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UNDERSTANDING THE INFORMATIONAL SOCIAL INFLUENCE OF ONLINE REVIEW PLATFORMS

Completed Research Paper

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Abstract

Online review platforms have become a basis for many consumers to make informed decisions. This type of platforms is rich in review messages and review contributors. For marketers, the platforms' practical importance is its influence on business outcomes. In the individual level, however, little research has investigated the impacts of a platform on consumer decision-making process. In this research, we use the heuristic-systematic model to explain how consumers establish their decision based on processing review messages on the platform. We build a research model and propose impacts of different constructs established from the systematic and heuristic processing of review messages. Survey data from a Chinese online review platform generally supports our hypotheses, except that the heuristic cue, source credibility, fails to affect consumers' behavioral intention. Based on the findings, we discuss implications for both researchers and practitioners. We further point out limitations and suggest opportunities for future research.

Keywords: Online review platforms, consumer decision-making, informational social influence, heuristic-systematic model, word-of-mouth

Introduction

The advancements of Web 2.0 technologies have greatly facilitated the proliferation of online reviews on the Internet. These reviews express consumer evaluations and critiques of products and services. They have been widely distributed among various Internet media, including retailers' websites, online discussion forums, blogs, social networking sites, and online review platforms (e.g., Lee and Youn 2009; Trusov et al. 2009). For designers of websites (Dellarocas 2003), as well as marketers (Godes et al. 2005), important problems are how to understand the impacts of online reviews, and how to leverage their impacts for marketing or business purposes.

Recent survey reports from the Pew Internet & American Life Project indicated that 81% of American online users performed research regarding products, and 71% were confident of purchasing the right product based on information gathered from the Internet (Horrigan 2008). A report from China contained results of interviews with 640 Bulletin Board System (BBS) users and bloggers (CIC 2009). It was found that 82% of these users would search for product information or evaluations on the Internet. 56.3% adopted this approach to become familiar with relevant products, and 58.7% indicated that their purchase decisions were influenced by online information. Online reviews appear to prevail as important information sources that help consumers reduce uncertainty and improve confidence on purchasing products.

Although online reviews obviously can exert influence on consumers, more important concerns are to what extent and in what way review information can influence consumers (Lee and Lee 2009). Because of the bidirectional communication capabilities of the Internet, online reviews are distributed at large scales with low costs. On the other hand, the absence of online identities behind review messages may challenge their trustworthiness (Dellarocas 2003).

In this study, we particularly focus on online reviews on third party platforms. Contrary to word-of-mouth in the offline context, an online review platform generally consists of a large number of review messages from review contributors in different levels of credibility. Since research on online review platforms is still limited, we attempt to investigate the impacts of the platform on consumer decision-making process.

According to the study from de Valck et al. (2009), the behavior of virtual community participants is usually not visible to other members in the community; therefore, informational social influence, rather than normative social influence, may serve as a better theoretical perspective to explain the impacts of the community on participants' decision-making. Informational social influence posits that people engage in obtaining information from a reference group so as to achieve evidence of reality (Deutsch and Gerard 1955). Following this perspective, we posit that online review platforms provide a community context, which can exert informational power. We propose that consumers may use an online review platform to achieve reasoned evaluations of their decision-making behavior. Hence, we identify two research questions for this study:

- 1) What kinds of informational social influence factors are important on the online review platform?
- 2) How do these factors stimulate consumers' decision-making behavior when they read review messages on the platform?

The rest of this research is structured as follows: first, we discuss the theoretical background regarding to informational social influence and dual process theories. We then apply the prominent dual process theory, heuristic-systematic model, to explain how consumers establish their decision based on processing review messages on the platform. We build our research model and examine it with survey data from a Chinese online review platform. Findings of this research are presented next, along with discussions on their theoretical and practical implications. Finally, we conclude our research by considering limitations and suggesting opportunities for future research.

Theoretical Development

Informational Social Influence and Dual Process Theories

Deutsch and Gerard (1955) is one of the earliest studies that contribute to the notions of normative social influence and informational social influence. Informational social influence suggests that people are influenced by relevant others' thoughts, feelings, and behaviors, and accepting them as credible evidence of reality. Regarding to Kelman's

(1961) three social influence processes (i.e., compliance, internalization, and identification), Burnkrant and Cousineau (1975) postulated that informational social influence corresponds to the internalization process. Motivated by instrumental purposes, consumers would internalize helpful information from others to enhance their own knowledge. Early studies have presented consistent conclusions of informational social influence on consumers' product evaluations (Cohen and Golden 1972), or product quality judgments (Pincus and Waters 1977).

To explicate the internalization process of informational social influence, this study adopts dual process theories in the context of online review platforms. Dual process theories provide comprehensive discussions on how individuals process information, establish its validity assessments, and later form decision outcomes (Eagly and Chaiken 1993). Two of the most prevalent dual process theories are heuristic-systematic model (HSM) (Chaiken 1980) and elaboration likelihood model (ELM) (Petty and Cacioppo 1986). HSM and ELM provide similar mechanisms in explaining individuals' information processing strategies. Systematic processing in HSM and the central route in ELM indicate that individuals use high cognitive efforts to elaborate information. On the other hand, heuristic processing in HSM and the peripheral route in ELM posit that individuals adopt heuristic and simple decision rules to quickly form judgments. In this study, we apply HSM to explain consumers' information processing behavior on online review platforms. The choice of HSM is similar to Zhang and Watts's (2008) advocates, which suggested that HSM provides broader and appropriate explanations of individuals' information processing behavior in the context of online communities.

In the HSM literature, systematic processing indicates that "people consider all relevant pieces of information, elaborate on these pieces of information, and form a judgment based on these elaborations"; whereas heuristic information processing refers that "people consider a few informational cues—or even a single informational cue—and form a judgment based on these cues" (Todorov et al. 2002, p. 196). According to the sufficiency principle of HSM (Chen and Chaiken 1999), individuals will systematically process information when they are in situations of sufficient motivation, ability, and cognitive resources (Zhang and Watts 2008). Similarly, heuristic information processing does not occur automatically. The three necessary conditions for heuristic processing are the availability, accessibility, and applicability of knowledge (Chen and Chaiken 1999). For example, 1) the heuristic cue "experts are reliable and can be trusted" can only work when individuals already have certain knowledge or experiences about the cue (availability); 2) individuals will perceive an expert's advice as helpful when they can remember this heuristic cue at the time they make decisions (accessibility); and 3) individuals will not adopt this cue when they find that the expert has never provided correct advice on a particular judgmental task before (applicability).

In the context of online review platforms, we posit that consumers can process review messages in both systematic and heuristic manners. Given the recent proliferation of online review platforms, many consumers have adopted these platforms to make informed decisions. When in need of purchasing products, it is common for consumers to process information on a platform with sufficient motivation and cognitive resources. Consumers can also develop relevant knowledge during their frequent usage behavior. Hence, consumers meet the requirements of systematic processing. In addition, online review platforms generally provide necessary conditions for consumers to process review messages heuristically. For example, online review platforms can establish registration systems and assign review contributors to certain levels of rankings based on their contribution quantity and quality. Therefore, consumers can apply this cue as an indication to recognize review contributors' expertise. According to prior research, a common heuristic cue is "experts can be trusted" (Chen and Chaiken 1999). Hence, consumers can make use of this cue and form quick judgments.

In previous studies, dual process theories have been proposed to understand individuals' persuasion communications and "validity seeking" behavior (Chaiken et al. 1989; Petty and Cacioppo 1986). In the information systems (IS) literature, researchers have begun to apply these theories to understand how individuals' information processing behavior can lead to their decision outcomes (e.g., Cheung et al. 2009; Sussman and Siegal 2003; Zhang and Watts 2008). In the study of Sussman and Siegal (2003), they initially proposed concepts of information usefulness and information adoption. Information usefulness captures individuals' validity assessments of an e-mail message. Information adoption addresses the internalization phase of knowledge transfer from the e-mail message to the mind of the e-mail recipient. It is operationalized as the extent to which individuals will follow or act on the message (Sussman and Siegal 2003). In a following study, Zhang and Watts extended the concept of information adoption and defined it as "the extent to which people accept content that they are presented with as meaningful, after assessing its validity" (2008, p. 75). Information adoption is then operationalized as the effectiveness that a message can contribute to individuals' decision or problem-solving (Zhang and Watts 2003; Zhang and Watts 2008). In this study, we attempt to extend the understanding of impacts of information processing behavior on consumer decision-

making process. We focus on consumers' behavioral intention after they assess the validity of review messages on online review platforms.

Information Adoption and Behavioral Intention

In the context of online review platforms, we postulate that information adoption may not fully capture the impacts of online reviews on consumers' purchase behavior. First, the platform usually consists of many online reviews. However, prior research on information adoption focuses on the acceptance of one piece of information (e.g., Cheung et al. 2009; Sussman and Siegal 2003; Zhang and Watts 2008). In this study, it may be difficult to explain how many review messages consumers have adopted. Second, some online reviews may provide advice and recommendations about their purchase behavior, whereas some may just provide simple or objective descriptions of products (Park et al. 2007). Since the latter kind of information may have nothing to do with consumers' purchase decision, it is unclear what the relationship between information adoption and consumers' decision-making will be.

Given these concerns, we adopt behavioral intention in the context of online review platforms. It refers to consumers' willingness to purchase a product after they process review messages on the platform. In this study, the attempt of using the dual process theory, HSM, to investigate one's behavioral intention is similar to Angst and Agarwal's (2009) proposition that individuals' exposure to messages may lead to their behavioral intention. Indeed, early research on dual process theories has suggested that information processing can affect the attitude formation or change of attitude objects (Eagly and Chaiken 1993). The objects can be the product of interest and can also be the product purchase behavior. In this study, we do not consider the impact of behavioral attitude on behavioral intention. Because we do not develop our research model through the lens of beliefs-attitude-intention frameworks (e.g., Ajzen 1991; Ajzen and Fishbein 1980), and we want to emphasize the direct impacts of consumers' information processing behavior on their behavioral intention.

Behavioral intention also differs from information adoption in the respect that the former has a restriction on the valence of review messages, while the latter does not. For instance, review messages with negative, but helpful advice may be associated with a high level of information adoption. In contrast, these negative review messages are likely to lead to a low level of behavioral intention.

Impacts of Systematic and Heuristic Processing

When consumers adopt systematic and heuristic processing to online reviews on the platform, they can form perceptions regarding to the cues they have processed. The two widely studied perceptions are argument quality for systematic processing and source credibility for heuristic processing (Zhang and Watts 2008). In this study, we discriminate the understandings of argument quality into two separate constructs: perceived informativeness and argument strength. Apart from considering source credibility, we further consider another heuristic cue: perceived quantity of reviews in the context of online review platforms.

Informativeness and Persuasiveness

Argument quality and argument strength are two, sometimes exchangeable, constructs resulting from individuals' systematic information processing. Literally, argument quality may emphasize the quality of received information, whereas argument strength may focus on the persuasive strength of received information. However, early experimental studies on information processing do not explicitly discriminate against them and use them to address the persuasive impact of received information (e.g., Johnson and Eagly 1989; Petty and Cacioppo 1984; Zhang 1996).

Recently, some researchers have begun to disclose some inconsistent understandings of these constructs (Angst and Agarwal 2009). In some research, argument quality measures the extent to which received information can persuade a person to believe something or to perform a behavior (using words like "persuasive" or "convincing") (Cheung et al. 2009). On the other hand, some researchers operationalize argument quality to capture the quality dimensions of received information (using words like "complete," "accurate," or "timely") (Sussman and Siegal 2003; Zhang and Watts 2008).

In this study, we posit that there are two different dimensions of received information. For example, online reviews with complete and accurate information about the characteristics of a digital camera may have high quality of review

information. However, these online reviews may not be enough to persuade consumers to buy the camera. In the literature of advertising, researchers have indicated the information-persuasion dichotomy of advertisements (Hunt 1976; Santilli 1983). Rosen and Olshavsky (1987) postulated that it is important to recognize two different kinds of information for informational social influence: attribute-value information and recommendations. Similarly, Park et al. (2007) suggested that online reviews can function as an informant role and also as a recommender role when they affect consumers' decision behavior.

To recognize their distinctions, in this study, we adopt perceived informativeness to capture the quality aspect of online reviews (Ducoffe 1996) and use argument strength to represent the dimension of persuasiveness (Zhang 1996). We propose that both perceived informativeness and argument strength are important predictors of consumers' behavioral intention. Prior research on advertising has found that informative advertisements may lead to consumers' purchase behavior (Ducoffe 1996; Mitchell and Olson 1981). Research on dual process theories also concludes that persuasive arguments can contribute to favorable decision outcomes (Angst and Agarwal 2009; Eagly and Chaiken 1993). Following the previous discussion on the valence restriction of review messages, we focus on perceived informativeness and argument strength of positive review messages in the context of online review platforms. If a consumer systematically processes these online reviews about a particular product and perceives them as informative and persuasive, then the consumer is likely to purchase the product. The following two hypotheses are provided:

H1: Perceived informativeness of positive reviews on the platform is positively associated with behavioral intention

H2: Argument strength of positive reviews on the platform is positively associated with behavioral intention

More than One Heuristic Cue

Prior research defines source credibility as review recipients' perception about the credibility of the source of a review message, instead of the message itself (Chaiken 1980). Source credibility captures the expertise and trustworthiness of the review source (Petty and Cacioppo 1986). It has been recognized as an important heuristic cue in the literature of dual process theories (Chaiken and Maheswaran 1994; Eagly and Chaiken 1993; Petty et al. 1995).

Researchers have suggested that a high level of source credibility improves the perceived usefulness (Sussman and Siegal 2003), the credibility (Cheung et al. 2009), and the information adoption of a review message (Zhang and Watts 2008). In the context of this study, we posit that consumers can adopt this heuristic cue to form behavioral decisions. Online review platforms commonly provide information about review contributors (e.g., profile pictures, nicknames, and rankings). Hence, consumers may find it easy to establish a general perception of source credibility of review messages. Similarly, we focus on source credibility of positive review messages on the platform. When a consumer generally perceives positive review contributors as credible, the consumer is more likely to perform purchase behavior. The following hypothesis is provided:

H3: Source credibility of positive reviews on the platform is positively associated with behavioral intention

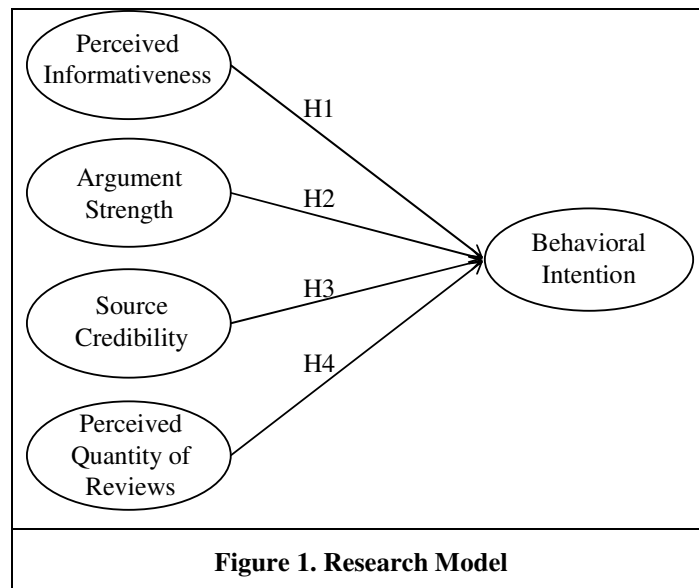
The additional heuristic cue we consider in this study is perceived quantity of reviews. We believe that the volume of review messages is probably one of the most important distinctions between online review platforms and traditional word-of-mouth in social reference groups. However, previous empirical studies only adopt dual process theories to investigate how one piece of review information can affect individuals' decision-making (e.g., Cheung et al. 2009; Sussman and Siegal 2003; Zhang and Watts 2008).

In this study, we attempt to extend the emphasis on the volume of online reviews. We interpret it as another heuristic cue. Early studies have indicated that the heuristic cue "length implies strength" can influence individuals' judgments (Chen and Chaiken 1999). In the context of online review platforms, indicators are generally provided to inform consumers the number of review messages about a given product. Thus, consumers can easily form a perception of review quantity and heuristically recognize the popularity of this product on the platform. According to the study of Park et al. (2007), perceived popularity of products would have a significant impact on individuals' decision-making. Similarly, Duan et al. (2009) adopted the informational cascades theory and suggested that widely downloaded software products are likely to be downloaded by new adopters. Therefore, we propose that perceived quantity of reviews may have a positive impact on consumers' behavioral intention.

Note that no valence restriction is placed on perceived quantity of reviews. There are several reasons. First, previous studies on the volume of online reviews emphasize the impact of their total number (e.g., Chevalier and Mayzlin 2006; Duan et al. 2008). Second, Hu et al. (2009) examined the J-shaped distribution of online product reviews, which is an asymmetric bimodal distribution illustrating high ratings for most of the products. Their finding indicates that most of the online reviews are positive. It is probably because of two biases: purchasing bias (products with low ratings are not purchased; thus, no additional ratings are given) and under-reporting bias (consumers are more likely to provide extremely high or extremely low ratings to products). Finally, online review platforms generally provide indicators to report the overall number of review messages. It may be difficult for some platforms to identify the valence of textual reviews and to provide numerical indicators of the positive ones (just as the platform we investigated in this study, see next section). Thus, consumers may only process the quantity of all reviews and make heuristic evaluations. The following hypothesis is provided:

H4: Perceived quantity of reviews on the platform is positively associated with behavioral intention

In sum, the research model of this study can be depicted in Figure 1.



Research Method

This study involves empirical testing of concrete hypotheses. The research context is about online review platforms. To investigate the natural state of this context, we adopt the survey method to gather real field information. In particular, we test the research model based on the data collected from a Chinese online review platform: Dianping.com.

Research Site

Dianping.com was started in 2003. Initially, it attempted to adopt successful business models such as Amazon.com, Zagat.com, and Viamichelin.com in providing Chinese Internet users with restaurant reviews. In late 2008, the Chinese catering industry earned over 1460 billion dollars, showing a yearly growth rate of 15%. Based on this sizable market, Dianping.com has attracted over 3 million registered users and obtained monthly page views averaging 1,000 million (Li 2009). According to the data from Alexa.com, Dianping.com has a global traffic rank at 485th and a regional traffic rank at 82nd (in China)¹.

The sizable catering market and the prevalence of Dianping.com in China imply that it is common for consumers to have enough motivation, ability, and cognitive resources to perform systematic processing of online reviews on the

¹ The information was accessed from Alexa.com on 08/04/2010.

platform. In addition, Dianping.com provides indicators showing rankings of review contributors and the number of overall reviews about each restaurant. Thus, consumers can use these heuristic cues during their decision-making process. In sum, we believe that Dianping.com is a suitable online review platform to test our research model. Choosing a single research site can further reduce bias effects from reputations of different platforms, and also from techniques of employing the heuristic cues on different platforms.

In the context of Dianping.com, we focus on consumers' initial restaurant consumption behavior. Their behavioral decision process can be interpreted in the following situation. A consumer plans to consume in a restaurant, which s/he has never been to before. S/He logs on to Dianping.com and reads online reviews on the restaurant webpage. After reading the online reviews, s/he can make the consumption decision.

Questionnaire

We created an online survey questionnaire for this research. Some screening questions were included in the questionnaire, to ensure that respondents had recently read online reviews on Dianping.com to consider their consumption decision on a real restaurant. In addition, there should be positive online reviews about the restaurant. The measurements of constructs were adapted from English studies. Thus, the questionnaire went through the process of translation and back-translation before the data collection.

The questionnaire adopted a self-reported recall approach to collect data from respondents. Respondents were asked to recall their most recent information processing behavior on Dianping.com about which they were considering consuming in a restaurant in a few days. To minimize possible biases from poor memory recall, respondents would need to write down the name of the restaurant or give the URL of the restaurant webpage from Dianping.com. We encouraged them to read again the online reviews about the restaurant. It could help them complete the questionnaire more quickly and provide answers more accurately. The self-reported recall approach has also been adopted in previous empirical studies on the impact of online review information. For instance, Cheung et al. (2009) developed an optional question to ask respondents to provide the link of the review message. Zhang and Watts (2003) encouraged respondents to read again the actual review message for memory refreshing before they completed the questionnaire.

Measures

In this study, we adapted the measurements of constructs from prior studies (see Table 1). All items used seven-point Likert scales. We slightly modified the wording of these items to fit the context of Dianping.com.

Table 1. Measurements of Constructs		
Construct	Items	References
Perceived Informativeness	<ol style="list-style-type: none"> 1. The positive reviews provided relevant information about the restaurant 2. The positive reviews provided complete information about the restaurant 3. The positive reviews provided timely information about the restaurant 	(Ducoffe 1995; Ducoffe 1996)
Argument Strength	<ol style="list-style-type: none"> 1. The arguments of the positive reviews about the restaurant were convincing 2. The arguments of the positive reviews about the restaurant were persuasive 3. The arguments of the positive reviews about the restaurant were strong 4. The arguments of the positive reviews about the restaurant were good 	(Cheung et al. 2009; Zhang 1996)
Source Credibility	<ol style="list-style-type: none"> 1. People who left positive reviews about the restaurant were knowledgeable in evaluating restaurants (especially this restaurant) 2. People who left positive reviews about the restaurant were experts in evaluating restaurants (especially this restaurant) 3. People who left positive reviews about the restaurant were trustworthy 4. People who left positive reviews about the restaurant were reliable 	(Cheung et al. 2008; Sussman and Siegal 2003)

Perceived Quantity of Reviews	1. On Dianping.com, many people had posted reviews about the restaurant 2. The number of reviews about the restaurant is large on Dianping.com 3. The restaurant was popular on Dianping.com	(Park et al. 2007)
Behavioral Intention	1. After reading online reviews, I intended to consume in this restaurant 2. After reading online reviews, I planned to eat at this restaurant	(Pavlou and Fygenon 2006)

Pilot Study

We administrated a pilot study to collect feedback about the questionnaire. We sent invitation messages to a small and convenient sample on Dianping.com and obtained 30 responses. Based on the data, we assessed the validities of the measurements (see the measurement model section for the detailed procedure). Preliminary results suggested that the measurements of constructs had sufficient validities. In addition, we received feedback on the wording of some questions, as well as some issues about the layout of the questionnaire.

Data Collection

The final questionnaire was further improved based on feedback from the pilot study. In October 2009, we distributed URLs of this questionnaire among potential respondents. We posted invitation messages in discussion forums that were affiliated with the platform. To promote responses, incentives of 10 RMB were used for the first 150 valid completions of the questionnaire. In around one month, 193 people filled out the questionnaire. To ensure the quality of the collected data, some responses were not considered in this study. The excluded respondents were those: 1) who had used the same IP address to fill out the questionnaire for more than once, 2) who had inconsistent answers in the screening questions, and 3) who kept filling the same value in most of the questions. Finally, a total of 145 responses were valid for this study.

The demographic characteristics of the respondents are listed in Table 2. As shown below, 81.4% were females and 18.6% were males. Most of the respondents aged from 19 to 35. 95.2% had university or above degrees. 66.9% had incomes of above 2000 RMB per month.

Table 2. Demographic Characteristics			
		Number	Frequency
Gender	Male	27	18.6%
	Female	118	81.4%
Age	Below 18	2	1.4%
	19-25	85	58.6%
	26-35	58	40.0%
	Above 36	0	0.0%
Education	Junior high school	0	0.0%
	Senior high school	7	4.8%
	University	118	81.4%
	Postgraduate or above	20	13.8%
Income	Below 999	21	14.5%
	1000-1999	27	18.6%
	2000-2999	26	17.9%
	3000-3999	35	24.1%
	4000-4999	15	10.3%

	Above 5000	21	14.5%
During the past 14 days, how many restaurants have you been to after you read reviews on Dianping.com?	0	5	3.4%
	1-3	88	60.7%
	4-6	32	22.1%
	7-9	9	6.2%
	10-12	6	4.1%
	13-15	3	2.1%
	Above 16	2	1.4%
During the past 14 days, how many times have you visited Dianping.com to seek reviews about restaurants?	0	0	0.0%
	1-3	30	20.7%
	4-6	38	26.2%
	7-9	24	16.6%
	10-12	14	9.7%
	13-15	6	4.1%
	Above 16	33	22.8%

Data Analysis

In this study, we used Partial Least Squares (PLS) to analyze the research model. PLS is a robust and frequently adopted technique in the IS literature (Ahuja and Thatcher 2005; Gefen and Straub 1997; Venkatesh and Morris 2000). It is a component-based structural equation modeling approach that requires a relatively small sample size with no restriction on normal distribution (Chin et al. 2003). Given that this research is also theoretically developmental in nature, it is suitable to use PLS for the data analysis of the study. Meanwhile, researchers have pointed out the importance of sufficient sample size when using the PLS method (Marcoulides and Saunders 2006). We recognized these needs and chose PLS in this study. The two-step analytical procedure was followed: measurement model and structural model (Hair et al. 1998).

Measurement Model

To validate the measurement model, we assessed the convergent validity and discriminant validity. Convergent validity suggests that items of the same construct should be closely related to each other, as they are theoretically related. Composite Reliability (CR) and Average Variance Extracted (AVE) are two indicators for measuring convergent validity. It is considered acceptable when CR values are higher than 0.7, and AVE values are higher than 0.5 (Fornell and Larcker 1981). As shown in Table 3, the CR values of all constructs ranged from 0.876 to 0.946, and the AVE values ranged from 0.702 to 0.898. All items of constructs had significant path loadings at $p < 0.01$. It further indicated that convergent validity of measurements was sufficient in this study.

Table 3. Descriptive Statistics of Constructs				
	Item	Loading	Mean	St.Dev
Perceived Informativeness (PI) CR=0.876; AVE=0.702	PI1	0.896	5.717	1.223
	PI2	0.836	5.090	1.328
	PI3	0.778	5.255	1.316
Argument Strength (AS) CR=0.927; AVE=0.762	AS1	0.904	5.455	1.207
	AS2	0.925	5.483	1.161
	AS3	0.834	5.262	1.149
	AS4	0.824	5.731	1.088

Perceived Quantity of Review (PQR) CR=0.895; AVE=0.739	PQR1	0.871	5.497	1.355
	PQR2	0.872	5.186	1.434
	PQR3	0.835	4.972	1.389
Source Credibility (SC) CR=0.927; AVE=0.760	SC1	0.869	4.890	1.259
	SC2	0.868	4.662	1.220
	SC3	0.877	4.952	1.132
	SC4	0.873	4.786	1.094
Behavioral Intention (BI) CR=0.946; AVE=0.898	BI1	0.951	5.628	1.136
	BI2	0.944	5.697	1.056

Discriminant validity describes the extent to which the measure is not a reflection of other variables. We performed two steps to test this validity (Gefen and Straub 2005). First, as shown in Table 4, confirmatory factor analysis with PLS indicated that the items had high loadings on their corresponding constructs.

	PI	AS	PQR	SC	BI
PI1	0.896	0.599	0.335	0.368	0.457
PI2	0.836	0.511	0.232	0.385	0.372
PI3	0.778	0.521	0.239	0.396	0.312
AS1	0.559	0.904	0.382	0.471	0.481
AS2	0.588	0.925	0.436	0.465	0.507
AS3	0.562	0.834	0.300	0.459	0.395
AS4	0.565	0.824	0.351	0.432	0.450
PQR1	0.336	0.377	0.871	0.199	0.372
PQR2	0.242	0.346	0.872	0.130	0.317
PQR3	0.254	0.369	0.835	0.224	0.323
SC1	0.401	0.434	0.171	0.869	0.271
SC2	0.381	0.454	0.162	0.867	0.227
SC3	0.388	0.504	0.206	0.877	0.314
SC4	0.404	0.423	0.206	0.873	0.275
BI1	0.450	0.490	0.433	0.295	0.951
BI2	0.425	0.512	0.310	0.303	0.944

Second, we performed the AVE analysis, which is indicated by low correlations between the measure of interest and the measures of other constructs that are not theoretically related. If the square roots of the AVE for each construct is greater than its correlations with other constructs, then discriminant validity is further confirmed (Fornell and Larcker 1981). As shown in Table 5, discriminant validity was also sufficient in this study.

	PI	AS	PQR	SC	BI
PI	0.838				
AS	0.651	0.873			
PQR	0.326	0.424	0.860		
SC	0.452	0.522	0.216	0.872	

BI	0.462	0.528	0.394	0.316	0.948
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Note: The bold diagonal values refer to the square roots of AVEs

Since this research adopted a self-reported survey method, it was necessary to check possible impacts from common method bias. According to the study of Podsakoff et al. (2003), Harman's single-factor test was examined. The principal component with unrotated factor solution did not extract a single factor, and no factor accounted for the majority of the variance. In advance, Liang et al. (2007) extended the studies of Podsakoff et al. (2003) and Williams et al. (2003). They applied PLS to test common method bias. Following Liang et al.'s (2007) procedure, we included a common method factor with the items of all constructs into the research model. Thus, the variance of each item was explained substantively by its principle construct, as well as by the method factor. As shown in Table 6, the substantive factor loading (R1) of each item was significant at $p < 0.01$ and was much larger than the corresponding method factor loading (R2). The method factor loadings were not significant at $p < 0.01$. In addition, the average variance explained by principal constructs ($R1^2$) was much larger than that by the method factor ($R2^2$). Therefore, common method bias was not a concern for this study.

Construct	Item	Substantive Factor Loading (R1)	$R1^2$	Method Factor Loading (R2)	$R2^2$
Perceived Informativeness (PI)	PI1	0.833**	0.694	0.054	0.003
	PI2	0.877**	0.769	-0.052	0.003
	PI3	0.808**	0.653	-0.006	0.000
Argument Strength (AS)	AS1	0.935**	0.874	-0.036	0.001
	AS2	0.900**	0.810	0.025	0.001
	AS3	0.889**	0.790	-0.050	0.003
	AS4	0.762**	0.581	0.063	0.004
Perceived Quantity of Review (PQR)	PQR1	0.830**	0.689	0.047	0.002
	PQR2	0.921**	0.848	-0.069	0.005
	PQR3	0.827**	0.684	0.024	0.001
Source Credibility (SC)	SC1	0.898**	0.806	-0.027	0.001
	SC2	0.920**	0.846	-0.046	0.002
	SC3	0.800**	0.640	0.079	0.006
	SC4	0.870**	0.757	-0.005	0.000
Behavioral Intention (BI)	BI1	0.938**	0.880	0.015	0.000
	BI2	0.957**	0.916	-0.015	0.000
Average		0.873	0.765	0.000	0.002

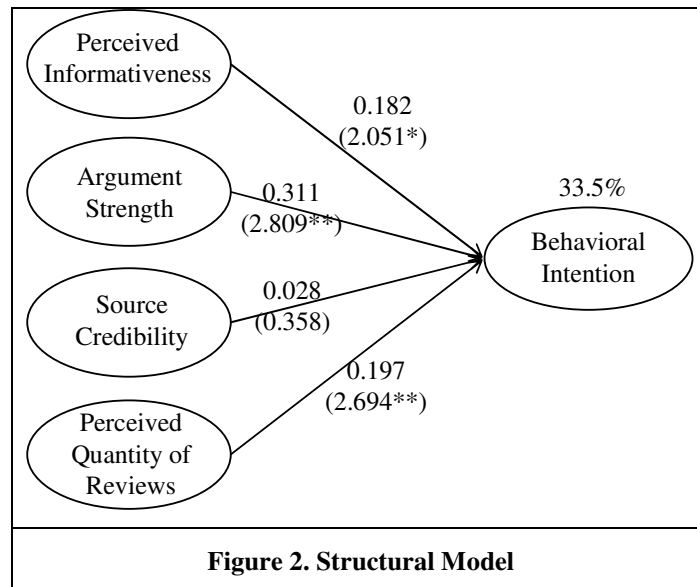
Note: ** denotes $p < 0.01$

We also examined multicollinearity of independent variables to check whether severe interdependence existed in the research model. We found that the variance inflation factors (VIF) ranged from 1.211 to 1.991, and the tolerance values ranged from 0.502 to 0.826. These results did not exceed the thresholds indicated by previous literature (Mason and Perreault 1991). That is, VIF values should be smaller than 10 and tolerance values should be larger than 0.1. The VIF and tolerance values of this study were also within the more stringent criteria (VIF < 5 and Tolerance > 0.2) indicated by Groebner et al. (2001). Hence, multicollinearity was not a serious problem for this study.

Structural Model

We initially considered the impacts of possible control variables in the research model. These control variables included past experience (i.e., about reading reviews on the platform and about consuming in a restaurant after reading reviews on the platform) (Pavlou and Fygenon 2006), and demographic variables, such as gender, age, education, and income. They were controlled on behavioral intention. The results indicated that all of them had no significant impacts. Thus, we did not consider the impacts of control variables in the following structural model.

As illustrated in Figure 2, we examined the path coefficients, associated t-value of the paths (significant paths are indicated by asterisks), and the explanatory power of constructs in the structural model. Tests of significance of all paths were based on the bootstrap resampling procedure. The results indicated that almost all hypotheses were supported, apart from the hypothesis from source credibility to behavioral intention. Argument strength was the strongest predictor to behavioral intention, followed by perceived quantity of reviews and perceived informativeness. Overall, the four independent variables explained 33.5% of variances in behavioral intention.



Note: Values in brackets are t scores of corresponding paths;

* denotes $p < 0.05$, and ** denotes $p < 0.01$.

Discussion

In this study, we adopt the prominent dual process theory, HSM, to investigate the informational social influence of online review platforms on consumers' decision behavior. We test the research model based on survey data from Dianping.com. The results indicate that perceived informativeness, argument strength, and perceived quantity of reviews are important determinants of consumers' behavioral intention. Source credibility, however, does not have a significant impact on behavioral intention.

Implications for Research

We believe that this research can contribute to the prior literature with some theoretical implications. First, we apply HSM to investigate how consumers' information processing behavior on the platform can affect their behavioral intention. The emphasis on consumers' decision-making behavior extends previous studies' discussion on information adoption in the online context (e.g., Cheung et al. 2009; Zhang and Watts 2008). This emphasis is consistent with the advocates from the study of Angst and Agarwal (2009), who adopted ELM, another dual process theory, to understand individuals' behavioral decision. Through the lens of informational social influence and dual process theories, we also believe that this research can enrich our understandings about the impacts of online reviews on consumers' decision-making process (e.g., Lee and Lee 2009; Park et al. 2007).

Second, we find evidence about the impacts of systematic processing on consumers' behavioral decision. The results imply that the content of online reviews on the platform still plays an important role in consumers' decision-making. This is similar to Pavlou and Dimoka's (2006) suggestion of the importance of textual review messages. Further, we discriminate two kinds of perceptions established from this type of information processing: perceived informativeness and argument strength. Their distinctions are consistent with Rosen and Olshavsky's (1987) postulation about two types of informational social influence (i.e., influence of attribute-value information and influence of recommendations) and Park et al.'s (2007) proposition about two functional roles of online reviews (i.e., informant role and recommender role).

Third, the impacts of heuristic processing on consumers' behavioral intention are partially supported from the survey data. Perceived quantity of reviews overwhelms source credibility and has a positive impact on behavioral intention. The insignificance of source credibility may be attributed to some possible reasons. On Dianping.com, any users can freely register and then post online reviews to restaurants. Not all users would like to leave identity-related information for other users to recognize their expertise. The anonymous property of online review contributors may affect their trustworthiness (Dellarocas 2003). In addition, although Dianping.com provides a ranking system to assign users with different levels of "contribution value", we observe that the ranking information of users with low contribution values is not displayed beside their nick names and review messages on the restaurant webpage of the platform. Hence, it may be difficult for consumers to determine the credibility level of these users. Based on dual process theories, we still believe that source credibility is an important heuristic cue for individuals to make judgments. Online review platforms may provide more indications to better represent the credibility level of review contributors. They may also use some information technologies to manipulate and increase its influence (Zhang and Watts 2008).

In previous studies, researchers have investigated the impact of review quantity on market-level outcomes (e.g., Duan et al. 2008; Godes and Mayzlin 2004; Liu 2006). In this study, we attempt to extend the discussion of review quantity to individual-level outcomes (e.g., Park et al. 2007). We further postulate perceived quantity of reviews as another important heuristic cue on online review platforms. Our finding supports its impact on consumers' behavioral intention. It is possible that there are other potential heuristic cues apart from source credibility (Zhang and Watts 2003). According to the study of Chen and Chaiken (1999), a heuristic cue should meet three necessary conditions: availability, accessibility, and applicability. We hope that our study can attract attention from researchers to extend this area and to improve the understandings about the impacts of heuristic processing on consumers' decision-making process.

Implications for Practice

We also believe that this research can contribute to practitioners with some implications. For designers of online review platforms, they may leverage the impacts of review messages through the lens of our research model. To improve the impacts of systematic processing, the platform should be careful to the content of reviews contributed by users. Low levels of informativeness and persuasiveness will be less likely to lead to consumers' purchase behavior. The platform may establish some kind of "prosecution system". Hence, users can voluntarily report any online reviews that are extremely not informative and persuasive, or with inappropriate content and advertisements.

Based on the findings from heuristic cues, the platform can make use of the effect from perceived quantity of reviews. One possible approach is to display popular products on the home page of the platform. In this regard, consumers can be attracted to products with many online reviews. To improve the impact of source credibility, as discussed before, we suggest the platform could provide effective indications and potential technical artifacts to assist consumers in recognizing the credibility of review contributors.

Findings of this research can also contribute understandings to managers of firms. As Godes et al. (2005) indicated, firms may get involved with the phenomenon of online reviews through four stages: observer, moderator, mediator, and participant. Although discussions of more aggressive stages (e.g., moderator, mediator, and participant) may be beyond the scope of this research, we believe that managers could still improve their understandings in the observer stage. We suggest that managers of firms could understand or even predict the impacts of online review platforms through the lens of our research model.

Limitations and Future Research

This research also has several limitations of which future researchers should be aware. First, we adopt the Chinese online review platform, Dianping.com, as our research site. Thus, the findings of the research model may be influenced by some contextual factors, such as the eating habits of Chinese users and gender preferences. In addition, prior studies have pointed out that the impacts of online reviews may differ for product types, such as quality and preference goods (Lee and Lee 2009), or search and experience goods (Park and Lee 2008). The impacts of online reviews on online product purchase and offline product purchase may be different as well. Accordingly, future studies should be careful in applying findings of this study to online review platforms dealing with different products and contexts.

Second, the valence of online reviews on the platform may affect consumers' behavioral decisions. Prior literature has indicated that asymmetric effects may exist for positive and negative online reviews. For instance, Park and Lee (2008) postulated that negative reviews may have stronger effects than positive ones. In other words, although a restaurant webpage may have a small amount of negative online reviews, individuals may be still less likely to consume in the restaurant. Hence, future research could extend this study by considering possible impacts of negative online reviews in the model.

Third, this study does not consider the effects from possible moderators, such as review recipients' expertise and involvement (e.g., Sussman and Siegal 2003), or disconfirming information and focused search (Zhang and Watts 2008). It is possible that they may moderate the impacts of systematic and heuristic processing in this research. Note that prior studies propose their moderating effects under the condition of processing only one piece of information. On online review platforms, however, consumers may need to process many review messages before making their decision. Thus, future research may need to propose the impacts of moderators carefully in the context of online review platforms.

Finally, the four independent variables account for only 33.5% of variances in behavioral intention. It indicates that some other important predictors may be missing in this study. Prior research indicates that consumers' familiarity with a firm may affect their searching behavior for online reviews and may further influence their patronage intention (Chatterjee 2001). Thus, in the context of this research, familiarity with a restaurant may have impacts on consumers' usage of Dianping.com and their restaurant consumption behavior. It is also possible that consumers may access other sources of information aside from reading online reviews on Dianping.com. These information sources may include search engines, other online review platforms, blogs, magazines, or traditional word-of-mouth from their social reference groups. Therefore, future researchers may incorporate other possible factors into the model and enrich understandings about the impacts of online reviews on the platform.

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