



# Herd behavior in purchasing books online

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## Abstract

Previous studies on informational cascades have stressed the importance of informational social influences in decision-making. When people use the product evaluations of others to indicate product quality on the Internet, online herd behavior occurs. This work presents four studies examining herd behavior of online book purchasing. The first two studies addressed how two cues frequently found on the Internet, i.e., star ratings and sales volume, influence consumer online product choices. The last two studies investigated the relative effectiveness of different recommendation sources. The experimental results demonstrated that subjects use the product evaluations and choices of others as cues in making purchasing book decisions on the Internet bookstore. Additionally, recommendations of other consumers exerted a greater influence on subject choices than recommendations of an expert. Finally, recommendations from recommender system influenced online consumer choices more than those from website owners. The results and implications of this research are discussed. © 2007 Elsevier Ltd. All rights reserved.

*Keywords:* Herd behavior; Informational influence; Internet bookstore

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## 1. Introduction

One of the most intriguing social phenomena evoked by advances in information and communication technologies is the vast magnification of the power of crowds. The emergence of the Internet has enabled consumers to form technology-mediated communities through which they can exchange opinions and experiences regarding companies, prod-

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ucts, services, and even world events. Additionally, the emerging online economy provides consumers with easy access to numerous choices. Unlike traditional face-to-face (FtF) retail environments, in which products can be seen and touched and customers can consult salespersons, transactions occur in a computer-mediated communication (CMC) environment that provides no opportunities for experiencing a product or for FtF consultation before making a purchase. Influencing consumer choices in a virtual environment is a challenge facing Internet companies.

“When people are free to do as they please, they usually imitate each other” (Hoffer, 1955). This tendency results in herd behavior, where everyone is doing what everyone else is doing (Banerjee, 1992). People often infer information from the actions of others. For example, consumers frequently select popular brands because they believe that popularity indicates better quality. Furthermore, when two restaurants exist beside one another, customers often pick the one with more seats occupied. Similarly, New York Times bestseller can be sold well enough to continue as a bestseller (Bikhchandani, Hirschleifer, & Welch, 1992). Herd behavior describes various social situations in which individuals are strongly influenced by the decisions of others (Asch, 1956). This construct was also widely used by marketing practitioners to induce consumer purchase intentions (Bearden & Etzel, 1982). Adapting this definition (Asch, 1956) to a consumption setting, this investigation defines herd behavior as a change in consumer product evaluations, purchase intentions, or purchase behavior resulting from exposure to the evaluations, intentions, or purchase behaviors of referent others. Previous studies have investigated herd behavior in digital auctions (Dholakia, Basuroy, & Soltysinski, 2002; Stafford, Kilburn, & Stern, 2006) and software downloading, and bid numbers and download counts have been used by consumers to indicate quality (Hanson & Putler, 1996).

Consumers use the evaluations of others as an indicator of product quality while making their decisions (Park & Lessig, 1977). The above situation becomes more obvious in the face of difficult and ambiguous conditions, such as CMC environments. The uncertainty of online retail environments can increase consumer reliance on the opinions of others regarding products. The emergence of the Internet has made it important to understand the potential of online herd behavior in influencing consumer decisions. Although herd behavior has long been studied in traditional retail environments (Lascu & Zinkhan, 1999), influences on online herd behavior are a fairly recent topic of investigation in retail marketing. This study thus is mainly concerned with investigating herd behavior in purchasing books online.

## 2. Literature review

Previous studies have demonstrated that people are influenced by others in decision-making (Asch, 1956; Lascu & Zinkhan, 1999). Deutsch and Gerard (1955) distinguished two influence types – normative and informational. Normative influence describes occurrences in which individuals conform to the expectations of others, while informational influence is considered to be the tendency to accept information received from others as an indicator of reality. Since people have no need to conform to the expectations of others when making online purchases, informational influence exert a stronger influence on customers than normative influence. This investigation focuses on informational influence for Internet bookstores to understand the potential for online herd behavior to influence consumer book choices.

Consumers make decisions based on existing online information. However, when facing plentiful information, people often imitate others rather than making decisions based on existing conditions (Bonabeau, 2004). Such imitation behavior can lead to the formation of informational cascades (Bikhchandani et al., 1992). Informational cascades occur when individuals follow the previous behavior of others and disregard their own information. Such imitative behavior can be derived from rational inferences based on the decision information of others that dominates individual signals (Anderson & Holt, 1997). The mimetic behavior by consumers, once started, leads to an upward cascade. Economists have called spiraling escalation in the cognitive or behavioral sequence upward cascade (Dholakia et al., 2002). Additionally, herd behaviors also affect Internet usage. Computer users often adopt popular software, thus further increasing its popularity (Brynjolfsson & Kemerer, 1996). One explanation is that network externalities, agent deriving from a good when the number of other agents consuming the same kind of good changes (Liebowitz & Margolis, 2007), i.e., the utility a user derives from consuming a software increases with the number of other users adopting the same software (Katz & Shapiro, 1985). Another explanation is informational cascades (Banerjee, 1992; Bikhchandani et al., 1992). Given the numerous new products and services available on the Internet, consumers are frequently face intricate purchasing decisions while lacking access to accurate information on product quality (Brynjolfsson & Smith, 2000). Informational cascades can be common in such situations which require consumers to infer product quality based on the choices of other consumers and incorporate that information into their own decision-making. Similarly, in digital auctions, buyers tend to bid for listings that others have already bid for, while ignoring similar or more attractive unbid-for listings (Dholakia & Soltysinski, 2001). All these attributes also apply to online book purchasing. When the cue for participating in a specific bid is the number of individuals already participating, sales volume and star ratings serve as cues for making purchase decisions. Specifically, high sales volume or star ratings of books can influence consumer buying behavior and cause an informational cascade in CMC.

In CMC, consumers tend to search for information to reduce uncertainty and risk (Peterson & Merino, 2003). The Internet as a communication network is a powerful tool that firms and consumers use to exchange information relatively cheaply. The advent of the Internet is also increasing the importance of product recommendations. In complex and unfamiliar situations, people attempt to utilize all accessible information, including product profiles and recommendation information in making final decisions (Todd & Benbasat, 2000). Furthermore, consumers may use heuristics, such as recommendations from others, to minimize the effort of decision-making (Lee & Geistfeld, 1998). Product recommendations shape consumer decisions and choices. Various online recommendations influence consumer choices since consumers may consider them credible. Informational influences operate through internalization (Kelman, 1961). Internalization may occur if reference groups are considered credible. Kelman (1961) proposed that credibility involves expertise and trustworthiness. Consistent with this view, Ohanian (1990) indicated that source credibility comprises expertise, trustworthiness, and attractiveness. Furthermore, previous studies have demonstrated that source – expertise, trustworthiness, and attractiveness – positively influence consumer attitudes towards a brand and purchase behavior (Harmon & Coney, 1982). This work examines the relative strength of an expert opinion versus crowd opinion in influencing book choices of shoppers at an Internet bookstore.

The most obvious feature between FtF communication and CMC is physical presence (Adrianson, 2001; Félix, Jesús, & Luis, 2007). Consumers thus rely on more information and on the comments of others when making decisions regarding online book purchases. This investigation studies herd behavior in online book purchasing. Books are experience goods that “are not determined before purchase” (Nelson, 1974). Since it is more difficult to evaluate experience goods than search products before purchasing, consumers become more reliant on the opinions of other consumers. Furthermore, books are essential low-involved products and are relatively low priced. Compared with high-involved products, consumers spend less time and cognitive efforts considering low-involved product choices (Goldsmith & Emmert, 1991). Such products thus are more likely to elicit online herd behavior. This investigation uses cues frequently found on the Internet, i.e., star ratings, sales volume, and consumer recommendations, to examine herd behavior in online book purchasing. This work also discusses recommendation systems, a brand-new source of influence.

### 3. Hypotheses

Research on the effect of store design on consumer purchases indicates that online stores should provide functions that support consumers in product assessments and decision-making, including customer interaction and customized information. Customer interaction enables consumers to access the comments or opinions of other consumers, while customized information can provide sales data and customer preferences.

Furthermore, studies on information source selection have investigated consumer assessments of the diagnosticity of information sources across three tasks, including seeking recommendations, seeking evaluations, and making decisions when facing conflicting opinions (Gershoff, Broniarczyk, & West, 2001). These results implied that some product information, treated as cues for eliciting herd behavior, could influence consumers and induce herd behavior.

According to the preceding review of the literature, this work postulates that providing cues for eliciting herd behavior will influence consumers and lead to online herd behavior. The cues examined in this work for eliciting herd behavior include (1) star ratings, (2) sales volume, (3) consumer recommendations, and (4) recommender system recommendations. Consumer recommendations are compared with expert recommendations in terms of trustworthiness, expertise and attractiveness.

Based on the previous literature, this investigation first posits that people use the product evaluations of others, such as star ratings on the Internet bookstore, as an indicator of product quality. For example, Amazon uses “star numbers of average customer review” to rate consumer preferences regarding books. Second, we propose that people are sensitive to Internet sales volumes. Best-seller lists, drawn based on total product sales volume, have also guided consumers and driven reader imitation (Bonabeau, 2004). The following two hypotheses thus are proposed:

- H1:** Displaying that a book has high star ratings will positively affect consumer online choices regarding that book.
- H2:** Displaying that a book has high sales volume will positively affect consumer online choices regarding that book.

Besides the above two hypotheses, which relate to cues of eliciting herd behaviors in consumer online book purchasing choices, this work formulates a set of four hypotheses related to the effectiveness of different online recommendation sources in online book purchasing choices. First, this investigation posits that “the recommendations of other consumers” exert a greater influence on online consumer choices than “recommendations of an expert”. Research on information sources indicates that information sources can influence consumer decisions. Such information may include movie critics, financial analysts, and Consumer Reports magazine. Basuroy, Chatterjee, and Ravid (2003) have demonstrated that movie critics may act both as influencers and predictors, and significantly impact movie revenue. Previous library research has also shown that people are influenced by book reviews when making book selection decisions (Carlo & Natowtztz, 1995; Dilevko et al., 2006). Consumer online recommendations guiding consumers to buy or do something can be considered as opinion aggregators. That is, consumers are influenced more by “collective intelligence” than by a small group of experts (Surowiecki, 2004). People may not be acquainted with each other, but are homogeneous and have equal intention to give, and receive, the best information possible. Furthermore, Wangenheim and Bayon (2004) indicated that similarity is one kind of source characteristic related to external information. Source of similarity indicates the degree of similarity between the source of a recommendation and potential customers. The tendency of individuals to compare themselves with others increases with increased perceived similarity, because individuals implicitly assume that similar people have similar needs and preferences, and thus they see those information as more informative or diagnostic. Friedman and Friedman (1979) also indicated that for low-knowledge products, which lack significant attributes requiring consumer evaluation and generally experience goods, such as movies and books, consumers trusted the suggestions of typical consumers more than those of experts. Online recommendations of consumers thus influence consumer choices more than those of an expert. Additionally, “Other consumers” were considered a more trustworthy source of recommendations than were experts (Bonabeau, 2004). On the other hand, expertise can be viewed as “authoritativeness”, “competence” and “expertness” (Applebaum & Karl, 1972). Previous studies have shown that perceived level of expertise positively impacts subject compliance with source recommendations (Crisci & Kassino, 1973). Therefore, an expert should be perceived as possessing more expertise than other consumers. Finally, attractiveness is viewed as “familiarity”, “likeability”, and “similarity” (Ohanian, 1990). Other consumers are perceived as more familiar and similar to the decision maker than are experts. That is, consumer recommendations are more attractive than expert recommendations.

- H3:** The recommendations of consumers exert a greater influence on online consumer choices than recommendations of an expert.
- H4a:** Consumer recommendations are considered as more trustworthy than expert recommendations by Internet consumers.
- H4b:** Consumer recommendations are considered as less expert than expert recommendations by Internet consumers.
- H4c:** Consumer recommendations are considered as more attractive than expert recommendations by Internet consumers.

Previous studies have demonstrated that recommender systems are impersonal information sources that providing consumers with personalized information (Senecal & Nantel, 2004) and facilitate consumer decision-making (Liang & Lai, 2002). Collaborative filters suggest consumers buying products or reading product information according to those others with similar habits. For example, Amazon uses a “recommendation algorithm” to find and rate previous consumer purchases, and then displays this information to other visitors (Bonabeau, 2004). Consumers may perceive recommendations from websites as less reliable than those of other consumers based on the recommendation system (Senecal & Nantel, 2004). This study thus predicts that recommendations from “recommender system” will influence online consumer choices more than those from website owners.

**H5:** Recommendations from recommender system influence consumer online choices more than those from website owners.

#### 4. Examining herd behavior in purchasing books online

This investigation reports four studies conducted to test the herd effects of online book purchasing. The four experiments involved a total of 815 students, including both males and females, from a Taiwanese university. The majority of subjects were between 19 and 28 years old (86%). Fifty percent of the subjects were female, 66% were full-time students and 34% were part-time workers and students. On average, subjects had been using the Internet for 5 years and currently spent approximately 16.5 hours per week online. Each subject was assigned to a single experiment to clarify the influence of independent herd cue on the book choices of Internet shoppers.

##### 4.1. Study 1

The experiment schema, shown in Table 1, includes three levels of star ratings assigned by other customers. Subjects were presented with a choice of two books, each with different star rating, i.e., star numbers of average customer review. Stars varied markedly among three levels to reflect reviewer preferences based on 10 reviews. There were 5 stars versus 1 star for Group 1, 4 stars versus 2 stars for Group 2, and 3 stars versus 3 stars for Group 3. The stars reflected possible real situations related to online consumer evaluation of books in Taiwan and provided clues in eliciting herding behaviors. Consumers in most Internet bookstores signaled their appreciation of individual books by assigning them a ranking of 1–5 stars. The highest evaluation of a book was 5 stars, while the lowest was 1 star. The contrast scenario was labeled Group 1. Furthermore, this study used the concept of proportion. Group 2 thus were manipulated by 4 stars versus 2 stars, and Group 3 for 3 stars versus 3 stars. Group 3 was the control group. A total of 6 stars were involved in each group. This study thus examined the herding effect in relation to the proportion of stars, including 5/6 in Group 1, 4/6 in Group 2, and 3/6 in Group 3.

The experiment involved 180 students, including both males and females, from a Taiwanese university. Subjects voluntarily signed up to participate to receive extra credit in information management courses. Separate sign-up sheets were employed at each class,

Table 1  
Design and choice of book results for study 1

	Group 1 ( <i>n</i> = 60)		Group 2 ( <i>n</i> = 60)		Group 3 ( <i>n</i> = 60)	
	Book1	Book2	Book1	Book2	Book1	Book2
	Happy	Easy	Happy	Easy	Happy	Easy
	Holiday	Holiday	Holiday	Holiday	Holiday	Holiday
	Star 5	Star 1	Star 4	Star 2	Star 3	Star 3
Mean <sup>a</sup>	2.37		2.50		3.38	
Standard deviation	1.56		1.60		1.98	

$F_{(2,177)} = 6.174$  ( $P = .003$ )

LSD test<sup>b</sup>: Group 1 < Group 3\*\*, Group 2 < Group 3\*\*\*

<sup>a</sup> Mean value on a 6-point scale, where 1 indicated “will buy Happy Holiday (Book1) and will not buy Easy Holiday (Book2)” and 6 indicated “will buy Easy Holiday (Book2) and will not buy Happy Holiday (Book1)”.

<sup>b</sup> \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ .

and they were the basis for the random assignment of subjects to treatment conditions. Each subject was randomly assigned to one of the three treatment conditions, resulting in 60 subjects attending each treatment condition.

Each participant was led into the experimentation computer room to answer questions on a computer. The subject was asked to choose one of two holiday traveling books with similar sounding titles (Happy Holiday and Easy Holiday) from the Internet bookstore, with the underlying assumption that they planned to travel during the coming holiday. The web pages of the Internet bookstore presented related information regarding these two travel books. To avoid being affected by other factors, related features of these two travel books were kept identical, including hardcover, pages, publisher, list price and availability. The background of the Internet bookstore and the books information on the home page, were modified from actual Internet bookstore Web pages. After reading the experimental Web pages, participants were asked to express their overall preferences regarding the two travel books.

The overall preference choices regarding the two books constituted the dependent variable. Differences among conditions were assessed using analysis of variance. The overall preference choices of two travel books were operationalized by asking, “After you read the information regarding these two travel books in the Internet bookstore, what is your preference for buying each book? Evaluate the two travel books on the following scale.” Responses were made using a six-point scale, indicating their likelihood of buying either one of the two books.

#### 4.1.1. Results

One-way ANOVA was performed on the scaled scores and indicated significant differences ( $F_{(2, 177)} = 6.174$ ,  $p = .003$ ) among the three groups. Table 1 lists the results. Clearly, Group 1 (mean = 2.37) had a lower mean score than the other groups (Group 2 = 2.50, Group 3 = 3.38). The LSD test demonstrated significant differences between Groups 1 and 3, and Groups 2 and 3, but not between Groups 1 and 2.

Although Groups 1 and 2 do not differ significantly, in general higher number of subjects choosing the book was associated with higher star ratings, indicating a positive relationship between the star ratings assigned by other customers and subject online choices.



These results showed that displaying a book with a high rating positively affects consumer online choices regarding that book, supporting **H1**.

4.1.2. Discussion and conclusions

The two main findings of study 1 are as follows. First, subjects use the product evaluations of others, such as star ratings assigned by other customers on the Internet bookstore, as a source of information regarding books. Subjects appear to use the evaluations of others as an indicator of whether a book is good or not. This experiment thus suggested the existence of herd behavior.

The second key finding is that subjects change their choices when other customers present different ratings regardless of “stars”. When subjects were informed that Book 1 was assigned more stars than Book 2, the differences in the number of stars given to different books did not significantly influence their choices. One explanation for this insensitivity between Groups 1 and 2 may be that the absolute numbers of star makes no difference once subjects perceived that the two books receive different evaluations.

4.2. Study 2

The first study focused on star ratings of the effects of books on consumer online choices, while the second study investigated the sales volume effects. Participants were presented with identical scenarios to those in study 1, but the star ratings were replaced by book sales volumes. Relative sales volumes reflected possible real book sales in Taiwan and provided cues regarding herding behaviors. The sales volume for Book 2 was fixed at 3000 books, while Group 3 served as control treatment. Group 1 represented the greatest relative sales volume among three groups with sales volume of 9000 books versus 3000 books. Group 2 represent the middle relative sales volume with sales volume of 6000 books versus 3000 books. In Group 3, the two books have equal sales volume of 3000 books each. The experiment schema in this study is shown in Table 2. There were three different groups, with each subject seeing only one treatment condition for the two travel

Table 2  
Design and choice of book results for study 2

	Group 1 ( <i>n</i> = 60)		Group 2 ( <i>n</i> = 60)		Group 3 ( <i>n</i> = 60)	
	Book1	Book2	Book1	Book2	Book1	Book2
	Happy	Easy	Happy	Easy	Happy	Easy
	Holiday	Holiday	Holiday	Holiday	Holiday	Holiday
	9000 books	3000 books	6000 books	3000 books	3000 books	3000 books
Mean <sup>a</sup>	2.12		2.88		3.80	
Standard deviation	1.12		1.80		1.81	
$F_{(2,177)} = 14.12$ ( $P < .001$ )						
LSD test <sup>b</sup> : Group 1 < Group 2*, Group 1 < Group 3**, Group 2 < Group 3***						

<sup>a</sup> Mean value on a 6-point scale, where 1 indicated “will buy Happy Holiday (Book1) and will not buy Easy Holiday (Book2)” and 6 indicated “will buy Easy Holiday (Book2) and will not buy Happy Holiday (Book1)”.

<sup>b</sup> \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ .



books. One hundred and eighty-five students, including male and female completed this study.

#### 4.2.1. Results

Table 2 presents ANOVA results, which indicates significant differences ( $F_{(2,177)} = 14.12$ ,  $p < .001$ ) among three groups. Group 1 (mean = 2.12) appeared more likely to buy Book1 than any other group (Group 2 = 2.88, Group 3 = 3.80). Moreover, the result of the LSD test indicated that statistically significant differences existed among groups. Thus, **H2** was supported, suggesting that book sales volume positively influences consumer online choices regarding that book.

#### 4.2.2. Discussion and conclusions

The experimental results have shown that subjects chose books that were selected by the largest number of other consumers. However, in situations involving equal quantities of cues, namely Group 3, the mean of the scaled scores indicated no differences in book selection. The results of study 2 demonstrate that book sales volume is related to future consumer purchases of that book. That is, online customers are sensitive to sales volume. When subjects see the relationship between sales volumes, they become increasingly willing to select books with higher sales volume. The number of subjects selecting a book thus increases with the sales volume of that book.

This experiment appeared to demonstrate the existence of herd behavior. The findings implied that Group 1 was the group most influenced by online herd behavior. This study confirms that actual sales of a book are increased when online shoppers learn that the book is already selling strongly.

#### 4.3. Study 3

A between-subject design with three treatments was used to examine **H3**, **H4a**, **H4b** and **H4c**. This study examined whether crowds or an expert exerted more influence on the online choices of consumers. One hundred and ninety-five students participated in the online experiment. Each subject was randomly assigned to one of three following conditions: consumer recommendation, expert recommendation and no recommendation. After having read Web pages, subjects were asked to evaluate their purchase intentions for one travel book in the Internet bookstore and then complete an online questionnaire regarding the credibility of the recommendation sources.

The Web pages of the Internet bookstore presented related information regarding the travel book. Additionally, the recommendation page presented recommendations and their source (consumers or an expert). For the “consumer recommendation” treatment (Group 1), the recommendation for the travel book was presented as follows: “This recommendation is based on other consumer selections. Happy Holiday is the leading book in the tourism area as voted for online by readers.” For subjects assigned to the “expert recommendation” treatment (Group 2), the recommendation was presented as follows: “This recommendation is based on evaluation by a tourism expert. Our advisors, experts in the tourism area, strongly recommend Happy Holiday.” Subjects assigned to the “no recommendation” treatment (Group 3) were not exposed to any recommendation. Besides this, identical information was provided for each treatment. After reading the experimental Web pages, participants were asked to express their purchase intentions regarding the

travel book. Travel book purchase intention was operationalized by asking, “After you read the information regarding this travel book in the Internet bookstore, what is your intention to buy this book?” Subsequently, subjects who had viewed the recommendation page (containing recommendations either by consumers or an expert) were asked to complete a scale for measuring recommendation credibility for assessing the expertise, trustworthiness, and attractiveness of the recommendation sources. Results from a pretest ( $n = 42$ ) and from the experiment ( $n = 195$ ) both show the reliability of the measurement scale. Meanwhile, the Cronbach’s alphas for the expertise, trustworthiness, and attractiveness dimensions are 0.90, 0.85 and 0.81, respectively.

#### 4.3.1. Results

To test **H3**, one-way ANOVA analysis was performed to determine the existence of significant differences regarding consumer choices in the Internet bookstore among the three different recommendation conditions. Additionally, a MANOVA analysis was performed to assess the perceptions of the expertise, trustworthiness, and attractiveness on different recommendation sources.

Table 3 lists the ANOVA results, which indicates significant differences ( $F_{(2,192)} = 8.61$ ,  $p < .001$ ) among the three different recommendation conditions. Consumer recommendation (mean = 4.28) appeared to influence respondents’ purchase intentions more strongly than either expert recommendation (mean = 3.88) and no recommendation (mean = 3.51). The LSD test demonstrated statistically significant differences among the three different recommendation sources. Thus, online book recommendations strongly influenced consumer book choices. Moreover, online consumer recommendations were more influential than those of an online expert. **H3** thus was supported.

Table 3  
Choice of book, perception of trustworthiness, expertise, and attractiveness for study 3

		Group 1 ( $n = 65$ ) Consumer recommendation	Group 2 ( $n = 65$ ) Expert recommendation	Group 3 ( $n = 65$ ) No recommendation
Choice	Mean <sup>a</sup>	4.28	3.88	3.51
	Standard deviation	1.05	1.03	1.03
	$F_{(2,192)} = 8.61$ ( $P < .001$ )			
	LSD test <sup>b</sup> : Group 1 > Group 2*, Group 1 > Group 3***, Group 2 > Group 3*			
Trustworthiness	Mean <sup>a</sup>	4.17	3.51	
	Standard deviation	.63	.82	
	$F_{(1,128)} = 26.74$ ( $P < .001$ )			
Expertise	Mean <sup>a</sup>	3.82	4.37	
	Standard deviation	.63	.82	
	$F_{(1,128)} = 20.71$ ( $P < .001$ )			
Attractiveness	Mean <sup>a</sup>	3.65	3.82	
	Standard deviation	.59	.62	
	$F_{(1,128)} = 2.64$ ( $P = .107$ )			

<sup>a</sup> Mean value on a 6-point scale, where 1 indicated “strongly disagree” and 6 indicated “strongly agree”.

<sup>b</sup> \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

MANOVA analysis reveals that statistically significant differences existed in the expertise, trustworthiness, and attractiveness among different recommendation sources (Wilk's lambda:  $F_{(2,127)} = 19.76, p < .001$ ). Table 3 shows that both trustworthiness and expertise were significant, but their signs differed. Additionally, attractiveness was not significant. In terms of trustworthiness, as predicted by H4a, consumer recommendations were considered significantly more trustworthy than expert recommendations (mean = 4.17 and 3.51, respectively;  $F_{(1,128)} = 26.74, p < .001$ ). As predicted by H4b, consumer recommendations were perceived as being based on less expertise than expert recommendations (mean = 3.82 and 4.37, respectively;  $F_{(1,128)} = 20.71, p < .001$ ). Additionally, consumer recommendations were not considered significantly more attractive than expert recommendations on the Internet (mean = 3.65 and 3.82, respectively;  $F_{(1,128)} = 2.64, p = .107$ ). H4c thus was not supported.

#### 4.3.2. Discussion and conclusions

The results suggest that subjects may refer to the opinions of others, for example recommendations. Book recommendations significantly influence subject book choices. Additionally, recommendations from different sources also exert different influences in terms of increasing willingness to purchase books online. This study finds that consumer online recommendations influence consumer choices more than those of an expert. Interestingly, the TV studio audience of *Who Wants to Be a Millionaire* guesses correctly 91% of the time, compared to “experts” who only manage a 65% correct rate (Surowiecki, 2004). There is a proverb: “Two heads are better than one”. Experts, regardless of their knowledge, only possess limited information. For many people, herd behavior suggests a better heuristic than following expert opinion.

#### 4.4. Study 4

The final study was an experiment testing whether recommendations from recommender system exerted a stronger effect on subjects than those from website owners in terms of increasing willingness to purchase books online. This study extended the findings of study 3. Recommender system, mimic word-of-mouth recommendations (Ansari, Essengai, & Kohli, 2000), can be considered an information source as “other consumers” on the Internet. Additionally, this study also examined the online influence of the recommendations of website owners.

Two hundred and sixty students participated in this experiment as part of their course requirements. Subjects were randomly assigned to either the recommendations from recommender system or the website owner conditions. Thus, 130 subjects attended each treatment condition. Recommendations from recommender system treatment (Group 1) were presented in the following formats: “If you have purchased Happy Holiday, you can also consider the following related travel books.”; “customers who bought this book also bought: Travel Holiday, Travel Heaven, Travel World, and Travel Dreams”. “This recommendation is based on the analysis of consumers who have purchased books on this Internet bookstore. Our computer system analyzed our consumer purchase records and, based on your personalized profile, the system strongly recommends these related travel books to you.” Furthermore information regarding the travel books was presented if subjects clicked the book hyperlink. Finally, each participant was asked the choice of buying those recommended related travel books (Travel Holiday, Travel Heaven, Travel World,

and Travel Dreams). On the other hand, the experimental condition of website owner recommendations treatment level was identical to the recommender system condition, except that the recommendation description “Customers who bought this book also bought...” was replaced by “Our Internet bookstore staff strongly recommends that you buy...” The “website owner” treatment level was presented as follows: “This recommendation is based on an evaluation by our staff. Our staff, working for this Internet bookstore, strongly recommends these related travel books to you according to their experience.”

The purchase choice was operationalized by asking, “After you read the information related to those travel books on the Internet bookstore, which books do you want to buy? (you can choose more than one book or buy nothing).” Responses were given five options, i.e., buying either one of the four books or buying nothing.

#### 4.4.1. Results

Study 4 tested the hypothesis that differences between two recommendation sources influence online purchasing, and used a  $\chi^2$ -test to do so. As expected, the recommender system and website owner recommendations regarding online purchasing differed significantly. The results strongly support **H5**, as indicated in Table 4 ( $\chi^2(1) = 7.506$ ,  $p = .005$ ). As illustrated in Table 4, of the respondents ( $n = 130$ ) in the recommender system recommendations condition, 88.4% would buy recommended travel books and only 11.6% would not. Furthermore, in the recommendation from the website owner condition ( $n = 130$ ), 75.4% of subjects would buy recommended travel books and only 24.6% would not. The percentage of subjects (75.4%) who bought recommended travel books in the website owner condition was lower than that (88.4%) in the recommender system. Therefore recommendations from recommender system influenced subject online choices more than those from website owners, supporting **H5**.

#### 4.4.2. Discussion and conclusions

Study 4 provides further evidence that subjects may be influenced by the choices of others. This study extended the findings of study 3 to see if any differences on influencing subject online choices are due to different recommendation sources. As expected, results support the contention of this study that online recommendations from recommender system influence subject online choices more than recommendations from website owners. Consumers clearly prefer to receive guidance from those perceived to be similar to themselves (Brown & Reingen, 1987; Feick & Higie, 1992; Price, Feick, & Higie, 1989). Subjects use and rely on agents, such as recommender systems, to make choices. However, recom-

Table 4  
Choice of book results for study 4

Recommendation		Buy another books		Total	$\chi^2$	$P^a$
Source		Yes	No			
Recommender system	$n$ (%) <sup>b</sup>	115 (88.4)	15 (11.6)	130 (100)	7.506	.005*
Website owner	$n$ (%) <sup>b</sup>	98 (75.4)	32 (24.6)	130 (100)		

<sup>a</sup> \*  $P < 0.05$ .

<sup>b</sup> Percentage in relation to total sample size.

mentations from website owners did not influence consumer propensity to follow book recommendations. Website owners who recommend a book have less credibility than other consumers recommending the same book on the Internet. Possibly recommendations from the website owner appear too commercial to be trustworthy.

Interestingly, recommendations influence consumer online choices even if “other consumer recommendations” have been substituted for “recommender system”. The rapid growth of e-commerce has created product overload in situations where consumers become unable to effectively choose the products they are exposed to. The opportunity for customers to choose among growing numbers of products has increased the burden of information processing before product selection (Kim, Kim, & Lee, 2000; Schafer, Konstan, & Riedl, 2001; Xiao & Benbasat, 2003). Recommender systems thus have been developed to alleviate the product overload faced by Internet shoppers. Recommender systems can serve as clerks saving consumer time and effort by screening out unattractive alternatives. The emergence of the Internet has provided consumers with the opportunity to seek advice regarding the book information and recommendations of others by accessing recommender systems. Recommender systems track the past behaviors of groups of customers to make recommendations to group members. Consumers can obtain more effective recommendations when shopping online. The results demonstrate that this information source affects subject online choices, and also represents the existence of herd behavior when using recommendation systems on the Internet.

## 5. General discussion and implications

The main goal of this work is to examine herd behavior of online book purchasing to improve understanding of how people make decisions regarding online book purchases. The analytical results showed that sales volume and star ratings of a book influenced subject online book choices. “The recommendations of other consumers” influenced subject choices more than “recommendations of an expert”. Furthermore, book recommendations from recommender system influenced consumer online choices more than those from website owners. Consumers use online herd cues to acquire product information, and also ask information sources to recommend the best option.

The Internet recently has emerged as a dynamic medium for channeling transactions between customers and companies in a virtual marketplace (Yang & Lester, 2005). The Internet also enables consumers to obtain online comments from other consumers. Customer preferences and comments articulated via the Internet are available to numerous other customers, and thus significantly impact consumer behavior. The rapid growth of online marketing has provided a fertile environment for the emergence of new marketing concepts and tools. Thus, for marketers, this research help improve understanding of the different cues for eliciting herd behavior on the Internet, and the manner in which information sources can influence the effectiveness of online interpersonal influence. This work clarifies the influence of herd cues on online consumer decisions. Besides examining herd behavior in relation to online book purchasing, much of the work on online product choice remains in its infancy. Consequently, numerous research avenues can be identified.

The results of this research have various implications for online stores. First, online marketers may use cues, such as sales volumes and star ratings, to induce purchase intentions.

Online stores can create prominent displays of best sellers to stimulate sales. Numerous consumers buy products on the list simply because they believe that such products must be worth possessing. Moreover, marketers can create store situations that “spark” these herd cues. Earlier research suggests that creating novel and interesting consumption experiences can pair loyal customers with new customers (Bone, 1992). Second, online marketers can initiate programs in which consumers recommending products to others, for example those clicking a “tell other consumers about this product” link, are rewarded. Based on network externalities (Liebowitz & Margolis, 2007), demand for a product increases when consumers believe that more people have purchased that product. Companies can also establish a recommender system since product recommendations by experts or themselves are less effective than those by other consumers in CMC. Third, online stores may create blogs. Blogs represent a significant new development in the information world (Johnson & Kaye, 2004). Blogs provide a method of gathering and organizing opinions and thus reinforce organizational objectives regarding knowledge fostering and information sharing (Dearstyne, 2005). Even more, consumers became creators through blogging (Rebecca, 2006). Blogging is a new force on the information stage, and online stores can use the power of blogs to induce herd behavior in CMC.

This work suffers some limitations, numerous possible research avenues exist. First, although different sampling frames were used for each study in this work to preserve internal validity, all of these frames participated in the “laboratory test”. Thus, as with most online studies, the possible self-selection bias makes it impossible to confirm that the study participants are representative of the population of Internet shoppers. Future research could examine herd effects in a real market situation. Second, previous studies have demonstrated that product types impact consumer choices and purchase behavior. However, this work studies herd behavior in online book purchasing, and only considers one kind of product, namely, books. Thus, additional studies using different samples and products would be helpful in generalizing the findings of the present study. Third, this investigation examined the influence of herd cues on online consumers and thus induced herd behavior in CMC. However, it examined these herd cues respectively. It would be of interest to design a mixed within/between subjects experiment to examine the interaction between individual variables and combine these herd cues to examine herd effects in a future study. Finally, previous research indicated consumer characteristics (e.g., personality traits, subjective product knowledge, and product experience) are susceptible to interpersonal influence (Gilly, Graham, Wolfinbarger, & Yale, 1998; Lascu, Bearden, & Rose, 1995; McGuire, 1968; Park & Lessig, 1977). Future works could examine possible variables that may elicit herding behavior in CMC. Focusing on such issues may enable improved understanding of herd behavior in CMC.

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