing.**

## III.4. Moderation Hypotheses Testing

To test moderation hypotheses for each moderator, we split the samples into two groups using its median value. After accounting for the control variables and main effects, the product term between moderators and each of the four independent variables was added to the respective regression model and the change in R-square, and the coefficients were examined.

Results of moderation hypotheses testing are presented in Table 3. We can see that the effect of argument quality increased with higher levels of recipient expertise, and that of source credibility decreased with higher levels of member involvement. These replicate previous studies in dual-process theories, thus confirming their applicability to studying knowledge adoption in online COPs. We also found that the effects of genre conformity and information consistency decreased with higher level of recipient involvement, which support our theoretical arguments that genre conformity and information consistency operate as heuristic cues in online COPs. Moreover, higher levels of focused search reduced the effect of source credibility, and higher levels of disconfirming information increased the effect of argument quality, suggesting that both focused search and disconfirming information raised elaboration likelihood.

In summary, 6 out of 12 moderation hypotheses were supported by the data. The unsupported hypotheses scattered across moderators and dependent variables. For each of the examined moderators and dependent variables, the data do lend some support regarding the roles these variables play in knowledge adoption in online COPs. Moreover, we found additional supports for our theoretical arguments when we subjected the potential new cues to the moderation of potential new elaborators. With an increased level of focus search, the data revealed that the effects of both genre conformity and information consistency are reduced.

Moreover, the fact that all the moderation hypotheses are not supported by the data is not entirely surprising considering the exploratory nature of the research and the complexity of the phenomenon. First,

| | Main Effect | Moderator | Moderation Term | F-stat for $\Delta R^2$ |
|---|---|---|---|---|
| **H2a:** Argument Quality X Recipient Expertise | $B = 0.431$ $t = 6.093$ Sig. $T = 0.000$ | $B = -8.925$ $t = -1.526$ Sig. $T = 0.129$ | $B = 0.176$ $t = 1.871$ Sig. $T = .063$ | $F(1,137) = 3.50$ [+] |
| **H2b:** Source Credibility X Recipient Expertise | $B = 0.188$ $t = 3.976$ Sig. $T = 0.000$ | $B = -4.979$ $t = --1.747$ Sig. $T = 0.083$ | $B = 0.123$ $t = 1.804$ Sig. $T = 0.073$ | $F(1,139) = 3.26$ [+] |
| **H2c:** Argument Quality X Recipient Involvement | $B = 0.540$ $t = 8.209$ Sig. $T = 0.000$ | $B = 4.239$ $t = 1.522$ Sig. $T = .130$ | $B = -0.118$ $t = -1.175$ Sig. $T = 0.242$ | $F(1,137) = 1.38$ |
| **H2d:** Source Credibility X Recipient Involvement | $B = 0.282$ $t = 6.427$ Sig. $T = 0.000$ | $B = 8.678$ $t = 3.173$ Sig. $T = 0.002$ | $B = -0.144$ $t = -2.232$ Sig. $T = 0.027$ | $F(1,138) = 4.98$ [*] |
| **H4a:** Genre Conformity X Recipient Expertise | $B = 0.330$ $t = 2.794$ Sig. $T = 0.006$ | $B = -2.584$ $t = -1.272$ Sig. $T = 0.206$ | $B = 0.161$ $t = 1.008$ Sig. $T = 0.315$ | $F(1,136) = 1.02$ |
| **H4b:** Genre Conformity X Recipient Involvement | $B = 0.552$ $t = 5.072$ Sig. $T = 0.000$ | $B = 4.825$ $t = 2.552$ Sig. $T = 0.012$ | $B = -0.258$ $t = -1.748$ Sig. $T = 0.083$ | $F(1,136) = 3.05$ [+] |
| **H5a:** Info Consistency X Recipient Expertise | $B = 0.708$ $t = 8.345$ Sig. $T = 0.000$ | $B = -1.335$ $t = -0.810$ Sig. $T = 0.420$ | $B = 0.073$ $t = 0.636$ Sig. $T = 0.526$ | $F(1,137) = 0.41$ |
| **H5b:** Info Consistency X Recipient Involvement | $B = 0.782$ $t = 9.847$ Sig. $T = 0.000$ | $B = 4.523$ $t = 2.406$ Sig. $T = 0.017$ | $B = -0.233$ $t = -1.890$ Sig. $T = 0.061$ | $F(1,137) = 3.57$ [+] |
| **H6a:** Argument Quality X Focused Search | $B = 0.487$ $t = 7.109$ Sig. $T = 0.000$ | $B = 7.131$ $t = 2.598$ Sig. $T = 0.010$ | $B = -0.152$ $t = -1.506$ Sig. $T = 0.134$ | $F(1,137) = 2.27$ |
| **H6b:** Source Credibility X Focused Search | $B = 0.252$ $t = 5.386$ Sig. $T = 0.000$ | $B = 9.052$ $t = 3.389$ Sig. $T = 0.003$ | $B = -0.125$ $t = -1.964$ Sig. $T = 0.052.$ | $F(1,139) = 3.86$ [+] |
| **H7a:** Argument Quality X Disconfirming Info | $B = 0.307$ $t = 4.035$ Sig. $T = 0.000$ | $B = -8.493$ $t = -2.971$ Sig. $T = 0.004$ | $B = 0.282$ $t = 2.620$ Sig. $T = 0.010$ | $F(1,137) = 6.87$ [**] |
| **H7b:** Source Credibility X Disconfirming Info | $B = 0.136$ $t = 2.913$ Sig. $T = 0.004$ | $B = -6.317$ $t = -2.128$ Sig. $T = 0.035$ | $B = 0.089$ $t = 1.249$ Sig. $T = 0.214$ | $F(1,139) = 1.56$ |
| **Exploration:** Info Consistency X Focused Search | $B = 0.738$ $t = 9.456$ Sig. $T = 0.000$ | $B = 4.505$ $t = 2.377$ Sig. $T = 0.019$ | $B = -0.211$ $t = -1.717$ Sig. $T = 0.088$ | $F(1,136) = 2.95$ [+] |
| **Exploration:** Genre Conformity X Focused Search | $B = 0.613$ $t = 5.245$ Sig. $T = 0.000$ | $B = 7.740$ $t = 4.211$ Sig. $T = 0.000$ | $B = -0.433$ $t = -2.980$ Sig. $T = 0.003$ | $F(1,136) = 8.88$ [**] |
| **Exploration:** Genre Conformity X Disconfirming Info | $B = 0.239$ $t = 2.811$ Sig. $T < 0.006$ | $B = -7.020$ $t = -3.547$ Sig. $T = 0.001$ | $B = 0.336$ $t = 2.104$ Sig. $T = 0.037$ | $F(1,136) = 4.43$ [*] |

Note: [+] $p < 0.1$; [*] $p < 0.05$; [**] $p < 0.001$. The dependent variable in all regression models is knowledge adoption

**Table 3: Results of Moderation Analyses: hypotheses testing and explorations.**

this study included three heuristic cues and collected field data, while most previous studies have included only one heuristic cue and generally used controlled lab experiments. It is possible that, at any one time, the informants in the Travel Forum only focus on one or two of the cues and/or argument quality but not on all of them, which explains the lack of significance for all moderation effects. It is also possible that the Travel Forum has some other cues available to and used by the informants but not identified and hence not included in this study. If so, these cues may have overshadowed the effects of the cues investigated here, and/or argument quality, resulting in some insignificant moderation effects.

Thus, given the limited sample size and the inherent complexity of the research, we conclude that the data supports the research model sufficiently well as to support further pursuit of this research stream.

## IV. DISCUSSION

This study applies dual-process theories of information processing to the study of how members of text-based, asynchronous online COPs adopt knowledge contributed by other members. By applying this widely accepted theoretical approach to this domain, it advances our understanding of knowledge adoption in online COPs. It also contributes to research in Computer-Mediated Communications in two ways. First, it rejects the cue-filtering perspective of media richness (Daft & Lengel, 1986), arguing instead that the new media features new cues

that are utilized by people as they process mediated content. In particular, our examination of genre conformity extends previous research in genres, exploring how a particular genre – gonglue here – can provide cues for assessing message validity. We also investigate how members' information acquisition strategy and the consistency of the message with prior knowledge affect knowledge adoption through the mechanism of elaboration likelihood. We present evidence suggesting that, as members approach messages in a focused search mode, and to the extent that the current message disconfirms what members already know, they will pay less attention to heuristic cues regarding the message and focus more on its content.

This study also bears practical significance. For organizations that are interested in benefiting from online COPs, it sheds new light on how and why online COPs work. It offers suggestions for how organizations might more effectively facilitate online COPs. For example, organizations may help identify, adapt, establish, and reinforce knowledge-sharing genres used by online COPs. The findings from this dissertation may also help organizational members improve their knowledge-sharing experience in online COPs. For example, knowledge contributors should realize that it is important to follow the knowledge-sharing genre and to support controversial viewpoints with more arguments. For knowledge seekers, knowing that genre conformity and information consistency are just two cues may warn them against misusing

or overusing them, thus enabling them to consciously adjust their knowledge seeking behavior and to make optimal tradeoffs between efficiency and effectiveness during validity assessment. For system designers of online COPs, this study suggests new directions for designing software that can better support knowledge sharing in online COPs. For instance, it may be worthwhile to explicate some usually implicit heuristic cues such as member credibility, perhaps with the help of social visualization technologies (Donath *et al.*, 1999).

More research in this stream is needed to gain a deeper understanding of dual-process knowledge adoption in online COPs. In particular, we plan to pursue the following three research directions: First, the research site of the reported study, the Travel Forum, is a non-work related, recreational Internet online COP. Replicating this research in a work-related, professional online COP that is hosted by an organization will help to ensure the generalizability of our findings. Second, we plan to continue our effects in identifying potential new cues and/or determinants of elaboration likelihood so that we can expand our understanding of knowledge adoption in online COPs. Finally, we will explore the implications of our findings on community software design, in particular focusing on ways that social visualization application might improve knowledge sharing between community members. We believe that the model and findings presented here represent an important new means of understanding the theoretical underpinnings of online COPs.

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# Appendix I: Quantitative Measures and Indicators[2]

Zhang and Watts: Knowledge Adoption in Online Communities of Practice

*Knowledge Adoption:*

The message has enhanced my effectiveness in making my travel plan.
Information from the message contributed to my own travel plan.
The message made it easier for me to make my travel plan.

*Argument Quality* (adopted from Bailey & Pearson, 1983):

You think the information in the message was:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Timely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Untimely |
| Ambiguous | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Definite |
| Uninformative | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Informative |
| Incomplete | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Complete |
| Inaccurate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Accurate |

*Genre Conformity:*

To what extent does the author write the message as a 'Gonglue'?

Not at all   1   2   3   4   5   6   7   To a great extent

To what extent is this message a perfect example of 'Gonglue'?

Not at all   1   2   3   4   5   6   7   To a great extent

To what extend would you describe this message to other forum members as a 'Gonglue'?

Not at all   1   2   3   4   5   6   7   To a great extent

*Source Expertise* (adapted from Watts Sussman, 1998):

How knowledgeable was the author on traveling in general?

Not knowledgeable   1   2   3   4   5   6   7   Knowledgeable

How knowledgeable was the author on traveling in your destination?

Not knowledgeable   1   2   3   4   5   6   7   Knowledgeable

In general, to what extent was the author an expert on traveling?

Not expert   1   2   3   4   5   6   7   Expert

To what extent was the author an expert on traveling in your destination?

Not expert   1   2   3   4   5   6   7   Expert

*Source Likeability* (adopted from Chaiken, 1980):

The author was:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Arrogant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Modest |
| Unlikable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Likeable |
| Biased | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Unbiased |

*Source Trustworthiness* (adopted from Watts Sussman, 1998):

How trustworthy was the author?

Not trustworthy   1   2   3   4   5   6   7   Trustworthy

How reliable was the author?

Not reliable   1   2   3   4   5   6   7   Reliable

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2. Note: 1) If not specified, items are self-developed; 2) If not specified, items are measured with 7-point Likert scale anchored with Strongly Disagree at 1 and Strongly Agree at 7.

*Information Consistency* (adapted from Vandenbosch & Higgins, 1996):

The message reinforced my confidence in my travel plan.
The message supported the actions in my then existing travel plan.
The message verified my assumptions for my travel plan.

*Recipient Expertise*:

When you started making your travel plan, how experienced were you in making travel plan?

    Not experienced  1    2    3    4    5    6    7    Highly experienced

Adapted from Watts Sussman, 1998:

When you started making your travel plan, to what extent were you an expert on traveling in general?

    Not expert      1    2    3    4    5    6    7    Extremely expert

When you started making your travel plan, to what extent were you an expert on your destination?

    Not expert      1    2    3    4    5    6    7    Extremely expert

*Recipient Involvement*:

How involved were you in making this travel plan?

    Not involved    1    2    3    4    5    6    7    Highly involved

How important was it for you to have a good travel plan ready before you set off?

    Not important    1    2    3    4    5    6    7    Extremely important

Adapted from Stamm & Dube, 1994:

How much had making this travel plan been on your mind when you were making your travel plan?

    Not at all      1    2    3    4    5    6    7    A great deal

*Disconfirming Information*:

The information from the message contradicts what I knew before reading the message.
Adapted from Vandenbosch & Higgins, 1996:
The message questioned my preconceptions about my travel plan.

*Focused Search*:

I was looking for certain knowledge when reading the message.
Before I read the message, I was hoping that it would close some specific gaps in my travel plan.
I selected this message wishing that it has the information I was searching for.
I closely examined the message to find answers to particular questions.