THREE STUDIES ON INTERACTIVE AND SOCIAL E-COMMERCE: EMPOWERING CONSUMERS AND BUSINESSES

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SUMMARY

Internet technologies nowadays have provided great opportunities to improve businesses'
online presence, create more values to consumers online, and increase businesses'
revenues through more effective online marketing. In this thesis, two themes of Internet
technologies and applications that are particularly important to e-commerce are explored.
One is multimedia and virtual reality (VR) technologies that help improve Web interface
and experience, and the other is social applications based on user-generated content
(UGC) that make the Web a much richer informational and social space. The thesis
consists of three empirical studies: Study One explores multimedia-based online product
experiences, and Study Two and Three focus on product search and evaluation on social
product search and review platforms.

Particularly, Study One (Chapter 2) identifies the research gaps in the literature of
multimedia-based product presentations and interaction design, and proposes a new
interaction design concept. An experiment is conducted to investigate three different
product presentations, one passive and two interactive formats. The study focuses on the
impacts of online presentations on users' cross-channel behavior, which is a theoretically
new and practically important aspect rarely studied before. The findings reveal a non-
linear effect of interactivity design and a moderating role of users' domain knowledge.

Study Two (Chapter 3) seeks to gain more insights into how the increasingly
prevalent user-driven designs and social features on e-commerce websites create values
for consumers. It focuses on users' online product search and decision making in the
social context and how it is shaped by different types of social search mechanisms.

Experimental websites using real data from a large social-network-based product-search website are constructed. The experiment findings reveal the individual and joint impacts of two distinct social search mechanisms on users' diagnostic and serendipitous discovery of products.

Study Three (Chapter 4) continues to look at the social commerce context but focuses on how businesses can make use of and derive value from user-generated content. Particularly, marketing through user-generated content in a rich information environment presents an interesting research context that has seldom been examined. This study investigates the persuasive effects of a controversial marketing vehicle based on user-generated product review. The findings from a series of four experiments suggest an interesting interplay among the content of the marketing review, its congruence with the social information context, and the heterogeneity of opinions in the social information context itself.

Overall, Study One develops a better understanding on the use of multimedia-based interactive technologies for businesses to promote products, and Study Two and Three reveal the value of social applications and social information for both consumers and businesses. Contributions and implications of the studies are summarized and directions for future work are also discussed (Chapter 5).

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CHAPTER 1 INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

1.1.1 E-commerce Technologies and Applications: Multimedia and Social Media

Internet technologies have changed the way businesses operate nowadays. Through various Web technologies and applications, businesses now have great opportunities to improve their online presence, provide more values to consumers, and increase revenues through more effective marketing. With the current development of e-commerce, two themes of Internet technologies and applications are particularly evident.

On the one hand, Web-based stores are increasingly adopting state-of-the-art technologies to attract the fickle and selective attention of consumers. Toward this end, multimedia and virtual reality (VR) technologies that provide users with realistic, interactive computer environments have been increasingly popular (Li et al. 2001l; Suh and Lee 2005). With the assistance of such technologies, users can experience products virtually by examining and manipulating the visual images, functions, and features of products in a variety of ways (Jiang and Benbasat 2007a; Smith et al. 2009).

On the other hand, online applications relying on user-generated content such as blogs, wikis, product review platforms, and social networking sites are becoming an essential part of the Web landscape (Kaplan and Haenlein 2010; Parameswaran and Whinston 2007b). This leads to the emergence of the next generation Web (Parameswaran and Whinston 2007a), also known as Web 2.0 or the "social Web"

(Bernoff and Li 2008). Accordingly, e-commerce has been drifting towards online social commerce, which involves using social media that supports social interaction and user contributions to assist online product search and evaluation.

Both themes have attracted an increasing amount of research in recent years. However, problems still exist in terms of how to smartly make use of these technologies to create value for consumers and for businesses as well as what are the unique values generated by specific applications. The three studies in this thesis thus identify the current gaps in studying the use of multimedia technologies and social media in e-commerce. Particular attention has been paid to multimedia-based product presentations on Business-to-Consumer (B2C) websites (Study One) as well as product information and connectivity mechanisms based on user-generated content on social product-search (SPS) platforms (Study Two and Study Three). The three studies empirically investigate how these new technologies and applications have changed businesses' capabilities of marketing products and consumers' online informational experience.

1.1.2 Multimedia Product Presentations: Reviews and Problems

As more and more businesses incorporate online operations, online product exposure is becoming essential to the success of newly launched products. Accordingly, firms have been pursuing and developing better product presentations using multimedia and VR technologies to attract more potential consumers to the products. For example, technologies now enable firms to portray product dynamically and continuously in video clips, with realistic visual and sound effects (e.g., www.mbusa.com; www.honda.com). Interactive technologies further allow users to use their mice and keyboards to rotate and view products and manipulate various functions directly on the virtual products (e.g.,

www.sonyerricson.com; www.timex.com). This is an even more "realistic" form that let consumers "feel, touch, and try" products online, called *virtual product experience* (VPE; Jiang and Benbasat 2005).

Research has revealed that online product presentations incorporating motion and interactivity design are generally superior to the traditional static images in terms of users' product learning and online experience (Jiang and Benbasat 2005). However, there is a conflict in empirical findings regarding the relative advantage of a highly interactive design and non-interactive video-based design. While some studies have observed that interactivity in product presentations can foster highly positive user evaluation of the online experience (e.g., Fiore et al. 2005; Schlosser 2003), others find that in certain aspects presentations incorporating highly interactive designs (e.g., VPEs) do not necessarily perform better than those passive ones (e.g., video) (e.g., Jiang and Benbasat 2007a; Klein 2003). Hence, it seems that the design of online interactivity deserves further attention since interactive designs are usually costly to develop, and if these designs do not actually outperform others, then such investment cannot be well justified. Unfortunately, extant research has seldom considered design forms other than the non-interactive ones and the highly interactive ones.

Also, current research has mainly investigated how the online presentations influence users' online product learning (e.g., Jiang and Benbasat 2007a; Suh and Lee 2005), product evaluations (Li et al. 2001), and evaluations of the online store (Fiore et al. 2005; Jiang and Benbasat 2007b). However, considering the businesses' efforts in creating multiple channels of product sales and the consumers' mixed online and offline shopping activities (Arbesman 2010; eMarketer 2008; Forrester Research 2004, 2006;

Leggatt 2007), the investigation of the impacts of online product presentations should not

be confined within the *online* context only. Indeed, it is reported that the majority of

consumers nowadays are cross-channel shoppers. When new products are launched, they

tend to research online first and then turn to the offline stores to make the actual purchase

as they still prefer to actually try the products (Arbesman 2010; eMarketer 2006).

Statistics further show that Web-influenced retail store sales in US totaled $917 billion in

2009, which was more than three times greater than direct online sales

(ForresterResearch 2010). Hence, businesses would waste a lot of opportunities if they

did not make use of the online channel to stimulate cross-channel behaviors. Accordingly,

research on online product exposure should also pay attention to how the Web presence

influences consumers' subsequent offline product experience, thus facilitating the overall

shopping circle.

Hence, Study One explores different forms of presentation designs and reveals a

non-linear effect of online product interactivity on users' cross-channel behavior. The

purpose is to shed light on possible new design methods based on the current multimedia

technologies, and propose solutions to specific problems identified.

1.1.3 Social Product Search and Review Platforms: Reviews and Problems

In recent years, Web is no longer a media where firms solely design and control the

provision of product information or experience to users. The newly-introduced IT tools

and applications have allowed users to be more involved in what information is available

to them and to connect with other Web users, thus making online *social* commerce

possible. The practical applications of social commerce can take several forms, e.g.,

when users contribute product reviews and access reviews posted by their peers (Chen

and Xie 2005; Li and Hitt 2008; Mudambi and Schuff 2010), when they bookmark or categorize products using their own descriptors which then become search paths of other users (Ames and Naaman 2007; Golder and Huberman 2006), or when they carry out shopping activities online while connected with other peers or friends (Hung et al. 2008; Zhu et al. 2010).

Accordingly, users' online product search and decision making may be strongly reshaped by the development and adoption of social commerce. As noted by Agarwal et al. (2008, p250): "there is a need for future research to investigate the sociotechnical designs that help digitally-enabled networks better achieve the purpose of their members." Study Two and Three of the thesis thus focus on user-driven design and social participation on e-commerce platforms. Particular attention is paid to one type of social commerce platform, which is labeled *social product-search* (SPS) websites. These website allow individuals to share their opinions and interests about products or services and to make further use of this information to facilitate online product search, product evaluation and social network building. For example, Yelp.com allows users to search and provide reviews for restaurants, shopping malls, etc., and facilitates connections between food lovers or shopping aficionados. Flixster.com encourages users to share their favorite movies, and facilitates movie searches based on social networks. The rich presence of social members and their information contribution online thus constitute "tangible resources that provide people with the ability to do old things in new ways and to do things they could not do before" (Leonardi and Barley 2008, p161).

Given the unique characteristics of social product-search websites as compared to the traditional B2C ones, studies are needed to unveil how consumers derive value from

such experiences and what are the unique values. For example, with various sources of information in an online social environment, consumers may have different ways to search products and make decisions. They may follow specific search directions identified by other similar users to find exactly what they want, or they may trace down non-linear paths given the vast amount of information from different users, enjoying exploration in unanticipated directions (Pirolli 2007). However, research on whether and how different social features deliver unique value for product searchers has been rare. Hence, Study Two focuses on social search mechanisms on SPS websites and how they enable information seekers to make expected and unexpected product discoveries.

Indeed, social product-search websites are platforms that serve both consumers and businesses (i.e., product vendors or service providers), and the registered businesses are an important source of revenues for the platforms (e.g., through advertising or affiliation). However, current research has mainly focused on how consumers obtain information or derive values from the platforms, but rarely on the potential benefits or value for businesses, i.e., the product vendors. For example, a major and important type of social information on SPS websites is product reviews – a form of online Word-of-Mouth – which convey rich, unstructured information based on consumers' own product experience. There has been a growing literature that investigates the impacts of review ratings (Ba and Pavlou 2002), review content (Pavlou and Domika 2006), quantity of reviews (Chen and Wu 2004) and other related information on consumers' product evaluation and trust towards vendors. Most of the studies treat online product reviews as a form of unbiased information that can well inform consumers, and assume that businesses (i.e., product vendors) have no avenue to respond to the influence of these

reviews. Hence, questions remain in terms of how businesses can derive value from the user-generated information on SPS platforms. Accordingly, Study Three focuses on the creation of business capabilities in the social commerce context.

In particular, strategic usage of product reviews by businesses has been an emerging phenomenon in today's online world but little research has been done to investigate the actual effectiveness of such persuasive messages on these platforms (e.g., Dellarocas 2003; Hu et al. 2009). In fact, whether businesses can market or promote products based on a strategic use of user-generated information and whether they can achieve the marketing purpose in such a rich information environment represent interesting research avenues. Study Three thus focuses on the social mechanism of user reviews and starts the investigation by looking at a relatively explicit and ethical form of using reviews for business marketing purpose, called "sponsored review". It explores how the sponsored user review interacts with the social information context and influences consumers' product purchase intention.

Overall, Study Two and Three investigate the social information and features on social product-search platforms. The purpose is to reveal how user-generated information and related mechanisms create unique value for the consumers and also for the businesses.

1.2 RESEARCH FOCUS AND POTENTIAL CONTRIBUTIONS

This thesis explores two fast-developing trends of e-commerce technologies and applications. Particularly, Study One focuses on multimedia-based product experience on B2C e-commerce websites, and Study Two and Three focus on product search and evaluation on social product search and review platforms. By identifying what is lacking

in the current literature, this thesis investigates how to smartly use and design multimedia technologies and social media applications on today's e-commerce websites to create value for consumers and businesses.

1.2.1 B2C E-commerce: Multimedia Technologies

1.2.1.1 Study I: Consumer Enticement and Product Interactivity Design

In view of the current development of multimedia and VR technologies, Study One focuses on vivid and interactive online product presentations. It identifies and tries to fill in three research gaps in the current literature. First, while existing studies tend to treat product interactivity design as a dichotomous factor (e.g., Fiore et al. 2005; Jiang and Benbasat 2007a; Schlosser 2003), this study argues that interactivity design is actually a continuum and examines different interactivity designs. Second, while researchers have theorized how online product presentations influence users' product learning and their online experience, this study focuses on an important cross-channel impact of Web design. Third, this study investigates the role of consumers' prior knowledge in moderating the effects of online product presentations, an issue that is highly important but has not been tested in previous studies.

Particularly, this study investigates three different online product presentation formats, i.e., a non-interactive video presentation and two interactive presentations, in terms of their ability to entice users to try the product offline. Drawing on the literature on persuasive technology as well as the cognitive psychology literature on the Zeigarnik effect and consumer curiosity, this study suggests a non-linear effect of interactivity design and how such effects will differ depending on consumer segments.

1.2.2 Online Social Commerce: Product Search and Review Platforms

1.2.2.1 Study II: Product Discovery and Social Search Mechanisms

As social Web becomes an increasingly important part of daily life, user-generated information and social connections become essential components on e-commerce websites. Study Two and Three thus focus on user-driven design and the mechanisms based on social participation. Despite the heated discussions on the social Web, significant research progress on users' information behavior in such context is yet to be made. Hence, Study Two looks at a type of social commerce platform, i.e., social product-search website, and investigates how users' product search behavior is shaped by the presence of user-generated information and social search cues. In particular, it identifies two important mechanisms that facilitate product connectivity and search on SPS websites. One is product connectivity through user-generated keywords, called tags, which allows product search following endogenous, attribute-based product descriptors based on the "Wisdom of Crowd". The other is product connectivity through social connections with experienced community users, who may provide high-quality and diversified product information based on the "Wisdom of Expert". Drawing on Information Foraging Theory (Pirolli and Card 1999; Priolli 1997), this study investigates the individual and joint effects of these two distinct product search mechanisms. It reveals the unique value users can derive from social search, i.e., to make diagnostic and serendipitous discoveries, and how to derive them through the integral use of different social search mechanisms.

1.2.2.2 Study III: Consumer Persuasion and Sponsored Product Review

With an abundance of user-generated information in the online environment that facilitates consumers' product search and decision making, another interesting question is how businesses can make use of such information to market and promote their products rather than simply bearing the influence. Study Three thus concerns about the businesses' capabilities on SPS websites. For example, one of the major and important types of user-generated information on SPS websites is product reviews. In tilting the balance of power between consumers and businesses, some of the SPS platforms have allowed registered businesses to pay a service fee in order to select their favorite consumer review and feature it prominently on the review pages. This selected review is highlighted as the "sponsor's favorite", hence referred to as the sponsored review. Being consumer-generated yet also marketer's "favorite" thus makes sponsored review a controversial marketing weapon. Moreover, unlike traditional sales context which is relatively simple in terms of information availability, a sponsored review is usually associated with a rich information context with many other unbiased sources of information. Study Three thus examines the persuasive influence of such marketing mechanism and reveals an interesting interplay among the sponsored content, the congruence between the sponsored message and the social information environment, and the heterogeneity of the information environment itself.

1.2.3 Potential Contributions of the Thesis

This thesis seeks to benefit and contribute to both academic and practitioner arenas by investigating the design of multimedia-based product presentations and the value of social product information and search mechanisms to consumers and businesses.

Specifically, by addressing the research gaps proposed in the previous sections, the three studies in this thesis are expected to make the following contributions.

First, by identifying the gaps in prior research on multimedia and online interaction design, Study One proposes an interaction design concept that is intriguing and novel to IS literature. While previous studies assume a design can be either fully interactive or passive and report inconclusive evidence about the comparisons, this study proposes the unique value of a smart but partial interactivity design. Also, it looks at how to leverage online product interaction design to influence consumers' actual behavior offline, which is both theoretically novel and practically important. In addition, while studies on other online decision tools have long recognized the important role of users' existing knowledge, this study is the first to show this role in the effects of multimedia-based product presentation design. It also makes significant theoretical contributions by extending a well-known theory in cognitive psychology to the new context of online interactivity design, and enhances it by proposing an important facilitating design factor and a boundary condition.

On the other hand, as social applications become increasingly popular in various aspects of life nowadays, social features are emerging on e-commerce platforms too. Through collaborating with one of the largest social-network-based product search websites in China, Study Two investigates how specific social features shape consumers' online product search based on real data of products, users, and user-generated information. Specifically, it provides a better understanding of product search behavior in social commerce environment based on Information Foraging Theory, and extends the theory by considering different types of search mechanisms. In addition, while prior

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information search and retrieval studies have put much emphasis on relevance and convergence, this study advocates a new and important aspect of search performance, i.e., serendipity, and shows how to achieve it based on an integral use of social search cues.

Rather than revealing the value of social features in enriching consumers' informational experience online, Study Three discovers the potential of businesses' marketing capabilities based on social information. It reviews traditional research in consumer persuasion, attribution process, and judgment under uncertainty, and extends this stream of research to a more complicated context. This is a context where marketers can promote themselves through actual consumer-generated information and where various sources of information coexist with the marketing message. The study provides a thorough understanding of designing marketing message in an online social context, and identifies important characteristics of the social information environment that may influence consumers' response to user-generated persuasive information.

Practically, this thesis is also expected to provide important insights into the design of multimedia-based product interaction and user-generated information.

First, by investigating different forms of online product interactivity designs, Study One provides important insights into how to smartly design interactive technology to achieve the intended effect. It suggests that the most complex and costly technology may not necessarily entail the most desired results and it is important to understand user psychology before designing "persuasive technology".

By examining users' product search behavior on a rich social platform, Study Two provides guidance on how to organize and exploit the potential of online social

network and large-scale user-generated information. It also reveals an interesting role of experienced users in the community based on their social embeddedness and modeling role. Overall, it emphasizes the importance to understand the unique capability of different social mechanisms and their complementarities.

By exploring the persuasive effects of sponsored user review, Study Three directs businesses' attention to how to make use of user-generated information for marketing purpose in an ethical way. Given the rich social information on SPS platforms, it suggests that businesses should bear in mind the mechanism of "adaptive selling" (e.g., Sujan 1986), i.e., to adopt the appropriate consumer endorsement according to their social information environment.

Overall, this thesis is expected to provide intriguing implications and provoke new thoughts on the use of multimedia technology and social applications in e-commerce.

1.3 THESIS ORGANIZATION

The opening chapter has provided an overview of the study context and the general motivations based on the current research gaps. It highlights the importance of the multimedia and social media applications for e-commerce, and raises the research questions that will be addressed in the studies as well as the potential contributions. The subsequent chapters of the thesis are organized as follows.

Chapter 2 describes Study One in detail. It first reviews the literature on e-commerce product presentations and interaction design and identifies the specific gaps in the literature. It then introduces a new design concept and compares the impacts of three different presentation designs along the interactivity spectrum. A 3×2 experiment is

conducted to test the proposed hypotheses. Discussions and implications are then reported.

Chapter 3 describes Study Two in detail. It first reviews the literature on information foraging in social context and then presents the hypotheses on the individual and joint impacts of two social search mechanisms on users' product search process. A 3×2 experiment is conducted to test the hypotheses. Discussions and implications are then reported.

Chapter 4 describes Study Three in detail. It first reviews the traditional literature on the Salience Effect and Attribution Theory, and proposes the potential marketing impacts of sponsored product review. It then reviews further literature on Attribution Theory and judgment under uncertainty, and proposes the interaction effects between the sponsored review and the social information context. A series of four experiments are conducted to test the predictions. Discussions and implications are then reported.

Chapter 5 concludes this thesis by summarizing the findings and implications of the three studies, followed by a projection of possible future research directions.

CHAPTER 2 STUDY I: ENTICING CONSUMERS THROUGH ONLINE PRODUCT INTERACTIVITY DESIGN

2.1 INTRODUCTION

Many businesses that have online operations are concerned about how to display and promote their new products online and how the online product experience influences their site visitors. They have employed various forms of product presentations on the websites to attract consumers to their products. Particularly, besides the traditional ways of displaying products online using text and pictures, many websites have started to use more engaging multimedia features to enrich product presentations (Coyle and Thorson 2001; Suh and Lee 2005). One example is www.landroverusa.com, which uses video clips to display cars in motion. A video's temporal visual cues and associated sound effects often depict the product in a more vivid way (e.g., Miller and Marks 1997). Furthermore, www.sony-ericsson.com allows users to use their mouse or keyboard to rotate and view a virtual cell phone as well as to try out its various functionalities. This type of online experience which aims at simulating customers' feel, touch, and trial of products is termed *virtual product experience* (*VPE*) (Jiang and Benbasat 2004). As users are often aroused and attentive during an active and explorative process, VPE usually leads to a high level of active learning, enjoyment, and fulfillment during users' online product experience (e.g., Jiang and Benbasat 2007a; Li et al. 2003).

The design and impacts of online presentations of products have attracted a lot of research in recent years. Studies have mainly focused on how different presentations influence users' online product learning (e.g., Jiang and Benbasat 2007a; Suh and Lee

2005), product evaluations (Li et al. 2001), and evaluations of the online store (Fiore et al. 2005; Jiang and Benbasat 2007b). Findings have shown that presentations incorporating motion and interactivity are generally superior to static images in terms of users' product learning and their online experience (e.g., Jiang and Benbasat 2004). However, the comparison between VPE and non-interactive video designs has been inconclusive. Particularly, some studies have observed that interactivity in a product presentation can foster highly positive user evaluation of the online experience (e.g., Fiore et al. 2005; Schlosser 2003), whereas others find that in certain aspects presentations incorporating highly interactive designs (e.g., VPEs) do not necessarily perform better than those passive ones (e.g., video) (e.g., Jiang and Benbasat 2007a; Klein 2003). A plausible reason is that while a certain amount of interactivity is desired, a high level of user interactions usually requires a lot of efforts from users and may dilute the novelty and interest initially generated by the interactive features. Hence, it seems that the design of online interactivity should deserve further attention since interactive designs are usually costly to develop, and if these designs do not actually outperform others, then such investment cannot be well justified. Unfortunately, extant research on online presentation designs seems to have focused on either non-interactive designs or fully interactive ones, but overlooked the potential of using interactivity in other ways.

For example, instead of simulating a continuous and sophisticated interactive process, commercial website designers are trying to incorporate limited interactivity into a passive interface such that users do not get a complete interactive experience but can be actively involved. Suppose that you are on a cell phone website where new music phones are being promoted. One presentation to introduce "disc-to-phone music transfer" feature

may let you directly act on the interface during every step of this functional process. You would first pick a disc and drag it into the drive. Next, you would click "add" to select the songs, and finally click "ok" to confirm. Alternatively, another form of presentation may start by showing a short introductory video, but at one point the video suspends and prompts you to drag a disc to a computer drive on the screen. Upon receiving your input, the presentation continues the subsequent steps of selecting and adding songs in a fluent video form again. The latter was in fact what Sony-Ericsson did when this application was first released. Apparently, these two presentation designs convey the same product information, i.e., the functional process of a particular product feature, but they differ in the extent to which user-product interaction is embedded in the presentation. The former allows the user to actively experience all the steps of the entire executing process of the function; hence it is termed *full interaction VPE*. The latter shows part of the process automatically, followed by the suspension of this automatic process and a trigger for the user to act (i.e., "dragging" in this case); the user's action then leads to subsequent automatic demonstration. Hence, this is termed *triggered interaction VPE*. In essence, full interaction VPE provides users a completely interactive experience with the virtual product, whereas triggered interaction VPE engages users by incorporating some user interactions but do not afford a complete active experience.

This study thus examines three different formats of online product presentations – namely, non-interactive video presentation, triggered interaction VPE and full interaction VPE. Different from previous studies which have mainly compared a fully interactive design to a non-interactive one, the current study includes finer manipulations of product

interactivity. The purpose is to introduce a new interaction design concept in product presentations and unveil the possible nonlinear effect of product interactivity.

Moreover, while prior studies have mainly focused on how to achieve better online product learning (e.g., Jiang and Benbasat 2007a) or flow experience online (Hoffman and Novak 1996; Rettie 2001) via product presentations, this study takes a different stance and investigates how online product presentations affect consumers' subsequent offline product experience. Specifically, it examines the effects of online product presentations on enticing consumers to try the real products *offline*, which represents an important *cross-channel* influence of website design rarely examined in prior studies. In fact, many recent evidences suggest that the majority of consumers nowadays are "cross-channel" shoppers, i.e., they tend to research online and then turn to the offline stores to make the actual purchase where they can inspect the real products (Arbesman 2010; eMarketer 2006; eMarketer 2008; ForresterResearch 2006; Leggatt 2007). For example, it is reported that over two-thirds of consumers who make an offline purchase have been exposed to the product online prior to the purchase (Byrnes 2007). Furthermore, web-influenced retail store sales in US totaled $917 billion in 2009, which was more than three times greater than direct online sales (eMarketer 2008; ForresterResearch 2010). Research has also suggested that an online product exposure preceding a physical direct experience is effective in influencing brand attitudes because of reinforced learning and engagement (Daugherty et al. 2008). Overall, online exposure of products has become a critical contact point for consumers. If designed well, it may attract more consumers to visit offline stores and even make purchase, thus facilitating the entire shopping circle. In contrast, businesses would waste a lot of opportunities if

they do not make use of the online channel to stimulate cross-channel behaviors. This study thus examines different online presentations in terms of their impacts on enticing consumers to offline product trials.

Another purpose of the current research is to investigate the role of users' knowledge in moderating the enticing effects of online product presentations. The online platform constantly features new products on the market, and users' processing of new product information is often influenced by their knowledge about similar products based on prior experiences, namely, their relevant *product-class knowledge*. Earlier studies have shown that one's prior product-class knowledge plays an important role in information acquisition (Bettman and Park 1980), information processing (Bettman 1979), and reactions to advertising (Anderson and Jolson 1980). For example, studies on various online decision tools have found that the extent to which users perceive the tools as useful and rely on them for product selection differs according to users' product category knowledge (e.g., Kamis and Davern 2004; Kramer 2007; Spiekermann 2001). In addition, cognitive motivation literature has also suggested that users' information processing capability is critical in influencing motivations and execution of goal-directed activities (Eccles and Wigfield 2002; Schunk 2000).

Overall, this study tries to fill in three gaps in the extant literature on online product presentations. First, while existing studies tend to treat product interactivity as a dichotomous design factor (e.g., Fiore et al. 2005; Jiang and Benbasat 2007a; Schlosser 2003), we argue that interactivity design is actually a continuum. We aim to shed light on possible new design methods that may solve specific problems (Benbasat and Zmud 2003; Hevner et al. 2004). Second, while many researchers have theorized how online product

presentations influence users' product learning and their online experience, this study

focuses on how to present products online to entice consumers to try the real products

offline. Such cross-channel impacts of web design is practically important and is indeed a

new theoretical perspective in the IS field. Third, this study investigates the role of

consumers' product-class knowledge in moderating the effects of online product

presentations, an issue that is highly important but has not been tested in previous studies.

The study is organized as follows. The next section presents a review of theories

and studies on persuasive technology and consumer psychology as well as their

application to the current context. Hypotheses are then proposed, followed by the report

of an experiment and the interpretation of the results. Finally, findings are summarized

and implications are discussed.

2.2 LITERATURE REVIEW

2.2.1 Persuasive Technology and Online Product Presentations

It is noted that interaction designs are, at the most fundamental level, concerned with

changing, guiding, supporting, eliciting, and controlling user behavior. In particular, the

growing field of "persuasive technology" has focused on how technology exerts

motivational and behavioral influences that may induce user actions (Fogg 2003;

Khaslavsky and Shedroff 1999; Mbakwe and Cunliffe 2003). Nowadays people are often

surrounded and influenced by persuasive technologies. For example, a "talking"

pedometer makes people keep jogging (Fogg 2009), and a cigarette counter on a cigarette

box that displays the number of cigarettes a person has consumed makes people smoke

less (Sharp et al. 2007, p197). In the context of new product launch, businesses often

employ online product presentations as a form of persuasive technology. They carefully

craft sensory, mental, or subliminal stimulation in the presentations in order to arouse

potential consumers' interest and curiosity in the featured product and prompt them to

actively explore and try it (Deighton and Grayson 1995; Hoch 2002; Hoch and Ha 1986).

Indeed, product trial is a consumer's direct experience with the product based on a

voluntary interest, hence it represents a critical and powerful step in strengthening

product attachment and forming purchase decision (Smith 1993; Wright and Lynch 1995).

Accordingly, it is worthwhile to investigate users' tendency to try the actual product as

enticed or "persuaded" by online product presentations (Maloney 1962; Swasy and

Rethans 1986; Tybout et al. 1983; Wood and Lynch 2000).

2.2.2 The Zeigarnik Effect: Incompleteness as a Source of Motivation

Studies on persuasive technology suggest that the design of an "alluring or tempting"

product experience is not simply visual or functional, but involves a promise to be

fulfilled and a connection with the users' goals and emotions (Khaslavsky and Shedroff

1999, p46). In particular, studies on motivation and cognitive psychology contend that in

order to effectively trigger users' curiosity and persuade them to pursue further activities

as intended, the stimuli should "preserve" some elements so as to trigger a "goal tension",

rather than being complete or perfect (Mantyla and Sgaramella 1997; Martin and

Davidson 1964). This idea is elaborated in the Zeigarnik effect (Green 1963; Zeigarnik

1967). In the narrow sense, the Zeigarnik effect refers to the human tendency to

remember a task that is approaching completion more indelibly than a task that has

already been completed. For example, waiters often have better memories of the orders

that are in the process of serving than those already served. In a broad sense, this theory

implies that the incompleteness of an experience creates a "psychic tension" in users and an urge to carry on the task until a sense of completion and fulfillment is obtained (Zeigarnik 1967). Such cognitive tension created by the incomplete experience does not only increase the attractiveness of the unrevealed experience, but also pushes the curiosity to a high level, making users "want" further experience and relieve the tension.

Indeed, the Zeigarnik effect was derived from the well-known Gestalt principle of closure (Wertheimer 1944; Anderson 1977), which refers to the form-forming capability of human senses (see Figure 2.1 as an illustration). While Gestalt notions suggest that human mind tends to perceive elements that are not physically present in order to complete an incomplete figure, the Zeigarnik effect proposes that such form-forming tendency is not only evident in visual contexts, but also in various other cognitive tasks (Zeigarnik 1967). Being aware that the task is left incomplete promotes users' continued task-related cognitive effort, making them retain the task in memory and motivated to conduct task-related activities until a sense of completion is obtained (Greist-Bousquet and Schiffman 1992). For example, teachers often leave the learning tasks partially incomplete when releasing students for breaks, because this incompleteness may make students maintain a questioning mind, thus yielding better retention and active learning (Van Bergen 1968). Similarly, Forster et al.'s (2005) experiment showed that if participants had not accomplished the task of finding a particular word from a random display of words, they would be faster in responding to later encounters that are semantically related to the target word as compared to those participants who had accomplished the word finding task. Overall, humans always experience thoughts and a

"resumption drive" (Marrow 1938, p11) about an experience that was once pursued but left incomplete or unfulfilled (Baumeister and Bushman 2008, p122).
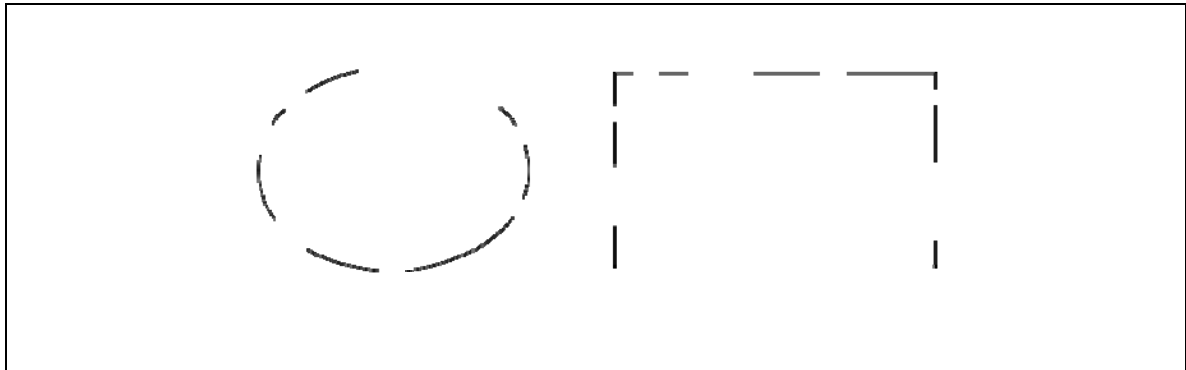
Figure 2.1: Gestalt Psychology – Law of Closure
(Although the circle and rectangle are incomplete, people still tend to perceive them as circle and rectangle because the mind may experience elements it does not perceive in order to complete a regular figure.)

Product marketers have employed the Zeigarnik effect to arouse potential consumers' attention to the advertising message and the product. For example, movie trailers or TV drama previews usually present only selected parts of the advertised shows, in order to entice the audiences to watch the entire shows. Vendors of digital goods such as software or games at times impose functional or time restrictions during the online trials, so that there is future experience to be expected for users (Yang and Teo 2007). The purpose is often to tantalize users to procure the full version. Overall, incorporating incomplete sensory cues or information in product promotion stimuli has been found to intensify viewers' curiosity (Joyner 2003, p35) and affective responses towards the product (e.g., Peracchio and Meyers-Levy 1994) due to "the thrill of unsolved problems or undeciphered riddles" (Kreitler and Kreitler 1972, p.99). Indeed, literature in consumer curiosity has defined curiosity as "a form of cognitively induced deprivation that results from the perception of a gap in one's knowledge" (Berlyne 1954), which usually

motivates exploratory behavior and knowledge acquisition. This also reflects the perspective of task incompleteness conveyed in the Zeigarnik effect, i.e., when the situation alerts consumers of the incompleteness of the current experience, curiosity and a feeling of unfulfilled needs will be triggered (Loewenstein 1994, p76; Malone 1981; Miller 1987). Consumers' proactive responses to further the exploration are then invoked so as to satisfy the needs (Greene 2001).

However, the mere presence of a gap or incompleteness does not always result in curiosity and further exploration, e.g., when users are not cued to be aware of the need or a goal to fill the gap. This is not explicitly addressed in the Zeigarnik effect but some studies term such case as "no-cue curiosity", i.e., when users are presented with an information gap but have no clue about how to interpret it and thus little desire to elaborate it further (Menon and Soman 2002). In other words, if users' voluntary thoughts and attention are not triggered to focus on the missing component, then they cannot be successfully enticed to resolve it (Greene 2001; Hoch 2002). This is also echoed in studies on persuasive technology (Khaslavsky and Shedroff 1999), which suggest that the "seductive" qualities of an experience entail intriguing users by attention-grabbing cues first and then creating promises and expectations to "hook" them into deeper discovery. Accordingly, designers often purposely embed design cues that can stimulate users' sensitivity to and awareness of the incomplete components.

In sum, an enticing experience is achieved when a consumer is aware of some gap in the current experience and form a prospect that is to be realized (Deighton and Grayson 1995; Hoch 2002; Loewenstein 1994; Menon and Soman 2002). However, users may only attend to the gap when cues are designed to direct their attention to it and thus

to enforce their intention to resolve the gap. Hence, an enticing product presentation should (1) create a product experience with certain degree of incompleteness or openness for follow-up investigation, and (2) provoke users' awareness of the missing part and thus the desire to resolve it.

2.2.3 The Moderating Role of Relevant Knowledge in the Zeigarnik Effect

Past studies have also proposed that people's tendencies to feel curious and continue a certain task may depend on their knowledge schema in the relevant domain, i.e., the extent to which they possess knowledge in the focal topic (e.g., Lowenstein 1994). In particular, the effect of incompleteness or gaps in inducing curiosity and exploration behavior tends to be more pronounced when individuals possess more relevant knowledge schema. For example, in Berlyne's (1954) experiment, asking subjects questions about more familiar animals evoked greater curiosity. Similarly, Jones (1979) had subjects rate how curious they were to see the answers to questions and also tested them on their knowledge related to the questions. He observed a significant correlation between self-evaluated knowledge of a particular item and curiosity about that item. He further concluded that subjects were more curious toward the unresolved questions about which they already had some knowledge than toward those about which they had little or no knowledge" (Jones 1979).

The reasons for such positive effect of a relevant knowledge base in the occurrence of the Zeigarnik effect are twofold. First, the information and task stimuli will appear more relevant if users have more past related experiences. The feeling of relevance thus increases users' involvement with and sensitivity to the stimuli, enabling them to pay attention to any missing component. On the contrary, individuals with less

prior experience or related knowledge may be less likely to find the stimuli immediately relevant. They may tend to process the information superficially and focus mainly on what is available rather than what is promising (Hunt 2008; Kramer 2007). Second, individuals with a higher level of relevant knowledge schema have a stronger ability to close the gap or resolve the incomplete experience; hence the goal of completion appears more meaningful and manageable to them (Loewenstein 1994; Shunk 2000). Particularly, individuals with a good knowledge base are able to encode and process the information presented efficiently (e.g., Jeffries et al. 1981) and thus are motivated to search and digest more (e.g., Brucks 1985). For example, trials of games or software may be more effective in attracting users who have higher capabilities and richer resources to process the information (Yang et al. 2006). In contrast, the lack of a related knowledge base and thus processing capability may dampen one's enthusiasm to engage in further processing (Bandura 1997). It is thus reasonable to expect that the motivational impacts of an incomplete experience will be greater for users who believe they can approach the goal of completion more effectively (e.g., Bettman and Park 1980; Messick and Sentis 1989).

To summarize the literature on the Zeigarnik effect, persuasive technology and consumer information processing, we conclude that when a stimulus triggers users' awareness of the incompleteness of an activity, users will develop a cognitive tension that entices them to keep processing related information and pursuing the activity towards completion. Moreover, such enticing effect is stronger when users possess a higher level of knowledge about similar activities.

2.3 HYPOTHESES DEVELOPMENT

This study aims to investigate the enticing power of online product presentations, i.e., the extent to which users' experience with the online presentation entices them to further try out the real product. In particular, we focus on three formats of online product presentations, i.e., non-interactive video design, full interaction VPE, and triggered interaction VPE. These three types of presentations provide users with different online product experience, which may result in different subsequent product trial behaviors. Specifically, the non-interactive format shows to the user a passive video that demonstrates the product functions, without prompting any user interaction with the virtual product. The full interaction VPE, in contrast, allows the user to freely interact with the virtual product in its full detail and at her own pace, hence providing a *complete* interactive experience. The triggered interaction VPE triggers the user to interact with the virtual product only at particular steps during a dynamic demonstration; the user's input then makes the automatic display of subsequent functional steps resumed. It thus creates an *incomplete* product interaction experience.

With the *non-interactive* presentation, the user is a passive audience throughout the process without any interaction with the virtual product. However, there is no explicit stimulus that prompts the user to long for a different and possibly better experience. In other words, without a strong trigger, a passive user may take the current situation as it is and may not be eager to have a direct and highly interactive product experience. This is similar to the case of "no-cue curiosity" in advertising, which presents a gap between what is provided and what can be expected but does not provoke the user's awareness of the link between the current experience and the pursuable future (Menon and Soman

2002). Hence, the mere presence of a gap in the current activity may not be enough to motivate the user to continue the activity if there is no cue to intensify her awareness of the gap and what she may want. Accordingly, a purely passive design that does not provoke the user's awareness of the missing product interactivity may not effectively drive her towards achieving a more interactive and holistic experience (Menon and Soman 2002).

Full interaction design, in contrast, makes everything concrete and readily available for the user's complete control. Although flexible control and complete interaction may provide the user with a highly engaging and enjoyable online experience, it is less likely to create strong tension in the user that prompts her to go beyond the current experience to satisfy a further need. Just as Wilson et al. (2005) have stated, although "knowledge makes the world more predictable", it also makes it "less delicious" and "less exciting", as there is less curiosity and less anticipated pleasure from resolving it (p5). Accordingly, full interaction may not engender an intensive desire to actively investigate the real product beyond the current virtual experience (e.g., Greene 2001, p.203; Wilson et al. 2005).

In the triggered interaction design, an on-going automatic demonstration of product functions suspends at particular moments and triggers the user's intervention. The user's action response is then followed by the subsequent automatic demonstration again. In other words, a video-based presentation is interrupted by the embedded triggers for user input. Such task interruptions change the user from a passive information processor to an active player and thus activate her sensitivity to the availability of active product experience. When this active experience is deprived after the user's action input,

an underlying "goal tension" will be strongly invoked (Mantyla and Sgaramella 1997). Hence, the user's *awareness* of the current interactive experience being incomplete is clearly heightened through the triggering of active involvement via the interaction cues and the subsequent loss of control. According to the Zeigarnik effect, such awareness of incompleteness should invoke the user's desire to continue and obtain a holistic and active product inspection. Overall, this incomplete interactive experience creates "cued curiosity", prompting the user to further gather, process, and integrate information by actively experiencing the product beyond the current presentation (Berlyne 1960; Menon and Soman 2002).

Similar comparisons are also found in other contexts. For example, in word guessing games (Litman et al. 2005; Loewenstein et al. 1992), providing the first letter of a target word or a highly associated word but not the full word represents a "cued" gap from the resolution. This boosts subjects' curiosity and willingness of knowledge acquisition, which surpasses the curiosity stemmed from either the case of knowing the target word or the case of having no clue about it at all. However, it is worthwhile noting that unlike word puzzles and many other marketing stimuli that incorporate incompleteness through hiding part of the vision or actual information, triggered interaction design is incomplete in terms of the mere *interaction* experience. The amount of factual product information conveyed is the same as with full interaction and the non-interactive design.

Overall, full interaction leaves little gap in users' current interaction experience with products, hence should be less effective in enticing users than an incomplete interactive experience as provided by triggered interaction. The non-interactive design,

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on the other hand, is expected to be less effective in enticing users than triggered interaction too because it does not provide a strong cue to stimulate users' awareness of and sensitivity to the missing interactions. Hence, triggered interaction as a "cued" incompleteness design is most likely to arouse users' motivation for subsequent active exploration. Therefore, we propose,

H1a*: triggered interaction will lead to higher willingness to conduct offline product trials than full interaction and non-interactive design.*

While users' reported willingness reveals their immediate thoughts about further inspecting the physical product upon an online exposure, their actual product trial is the behavioral expression of such reports. The actual trial behavior requires users to actually invest their time and efforts rather than a mere verbal report, which makes it an essential measure to capture users' true tendency to approach the real product. Recent studies have also noted the importance and necessity of providing actual opportunities for users to engage in related tasks in testing their curiosity and desire beyond mere self-reports (e.g., Litman et al. 2005). Indeed, some research on the Zeigarnik effect has examined people's actual behaviors and it is shown that the presence of gap or incompleteness does drive people's actual behaviors in various settings. For example, Litman et al. (2005) found that subjects were more likely to seek for further information (such as reading extra materials prepared by the experimenter) when they felt that they did not possess full knowledge than when they felt that they had all the information or little information. Reeve and Cole (1986) also showed that in a posttask free-choice period, subjects who

had not completed the experimental task were more likely to perform task-related activities than those who had completed the task. Therefore, we propose,

H1b: *triggered interaction will lead to more actual product trials than full interaction and non-interactive design.*

While we expect an incomplete stimulus such as triggered interaction will be more effective in enticing users than full interaction and non-interactive design, such effect may differ depending on users' level of relevant knowledge. As mentioned earlier, a relevant knowledge base increases the likelihood of the Zeigarnik effect to occur. In the context of online product experience, users who possess a higher level of related knowledge in the product class are more likely to feel the product experience relevant and be sensitive to the incomplete interaction with the virtual product. Such involvement with the experience and sensitivity to the interaction gap thus amplify their curiosity in the presence of an incomplete interaction experience. Users' prior experiences with many other similar products also enable them to feel more capable of obtaining mastery over the product usage through further experience (Alba and Hutchinson 1987). Hence, users with a higher level of product-class knowledge will be more likely to be motivated for further knowledge seeking through an incomplete experience that deprives them of the complete mastery over the object (Moore et al. 1986; Reardon and Moore 1996). However, users with lower related product-class knowledge may tend to follow what is available at the surface and are less sensitive to what is unrevealed when they engage in the current experience (Bettman and Park 1980). Accordingly, the relative influence of an

incomplete design on inducing product curiosity and exploration will be weaker for low knowledge users.

Overall, users' product-class knowledge is expected to moderate the influence of incomplete stimuli on users' feeling of cognitive tension and the forming of a prospect of completion. Such feeling and completion prospect will drive both their expressed willingness of product trials and their actual product trial behavior. Therefore, we propose,

H2a: The effect of triggered interaction on increasing users' willingness to conduct offline product trials is stronger with the increase of users' product-class knowledge.

H2b: The effect of triggered interaction on inducing actual product trials is stronger with the increase of users' product-class knowledge.

2.4 RESEARCH METHOD

An experiment was designed to compare the three different presentation formats. A cell phone was chosen as the target product because: (1) it is characterized by its experiential functions and operational behaviors and is thus suitable for VPE technology; and (2) it is a common product used by the majority of the population, making the task of inspecting and considering purchase of such product a realistic scenario for the subjects. In particular, the general design of the experimental cell phone was adapted from a classic Nokia model, but the specific implementation such as the execution of functions and sub-functions did not replicate any existing model on the market. A hypothetical brand and model name was then associated to this experimental cell phone so as to avoid the possible confounding effect of prior brand involvement. Hence, the experimental cell

phone was *unknown* to all the subjects. This is also in line with the intended context of this study, i.e., the promotion of newly launched products through online product presentations.

2.4.1 Experimental Website Design

Four functions of a cell phone are presented, i.e., managing calls, setting shortcut key, editing photos, and gaming. These are the typical and representative functions provided by most cell phones on today's market. Every function is demonstrated by three different presentation formats.

In the *non-interactive* condition, selected product functions can be previewed using pre-recorded videos loaded on the webpage; the whole process does not require any user participation.

In the *full interaction* condition, participants are able to launch a VPE simulator from the product homepage to sample the selected functions of the cell phone freely using the mouse. For example, the photo editing function allows users to edit a selected photo by changing its color theme, applying a photo frame to the photo, and etc. Full interaction thus demonstrates this function by allowing users to actively perform every step throughout this functional process and the cell phone reacts as a real product would by changing the display and emitting various sounds.

In the *triggered interaction* condition, product interactivity is embedded in a video-based presentation such that participants interact with a product simulator at preset triggering points, and the rest of the steps are performed automatically. For example, to demonstrate the photo editing function, steps of accessing the gallery application from

the main screen are shown in an automatic video flow. Then, the presentation *suspends*

and *prompts* the user to press the *select a photo* button. After receiving the user's input,

the presentation automatically resumes the flow by performing various editing options on

the selected photo.

The Appendix A shows the flow charts that demonstrate part of the steps of the

photo editing function using the three different presentation formats.

The factual product information (i.e., the visual characteristics and the execution

steps of functions) is kept uniform across the different presentation conditions. For

example, if users can try various photo editing options such as changing color themes and

adding frames in the full interaction condition, then the same options are also

demonstrated in the non-interactive and triggered interaction conditions. Hence, the only

difference across the conditions lies in the product interactivity design.

2.4.2 Sample Selection and Experimental Procedure

Students and staff in a major public university volunteered to participate in the

experiment. Specifically, presentation format was a factor manipulated between subjects,

whereas product-class knowledge was a measured variable. Since the operating system of

the experimental cell phone was adapted from a classic Nokia model, we measured

subjects' prior experience and knowledge about Nokia phones (on a 7-point Likert scale[1])

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[1] Three items were used to measure users' prior experience with Nokia phones, as
adapted from Kramer (2007) and Pereira (2000): (1) I am familiar with Nokia phones'
operating systems and functions; (2) I have substantial knowledge about Nokia phones in
general; (3) I can clearly recall the features of the Nokia cell phones I have used/am using.
The Cronbach's alpha is 0.92, indicating adequate reliability of this measurement scale.

and used it as their product-class knowledge[2]. The subjects were then randomly assigned to one of the three presentation conditions.

170 subjects participated in the study, with 58 subjects in full interaction condition, 57 subjects in triggered interaction condition, and 55 subjects in non-interactive condition. This ensures a sufficient statistical power of 0.8 for a medium effect size (Cohen 1988).

During the experiment, subjects were first asked to fill in a pre-experimental questionnaire about their demographic information. They were then asked to examine a cell phone product on their assigned experimental websites as if they were shopping online and deciding whether they wanted to purchase it. Then, upon inspecting all the functions and information of the product, they were asked to answer a post-experimental questionnaire which captured variables such as their willingness to try the real product. After each subject had answered all the questions, the experimenter then told him/her that he/she could have a chance to try the real product if he/she was interested; however, he/she would have to wait for 10 minutes before the cell phone could be delivered to the lab. The subject was also told that this decision of whether or not to wait for the real phone was completely voluntary. The purpose of having a waiting interval of 10 minutes

We then averaged these measurement items to form a measure of product-class knowledge for each subject.

[2] Since there are a variety of cell phone brands, models, and operating systems, we did not use the general cell phone knowledge as the product-class knowledge. For example, users who are familiar with Nokia cell phones and their operating system (i.e., the Nokia-owned Symbian OS and the user interface that runs on it, e.g., the Nokia-created S60 platform) may not be well-versed in dealing with Windows Mobile or Android systems on a Samsung phone or iOS on an iPhone. Hence, we used more specific product-class knowledge pertaining to the type of the experimental cell phone.

was to create a barrier to filter those who were not truly interested in physically experiencing the product and thus would not spend time waiting for it. Whether the subject had chosen to stay and wait for the real phone or leave immediately was recorded as the measure of actual product trial. This way of measuring the actual behavior was based on the approach used by Reeve and Cole's (1986), who gave subjects a free-choice period during the experiment and observed whether the subjects chose to re-engage in the previous incomplete task or other activities during this period. Hence, we believe the inclusion of a waiting period to capture subjects' true behavioral choice is effective and accurate.

However, since the experimental product was a unique model designed solely for the experimental purpose, we did not actually have the physical phone for subjects to try. Hence, after the 10-minute waiting period, we apologized to the subject that the product could not be delivered in time due to an unresolved technical problem[3]. The subjects were then dismissed from the experiment.

Each subject was paid $10 for the participation and was told not to reveal the experiment content to other students or staff.

2.4.3 Subject Background Information

Both the students and staff subjects were recruited from a public university. They were from 6 academic faculties/schools (19 departments) and 7 administration offices, representing very diverse backgrounds. Among them, 58% were female. The age of the

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[3] After all the data collection is completed, we also emailed all the subjects who chose to wait for the real products, informing them about the nature of the experimental product as well as the research purpose of this experimental procedure.

subjects ranged from 18 to 51. Across the three presentation conditions, there was no significant difference in gender and age distribution, subjects' general Internet experience, or their general interest in exploring cell phones.

2.5 DATA ANALYSIS AND RESULTS

2.5.1 Manipulation Check and Instrument Validity

This study employs three presentation designs with different levels of interactivity to examine the effects of incomplete interactive product experience. To check our manipulations, we first measured subjects' perceived interactivity of the presentations. The results show that full interaction (Mean = 5.59) is perceived to be more interactive than triggered interaction (Mean = 5.05) (p=.05) and the non-interactive format (Mean = 3.87) (p<.001), and that triggered interaction is perceived to be more interactive than the non-interactive format (p<.001). We also measured the extent to which subjects felt like there was a lack of complete product experience online. The results show that subjects in triggered interaction condition rated the highest (Mean = 5.2) as compared to those in full interaction condition (Mean= 4.7) and non-interactive condition (Mean= 4.8). This indicates that full interaction, as a highly interactive design, made subjects feel that the online product experience as more sufficient and complete than triggered interaction. A non-interactive video design did not significantly raise users' feeling of insufficiency either as compared to triggered interaction. Hence, the manipulation check is successful.

The measurement items for users' willingness to conduct offline product trial are adapted from prior marketing studies (e.g., Maloney 1962; Menon and Soman 2002). Four items are used: (1) The product presentation makes me want to know more about

the product by trying the real one; (2) I am interested in trying the real product; (3) I am enticed to explore functions of the actual phone; and (4) I am curious about playing with the real phone. The Cronbach's alpha is 0.92, indicating adequate reliability of the measurement. The correlation between willingness to try the product and actual trial is 0.3.

2.5.2 Results on Willingness to Conduct Offline Product Trial

Table 2.2 presents the mean and standard deviation of users' willingness to conduct offline product trial in the different presentation conditions. ANOVA was conducted on this dependent variable, with presentation format as the fixed factor and product-class knowledge as the covariate. There is a marginally significant main effect of presentation formats (F (2, 164) = 2.8, p=.06), hence H1a is moderately supported. The interaction effect between presentation formats and relevant product-class knowledge is significant (F (2, 164) = 3.97, p<.05) (See Table 2.1), hence H2a is supported. In order to clarify the nature of this interaction, we performed a spotlight analysis at one standard deviation above (i.e., high) and one standard deviation below (i.e., low) the mean of product-class knowledge (following Aiken and West 1991; Fitzsimons 2008; Irwin and McClelland 2001). Specifically, we test the simple effects of presentation formats for subjects with relatively high and low product-class knowledge based on the global influence of presentation formats and product-class knowledge. The results show that for subjects with high product-class knowledge, triggered interaction leads to significantly higher willingness to conduct offline product trial than both full interaction (beta= .49, t=2.86; p<.01) and non-interactive condition (beta=.47, t=2.93; p<.01). There is no difference between non-interactive and full interaction conditions (beta=.-.11, t=-.33; p>.05). For

subjects with low product-class knowledge, however, triggered interaction does not differ

from either full interaction (beta = -.14, t=-.88; p>.05) or non-interactive presentation

(beta =.24, t=1.56; p>.05). The interaction plot is presented in Figure 2.2(a).

Table 2.1: Main and Interaction Effects on Willingness to Try the Product				
Source	**df**	**Mean Square**	**F**	**Sig.**
Presentation	2	4.18	2.80	.06
Product-class knowledge	1	1.06	.71	.40
Presentation * Knowledge	2	5.93	3.97	.02
Error	164	1.50		

Table 2.2: Means and Standard Deviations of Willingness to Try the Product and Actual Product Trial			
	No Interaction	Triggered Interaction	Full Interaction
Willingness to Try	4.52 (1.14)	5.18 (1.22)	4.84 (1.35)
Actual Trial Rate	44% (0.50)	56% (0.50)	41% (0.50)

(a) Willingness to Try the Product

(b) Percentage of Actual Product Trial	
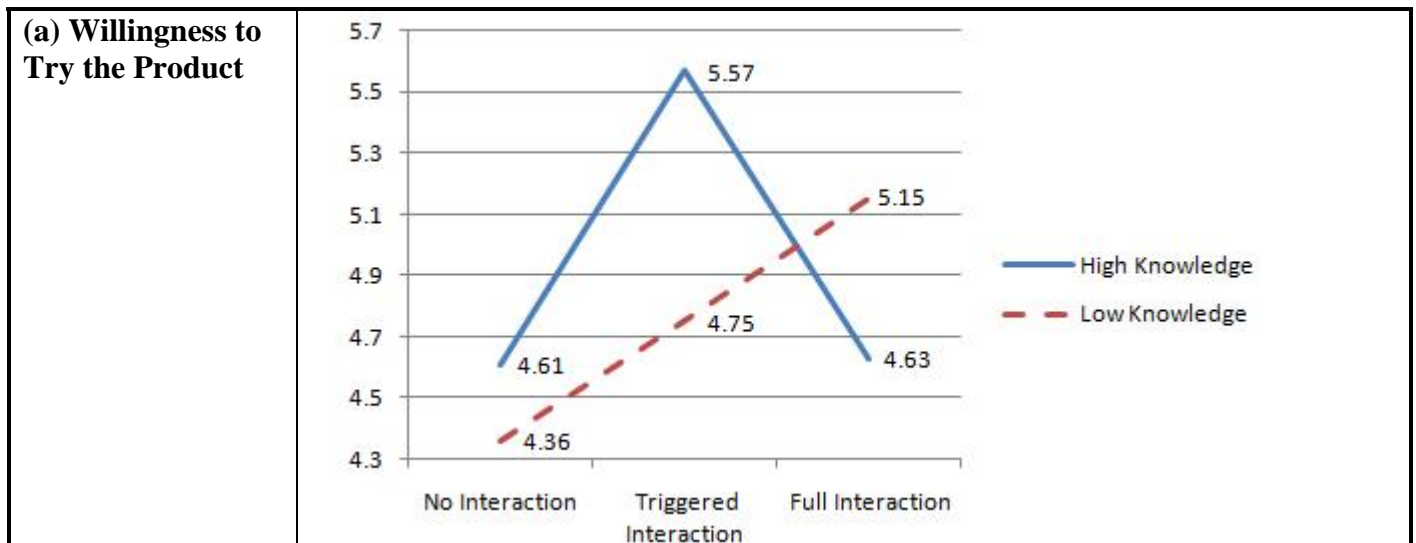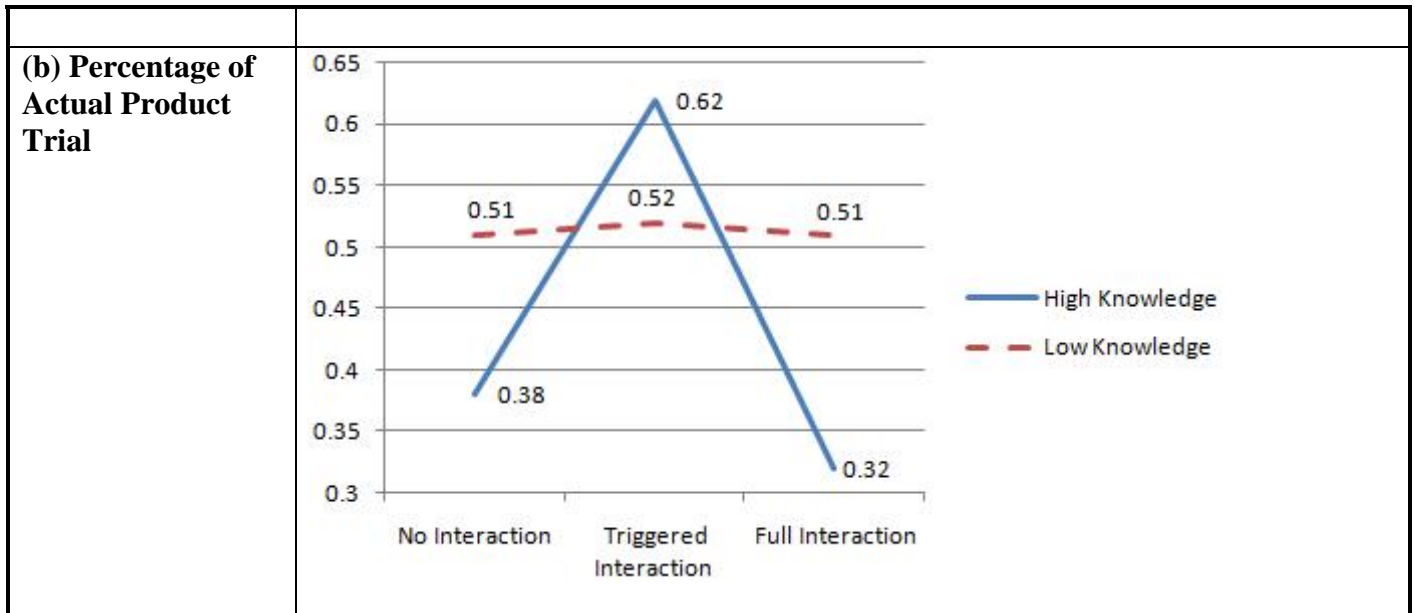
Figure 2.2: Plots of Interaction Effect on Willingness to Try the Product and Actual Product Trial
Note: Numbers are estimated at high (+1SD from the mean) and low (-1SD from the mean) produce-class knowledge.

2.5.3 Results on Actual Product Trial

The percentages of subjects who actually chose to try the actual product in the different

presentation conditions are shown in Table 2.2. Logistic regression was conducted on

actual product trial since it was a binary variable – the choice of trying the product was

coded "1" and the choice of leaving immediately was coded "0". Product-class

knowledge was modeled as a continuous covariate. The results show that there is no

significant main effect of presentation formats on actual product trial (See Table 2.3);

hence H1b is not supported. However, the interaction effect between presentation formats

and relevant product-class knowledge is significant (p<.05, See Table 2.3); hence H2b is

supported. In order to clarify the nature of this interaction, we performed a spotlight

analysis at one standard deviation above (i.e., high) and one standard deviation below

(i.e., low) the mean of product-class knowledge (following Aiken ad West 1991;

Fitzsimons 2008). For subjects with high product-class knowledge), triggered interaction induces more subjects to try the actual product than both full interaction (beta= .14, t=2.16; p<.05) and non-interactive condition (beta=.12, t=1.80; p=.07, marginally). For subjects with low product-class knowledge, however, triggered interaction does not differ from either full interaction (beta = .002, t=.03; p>.05) or non-interactive presentation (beta =.004, t=.07; p>.05). The interaction plot is presented in Figure 2.2(b).

Table 2.3: Main and Interaction Effects on Actual Product Trial (Triggered Interaction Condition as the Reference Group)						
	B	S.E.	Wald	df	Sig.	Exp(B)*
Triggered Interaction (Intercept)			1.80	2	.45	
No Interaction	.44	.61	.51	1	.47	1.55
Full Interaction	1.25	1.02	1.49	1	.22	3.47
Product-class knowledge	.39	.25	2.45	1	.12	1.47
Presentation × Knowledge	-.22	.12	3.71	1	.05	.81

*Note: Exp(B) is the exponentiation of the coefficient B, which represents an odds ratio. That is, the value of Exp(B) represents the factor by which the odds (i.e., the events of whether subjects chose to try the product) change for a one-unit change in the independent variable.

2.5.4 Discussion of Results

Consistent with our prediction based on the Zeigarnik effect and studies on consumer psychology, our findings suggest that for users with a higher level of product-class knowledge, the advantage of using triggered interaction VPE over the other two

presentation formats gets more evident in terms of increasing users' willingness to conduct offline product trial as well as their actual trial behavior.

It is worth noting again that product-class knowledge in this study pertains to subjects' prior knowledge about the relevant product class, rather than about the displayed product per se, since the displayed product was especially designed for this experiment and hence unknown to all the subjects. This is similar to the real-life context where online presentations are designed to promote new products that consumers are not aware of. Particularly, users' existing product-class knowledge facilitates their information processing and acquisition as well as achieving mastery over a particular product in the class. In the current context, subjects who have more prior experiences with Nokia phones, i.e., a higher level of product-class knowledge, may find the experimental product more relevant to their personal experience and be able to quickly reflect the stimulus information. Hence, given an incomplete product exposure stimulus, subjects possessing a higher level of product-class knowledge are more involved in the experimental task and to efficiently identify the gaps in interacting with the focal product. These subjects may also view the pursuit of a complete product experience as a more meaningful and approachable prospect; hence they may be more motivated towards such prospect after an incomplete interactive experience. In contrast, a lower level of relevant knowledge base may lead to a relatively lower perceived relevance and capability to process the presentation stimuli, which largely reduces the enticing effect of an incomplete interaction design.

2.6 IMPLICATIONS OF FINDINGS

This study focuses on specific design concepts and examines their applicability in the context of e-commerce product presentation design. This research has several theoretical and practical implications.

First, while past studies have mainly looked at the two contrasting ends of presentation design – such as non-interactive presentation and full interaction VPE (e.g., Jiang and Benbasat 2007a; Schlosser 2003) – we suggest that product interactivity design is a continuum rather than a dichotomy and propose that there is the middle course, e.g., the triggered interaction VPE. Moreover, this study provides important empirical evidence for the non-linear effect of interactivity design in online product presentations. Specifically, triggered interaction, which embeds product interactivity at only selected points in a non-interactive video presentation, can be more effective in terms of enhancing users' interest in offline product trials than both full interaction and a non-interactive presentation.

Indeed, to achieve a more complete understanding on the relative advantages of these different presentations, we also measured and tested two other traditionally important criteria of assessing presentations. One is the *perceived diagnosticity*[4], i.e., the extent to which the presentations are considered helpful in conveying relevant product information to assist users' product evaluation (e.g., Jiang and Benbasat 2004). The other

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[4] Three items were used to measure the **perceived diagnosticity** of the presentations, as adapted from Jiang and Benbasat (2004) and Kempf and Smith (1998): (1) The product presentation was helpful in familiarizing me with the product; (2) The product presentation was helpful for me to understand the functional processes of the product; (3) The product presentation was helpful for me to evaluate the product.

is *users' attitudes towards the presentations*[5], which represents users' overall evaluation

of the presentations. These two criteria both focus on users' perceptions of the online

experience rather than cross-channel behaviors. The results show that triggered

interaction, as a form of incomplete interaction design, is not significantly different from

full interaction (p>.05) in terms of perceived diagnosticity (M(full) = 5.46, M(triggered)

= 5.13) or attitudes towards presentations (M(full) = 5.17, M(triggered) = 4.97)[6]. Hence,

it seems that while incorporating interactivity into the presentations may be generally

beneficial, providing maximum interactivity may not always be necessary. An incomplete

interaction design can be the most effective in enticing users to conduct offline product

trial behavior while at the same time maintaining a high level of perceived diagnosticity

and favorable user attitudes towards the presentation.

Second, while little research has attempted to understand consumers' cross-

channel shopping behavior, such as how the web presence induces desired online-to-

offline conversion, this study focuses on the ability of online product presentations in

enticing or persuading users to conduct offline product trials. This is in line with the

significant increase in web-influenced retail store sales and the importance of "persuasive

technology" (Fogg 2003). Indeed, a large proportion of consumers nowadays are cross-

channel shoppers and they tend to perform offline actions after their online trip, such as

visiting local stores to test the real product before purchase (Arbesman 2010; eMarketer

2006). Accordingly, businesses are employing various online product presentation tactics

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[5] Three items were used to measure users' **attitudes towards the presentation**, as adapted from Coyle and Thorson (2001) and Kempf and Smith (1998): (1) The product presentation is good; (2) I have a favorable impression toward the product presentation; (3) I like this product presentation.
[6] The mean of the no interaction condition is 4.84 in perceived diagnosticity and 4.56 in attitudes towards presentations.

in order to grab the customers' attention, tug on their emotions, and entice them to react

passionately to the advertised products and visit the stores (Metros 1999). Designing

enticing online product presentations also partly alleviates the inherent difficulty

associated with online shopping (i.e., consumers' inability to directly experience the

products and hence their hesitance to purchase online) (Peterson et al. 1997; Rose et al.

1999) since offline shopping can be boosted via proper design of online presentations.

Particularly, product trial is a meaningful reflection of user enticement since it represents

their voluntary interest in inspecting the products further and personally. It is also found

to be a critical factor in determining the eventual purchase (e.g., Smith 1993; Wright and

Lynch 1995). Overall, with the unique but important focus on enticing users to conduct

offline product trials via online presentations, this research is among the first to

investigate consumers' cross-channel shopping behavior and brings about a new

theoretical perspective for IS research in related fields.

Third, just like other persuasive technologies which are often designed based on

theories and principles in cognitive psychology, triggered interaction represents an

incomplete interaction design and its enticing effects can be explained by the well-known

Zeigarnik effect. The Zeigarnik effect is originally rooted in human senses (i.e., the

Gestalt psychology) and memory studies and is extensively used to explain human

behaviors in cognitive tasks. It suggests that incomplete information or task creates

"psychic tension" within people, which acts as a motivator to drive people towards a

completion. While this seems to account for behaviors in various contexts such as visual

design, effective learning, project management, and marketing plan, little research has

been done to test the theory in the context of interaction design. As suggested by

"persuasive technology", creating interactive interfaces is virtually about getting the audience to do something – using an IT artifact, testing a product or taking some real-world action. Applying the Zeigarnik effect to this context, we find that triggered interaction which involves users via limited interaction cues and leaves a gap in users' interaction with the product can create a meaningful prospect, e.g., a completely active and real product experience, for users to pursue. But neither full interaction nor a non-interactive design creates a strong cognitive tension that drives users to go beyond the existing online experience. The present study thus makes the *first* attempt to apply the Zeigarnik effect and its related findings to the context of online interaction design, and advocates a brand-new design concept, i.e., incomplete interaction design.

This study also extends and enriches the Zeigarnik effect by identifying the importance of design cues that awaken and intensify users' awareness of the incompleteness. A mere presence of experience gap may not be able to induce desired motivational effect if there is no strong stimulus to make users' feel connected to the experience and thus pay attention to the incompleteness. For example, a non-interactive video presentation does not provide a complete interactive experience either, but it fails to provide a strong stimulus that adequately draws users' attention to what is missing now and thus the prospect of active experience. Just as the provision of limited software trials may make users involved in the process and thus create an attachment with the product (Yang and Teo 2007), prompting users to perform limited interactions in product presentations can intensify their awareness of the incomplete product experience and thus a desire for more. Our experiment results have successfully shown that product

presentations that incorporate interaction incompleteness and provoke users' awareness of such incompleteness may achieve higher enticing effect.

Overall, this study demonstrates that simpler and "smarter" triggered interaction design has the potential to outperform both the more widely studied non-interactive format (such as video) and the "luxurious" full interaction design in enticing consumers to pursue subsequent product trial. Indeed, similar concept and effect have been documented in various contexts (e.g., incomplete photographs, mystery novels, teaser ads, word-guessing games) (Menon and Soman 2002). This study thus extends this line of research to online product interactivity design and demonstrates that interactivity will exert nonlinear influence in certain aspects of user experience with products. Specifically, different from many other contexts which involve incomplete vision or information provision, this study shows that the incompleteness of *product interactivity* may achieve strong enticing effects too, without holding back any actual product information.

Fourth, while the Zeigarnik effect explains users' tendency to continue an incomplete task, it does not explicitly state any situational or moderating factor of such effect. This research thus makes another key theoretical contribution by integrating studies on consumer psychology with the Zeigarnik effect and proposing the moderating factor, i.e., users' relevant knowledge base. In our context, having a higher level of knowledge about the related product class makes the experimental stimuli more relevant to the users, and thus the users can be more involved and sensitive to the incompleteness or interruption of the experience. Users with a higher level of product-class knowledge may also be more capable of approaching a holistic active experience and anticipating mastery over the product. Accordingly, they will be more easily motivated to continue

active exploration when they are only provided with limited interaction experience. This thus presents an interesting contrast with the literature on online decision tools, which suggests that tools such as recommendation agents tend to exert stronger influence on users with less product category knowledge (e.g., Kamis and Davem 2004; Kramer 2007; Spiekermann 2001).

Overall, understanding the Zeigarnik effect and interest-stimulating tactics is extremely helpful for web designers, who have long been seeking to understand and "manipulate" the audience's attention and reaction to the exposed information (Briggs and Hollis 1997; Maddox 2001). In a broader sense, other design contexts such as online educational software development may also benefit from applying these tactics. For example, the extent of user actions allowed in educational software may enhance or de-motivate the learner's passion on learning the related subjects. Fundamentally, this is because people always tend to construct a closed and coherent experience – as long as they are provoked to care about the prospect and are confident that resolving the current gap is manageable and appealing.

Based on the current study, the message to marketers and web designers is that using the most complex technology may not necessarily entail the most desired result. Interactive features are usually costly to develop and maintain due to proprietary software, extensive programming, and a huge database of graphics (Fiore et al. 2005). In our case, the development cost of the more enticing triggered interaction is actually much lower than that of full interaction due to the reduced extent of user-product interactions. For each demonstrated product function, the triggered interaction is designed using Adobe Flash which loads a video file, plus only 5-10 layers to implement user interaction (e.g.,

buttons) at specific frames, and a few lines of code at these frames to set the flow sequence. The full interaction format, on the other hand, involves more user interactions, and requires more than 30 layers on average in the source Flash file, plus thousands of lines of codes to implement the flow. Hence, when firms intend to advertise and promote new products or new features through the online channel, intelligently embedding some user interactions could be effective in invoking consumers' attention and desire to continue the learning and trial offline.

2.7 LIMITATIONS AND FUTURE RESEARCH

There are several limitations with this study. First, the findings of this study are best generalized to *experience* products. Specifically, Nelson (1970) has proposed two different types of products, namely, *experience* products which users cannot fully evaluate without actual trial or consumption, and *search* products which users can accurately evaluate before actual consumption. In the case of search products such as hard drives, the vendors may want to promote direct online sales without offering physical trials, since consumers should be able to well evaluate the product through searchable information such as the capacity and access speed. Also, informational search products such as mortgage which do not require physical interaction at all may not be suitable for product interactivity design either. As suggested by Wright and Lynch (1995), the best medium to promote the product is the one that communicates the type of product information in the most congruent way. Hence, while it is certainly promising to discover the benefits of the incomplete interaction design for many experience products, caution is needed in generalizing and applying our findings to other product types.

Second, this study only focuses on one particular incomplete interactivity design, namely triggered interaction. However, since interactivity design is a continuum, there can be various degree of incompleteness. Hence, questions remain concerning what is the optimal level of incompleteness in a given situation. For instance, some prior study suggests that users' curiosity is stronger when the knowledge gap is moderate than it is very low or very high (e.g., Menon and Soman 2002). It is thus possible that a very low or very high level of incomplete design may not be as effective as a moderate incomplete design in inducing curiosity and enticement.

Also, while this study highlights the importance of awareness-provoking cues to make the missing experience evident to users, it only focuses on one particular way to stimulate users, i.e., invoking user actions in the form of triggered interaction design. Future research could continue to investigate the specific design of such cues, e.g., how to design such "interruptive" cues so that users are sufficiently intrigued deserves further attention.

In addition, in the current study, the enticing effect of incomplete interaction design is manifested through an immediate report of willingness and the actual behavior that involves a choice between immediate leaving and a short period of waiting before product trial – as constrained by a lab setting. A promising future direction is to investigate how strong or transient the Zeigarnik effect is. For example, early studies on Zeigarnik effect have shown that the memory about incomplete tasks persists after a period of at least one week (Heimbach and Jacoby 1972). In complementing and extending the current findings, future studies may thus examine whether the enticing effect is strong enough to persist over a longer period using surveys or field experiments.

CHAPTER 3 STUDY II: PRODUCT DISCOVERY THROUGH SOCIAL SEARCH MECHANISMS

3.1 INTRODUCTION

Collaborative platforms (e.g., Wikipedia, del.icio.us, digg.com, technocrati.com, flickr.com, thisnext.com, flixster.com) where people share knowledge, interests, bookmarks, product consumption experience, etc. are becoming increasingly popular. Instead of simply going out to shop or contacting friends for advice, people are reading or writing reviews, seeking information, and constructing their personal networks on popular websites. By facilitating access to user-generated contents, Web 2.0 has become a democratic, personalized, and do-it-yourself medium of communication (Turban et al. 2007, p812).

This study focuses on a particular type of e-commerce Web 2.0 platform that allows individuals to share their opinions and interests about products or services, and to make further use of this information for facilitating product search, product evaluation, and social network building. We label these websites *social product-search (SPS)* websites. For example, Yelp.com allows users to search and provide reviews for restaurants, shopping malls, etc., and facilitates connections between food lovers or shopping aficionados. Flixster.com encourages users to share their favorite movies, and facilitates movie searches based on social networks. Although different SPS websites have different foci in terms of products and system functionalities, user-generated product information and social networking are always their essential components.

In particular, many SPS websites allow community users to "label" products using their own words, so that products are characterized by a variety of descriptive

keywords, i.e., tags. For instance, the web page of "Gone with the Wind" on Amazon.com shows that the book has been tagged as "historical fiction", "American classics", "civil war", "great romance", "women", etc. These tags thus reflect the "Wisdom of Crowds", i.e., the collective wisdom of the user community which information seekers can use to search and evaluate products[7]. Meanwhile, some SPS websites also facilitate product information acquisition through social connectivity, i.e., to obtain product information from other users in a community and thus benefit from the wisdom of selected individuals (Hung et al. 2008). For example, Kaboodle.com and Stylehive.com feature the most experienced and influential community users who have expressed their views in displayed products. Information seekers can thus look for relevant information from these *featured users* through accessing their online personal profiles. By clicking into their profiles, information seekers can get to know these users' experiences and opinions about the focal products, which can be particularly specific and insightful in evaluating alternatives against needs. They can also discover other diversified and attractive recommendations based on the broad experiences of the featured users (Burt 2004).

Hence, unlike traditional e-commerce websites, SPS websites have the potential to facilitate information seekers' online activities by providing well-connected networks of products and of users. Just like in the physical world, where one makes a purchase decision by either comparing products in catalogues or simply asking knowledgeable others for suggestions (Ratchford et al. 2003), people can also search and assess products on SPS websites based on product attributes or by following advice from experienced

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[7] In this study we use "information seekers" to refer to visitors of social product-search websites who want to search and investigate products.

community members. The presence of product tags and connection to featured users thus support the two different ways of information search – product-attribute-based and people-based. With these various kinds of search cues in the online environment, information seekers may choose specific search directions to find exactly what they intended to look for, as in a planned purchase, or they may trace down non-linear paths, enjoying exploration in unanticipated directions and encountering pleasant surprises (Pirolli 2007). A person's product search process will ultimately determine her understanding about the product space and satisfaction with the decision outcome.

However, while the practice of collaboratively creating and managing tags to annotate and categorize contents or products by consumers has attracted much research attention, studies have mainly focused on people's incentives for tagging (e.g., Ames and Naaman 2007), the linguistic properties of tags (e.g., Veres 2006), and the growth pattern of tags on websites (e.g., Golder and Huberman 2006). Questions remain about how the presence of product tags based on the "Wisdom of Crowds" shapes information seekers' search behavior. Similarly, researchers are paying increasingly more attention to online social networking and the "gurus" in these networks because of their disproportionately large influence on other users (e.g., Gyongyi et al. 2008; Hung et al. 2008; Jurczyk and Agichtain 2007). Related studies have primarily focused on characteristics of these featured users' social networks (e.g., Kratzer and Lettl 2009), their roles in companies' marketing initiatives (e.g., Luethje et al. 2005), and empirical validation of their commercial impacts in various industries (e.g., Franke et al. 2006). But it is still unclear, in the context of SPS websites, whether and how social connections with those experienced community users can provide diagnostic and unanticipated product

information based on the "Wisdom of Experts". Furthermore, it may be fruitful to consider the complementarities between different informational and search cues on websites, because together we may obtain a more complete picture of how information seekers forage information in the social Web. Hence, *the objective of this study is to examine the individual and joint impacts of product tags as well as featured users on an information seeker's product search experience*.

In the following sections of this study, we first present a detailed description of the two social search mechanisms and explain the major theoretical foundations. Hypotheses are then proposed, followed by a description of research methodology and data analysis. Results are then reported and discussed. Finally, implications and future research directions are addressed.

3.2 TWO SOCIAL MECHANISMS TO FACILITATE PRODUCT SEARCH: PRODUCT TAGS AND FEATURED USERS

3.2.1 Product Tags

Tagging allows ordinary consumers, not only designers or experts, to generate keyword descriptors of products in the form of tags. Websites with product tags can assist information seekers' online activities at two levels.

First, product tags reflect individual users' description of a product as well as indicate how many people agree with a descriptor. Since every user can use her own expression to annotate a product, any one product is often described by a variety of tags, reflecting individuals' heterogeneous interests or attentions. When groups of users agree on the meaning of a certain tag, products can be tagged with the same word by multiple

users. Hence, every tag is associated with a number indicating how many people have used this tag for this particular product. For example, websites such as Buzzilions.com aggregate individual users' tags and present them as product descriptors on every product page together with a frequency count for each tag.

Second, some websites also *interconnect* tags of different products so that information seekers can browse related products possessing similar attributes (i.e., connected tags). This represents the website's ability to support product connectivity and navigation based on user-defined product dimensions. For example, if an information seeker wants to look for more books about the Civil War when examining "Gone with the Wind", she can click on the "civil war" tag and be directed to a list of books tagged similarly by the online community – including "Cold Mountain", "Shades of Gray", "Gone with the Wind", and many others. Information seekers can then click on any book in the list and examine it in detail. In this way, products with common attributes become interconnected via community-contributed tags. Overall, the diversity of product tags and the product connectivity afforded by connected tags have enabled "pivot browsing" (e.g., Millen et al. 2006), a navigation practice that allows information seekers to easily recognize and change search directions at any moment, thus offering constantly new views and routes to explore until a satisfying choice has been made.

3.2.2 Featured Users

Featured users on SPS websites are usually highly active users who have accumulated high contribution scores through sharing useful product experiences with others (Hung et al. 2008, p346). They often have richer product experiences and knowledge than average users (Venkatraman 1989). Accordingly, featured users are usually regarded as a high-

esteem information source for other users within social networks and contribute to the diffusion of new and valuable knowledge (Rogers 1976; Schreier et al. 2007). For example, in her personal profile, a featured movie lover may share various attractive alternatives, her knowledge about the origin and structure of the storylines, or information about awards won by particular movies. As visitors of such profile are exposed to this kind of relevant and novel knowledge, their movie search process may be greatly facilitated.

3.3 LITERATURE REVIEW

Individuals who try to choose a product from among a number of alternatives often go through a constructive search process where their preferences are constructed and adjusted depending on the information environment (David et al. 2007; Payne et al. 1992). During this process, they gather a number of promising options and evaluate them in detail before committing to a final choice (Haubl and Trift 2000; O'Keefe and McEachern 1998; Wang and Benbasat 2009). The stream of research in information foraging and adaptive human decision making is thus relevant to this study and hence discussed below.

3.3.1 Scent-based Information Foraging and Social Information Foraging

Information Foraging Theory (IFT) is a general theory that explains human information-seeking and sense-making behavior in task environments (Pirolli and Card 1999; Priolli 1997). According to the theory, people tend to dynamically identify search paths and adjust them towards more suitable ones as they encounter information during the search process, rather than blindly staying with a fixed search path based on the *a priori* perceptions. Particularly, they have to assess the value of different information paths

based on the observable cues, and decide on the time and effort allocation within and across information paths. Hence, people's information seeking is usually adjusted based on the cues and affordances in the information environment (Lynch et al. 1991; Pirolli 2007). For example, hyperlinks (and the associated text labels, thumbnail pictures, etc.) on websites are a common type of information cues that direct people's information search and thus their judgment. In this sense, Information Foraging Theory echoes the notion of "adaptive decision makers", as human's decision making is a mixture of top-down organized and opportunistic processing based on the information encountered (Hayes-Roth and Hayes-Roth 1979; Payne et al. 1993). For example, people might start with certain product attribute and then reassess the importance of it or notice another unexpected product or attribute worth exploiting, and make spur-of-the-moment adaptation.

The key assumption of Information Foraging Theory is that people often tend to select an information foraging strategy that maximizes their return on information foraging, i.e., rate of gaining valuable information. Particularly, the structure or affordances of the information environment determine the magnitude of the costs of different information foraging strategies, and this cost is weighed against the rate at which useful information is encountered. One concept that is important in predicting and explaining the information seeking process is information *scent*, which refers to information seekers' subjective sense of how much the navigational cues appear to be related to their information needs (Pirolli and Card 1999; Priolli 1997). If the scent is clear and strong, then it means that promising information can be found down the trail, hence the information seeker will be able to move directly towards the target information

and she knows where to spend the time. But if there is no scent or weak scent, then the seeker will have to perform random walk in order to spot a trace of scent.

In particular, humans often discover knowledge more quickly and thoroughly based on collaborative effort, just like animals tend to forage for food en mass since collective efforts are important in providing high scent paths for food resources. This is explained by Social Information Foraging, which extends Information Foraging Theory to a social context to address the information diversity and social brokerage in technology-mediated social systems (Pirolli, 2007). Social information foraging suggests that undiscovered public knowledge can be revealed when groups forage for information to "connect the dots" and bridge clusters of information. On the social Web, for example, the wide appearance of user-generated collaborative indices usually allows information seekers to explicitly recognize and locate useful paths based on traces of their peers; hence these user-generated cues may convey high information scent (Zhang et al., 2009). Also, the diffusion of new information across clusters of people is usually propelled by the more experienced users in the community. These users usually lead the trend of the community's consumption and provide high-quality information or recommendations that are not discovered by others. Hence, they often serve as a source of advice for information seekers, enabling useful and novel discoveries due to "standing on the shoulders of giants" effect (Chan and Misra 1990; Childers 1986; Pirolli 2009). Accordingly, navigational cues that enable access to the knowledge profiles of featured users in a community can be useful to information seekers and convey high information scent too.

Moreover, different information sources may vary in terms of value and relevance. While scent helps information seekers identify the value of particular information paths, seekers often have to decide how long they spend within one particular path and whether and when to switch to another. A decision of staying or switching is based on seekers' perception of the attractiveness of different paths, e.g., the scent of the path cues, as well as the cost to make a switch (Liu et al. 2010; Pirolli and Card 1999). According to Information Foraging Theory, seekers always want to get more valuable information for as little effort and time as possible. Hence, they often tend to spend most of the time in a small fraction of useful and accessible information paths (e.g., Lawrance et al. 2007). When there is a cue in the environment conveying strong scent, the user is expected to spend long time exploring down that path in depth. However, if there are other cues giving out strong scent that can also be approached without much cost, then it is possible for users to switch to another path of information. Overall, users have to judge whether and when to access another information path based on the value of different paths and the cost of switching.

In summary, information seekers tend to continuously forage and assess the scent of the information cues, evaluate the cost of switching, and construct and adjust their search directions (Pirolli and Card 1999; Pirolli 2007, p89). Information processing and decision making is thus highly adaptive, depending on the available cues in the environment. With user-generated information, various types of navigational cues based on other people's product experiences can convey strong information scent and support strategies for different information requirements.

3.4 HYPOTHESES DEVELOPMENT

3.4.1 Product Search: Diagnosticity and Serendipity

As noted by King and Hill (1994), the information gathering process must be distinguished from the decision outcome, and it is the process that shapes the ultimate decision. In this study, we are interested in how design mechanisms of SPS websites direct information seekers to search and discover products.

One important facet of a product search process is for information seekers to find relevant alternatives, evaluate them based on available information, and ultimately make an informed choice. A key concept here is *perceived diagnosticity*, previously defined as the extent to which a site visitor believes that a website is helpful in terms of evaluating a product's attributes (Jiang and Benbasat 2004; Kempf and Smith 1998; Pavlou and Fygenson 2006). In the current study, as we focus on a dynamic product search process rather than the evaluation of individual products, we define perceived diagnosticity as information seekers' perception of the extent to which an online product search experience helps them systematically and effectively evaluate and compare relevant alternatives for reaching a final choice.

Moreover, scent-based information search and adaptive decision making processes imply that information seekers' choices may not necessarily closely relate to their original intention or a planned search path (Payne et al., 1992; David et al., 2007). In other words, since information seekers usually work with a set of malleable and adaptive preferences that are sensitive to the information found in the environment, there is an opportunity for *serendipity*, i.e., when seekers acquire something useful from an

interaction without prior expectation (André et al. 2009; Nikolaeva and Sriram 2006; Toms 2000). Akin to the role of serendipity in scientific breakthroughs and discoveries, such serendipitous encounters are usually enriching and rewarding (Ross 1999; Toms 2000). The literature asserts that people experience serendipity when they explore an environment with diverse information and can quickly recognize what is potentially relevant (André et al., 2009; Björneborn, 2008).

3.4.2 Effects of Product Tags

When tags are presented on a product's page, they constitute a community-constructed and comprehensive summary of product characteristics (Hsieh et al. 2008). For example, at Thisnext.com, a dress can be tagged with "strapless", "black-and-white", "bubble dress", "above-the-knee", "evening dress", "homecoming dress" etc., which represent diverse styles of the dress and its dressing occasions. Having different set of tags directly signals the fine differences among products. The presence of such diverse keyword descriptors on the product page may also enable information seekers to efficiently filter out the unwanted alternatives by just a glance of the page. Moreover, the popularity of each tag, as indicated by its frequency count, provides a quick indicator of community agreement on the specific product feature. Since group behavior is an influential force in human decision making (Cialdini 1993; Giner-Sorolla and Chaiken 1997), the provision of such popularity information may help reduce information seekers' uncertainty when assessing alternatives. For example, if two dresses are both tagged as "evening dress", then the one having the higher frequency count for this tag may hint information seekers that it is a more popular evening dress than the other. Overall, tags as diverse and

collective product descriptors should facilitate a quick and direct understanding of products during the decision process. Therefore, we propose,

H1a: SPS websites with product tags will lead to a higher level of perceived diagnosticity of the product search process than those without product tags.

Apart from serving as descriptors of individual products, hyperlinked tags facilitate connectivity among related products. Thus, a product-to-product network is formed via tags, revealing the relationships of products in the web space (Hsieh et al. 2008). Following the previous example, if the tag "bubble dress" of a particular product has also been applied to other products, then information seekers who are interested in bubble style dresses can click on this tag and be directed to a list of other popular bubble style dresses as identified by the user community. Hence, unlike disconnected tags, interlinked tags become important navigational cues and organize the product space based on diverse attributes (Ames and Naaman 2007; Pirolli 2009). Tags as consumers' direct and natural "consumption vocabulary" pertaining to products (West et al. 1996) may convey strong scent (Kalbach 2007; Zhang et al. 2009), because tracing connected tags allows information seekers to access related alternatives sharing similar characteristics that are of their interest (e.g., "bubble dress"). Paths like this thus provide an easy mechanism to filter products. According to IFT, information seekers tend to maximize the information utility by investigating the few paths with the strongest scents in depth (i.e., the most relevant attribute dimensions), since these paths lead to the richest resources. In this way, information seekers can consider groups of similar, highly relevant items along identified

dimensions together, forming a systematic and effective comparison process (Biggs et al. 1985; Payne et al. 1993). Such in-depth and structured search can hardly be achieved when tags are not interlinked, as disconnected tags do not directly facilitate product connectivity and navigation. Therefore, we propose,

H1b: SPS websites with connected product tags will lead to a higher level of perceived diagnosticity of the product search process than those with disconnected product tags.

When information seekers examine a product, access to other search paths through product tags may also be presented. Like over-the-horizon radar, a diverse and comprehensive set of product tags may reveal to information seekers previously unforeseen product dimensions. Such concurrent presence of diverse ideas usually stimulates people's cognitive processes and latent interests, so that people may tend to discover more than they were initially looking for (Björneborn 2008; Foskett 1983). This is the power of social information foraging, i.e., greater information diversity generated by the community usually facilitates innovative discoveries, leading to greater information returns for the individual information seekers (Chi et al. 2007). According to IFT, when other tags stimulate seekers' latent interest and thus give out strong scent, seekers are likely to switch paths if the cost of moving between different tags is low. Since the concurrent presence of diverse tags allows easy and immediate switching, i.e., a form of "pivot" browsing (Millen et al. 2006), changes of search and evaluation foci are facilitated and people are thus likely to pursue the newly-emerged interesting information.

For example, an information seeker initially looking for a juicer may first follow the tag "juicer" and get to identify a good juicer product. But, this juicer product can be associated with other tags such as "healthy eating", which give out strong scent to the information seeker since she realizes her latent interest in cooking healthy food at home. If products are connected via tags, she may treat this juicer as an anchoring point and follow the "healthy eating" tag to a list of relevant kitchenware products. She may then find many other useful and interesting products, such as a machine to make home-made all-natural peanut butter, which would be quite appealing if she happens to like peanut butter. Hence, she may end up buying a peanut butter machine. Such discovery would not have been possible if the information seeker did not recognize a particular latent interest during the exploration (e.g., healthy eating) or did not have an easy and immediate access to such search path. Overall, the presence of connected tags makes information seekers recognize their latent interests easily and allows them to pursue these interests with low cost. Mathes (2004) and Quintarelli (2005) have also suggested that interlinked tag sets are likely to increase opportunistic and often interesting discovery, achieving a higher level of serendipity that would be unattainable without them. Therefore, we propose,

H2: SPS websites with connected product tags will lead to higher level of perceived serendipity of the product search process than those with disconnected product tags or without tags.

While the presence of disconnected tags may also help elicit information seekers' diverse interest dimensions, they do not effectively support product connectivity to facilitate

them to reach more products based on these elicited interests. Hence, we do not expect

websites with disconnected tags to greatly increase serendipitous findings during the

search process as compared to websites without any tags.

3.4.3 Effects of Featured Users

Besides discovering mass-market taste by following tags, people also tend to seek advice

from experienced individuals. According to social information foraging, effective

knowledge dissemination is greatly facilitated by those experienced individuals because

their product knowledge and rich experience is not available in others (Chaiken et al.

1989; Pirolli 2007). Hence, average users are usually better off by foraging information

from those more experienced users in the community. Some SPS websites highlight

"featured users", i.e., those who actively provide useful comments and recommendations

to other users based on their rich product experiences (Hung et al. 2008). For example,

Yelp.com and Flixster.com provide links to particular experienced users who have made

useful comments on the products being examined on a webpage. Through these links,

information seekers can access the personal profiles of these users, which include the

owners' comments on the focal product as well as other high-quality recommendations.

Accordingly, links to features users serve as navigational cues with strong scent and they

usually attract information seekers to seek more relevant advice. For example, someone

examining a particular restaurant would probably like to obtain opinions from other

experienced visitors to this restaurant. Hence, we expect that when it is easy to access

featured community members, information seekers are likely to forage information from

these users, hence gathering more useful information not available otherwise (e.g.,

Borgatti and Cross 2003; Nebus 2006). Therefore, we propose,

H3: SPS websites that present featured users will lead to a higher level of perceived diagnosticity of the product search process than those that do not present featured users.

However, following a particular featured user does not mean that all the information within that path will be closely related to information seekers' existing search interest. These experienced individuals have usually detected and exploited a variety of good opportunities not yet discovered by general users and organized these diverse findings in their own preferred ways. Hence, visiting these featured users' profiles may at times broaden information seekers' product search scope rather than getting options convergent to a planned search criterion. For example, an information seeker may be evaluating a bubble dress and then switch to the profile of a featured user who has owned this bubble dress for more information. This profile, however, may include this user's recommendations of other dresses suitable for a homecoming party, or some matching shoes or accessories for this bubble dress – which may result in the information seeker considering or buying more or different products than planned. Hence, with the easy access of featured users, information seekers' search path can become largely explorative and discretionary, making it more conducive to serendipitous discovery. Just as previous studies have suggested, serendipity travels in good social networks because people with adequate knowledge may provide unexpected solutions during social interactions (Nahapiet and Ghoshal 1998, p258). Establishing easy connectivity to featured community users is thus expected to direct information seekers to think "out of the box" or recognize their latent interests, and make unexpected interesting discoveries (Granovetter 1983). Therefore, we propose,

H4: SPS websites that present featured users will lead to a higher level of perceived serendipity of the product search process than those that do not present featured users.

3.4.4 The Disparity and Complementarity of Product Tags and Featured Users

As mentioned earlier, information search and processing is usually a mixed top-down organized and opportunistic process. Upon inspecting a product, information seekers may treat it as an anchoring point from which they trace promising navigational cues to obtain more information about this product and other related products. As more information unfolds, seekers may recognize other comparable options and directions, which are then evaluated against previous findings and serve as new anchoring points for subsequent search. Connected product tags and featured user links are both high scent navigational cues that play a role in this process. However, they facilitate product search and evaluation in different ways. Tags are created to describe various aspects of a product; hence, search through tracing a tag leads to alternatives closely related to the current product in terms of the tagged attribute. Searching products following a tag is thus structured and convergent to a particular product attribute. In contrast, information from a featured user's profile often includes diversified and freely-structured product opinions and interests, thus manifesting a divergent product discovery process.

Indeed, convergent and divergent information behaviors have long been recognized as the two distinct approaches of human reasoning and problem-solving (Guilford 1967). While convergent information search yields findings that are accurately and logically related to a certain criterion, divergent search leads to more dissimilar or loosely-related findings. Empirical studies have shown that in real life, these two types of behavior are usually mixed, complementing and reinforcing each other (Björneborn 2008;

Ford 1999). On the one hand, an organized and convergent search may identify central interests that subsequently function as points of departure for more divergent exploration (Björneborn 2008). Studies have found that divergent search usually proceeds to a significant degree via convergent thought processes, as having a clear line of processing gives users larger cognitive capacity to integrate resources and discover the potential value of diversified findings (Ford 1999). Just as "chance favors the prepared mind" suggests, if users have a questioning mind entailing certain aspects of interest, they will be more willing to explore and able to effectively link the unexpected, diverse encounters to their needs (Csikszentmihalyi and Sawyer 1995; Ford 1999; Van Andel 1994). On the other hand, divergent pieces of information obtained may entail the need for more convergent processing, because in doing so, deeper understanding can be achieved to ensure the appropriateness of the unexpected information (Björneborn 2008; Gale 2001). In sum, one type of information foraging behavior may enhance users' capacity of engaging in the other.

In the current context of product search, following attribute-based cues usually allows users to establish a clear search domain or identify a clear product interest. Attribute-based navigational cues such as connected tags can thus help users establish a search scope, and users can then decide to investigate in depth or explore other possibilities since they can trace their search paths easily and are unlikely to get lost (Houten van et al. 2004). However, people-based cues such as featured users' links do not facilitate narrowing down search paths at all, since they often lead to paths of unpredicted diversified information. Given the different nature of these two types of navigational cues, we thus expect that the utilization of information discovered through

featured users' connections will be higher when connected product tags are also provided as compared to when connected tags are not present. Specifically, tags allow information seekers to explicitly identify preferences, which could then serve as anchors to accommodate and discover the potential utility of divergent other findings (André et al., 2009; Ford, 1999). Being able to search and compare products along identified attributes in a logical way also gives information seekers the capacity to incorporate more information, thus motivating them to be more explorative (Biggs et al. 1985; Shugan 1980). Accordingly, information seekers may be more willing to make use of social connectivity with featured users, which usually leads to insightful product information as well as unanticipated diverse alternatives. Moreover, with the presence of connected tags, when information seekers are inspired by any recommendation or perspective in featured users' profiles, they can investigate it further thoroughly and clearly with low cost – by following the attribute-based tags associated with the new findings. Overall, the presence of connected tags lowers the cost of keeping trace of the search path and conducting thorough and convergent investigation around the new findings, hence information seekers should be able to make better use of the information from featured users. Accordingly, the effect of featured users on improving the product search process will be more evident with the presence of connected tags than without the tags.

For example, an information seeker browsing a stylish French restaurant may access the profile of a featured user who has given useful comments on this restaurant. This profile, however, may also include this user's personal restaurant recommendations – such as "my favorite big-night-out restaurants", or "fanciest restaurants in the bay" – prompting the information seeker to consider a wider variety of restaurants serving

different cuisines such as Italian or Japanese, or those with novel features such as garden house, open air seats, or live performance. The information seeker can then follow these new features by clicking on the tags associated with the restaurants, getting to know more and probably better such options. In this way, the information seeker can continuously identify her explicit or latent interests without getting lost and access relevant alternatives to find the best of that kind. A recent study on video search has also found that the discovery will be more fruitful when narrow searching cues and more generalized search cues are seamlessly provided so that users are more likely to pursue and switch as they like (Houten van et al. 2004). Therefore, we propose,

H5: There is an interaction effect between connected product tags and featured users on the perceived diagnosticity of the product search process, i.e., the effects of featured users will be stronger when connected product tags are present than when connected tags are not present.

H6: There is an interaction effect between connected product tags and featured users on the perceived serendipity of the product search process, i.e., the effects of featured users will be stronger when connected product tags are present than when connected tags are not present.

3.5 RESEARCH METHOD

3.5.1 Experimental Website Design

An empirical study was conducted to test the hypotheses. To enhance the realism (Singleton and Straits 1999, p194) and the generalizability of the findings, we

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collaborated with one of the largest social product-search websites in China, ABC.com[8].

This website combines reviews, tags, and social networking functionality for consumers

to search and discuss local businesses, consisting mainly of restaurants and other dining

services. ABC.com shared with us their database about around 1000 restaurants in

Shanghai and over 60,000 registered users in Shanghai[9] – a data fragment that forms a

well-connected social network clique. To remove brand identification of the website, we

developed our own experimental websites by adopting a different interface style, such as

color scheme and page layout, as well as a different domain name. Specifically, from the

main page, users could search and browse all the restaurants featured on the website.

Each restaurant information page shows an objective description of a restaurant, such as

its name, detailed location together with Google map, telephone numbers, a picture of the

restaurant, as well as all the individual user reviews and an overall star rating (based on a

5-star rating scale) of the restaurant. Each person's profile page contains basic

information about the user, such as her demographic data, past restaurant reviews,

favorite restaurant collections, as well as her network of friends.

The provision of product tags and featured users are both manipulated on product

information pages. We adopted a three-level design in manipulating the provision of

product tags. The first condition does not show any tag. The second condition presents

tags associated with restaurants, but the tags are not hyperlinked so that information

seekers can only view the descriptors of each restaurant in the form of tags. The tags

often describe such attributes as featured dishes, cuisine type, dining situation (e.g.,

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[8] We mask the real name of the company due to a non-disclosure agreement.
[9] The actual information, such as real names of the users, was masked.

friends gathering, dating, or casual eating), and ambience (e.g., live performance, private booth, open-air seats). The popularity count for each tag, i.e., a count indicating how many users have used the tag for the particular restaurant, is also provided. In the third condition, tags are presented and also hyperlinked so that, for example, if information seekers recognize an interesting tag of a restaurant, they can click on the tag and then be directed to a list of restaurants that are also tagged by the online community with the same keyword.

The presence of featured users is manipulated at two levels. In the treatment condition, a list of featured users are shown on the right-hand panel of the restaurant's information page and represented through their thumbnail pictures and names. These featured users are determined by their overall contribution scores, based on the actual data provided by ABC.com and reflecting the usefulness of the users' past contributions[10]. A featured user's profile page contains her personal information, her collections of favorite restaurants, and comments on the restaurants, including the restaurant that is currently being browsed. In the control condition, the list of featured users' links is not provided but the profiles of individual reviewers are still accessible by clicking on the reviewer link next to her review on the current restaurant.

In sum, we implemented a 3 (no product tags vs. disconnected tags vs. connected tags) * 2 (with vs. without featured users) between-subject experimental design. The

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[10] A user's overall contribution score is obtained from ABC.com. Particularly, it is computed according to her past information contribution, i.e., her provision of witty, informative, useful, and personal advice. Identifying featured users (or "mavens", "gurus", etc.) based on this contribution score has been adopted by most SPS websites (e.g., Thisnext.com, Kaboodle.com, and Stylehive.com).

screen capture of a restaurant information page for the condition with connected tags and featured users is provided in Appendix B.

3.5.2 Experimental Procedure

The participants consisted of a total of 168 undergraduate and graduate students (i.e., 28 subjects per group, with 6 groups), recruited from a major university in Shanghai. According to power analysis for a 3*2 between-subject design, this sample size ensures a sufficient statistical power of 0.8 for a medium effect size (Cohen 1988). Participants were assigned randomly to a condition and asked to fill in a pre-experiment questionnaire that measured demographic information and control variables including knowledge and interest in restaurants in Shanghai. They were then briefed on the features of the website and given several minutes to get familiar with how to use it. Afterwards they were instructed to perform a task of *finding a restaurant to dine with several friends in the coming weekend*. Their entire search process was captured by Camtasia Studio 4.0. After making the restaurant choice, the participants completed the questionnaires and were paid around US$6 each as a participation reward. The measurements for dependent variables are presented in Appendix C. Since this study was conducted in China, the questionnaire was translated into Chinese first and a backward translation method was used to ensure the consistency between the Chinese and English versions of the questionnaire.

3.5.3 Subject Background Information

The student participants were from 34 different academic departments, representing diverse backgrounds. Their average age was 22. In general, they were very familiar with using the Internet (mean = 6.02, 7-point scale). They were on average interested in exploring restaurants in Shanghai (mean = 5.21), but were not very knowledgeable about

the restaurants (mean = 3.48). There was no difference in these variables across the different treatment groups.

3.6 DATA ANALYSIS AND RESULTS

3.6.1 Instrument Validity

Exploratory factor analysis was performed on perceived diagnosticity and perceived serendipity. Results show that measurement items load heavily on their intended factors and lightly on other factors, indicating adequate convergent and discriminant validity (see Table 3.1 for factor loadings).

Table 3.1: Rotated Factor Loadings		
	Factors	
	Diagnosticity	**Serendipity**
Diag1	**.83**	.17
Diag2	**.70**	.09
Diag3	**.73**	.16
Diag4	**.81**	.21
Seren1	.15	**.88**
Seren2	.20	**.87**
Seren3	.25	**.85**
Seren4	.09	**.77**

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

3.6.2 Results on Perceived Diagnosticity of the Product Search Process

The Cronbach's alpha for perceived diagnosticity is 0.79. There is a significant main effect of restaurant tags (p<.001). In particular, post-hoc analysis on the three levels of restaurant tags based on the Scheffe test shows that the condition with connected tags lead to significantly higher level of perceived diagnosticity than the condition with disconnected tags (p<.001) and without tags (p<.001), while the latter two do not differ. Hence, hypothesis statement H1b is supported while H1a is partially supported. However, there is no main effect of featured users on perceived diagnosticity, thus H3 is not supported. Also, no interaction effect exists, i.e., H5 is not supported (see Tables 3.2 and 3.3).

Table 3.2: Main and Interaction Effects on Diagnosticity and Serendipity					
Source	**Dependent Variable**	**df**	**Mean Square**	**F**	**Sig.**
Product Tags	Diagnosticity	2	16.91	15.69	**.00**
	Serendipity	2	4.24	3.79	**.02**
Featured Users	Diagnosticity	1	0.41	0.38	.54
	Serendipity	1	3.43	3.07	**.07**
Tags * Featured Users	Diagnosticity	2	1.18	1.09	.34
	Serendipity	2	5.31	4.74	**.01**

Table 3.3: Means and Standard Deviations of Diagnosticity and Serendipity			
		With Featured Users	Without Featured Users
	No Tags	4.69 (1.31)	4.88 (1.03)
Diagnosticity	Disconnected Tags	4.60 (1.06)	4.50 (.95)
	Connected Tags	5.79 (.81)	5.40 (1.00)

	No Tags	5.26 (.97)	5.68 (.95)
Serendipity	Disconnected Tags	5.45 (1.07)	4.88 (1.21)
	Connected Tags	6.07 (.74)	5.36 (1.01)

3.6.3 Results on Perceived Serendipity of the Product Search Process

The Cronbach's alpha for perceived serendipity is 0.88. The availability of restaurant tags has a significant main effect on perceived serendipity ($p<.05$), while the presence of featured users has only a marginally significant effect ($p=.07$). Hence, H2 is strongly supported while H4 is moderately supported. There is a significant interaction effect on perceived serendipity between restaurant tags and featured users ($F (2,162) = 4.74$, $p<.01$) (see Table 3.2 and 3.3). Simple main effect analysis shows that the condition with featured users leads to a significantly higher level of perceived serendipity than the condition without featured users only when connected restaurant tags are provided ($p<.05$ for connected tags condition; $p>.05$ for disconnected tags and no tag condition). Hence, H6 is supported. Figure 3.1 shows the pattern of the interaction effect.
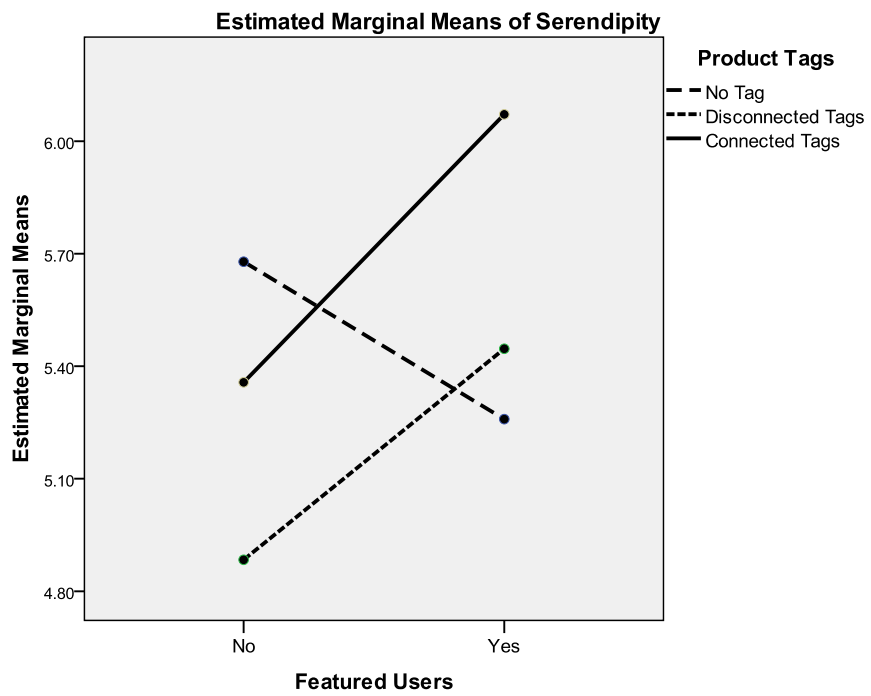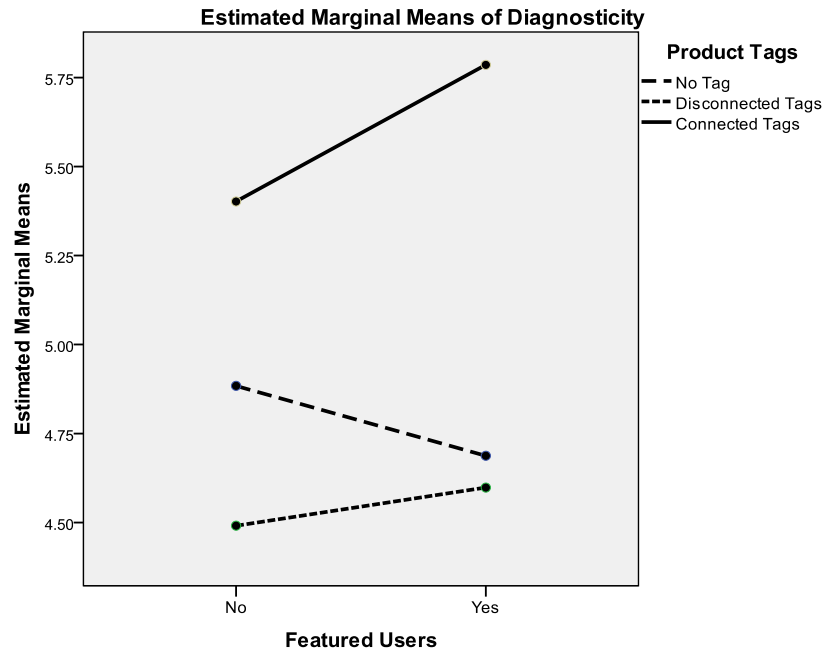
Figure 3.1: Plots of Interaction Effect on Diagnosticity and Serendipity

3.6.4 Discussion of Results

The experimental results of this study have provided valuable insights into the impacts of product tags and featured users on information seekers' product search experience. First, product connectivity based on hyperlinked tags is important in improving information seekers' search process in terms of both perceived diagnosticity and serendipity. However, the mere presence of disconnected tags does not have positive effects on perceived diagnosticity as compared to the absence of tags. One plausible reason is that the information conveyed by disconnected tags is largely constrained to depicting individual products, but of limited help in directly retrieving and comparing related alternatives. While it is certainly important for users to understand each individual product, an effective product evaluation process necessitates considering related alternatives. As noted by Russo (1977), making information available is not sufficient; information must be easily processable. The present study shows that if information seekers are not able to access related alternatives based on the tags, then the information on individual products still cannot be effectively utilized. In other words, it is the process of finding and comparing multiple promising alternatives (e.g., as supported by pivot browsing) that maximizes the utility of tags in decision making.

Connection with featured users does not improve the diagnosticity of the search process either. One plausible reason may be that, the presence of featured users alone cannot directly help narrow down information seekers' search scope and conduct a thorough comparison among alternatives. Without a clear and organized line of deliberation, a search process with diverse discoveries may still leave information seekers with uncertainty in their evaluations (Huber and Klein 1991; Payne et al. 1993, p183).

That is, information seekers may not be sure whether their findings are indeed good ones within their respective product category since seekers do not have an overview of the relative quality of products of the same kind.

The results on serendipity reveal that the connection with featured users may induce unexpected useful discoveries, but this effect is evident only when products are also connected by tags. Indeed, connected product tags also exhibit stronger effects on perceived serendipity when featured users are provided. This interaction effect implies that in terms of making valuable but "out of the box" discoveries, being able to conduct a mixed convergent and divergent search is important. In the current context, interesting alternatives discovered from connected featured users, when coupled with tag-enabled product connectivity, may trigger information seekers' interests in novel features that they have not thought of and allow them to switch the search direction conveniently as they want. In this way, the value of social connectivity and tag-based product connectivity in enabling serendipitous discoveries can be fully revealed. Indeed, when we looked at subjects' actual use of connected tags and featured users during the search process, we found that when featured users were present, subjects on average accessed more distinct tags than they did when featured users were not present (4 distinct tags accessed on average with featured users, and 2 distinct tags accessed without featured users). This also demonstrates that featured users together with connected product tags made information seekers switch search directions more often. In other words, connectivity with featured users may have expanded subjects' search scope by exposing novel alternatives to them, which then led to subjects' change of subsequent search criteria.

3.6.5 Supplementary Analysis on Search Process and Decision Outcome

Thus far we have revealed the impacts of product tags and featured users on subjects'

perceptions of their search process. Yet, it remains unclear how diagnostic and

serendipitous product search processes are actually manifested by the set of products that

have been accessed via tags or featured users or whether such processes indeed lead to a

satisfactory decision. Hence, we conducted further analyses in two steps. First, we looked

at the observable characteristics of subjects' search set to better understand what

constituted diagnostic and serendipitous processes. Second, we investigated whether

diagnostic and serendipitous search processes actually led to better decisions. The

findings are reported below.

Supplementary Analysis 1 – Actual Search Process: Three aspects of subjects' actual

search process were examined: first, the coherence of the set of restaurants that have been

accessed; second, the average star rating of all the restaurants in the search set; and third,

the average popularity of all the restaurants in the search set.

In particular, the purpose of measuring the coherence of the search set is to

understand whether subjects' product search has been organized along particular themes

or criteria. If it is a structured and coherent search process, subjects should be able to

retrieve relevant products in a logical manner rather than accessing products randomly. In

this way, they can effectively compare and evaluate these products along a certain line of

reasoning. Accordingly, in this study, the actual coherence of the search set was

estimated by calculating the average relatedness of every two *consecutively* accessed

products. Specifically, we used the number of common features (as demonstrated by

various product tags) shared by two consecutively accessed restaurants as an indicator of

the relatedness of these two restaurants. That is, the more common features shared by the two restaurants, the more related they are. Then, we computed the average of the restaurant-to-restaurant relatedness to represent the coherence of the entire search set.

In addition, the average *star rating* (with a 5-star scale) of all the restaurants in the search set was used as a possible indicator of the quality of the search set, because many prior studies had treated the product star rating as an indicator of product quality (e.g., Ba and Pavlou 2002; Dewan and Hsu 2004). Higher average star rating of the search set thus implies that potentially better quality restaurants have been accessed and considered during the search process. In addition to the rating-based quality measure, the average *popularity* of the restaurants accessed was estimated by the total number of customer reviews received by the restaurants. Restaurants that have received a lot of customer reviews are likely to be highly popular and well-known to the public, whereas those with fewer reviews may not have received as much attention by the public and tend to be the hard-to-find ones (i.e., the "*long tail*" of restaurants, Anderson 2006). Overall, by examining the coherence, average star rating, and average popularity of the restaurants in the search set, we hope to gain a deeper understanding on subjects' product search processes.

As demonstrated earlier, conditions with connected tags lead to a more diagnostic search process than conditions with disconnected tags and with no tags. Indeed, an examination of the coherence of subjects' search set and the average star rating of the restaurants in their search set indicated that subjects who were provided with connected tags also had a more coherent ($F(2, 162) = 9.89$, $p<.00$) and more highly-rated ($F(2, 162) = 16.16$, $p<.00$) search set than those who were not provided with connected tags. This

implies that connected tags can facilitate information seekers to access relevant restaurants in a logical way based on their preferences, thus supporting an effective evaluation and comparison process. Connected tags also lead seekers to access generally higher-quality restaurants during the process (as indicated by higher star rating), plausibly because product search based on tags tends to reduce the random "trial and error" accesses. Overall, the results on the actual coherence and average star rating of the search set have provided further evidence to the impacts of connected tags on search diagnosticity. The presence of featured users, however, does not have significant influence on these two aspects.

Furthermore, in order to gain deeper insights into the influence of featured users on inducing serendipity, we investigated the average popularity of the restaurants in subjects' search sets since unexpected pleasant findings can usually be those hard-to-find, "long tail" products. The results show that featured users generally led to the discovery of restaurants with lower popularity, as indicated by significantly fewer customer reviews received by the restaurants (F(1, 162) = 7.73, p<.01). This implies that accessibility to featured users' profiles enables information seekers to find those less well-known or "long-tail" products during the search process, and these encounters are likely to be considered as hard-to-find and novel. But since we are interested in a process that can be considered truly serendipitous, having novel encounters may not be enough – these novel encounters and their related discoveries should also be considered as of high quality and thus useful to information seekers. As shown above, the provision of connected tags enables information seekers to access generally more high-quality alternatives pertaining to their interests. Hence, when connected tags are provided, the presence of featured users

helps create a highly serendipitous search process – due to both the novel encounters and the related high-quality alternatives discovered en route. This thus provides further evidence to the interaction effects between connected tags and featured users on search serendipity.

Supplementary Analysis 2 – Decision Quality: To further understand the outcome of diagnostic and serendipitous search processes, we also looked at subjects' decision quality. Since this study involves a preferential choice problem, there is no objectively the best choice (David et al. 2007; Kuhlthau 1991). We thus measured subjects' perceived decision quality[11] and tested the effects of subjects' product search experience on their decision quality. The results show that both perceived diagnosticity (Beta = .18, p<.05) and perceived serendipity (Beta = .39, p<.00) are significant contributors to decision quality. Furthermore, following the mediation test procedure outlined in Baron and Kenny (1986), we found that perceived diagnosticity and serendipity actually fully mediate the effects of product tags and featured users on decision quality. Hence, it is evident that understanding users' product search experience as affected by alternative designs is critically important and useful. Particularly, our findings show that a good final choice can result from a diagnostic process which enables a coherent and effective way of product search and comparison, and also a serendipitous process which reveals unexpected pleasant findings en route. While diagnosticity has received much attention from web designers, our findings suggest that serendipity should also be an important

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[11] Perceived decision quality is measured using three items (based on Pereira 2001): (1) I made a good decision when picking restaurants; (2) I believe that my choice of restaurant meets my needs well; and (3) I am happy with my choice of restaurant on this website.

dimension of search experience that is worth considering when evaluating the benefits of the social Web (e.g., André et al. 2009; Foster and Ford 2003).

3.7 IMPLICATIONS OF FINDINGS

Despite the heated discussions on the Web 2.0 phenomena, significant research progress on users' information behavior in such context is yet to be made. On e-commerce product search websites, what has been amazing is the number of new emerging social features invented to influence users' online search experience. This study focuses on two of the latest and most popular design features based on user-generated contents on SPS websites – product tags and featured users – and examines their effects on information seekers' product search experience. This is also in line with the goal of design-science research, which is to build and evaluate purposeful and innovative IT artifacts to solve identified problems (Hevner et al. 2004). While laboratory experiment is usually preferred as a rigorous and highly controllable way to investigate the effects of alternative designs, this is difficult, if not impossible, in the study of social-network-based website features because it is almost practically infeasible to perform experimental manipulations on a commercial platform with a large amount of user-generated data and a vibrant online community. Fortunately, through collaborating with one of the largest social-network-based product search websites in China, this study evaluated these design features in a well-controlled lab experiment using real data about products, users, and user-generated information. To the best of our knowledge, this is the first research study to do so. Such a research setting allows us to clearly investigate the separate and joint influence of the two specific website features (i.e., product tags and featured users) on information seekers' search experience. As a result, this study has several theoretical and practical implications.

The increased attention paid to information seekers' online search behavior gives rise to questions regarding how to organize the massive amounts of products and the related user-generated information to facilitate navigation and search. Information Foraging Theory has been a popular theory for understanding how information seekers choose their search paths. At its core is the premise that individuals follow high-scent cues to navigate, expecting useful information to be obtained with lost cost. In the current study, product tags and featured users represent different typical types of information scent – i.e., product-attribute-based and people-based – on the social Web. Connecting products through tags is demonstrated to be an effective design to facilitate a diagnostic search process, as the ease of accessing related products enables information seekers to assess the relative quality of all the products that suits their needs. Being able to conveniently seek information from featured users may also improve decision making by obtaining new knowledge and broadening the search scope. The additional analysis indeed reveals that these people-based navigational cues can be helpful in revealing those products less well-known by the general population based on the rich experiences of featured community users, making information seekers feel that their findings are novel. Overall, this study extends Information Foraging Theory by considering different types of "scent" designs on social product-search websites and suggesting that these designs may induce distinct information behaviors.

Information Foraging Theory is also largely silent regarding how information seekers process or make use of information along specific paths, especially when different types of navigational cues coexist and jointly influence seekers' search behavior. In the context of product search and choice making, seekers' selection of information

cues to follow reflects their dynamic search goals or evaluation criteria. They may conduct a thorough investigation following a particular path, or they may switch between different search paths because various encounters en route change their ongoing information requirements or processing strategies. In this regard, theories and studies on human decision making have contended that humans are adaptive decision makers, and often maintain a mix of structured and opportunistic information processing. Our study reveals an interaction effect between the two distinct design mechanisms, i.e., when connectivity with featured users is coupled with connected product tags, information seekers will be able to more effectively recognize and make use of the unplanned but valuable findings. In this regard, this study provides further empirical evidences to theories and studies on adaptive human decision making in the context of SPS websites.

In relation to various navigational cues and information processing styles, this study stresses that information seekers usually may not just stick to a particular search goal or follow a particular search direction. At times they may deviate from their existing search paths to explore and discover interesting things. They often acquire useful information through incidental or serendipitous discoveries that are less related to the original intent (e.g., André et al., 2009; Toms, 2000), as they may not recognize something they really want until they actually see it (Zhang et al. 2009). Such an adaptive discovery process which frees seekers from a constrained view and prepares them for deriving value from unanticipated information also improves their decision quality significantly. However, information search and retrieval in traditional information systems has put much emphasis on concepts such as relevance and convergence, largely ignoring the aspect of serendipity. Hence, the present study fills in this research gap and

advocates that divergent and serendipitous encounters complement a convergent and relevant search pertaining to a specific agenda. Together, they provide a holistic approach to study information acquisition and decision making.

Indeed, a number of computer scientists have attempted to develop systems that deliberately induce serendipity (e.g., Beale 2007; Lieberman 1995), but most of these systems have focused on the shallower aspect, i.e., encouraging chance encounters by simply providing a diverse range of information. As a result, the triggering mechanism and thus the navigational trails are still far from being logically and fully understood (Toms, 2000). The interaction effects between product tags and featured users in our study suggests that the critical design factor to induce serendipity on SPS websites is not only to provide opportunities of diversified encounters, but also to facilitate establishing search scopes and keeping clear trace of search paths, as well as effective investigation around the diverse findings. For example, without connected tags to facilitate focused and high-quality search along particular criteria, the presence of featured users which may deliver diversified and novel information does not seem to create a more serendipitous experience than the absence of such cues. One plausible reason is that further investigation based on the unexpected findings from featured users is costly due to the lack of attribute-based product tags that can be directly accessed; as a result, users may be reluctant to make a switch from the current search direction.

Overall, we have shown that theories on information foraging, social information foraging, and adaptive decision making can be integrated into a meaningful whole in studying user behavior on SPS websites. We consider it as a fruitful approach that allows

us to better understand how people learn and make decisions on online social-network-based platforms.

For website designers, the most direct message is that organizing and exploiting the potential of online social networks and large-scale user-generated contents is crucial. Merely providing isolated information for individual products is not enough; rather, enabling linkages between the information so as to construct a well-connected product network is important. In this way, individuals' ability of resource seeking and evaluation can be largely improved. On the other hand, by identifying and providing convenient access to other experienced users within the community, the website can encourage the flow of novel and informative knowledge within the social network, i.e., inducing more serendipitous discoveries. This implies that experienced and influential individuals within social networks may increase the exposure and recognition of various interesting but less well-known products in the market because of their social embeddedness and modeling role. Hence, website owners and designers should be clear about the power of different forms of design mechanisms built upon the user-generated contents. In particular, although each mechanism has its unique capability in influencing user experience, a deeper understanding of how they complement or substitute for each other is essential to help website designers decide how to combine them on a platform in order to elicit their full potential. In sum, the key success factor for every Web 2.0 company is to build an effective linkage structure that makes the best use of user-generated contents on its platform. This forms a virtuous cycle – creating better value for users based on the information provided by them.

3.8 LIMITATIONS AND FUTURE RESEARCH

This study is not without limitations. First, it considers only one type of product, i.e., restaurants. This may impede the generalizability of our findings. Different products may influence people's desire to contribute information or express feelings; hence the number of tags or the extent of product connectivity can differ. For example, many tagging systems nowadays are applied to experience products or services such as movies, books, and music, because they are usually associated with various subjective and idiosyncratic views rather than objective and standard descriptions (Nelson 1970). Furthermore, information seekers' need for social information in making judgment may also vary depending on the nature of the products. In other words, when evaluating certain products or services, such as hotels, consumers may value information from other users and rely on such information; but for some other products, e.g., computer hard disks, consumers may prefer to develop their own evaluation based on the objective product descriptions and pay less attention to other users' opinions (e.g., Bei et al. 2004). In our case, since the information for assessing restaurants is mostly experience-based and information seekers who search for restaurants tend to be open to word-of-mouth information, we believe restaurant search is a proper context to investigate the effects of user-generated information. However, readers are cautioned against over-generalizing the findings to other products or services.

Second, the findings of our study are best applied to product search tasks where there exists a general search goal such that users tend to perform scent-based information foraging (e.g., search for a restaurant for friends' gathering). They cannot directly address many of the other ways in which users might use tags and social networks. For example,

people may browse information completely out of curiosity or entertainment, without a general search goal or direction. They may just be interested in the latest news or what others have been doing, which represents a form of lightweight learning (e.g., Millen et al., 2006). In contrast, extremely goal-oriented shoppers might have highly specific preferences such as buying a certain brand or a specific item. They aim to find the item as efficiently as possible and may ignore diverse cues that do not exhibit direct relevance to the search goal. Hence, the effects of tag-based product connectivity and social connectivity with featured users may be different for different search tasks.

The recent emergence of Web 2.0-related applications has transformed the Web from an information pool to a platform for social interactions and knowledge sharing. Increasingly more websites are exploiting the power of resource sharing and user connection to help information seekers make better decisions. While this study demonstrates that information seekers can benefit from knowledge shared by others whom they may not have known previously (be it through tags or featured users' profiles) another interesting possibility is to enable connection to users' acquaintances on the website, e.g., Flixster.com allows visitors to directly seek advice from their friends who are online. This also highlights a form of dynamic and synchronous user interaction beyond the connection to static user profiles. One promising application which aims at facilitating such real-time user connectivity within existing social networks is Facebook Connect, which works with various websites to bring users' identity and existing social connections to their online shopping. Hence, future research could investigate website features based on social information and connectivity between users who are acquainted with each other.

Besides investigating how different website designs facilitate information search activities, future studies could also look at how they influence the development and maintenance of online communities. For example, collaborative tagging, besides being a way to share and connect products, may also be a channel to identify similar people in the community. Indeed, on websites such as Flickr.com and Amazon.com, there are already clear evidences of communication and ad-hoc social clique formation through tags (Hotho et al. 2006; Mathes 2004). Other website mechanisms such as those that enable reciprocal behaviors, e.g., giving compliments to a product recommender and replying to a product review, have also been recognized as a way to keep the user community lively and well-tended.

CHPATER 4 STUDY III: CONSUMER PERSUASION THROUGH SPONSORED PRODUCT REVIEW

4.1 INTRODUCTION

In the era of *Web 2.0*, e-commerce business review and rating websites have become increasingly popular. For example, consumers can comment on restaurants throughout the United States and Canada on Yelp.com; they can also share their travel experiences and opinions on hotels in different cities on TripAdvisor.com. These consumer ratings and reviews are usually deemed as reliable references for potential customers since they are written by ordinary consumers, who are supposed to have no ulterior motives such as making sales commissions.

Indeed, such consumer-generated information is the most valuable asset of these websites. Nonetheless, this information is usually available for free and seldom plays a role in directly generating revenue for the websites. Recently, some of these websites have started allowing registered businesses to select their favorite consumer review, i.e., one that evaluates the business favorably and may thus help attract more customers, and to feature it prominently at the top of their web pages. This review is then highlighted and demarcated as the "sponsor's favorite", which we refer to as the *sponsored review*[12]. This service usually comes with a fee, e.g., Yelp.com allows businesses registered on its website to pay to join such sponsorship program (around $300-$1000 per month, Bowling 2009). Apparently, posting a sponsored review is to prioritize a positive piece of

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[12] Appendix D provides a screen capture of the web page of a sponsoring sports bar "Bowlmor Lanes" on Yelp.com. The sponsored review is demarcated as "One of Bowlmor Lanes' Favorite Reviews".

product information for website visitors, as the law of primacy suggests that information appearing at the beginning always tend to attract more attention and exert a greater impact (Rosnow 1966).

Hence, for the business, the sponsored review can be a way to create a positive first impression in potential customers, and ultimately leading to more customer patronages. While the abundance of consumer review information in the age of *Web 2.0* can severely hit the reputations of businesses due to the rapid viral propagation (Ferrand 2009; Miller 2009), using sponsored reviews for marketing purposes can thus somewhat tilt the balance of power back to the businesses. For the review platform, sponsored reviews become a new revenue-generating channel making use of the valuable information assets, adding to the traditional way of monetizing user traffic, e.g., by attracting advertisers to invest in banner advertisements (Karen I. 2003). Indeed, recent report from Interactive Advertising Bureau (IAB) has revealed that revenues from the traditional advertising channels have been declining substantially (Erickson 2009). Hence, studying the design and impacts of new revenue channels such as the sponsored review is of practical importance. Indeed, ABC.com[13], one of the largest business rating and review platforms for the food and beverage (F&B) industry in China with over ten million registered users and four-hundred thousand registered businesses, has also been considering such a sponsorship strategy and approached the authors for consultation on its implementation.

Employing consumer reviews as a marketing vehicle for product vendors is not a recent development. Many previous studies have looked at the impact of online consumer

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[13] We mask the real name of the company due to a non-disclosure agreement.

ratings and reviews on product sales (e.g., Chevalier and Mayzlin 2006) as well as the related concepts such as "word-of-mouth" or viral marketing (Howard 2005). However, marketing through sponsored reviews creates a unique and more complicated context – although a sponsored review is a spontaneous and unsolicited message just like other reviews, being selected and highlighted by a specific business also makes its persuasive motive evident. This is opposed to "undercover marketing" in which consumers do not realize they are being marketed to (Steinberg 2000), and also differs from direct promotional messages from salespersons. Overall, being customer-generated yet also an explicit "marketer's favorite" makes sponsored review a controversial marketing weapon.

Indeed, past studies have yielded a considerable amount of knowledge about consumers' responses to marketing messages (Friestad and Wright 1994). One aspect that has attracted much attention is how consumers perceive the motives or authenticity of the message (Hilton et al. 1993). Typically, when a consumer suspects a salesperson's motives, the persuasive impact of her sales messages may be diluted (Eagly et al. 1978). In the case of a sponsored review, suspicion may not be directed to the reviewer, but to the business being reviewed, as it intentionally selects and highlights the review. Moreover, while most previous studies focus on a salesperson's presentations in a relatively simple information environment, a sponsored review is usually presented in a rich information context with many other consumer reviews. Different information environments may lead to different inferences on the motive or authenticity of the sponsored message. Investigating the persuasive effect of a sponsored review in a rich information context is thus likely to add new insights into the attribution and persuasion literature.

Hence, this research is driven by both the practical and theoretical needs of exploring the design and effectiveness of sponsored reviews on online product evaluation platforms. In particular, we examine individuals' consumption intention[14] as influenced by the informative and persuasive messages presented on the business' review web page, since consumption intention has been the most proximal predictor of actual consumption behavior (Fishbein and Ajzen 1975). Specifically, a series of four experiments are conducted to explore the persuasive effects of the sponsored review. Experiment One and Two examine the potential persuasive effects of a top-placed salient positive review and whether credibility concern may dilute such effects. Experiment Three places the sponsored review in different information contexts and investigates the interplay between the content of the sponsored review and its congruence with other reviews. Experiment Four varies the product evaluations conveyed by other ordinary reviews and further investigates the factor of the heterogeneity of rating opinions across other reviews. The findings are then summarized and their implications are discussed.

4.2 LITERATURE REVIEW

4.2.1 The Salience Effect of Top-placed Information

Salience is an aspect of a stimulus that makes it stand apart from other similar stimuli due to either its inherent characteristics or its context (Raghubir and Valenzuela 2006). There is a large literature that shows more salient information tends to exhibit larger impacts on users' decision making because of the high prominence and visibility (e.g., Fiske and

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[14] In this study, consumption intention refers to consumers' intention to purchase or consume a product or service, which is similar to the concept of purchase intention in many other studies.

Taylor 1989). In the current context, the presentation of a sponsored review of being the first and highlighted in the review list makes it a salient piece of information. In particular, prior research has identified an important salience effect due to information ordering, namely, *primacy effect*, which refers to users' tendency to be strongly influenced by the first item in a list (Haugtvedt and Wegener 1994; Rosnow 1966). In online environments, there has been an abundance of evidence that supports such effect (Ansari and Mela 2003; Breugelmans et al. 2007; Drèze and Zufryden 2004; Hofacker and Murphy 2005), such as lists of product recommendations, search results, and sponsored ads. Several reasons have been offered to explain it. First, the first items in a list have less competition from other items for limited memory capacity, and are thus processed at a deeper level (Waugh and Norman 1965). Second, since items presented early serve as anchoring points for comparison, they are more often rehearsed and retrieved, thus being more cognitively accessible (Kardes and Sanbonmatsu 1993; Krosnick and Alwin 1987). Also, individuals will, in many cases, try to minimize cognitive costs and thus base their decision on the first acceptable information rather than diligently search a long list of information (Krosnick and Alwin 1987). Overall, in our context, this suggests that prioritizing and highlighting a positive user review can potentially be an effective marketing strategy because users tend to process and remember this information due to its salience.

4.2.2 Attributional Processing and Sales Tactics

One implicit premise of the salience effect is that people do not have doubt on the motive and credibility of the salient information and thus make use of it without extra thoughts. According to Attribution Theory, users are often drawn to seek causes and sources of

events (Heider 1958; Kelley 1973; Kelley 1967; Schank and Abelson 1977). In particular, causal attribution frequently occurs during cognitive processing of information and the derived causal inferences will be stored in memory along with the original stimulus information (Hastie 1984; Sherman and Titus 1982; Smith and Miller 1979). The attributional inferences will then influence the perceived credibility and thus the eventual persuasive power of the information. Specifically, consumers usually generate either a suspicion-oriented or a customer-oriented attribution of persuasive motives (DeCarlo 2005; Kirmani and Campbell 2004). A suspicion-oriented attribution is one where consumer considers that the marketer has an ulterior motive such as promoting the business without much consideration for customers (Fein 1996). For example, a consumer tends to suspect that a salesperson's behavior is motivated by a desire to make a sales commission, hence she may not take the information at the face value, at least until the suspicion have been resolved (Friestad and Wright 1994). A customer-oriented attribution, on the other hand, characterizes the marketer with an altruistic motive, e.g., to provide factual product information to help consumers reach an informed decision. For example, Ariely's experiment (2008) has found that subjects rated the product better after reading a positive review that was said to be from consumer reports compared to reading the same review that was said to be from an actual store. Accordingly, in the current context, if users have doubt on the motives of the sponsored review, then their processing of this message does not guarantee attitudes formation based on it (Fein 1996; Hilton et al. 1993; Vonk 1998).

Attribution theory has often been used to explain users' attributional process, i.e., how users attribute causes to the events. According to Eagly, Chaiken and Wood (1981),

people often expect an information communicator to take a particular stand based on her self-interests or pressures. If she actually conveys the message as expected, recipients tend to attribute the message to personal interests, e.g., a salesperson using a hard-sell message is assumed to aim at earning sales commissions. Such attribution leads recipients to discredit the message's validity. However, if the communicator conveys a position which is contrary to expectations, then she will be perceived as being relatively unbiased and telling the truths (e.g., DeCarlo 2005). For example, if a salesperson presents a balanced and fair view of the product, then it is likely to trigger customer-oriented attributions and be taken as the actual product quality. This is based on the expectation-confirmation approach in the Attribution Theory (Kelley 1972), which also underlies many other persuasion studies.

Just as a salesperson is naturally associated with the motive of influencing people to buy a product or service (Rule et al. 1985), a sponsored review is naturally deemed as intending to promote the target business. Based on the Attribution Theory and related empirical studies, specific presentations of a sponsored review may actually hold an opportunity to confirm or disconfirm a consumer's suspicion about it. For example, while traditional advertising messages usually describe products in a purely favorable light (Eisend 2006), research has suggested that "two-sided" advertising messages, i.e., those involving both the positive and negative aspects of the target product[15], can be useful in enhancing credibility (Crowley and Hoyer 1994; Eisend 2006). Indeed, a consumer review may at times involve both the good and bad sides of the product experience and it is possible that users tend to treat a two-sided sponsored review as a more trustworthy

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[15] A two-sided marketing message covers both positive and negative aspects of the product, although the overall tone of the message is typically to advocate the product.

ordinary review. This may then leads to greater commitment to this information (e.g., Karmarkar and Tormala 2010; Wood and Eagly 1981). Otherwise, if the sponsored review turns out to be entirely filled with positive evaluation, which confirms consumers' suspicion-based expectations, consumers would potentially form a stereotypic salesperson impression in their memory. In this case, consumers may discount the honesty or credibility of the product attribute claims made by it and be inhibited from being strongly influenced by it.

Overall, we expect that the persuasive effect of a top-placed, salient positive review is potentially evident in the online environment as it is expected to be processed at a deep level and thus highly accessible when users make judgment (Kardes and Sanbonmatsu 1993; Waugh and Norman 1965). However, such effect further depends on the attributional processing on this information. It is plausible that a positive ordinary review makes consumers process it automatically without much attributional thoughts, thereby achieving the salience effect. However, an explicit "sponsored" label may provoke consumers' attributional thinking on the motives and credibility of this positive message, and if the credibility concern is not alleviated, the salience effect may be largely weakened. This is examined in Experiment One.

4.3 EXPERIMENT ONE: THE SALIENCE EFFECT

4.3.1 Experimental Website Design

An experiment was conducted to test the expected effects. We used a real restaurant which served Chinese Szechuan cuisine and the actual consumer reviews of this restaurant as posted on ABC.com. For the experiment purpose, we renamed the restaurant

so that it appeared unknown to the subjects and thus there was no prior attitudes towards it. We selected a number of consumer reviews which made the overall numerical rating of the restaurant to be around 3.5-star (on a 1-5 rating scale) as this represented an average quality restaurant according to the dataset shared by ABC.com. We then developed our experimental web pages with a different user interface and domain name from ABC.com. The restaurant web page included the restaurant's name, overall star rating (i.e., 3.5-star), address, famous dishes, a picture of its typical dish, and a list of user reviews. Each user review was associated with a corresponding star rating, the reviewer's nickname, thumbnail picture, and the date of post. We provided star rating as a salient visual cue to indicate the overall judgment conveyed by each review, as utilization of star ratings in reviews had been the de facto standard for many product review platforms due to their easy coding and interpretation.

Three different web page conditions were created: top-placed 5-star sponsored review condition, top-placed 5-star non-sponsored review condition, and random sequence condition. Specifically, in the sponsored review condition, the first review in the review list is highlighted and explicitly labeled as the restaurant's "sponsored" review. This review is associated with a numerical rating of 5-star (i.e., the highest rating on a 1-5 rating scale). Just as 5-star hotels are often considered as high-quality hotels, a 5-star rating associated with a consumer review indicates a highly positive evaluation and is often the case for sponsored reviews. For example, according to our observations, around 88% of the sponsored F&B businesses on Yelp.com (i.e., 210 businesses out of the total 237 sampled) chose a 5-star consumer review as their sponsored review. The specific content of the sponsored review is included in Appendix E. Basically, this review

strongly advocates the restaurant by describing several delicious dishes as well as the good location and cheap price. Other reviews of this restaurant are presented below the sponsored review in a random order. A screen capture of the web page in this condition is shown in Appendix F.1.

In the non-sponsored review condition, the layout and information provided on the web page is exactly the same as that in the sponsored review condition, except that the first highlighted review is explicitly labeled as the "latest" review. That is, the same 5-star review is prioritized and highlighted, but it is indicated as the latest review for the restaurant. The purpose of creating this condition is to examine the salience effect of a positive review without an obvious marketing motive, although in reality the latest review is not guaranteed positive. A screen capture of the web page in this condition is shown in Appendix F.2.

In the random sequence condition, the same list of reviews as in the other two conditions is used but the display sequence of these reviews is randomized upon each refreshing of the web page. Hence, different subjects are exposed to a different sequence of the reviews and there is an equal chance for any one of the reviews to appear as the first one. The first review is not particularly highlighted nor with any particular label. This condition thus approximates the real-life scenario where no particular mechanism is employed to display user reviews. A screen capture of a web page sample in this condition is shown in Appendix F.3.

Overall, the factual restaurant information including all the user reviews is kept uniform across the three conditions.

4.3.2 Sample Selection and Experimental Procedure

A total of 75 undergraduate and graduate students were recruited from a major university in Shanghai, with each condition consisting of 25 subjects. Subjects were assigned randomly to one of the three conditions and asked to fill in a pre-experimental questionnaire measuring their demographic information. They then read the descriptions about the experimental task as well as the features of the web page. Particularly, subjects were asked to imagine that they planned to dine out in the coming weekend and wanted to evaluate whether this restaurant could be a good choice. They were then asked to browse the restaurant web page as they would normally do and they were allowed to view it for as long as they desired. Subjects in the sponsored review and non-sponsored review conditions also read the descriptions about the nature of the first review before browsing the web page. After browsing the restaurant web page, they were asked to fill in a post-experimental questionnaire. Each subject was paid RMB30 (around US$5) as a participation reward.

The measurement items for consumption intention are adapted from Coyle and Thorson (2001): (1) It is likely that I will dine in the restaurant, (2) I look forward to dining in the restaurant, and (3) I will try the restaurant the next time I dine out. As this study was conducted using Chinese subjects, the questionnaire was translated into Chinese first and a backward translation method was used to ensure the consistency between the Chinese and English versions of the questionnaire.

4.3.3 Data Analysis and Results

The subjects were recruited from 15 academic departments, representing diverse

background. The average age was 22.6. There was no difference in terms of their

demographic information or Internet experience across conditions.

4.3.3.1 Results on Consumption Intention

The Cronbach's alpha for the measurement of consumption intention is 0.93. ANOVA on

consumption intention shows a significant difference among the three conditions ($F_{(2, 72)} = 4.59$, $p < .05$) (see Table 4.1). Post hoc analysis based on Scheffe test reveals that

presenting a top-placed positive non-sponsored review (Mean=5.45, SD=1.17) leads to

significantly higher consumption intention than randomly displaying the reviews

(Mean=4.22, SD=1.69; $p < .05$), but presenting a sponsored review (Mean=4.71, SD=1.42)

does not differ from the random sequence condition (see Table 4.2).

Table 4.1: ANOVA Table for Consumption Intention in Experiment One					
		df	Mean Square	F	Sig.
Consumption Intention	Between Groups	2	9.55	4.59	.01
	Within Groups	72	2.08		
	Total	74			

Table 4.2: Multiple Comparisons on Consumption Intention in Experiment One					
Dependent Variable	(I) session	(J) session	Mean Difference (I-J)	Std. Error	Sig.
Consumption Intention	Sponsored	Non-sponsored	-.75	.41	.19
		Random	.48	.41	.50
	Non-sponsored	Sponsored	.75	.41	.19
		Random	1.23 (*)	.41	.01

	Random	Sponsored	-.48	.41	.50
		Non-sponsored	-1.23 (*)	.41	.01

* The mean difference is significant at the .05 level.

4.3.3.2 Additional Analysis on Eye Movement

In order to provide actual evidences on subjects' attention to the review information during the experiment, 13 subjects in each condition browsed the experimental web page using an eye tracker[16]. The eye-tracker used was Tobii X60, which was a stand-alone monitor-based unit. The eye tracking technology was integrated into the single unit, so it did not distract the subjects during the experiment. It allowed subjects to move their head in a relatively natural manner without dampening the accuracy in capturing eye movement. Particularly, subjects were first calibrated with the eye tracking unit by looking at a moving red dot on the screen. The calibration took less than 30 seconds. After the calibration was successful, subjects were presented with the experimental instructions and the experimental website. Subjects were monitored by the experimenter during the experiment to ensure the accuracy of capturing eye movements.

Tobii eye-tracking software was used to analyze the eye tracking data. The software captures various look zone metrics based on the areas of interest selected by the researcher. Since we were particularly interested in subjects' attention to the reviews on the web page, the time spent on individual reviews (total fixation duration) was a relevant measure. Accordingly, the regions where each individual review occupied on each webpage were selected (i.e., Areas of Interest) and the output in terms of the time spent viewing these regions is reported below.

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[16] Due to time and equipment constraints, we did not test all the subjects using the eye-tracking machine.

First of all, the results show that the first review generally attracts longer gaze time than average subsequent reviews in the list (see Table 4.3; p<.001). Moreover, ANOVA on total fixation duration (seconds) on the first review shows a significant difference among the three review presentation conditions (F (2, 36) = 4.55, p<.05) (see Table 4.3 and 4.4). Post hoc analysis based on Scheffe test reveals that the sponsored review attracts significantly longer gaze time than a normal first review in the random condition (on average, p<.05) (see Table 4.5).

Table 4.3: Means of Total Fixation Duration in Experiment One

	on First Review	on Subsequent Reviews (average)
Sponsored	22.63	10.67
Non-sponsored	17.24	8.75
Random	15.07 (average)	9.42

Table 4.4: ANOVA Table for Total Fixation Duration on the First Review in Experiment One

		df	Mean Square	F	Sig.
Total Fixation Duration on the First Review	Between Groups	2	196.669	4.55	.02
	Within Groups	36	43.229		
	Total	38			

Table 4.5: Multiple Comparisons on Total Fixation Duration on the First Review in Experiment One

Dependent Variable	(I) session	(J) session	Mean Difference (I-J)	Std. Error	Sig.
Total Fixation Duration on the First Review	Sponsored	Non-sponsored	5.38	2.58	.13
		Random	7.56 (*)	2.58	.02
	Non-sponsored	Sponsored	-5.38	2.58	.13
		Random	2.17	2.58	.70
	Random	Sponsored	-7.56(*)	2.58	.02
		Non-sponsored	-2.17	2.58	.70

* The mean difference is significant at the .05 level.

4.3.4 Discussion of Results

The results of Experiment One suggest that the salience effect indeed takes place on review platforms. By prioritizing and highlighting a highly positive review, consumers' judgment can be positively influenced, as shown by the superior effect of presenting a 5-star non-sponsored (latest) review. A highly positive sponsored review does attract a lot of attention; however, it does not achieve the intended persuasive effect. This is plausibly because users are concerned about the credibility of the sponsored information; hence they may be cautious about relying on it to make decision. The next experiment thus examines whether alleviating the credibility concern for a sponsored review can restore its persuasive effect as comparable to a salient non-sponsored review.

4.4 EXPERIMENT TWO: REVIEW SIDEDNESS AND ATTRIBUTIONAL PROCESSING

As indicated by studies on Attribution Theory, it is possible to influence consumers' trust on a marketing message by employing particular sales presentations or tactics (e.g., Campbell and Kirmani 2000). One such mechanism is to employ a two-sided message, which addresses both the good and bad sides of the product experience while remaining an overall positive tone. A two-sided message may tend to disconfirm consumers' expectation of an entirely complimentary advertising message, which helps alleviate consumers' concern about information bias. Accordingly, we expect that a two-sided sponsored review that conveys a dominant positive tone but also includes some negative aspects of the product may induce higher perceived credibility and thus acceptance of the

message (e.g., Karmarkar and Tormala 2010; Wood and Eagly 1981). In contrast, if the sponsored review turns out to be entirely filled with positive evaluation, as it was in Experiment One, then consumers would tend to attribute it to the marketer's deliberate intention to promote the product and thus do not base on it for decision making.

4.4.1 Experimental Website Design and Procedure

Experiment Two employs a 2 (type of the first review: sponsored vs. non-sponsored) * 2 (content of the first review: one-sided vs. two-sided) between-subject design. Four web pages similar to those in the sponsored and non-sponsored conditions in Experiment One were created, except that the first 5-star review is either one-sided or two-sided. Particularly, a one-sided review presents only the positive aspects of the restaurant, such as food quality, price, etc. This is the same sponsored (or latest) review as used in Experiment One. A two-sided review, on the other hand, contains the positive comments identical to those in the one-sided review, as well as some minor points that are not so satisfactory (see Appendix G). We expect that while a one-sided sponsored review may not be able to achieve the intended persuasive effect as a one-sided non-sponsored review does, a two-sided sponsored review may alleviate the credibility concern and hence achieve persuasive impacts comparable to a two-sided non-sponsored review.

A different batch of 80 undergraduate and graduate students were recruited from the same university, with each condition 20 subjects. The experimental procedures and incentives were similar to those in Experiment One.

4.4.2 Data Analysis and Results

The subjects were recruited from 14 academic departments. The average age was 20.9.

Although content sidedness is an objective manipulation, we did a manipulation check on

subjects' perceived review sidedness[17]. The results showed significant difference between

one-sided and two-sided conditions ($M_1 = 3.65$, $M_2 = 4.44$; $F (1, 78) = 13.04$, $p<.01$);

hence the manipulation was successful.

4.4.2.1 Results on Consumption Intention

There is a significant interaction effects between the type of the first review and the

sidedness of the first review on consumption intention ($F(1, 76) = 4.20$, $p<.5$; see Table

4.6 and Figure 4.1). The simple main effect analysis shows that the non-sponsored (latest)

review condition leads to significantly higher consumption intention than the sponsored

review condition when the first highlighted review is one-sided (Mean (non-sponsored) =

4.6, Mean (sponsored) = 3.67; $F (1, 38) = 6.81$, $p<.05$), but not when the first highlighted

review is two-sided (Mean (non-sponsored) = 4.22, Mean (sponsored) = 4.30). In other

words, with the same information context, presenting a two-sided sponsored review leads

to significantly higher consumption intention than presenting a one-sided sponsored

review.

Table 4.6: Main and Interaction Effects on Consumption Intention in Experiment Two				
Source	**df**	**Mean Square**	**F**	**Sig.**
Type of First Review	1	3.61	2.94	.09
Content Sidedness	1	.31	.25	.61

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[17] The manipulation check items for perceived sidedness are: (1) the sponsored review
states both the strengths and weaknesses of the restaurant; and (2) the sponsored review
presents an unbiased view of the restaurant.

Type of First Review * Content Sidedness	1	5.17	4.20	.04

Figure 4.1: Plots of Interaction Effects on Consumption Intention in Experiment Two
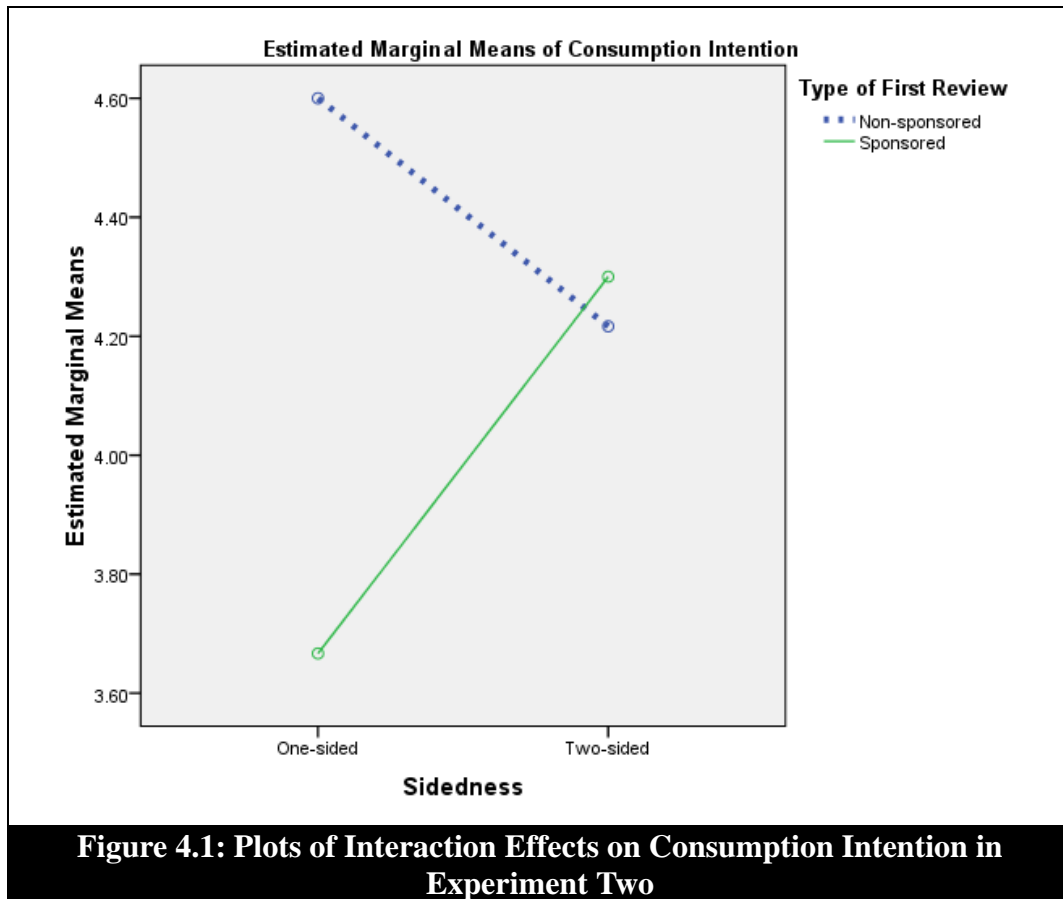
4.4.3 Discussion of Results

Overall, Experiment Two continues the investigation in Experiment One and shows that while the difference in the persuasive effects of a one-sided sponsored review and a one-sided non-sponsored review is quite significant, a two-sided sponsored review can actually achieve comparable persuasive effects as a two-sided non-sponsored review. A plausible reason is that the two-sided content alleviates subjects' credibility concern about the sponsored review, making it more likely to be accepted and used in decision making than a one-sided sponsored review. To further clarify the attributional process,

we also measured and tested users' perceived trustworthiness of the top-placed review, i.e., whether they perceive the sponsored or latest review as trustworthy and honest[18]. The results show that a two-sided sponsored review is perceived to be significantly more trustworthy than a one-sided sponsored review ($M_1 = 3.57$, $M_2 = 4.33$; $F(1, 38) = 4.9$, $p<.05$), whereas for a non-sponsored review, sidedness does not have a significant effect on its trustworthiness.

Together, Experiment One and Two demonstrate that for an average product, presenting a salient sponsored review has the potential to positively influence users' judgment if users' doubt on its motives and credibility is alleviated. This is based on the Attribution Theory (Kelley 1972), which states that people often draw inferences to understand the causes of others' behaviors and such inferences are stored in memory together with the original information. Hence, while the salience effect suggests that the sponsored message should be processed and remembered well, its actual persuasive impact will further depend on whether users attribute it as a valid and reliable source.

However, the attributional processing and persuasive impact of a marketing message is usually not only determined by its content per se. Indeed, previous studies have noted that the effect of a single message may depend on further information structure and contextual variables (Eisend 2006). Particularly, the Attribution Theory suggests that people often judge the cause of a particular behavior based on the consensus of multiple sources of information (Kelley 1972). On a product review platform,

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[18] The items used to measure perceived trustworthiness of the first review are: (1) I think the first review conveys an honest opinion on the restaurant; (2) I think the first review is trustworthy; and (2) I think the first review is suspicious. The Cronbach's alpha for this measurement scale is 0.9.

sponsored review will always be followed by other ordinary reviews which may or may not convey the same viewpoints. The next experiment thus varies the information context and examines the sponsored review in different contexts. We expect that a direct and effective way to attribute the marketer's motive is to examine whether the product evaluation conveyed in the sponsored review is generally in line with other reviews.

4.5 EXPERIMENT THREE: REVIEW SIDEDNESS AND CONGRUENCE

In Experiment Three, we introduce the factor of *congruence*, i.e., the extent to which other ordinary reviews following the sponsored review generally convey product evaluation agreeable to that of the sponsored review. Following the previous two experiments, our basic proposition is that depending on whether the information context makes consumers' suspicion-oriented attribution salient or not, the sidedness of the sponsored review will induce different effects on consumption intention.

The Attribution Theory (Kelley 1972) posits that one of the most important ways to judge a communicator's motive is to look at the consensus among a group of people on the idea presented. If most people do not like the idea but the communicator, i.e., the marketer in the current context, wants to push the idea to the recipients, then the ulterior motive (i.e., product selling) becomes salient and the message credibility is reduced. Hence, when other reviews collectively give a negative evaluation whereas the marketer still highlights a sponsored review that strongly advocates the product, a consumer's suspicion of the marketer's ulterior motives will be highly salient. A one-sided sponsored review may further confirm this negative expectation of a pushy marketer, which intensifies consumers' resistance in accepting the information. This will likely result in

an unintended and even adverse persuasive effect. If, however, the marketer disconfirms this expectation by choosing a seemingly fair review, e.g., one that addresses both the strengths and weaknesses of the product, then consumers' suspicion is likely to be discounted (Eagly et al. 1978). This may in turn boost the acceptance and persuasive effects of the review since its overall tone is still in favor of the product (e.g., Karmarkar and Tormala 2010; Wood and Eagly 1981).

In contrast, when the communicator advocates a position that is in accord with the viewpoint of other relevant information sources, e.g., a consensus on a high evaluation of a product, consumers may infer the marketer's motives as benign and thus be certain about the high quality of the target product. Hence, when other reviews collectively convey a positive product evaluation congruent with the sponsored review, consumers will develop favorable product judgments regardless of whether the sponsored review conveys a balanced view or not. In other words, the content sidedness of a single sponsored review may induce minimal difference in further enhancing consumption intention in the case of congruence.

Overall, we expect that there is an interaction effect between a sponsored review's sidedness and its congruence with other reviews on consumption intention, i.e., a two-sided sponsored review will lead to higher consumption intention than a one-sided sponsored review when the sponsored review is incongruent with other reviews but not when they are congruent with each other.

4.5.1 Experimental Website Design and Procedure

Experiment Three focuses on the effects of sponsored review and employs a 2 (two-sided vs. one-sided content) * 2 (low vs. high congruence) between-subject design. Four web pages with similar layout as in the sponsored conditions of previous experiments are created. The same Szechuan cuisine restaurant and its sponsored reviews were used; in addition, other ordinary reviews of this restaurant were also presented below the sponsored review in a random order.

The sponsored review was still associated with a 5-star rating. The manipulations for review sidedness were the same as in Experiment Two. The factor of congruence was manipulated at two levels based on the star ratings of all the reviews. In the high congruence condition, other reviews convey mostly positive opinions regarding the restaurant, with an overall average rating of 4.0-star, which is generally in line with the 5-star sponsored review. In the low congruence condition, other reviews mostly convey moderate to low opinions, with an overall average rating of 2.8-star, which largely differs from the 5-star sponsored review. All the reviews were actual reviews sourced from ABC.com.

A different batch of 128 undergraduate and graduate students were recruited from the same university, with each condition 32 subjects. The experimental procedures and incentives were similar to those in the previous studies.

4.5.2 Data Analysis and Results

The subjects were recruited from 16 academic departments. The average age was 21.4. Results of manipulation checks showed significant differences in both perceived

sidedness ($M_1 = 3.25$, $M_2 = 4.82$; $F (1, 126) = 62.27$, $p<.001$) and perceived congruence[19] ($M_L = 3.06$, $M_H = 5.22$; $F (1, 126) = 148.78$, $p<.001$). Hence, both manipulations were successful.

4.5.2.1 Results on Consumption Intention

There is a significant main effect of congruence on consumption intention ($F (1, 122) = 56.76$, $p<.001$; see Table 4.7 and Figure 4.2). There is also a significant interaction effect between congruence and content sidedness ($F (1, 122) = 6.72$, $p<.05$). The simple main effect analysis shows that a two-sided sponsored review leads to higher consumption intention than a one-sided one when the sponsored review is incongruent with other reviews ($M_1 = 3.16$, $M_2 = 3.88$; $F (1, 62) = 4.96$, $p<.05$) but not when they are congruent ($M_1 = 5.40$, $M_2 = 4.93$). The results thus confirm with our expectations.

Table 4.7: Main and Interaction Effects on Consumption Intention in Experiment Three				
Source	**df**	**Mean Square**	**F**	**Sig.**
Congruence	1	85.62	56.76	.00
Sidedness	1	1.66	1.10	.30
Congruence * Sidedness	1	10.14	6.72	.01

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[19] The manipulation check items for perceived congruence include: the overall product evaluation conveyed in the sponsored review (1) is generally congruent with that conveyed in many other reviews; (2) does not differ from that conveyed in many other reviews.

Figure 4.2 Plots of Interaction Effects on Consumption Intention in Experiment Three
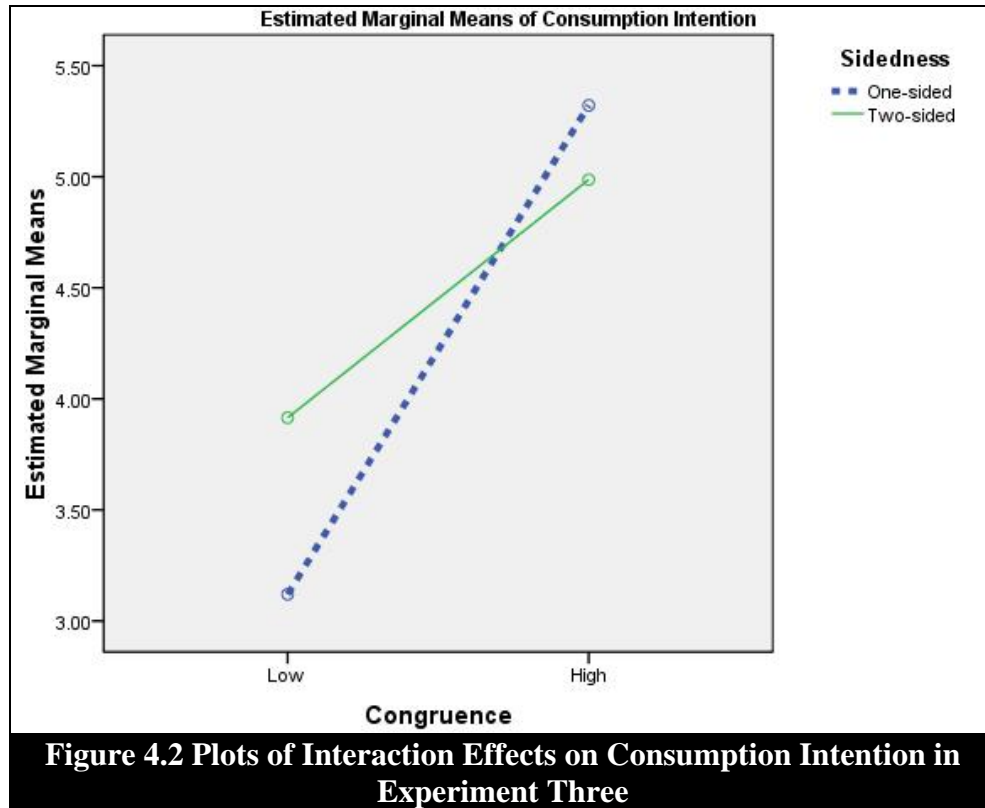
4.5.3 Discussion of Results

The results of Experiment Three show that when other reviews in general express favorable opinions about the product, which are congruent with the sponsored review, consumers tend to generate a heightened consumption intention regardless of the sidedness of the sponsored review. However, when other reviews generally convey negative (i.e., incongruent) evaluations, a seemingly balanced sponsored review will be more effective in inducing consumption intention. Indeed, the results on perceived trustworthiness of the sponsored review show that a two-sided sponsored review is perceived to be more trustworthy than a one-sided sponsored review ($M_1 = 3.52$, $M_2 = 4.11$; $F(1, 62) = 3.01$, $p=.08$) in the case of incongruence; whereas in congruence conditions, sidedness does not have significant effects on users' trust perceptions ($M_1 = 5.53$, $M_2 = 5.43$). In other words, when the information environment heightens

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consumers' negative attribution to the marketer's sponsored message, a two-sided sponsored message can achieve better persuasive effect than a one-sided message. However, the difference made by sidedness is not evident when other reviews are also in favor of the product, which allays consumers' suspicion due to the overall positive information context.

Congruence in Experiment Three was manipulated based on a comparison between the sponsored review's star rating and the *average* rating of other follow-up reviews. A related concern is that these follow-up reviews may not be consistent among themselves, i.e., there may be substantial variation among the ratings of these individual reviews. For example, an average 4-star consumer rating for a product may have been achieved in two different ways. First, the reviews can be highly consistent among each other, with the majority giving a 4-star rating. Alternatively, the reviews can be quite heterogeneous, with many 5-star ratings as well as many other 3-star or 2-star ratings. Thus, in comparing the former and latter scenarios, each may have quite a different distribution or variance of evaluation ratings in spite of having the same average score (4-star). The latter case may occur quite often for experience products such as restaurants, since consumers usually have vastly diverse tastes and preferences and hence may evaluate the same product differently.

Indeed, previous marketing studies have noted that valence inconsistency of different information sources usually creates uncertainty and hence consumers may fail to form a clear, well-defined impression of the target product (e.g., Herr et al. 1991). This uncertainty considerably weakens the influence of aggregate group opinions (e.g., Quester and Steyer 2010) and often prompts a change in consumers' judgment towards

moderation (Cialdini et al. 1973; Herr et al. 1991; Jaccard and Wood 1988). Recent

studies on online reviews also suggest that variation in ratings are as important as the

mean of ratings in predicting growth in sales (e.g., Clemons et al. 2006), as consumers'

product evaluations may deviate from an average view depending on the level of

variation. In Experiment Three, however, variation among the ordinary reviews was

assumed to be low in the theoretical development and was not controlled for in different

experimental conditions[20]. The aggregate information based on ordinary reviews was

generally clear enough to assist judgment. However, questions arise when this aggregate

information can no longer be easily interpreted due to the heterogeneity of these reviews.

We thus conduct Experiment Four with strict controls on the variation across other

review ratings. The purpose is to investigate the influence of the sponsored review in the

presence of other generally congruent or incongruent reviews with high or low levels of

heterogeneity among them.

4.6 EXPERIMENT FOUR: REVIEW SIDEDNESS, CONGRUENCE, AND HETEROGENEITY

Following and adding to the previous experiments, in Experiment Four, we introduce the

factor *heterogeneity*, i.e., the extent to which other ordinary reviews presented after the

sponsored review convey consistent product evaluation with one another.

According to the Attribution Theory (Kelley 1972), people often draw inferences

to understand the causes and implications of others' actions; however, this ability can be

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[20] In Experiment Three, the variance of star ratings of all ordinary reviews is 0.8 in high congruence conditions and 1.1 in low congruence conditions, which are both close to the low heterogeneity conditions in Experiment Four.

threatened when uncertainty increases (Griffin 1997). In particular, uncertainty arises when contradictory evidence is present and users are unsure about what has actually happened (e.g., Park and Han 2008). For example, product reviews written by different reviewers often convey contradictory evaluations due to the subjective nature of personal tastes and preferences. This may create uncertainty in potential consumers' product judgment (e.g., Park and Han 2008).

Experiment Three demonstrates that a two-sided, balanced sponsored review tends to exert a stronger persuasive effect than a one-sided review when other reviews generally convey less favorable product evaluations, i.e., incongruence. The assumption here is that the collective supporting or non-supporting stand of other reviews can be clearly observed, so that consumers can confidently interpret the sponsor's motive and make judgment based on the aggregate information. However, in many cases, these ordinary reviews can be highly heterogeneous. Consumers may not find a consensus opinion, and thus feel uncertain about relying on the general congruence or incongruence of opinions only.

Uncertainty usually induces negative attitudes as it hinders understanding of situations and curtails confidence in how to judge and behave (Jaccard and Wood 1988; Van den Bos and Lind 2002). As a result, people tend to be more "close-minded" or conservative about their attitudes under uncertain situations (e.g., McGregor et al. 2001). Past studies have suggested that a consumer's subjective value associated with a product is derived from an average of the value based on all the information, which is then discounted according to the level of uncertainty (Meyer 1981; Ross and Creyer 1992). Typically, in order to make judgment confidently, people always feel a need to eliminate

the uncertainty or make it cognitively manageable (e.g., Van den Bos and Lind 2002). In the current context, the sponsored review may indeed play a role in this process, e.g., in reducing consumers' uncertainty on a positive aggregate evaluation.

Specifically, if the average rating of the follow-up reviews is high (i.e., congruent with the sponsored review) but there is a mixture of positive and negative ratings, consumers will be confronted with mixed feelings and become uncertain about whether to evaluate the product positively. In this case, a balanced sponsored review which disconfirms consumers' expectation of a pushy marketing message tends to reduce the perceived bias of the message and promote greater acceptance (e.g., Karmarkar and Tormala 2010; Wood and Eagly 1981). In particular, it may leave consumers with the impression that the product is of high quality, albeit with tolerable imperfections, which concurs with the generally positive but divergent information context. Hence, consumers can be more confident in interpreting and resolving the differences in opinions and tend to develop an overall favorable product impression with higher certainty. If, however, the sponsored review does not reveal any negative aspects of the product despite the obvious presence of other negative opinions, then it tends to intensify consumers' suspicion of this sponsored message and its information credibility. This is likely to cause consumers to be even more hesitant in judging the product positively. Overall, with averagely positive but heterogeneous follow-up reviews, a two-sided sponsored review is more effective in reducing consumers' uncertainty in the overall product favorability and in encouraging consumption behaviors than a one-sided sponsored review.

On the contrary, when the follow-up reviews convey averagely low product evaluations (i.e., incongruent with the sponsored review), but which vary greatly in the

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rating scores, consumers may be uncertain about this average negativity because of the considerable amount of positive opinions presented (e.g., Park and Han 2008). Indeed, the uncertainty about the general negativity caused by the heterogeneous reviews in the environment likely induces consumers' positive judgmental shift (e.g., Herr et al. 1991; Jaccard and Wood 1988). This case thus differs from the case of incongruence with low heterogeneity in that although consumers are still aware of the general negative evaluation based on many ordinary reviews, the heterogeneity of these reviews induces uncertainty and thus dilutes the overall negativity. In other words, this uncertainty and other existing favorable opinions tend to make consumers perceive the positive sponsored review as somewhat reasonable and credible. Hence, whether the sponsored content is one-sided or two-sided may not make a large difference. In summary, with averagely negative but heterogeneous other reviews, the effect of a sponsored review's sidedness on product consumption behaviors will not be so evident.

Overall, following the previous experiments, we propose that the sidedness of the sponsored review will result in different influences according to the level of both congruence and heterogeneity. Particularly, we expect that there is a three-way interaction between the sidedness of a sponsored review, the congruence between the sponsored review and other ordinary reviews, and the heterogeneity of ordinary reviews on consumption intention, i.e.,

(1) When the heterogeneity is low, a two-sided sponsored review will lead to higher consumption intention than a one-sided sponsored review in the case of incongruence but not in the case of congruence (same as in Experiment Three).

(2) When the heterogeneity is high, a two-sided sponsored review will lead to higher consumption intention than a one-sided sponsored review in the case of congruence but not in the case of incongruence.

4.6.1 Experimental Website Design and Procedure

Eight web pages about the same restaurant similar to those used in Experiment Three were created for Experiment Four. The sponsored reviews in different conditions were all associated with a 5-star rating. All the consumer reviews were actual reviews sourced from ABC.com.

The manipulation for review sidedness was the same as in Experiment Two and Three. The factor of congruence was manipulated at two levels based on a comparison between the rating of the sponsored review (i.e., 5-star) and the average star rating of other follow-up reviews (averagely 4-star in the high congruence condition and 2.8-star in the low congruence condition). Heterogeneity was manipulated at two levels based on the variance of the star ratings of all the other reviews. In the high heterogeneity condition, the variance of all the star ratings is 2.2; whereas in the low heterogeneity condition, the variance is 0.9. In summary, we adopted a 2 (two-sided vs. one-sided content) * 2 (low vs. high congruence) * 2 (low vs. high heterogeneity) between-subject experimental design.

A different batch of 128 undergraduate and graduate students was recruited from the same university, with 16 subjects in each condition. The experimental procedures and incentives were similar to those of previous experiments.

4.6.2 Data Analysis and Results

The subjects were recruited from 17 academic departments. The average age was 22.3. Results of manipulation checks showed significant differences in perceived sidedness ($M_1 = 3.21$, $M_2 = 4.75$; $F (1, 126) = 70.33$, $p<.001$), perceived congruence ($M_L = 2.98$, $M_H = 4.67$; $F (1, 126) = 56.65$, $p<.001$), and perceived heterogeneity[21] ($M_L = 3.72$, $M_H = 4.55$; $F (1, 126) = 11.69$, $p<.01$). Hence, the three manipulations were all successful.

4.6.2.1 Results on Consumption Intention

There is a significant main effect of congruence and sidedness on consumption intention. There is no two-way interaction but there is a significant three-way interaction effect between the sidedness, congruence and heterogeneity ($F (1, 118) = 7.40$, $p<.01$; See Table 4.8, Table 4.9 and Figure 4.3). To understand the three-way interaction effect, a series of simple interaction effects tests was conducted. Results of ANOVA tests show significant two-way interaction effects between congruence and sidedness under both high ($F (1, 60) = 7.13$, $p<.05$) and low ($F (1, 60) = 4.61$, $p<.05$) heterogeneity conditions, but in contrasting patterns. Specifically, when the heterogeneity is low, a two-sided review will lead to higher consumption intention only in the case of incongruence ($F (1, 30) = 7$, $p<.05$), which concurs with the results of Experiment Three. In contrast, when the heterogeneity is high, a two-sided review will lead to higher consumption intention than a one-sided review only in the case of congruence ($F (1, 30) = 9.80$, $p<.01$). The results thus support our prediction.

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[21] The manipulation check items for perceived heterogeneity are: (1) other reviews demonstrate that these customers have similar overall impression of the restaurant; and (2) other reviews show a generally consistent overall evaluation of the restaurant.

Table 4.8: Main and Interaction Effects on Consumption Intention in Experiment Four				
Source	df	Mean Square	F	Sig.
Variation	1	.45	.32	.57
Congruence	1	35.77	25.72	.00
Sidedness	1	10.84	7.80	.01
Variation * Congruence	1	2.07	1.49	.23
Variation * Sidedness	1	.06	.04	.84
Congruence * Sidedness	1	.26	.18	.67
Variation * Congruence * Sidedness	1	10.29	7.40	.01

Table 4.9: Means and Standard Deviations of Consumption Intention in Experiment Four			
		Low Congruence	High Congruence
Low Variance	One-sided	3.02 (1.22)	4.96 (1.05)
	Two-sided	4.23 (1.36)	4.90 (1.09)
High Variance	One-sided	4.29 (.89)	4.33 (1.49)
	Two-sided	3.96 (1.59)	5.67 (.83)
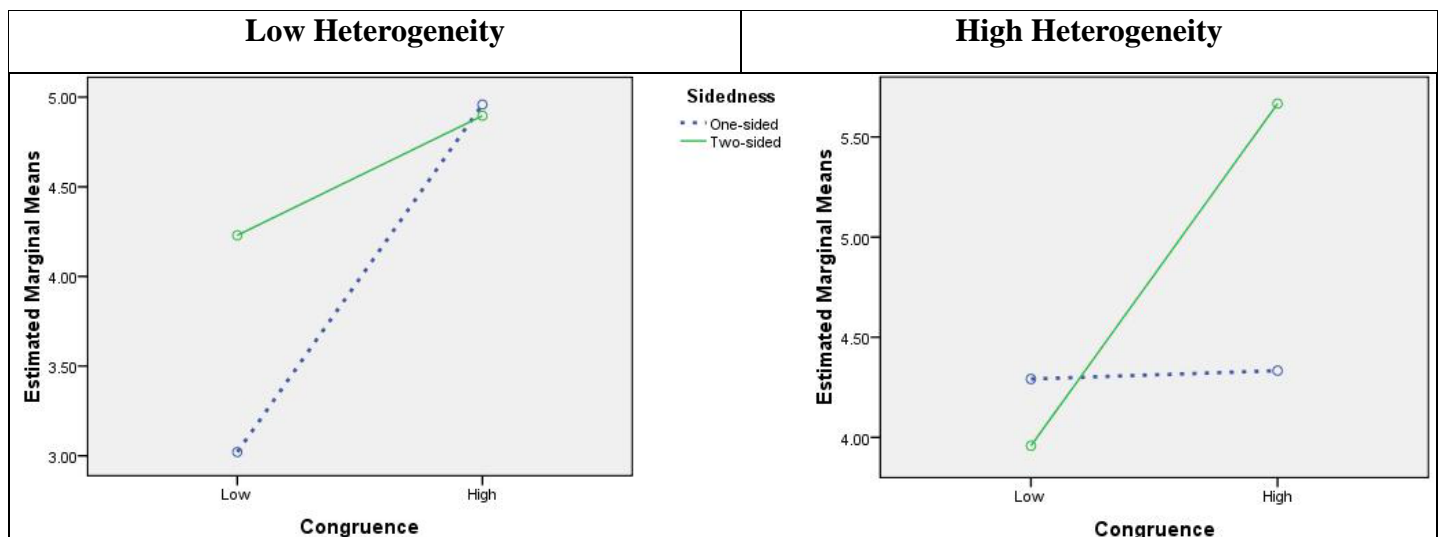
Figure 4.3: Plots of Interaction Effects on Consumption Intention in Experiment Four

4.6.3 Discussion of Results

This experiment demonstrates that, depending on the level of heterogeneity among other reviews, the pattern of the interaction between the sponsored review's sidedness and the congruence will differ. In particular, when the heterogeneity is relatively low, a two-sided sponsored review appears more credible and thus fosters greater persuasion than a one-sided review in the case of low congruence. In the case of high congruence with low heterogeneity, consumers can be quite certain about a positive product judgment, hence the sidedness does not have much impact. This interaction pattern also replicates that of Experiment Three.

However, when the heterogeneity is relatively high, the interaction pattern tends to be reversed. Specifically, a two-sided sponsored review helps consumers better interpret the divergent views and induces consumption behaviors in the case of high congruence. Whereas in the low congruence case, consumers will tend to shift their judgment towards a relatively positive direction due to the uncertainty caused by the mixed reviews in the environment. Hence, the effect of the sponsored review's sidedness becomes less evident.

Hence, by including both the factor of congruence and heterogeneity, we have presented a bigger and clearer picture of how the content of a sponsored review could exert various impacts on consumers' consumption intention.

4.7 GENERAL DISCUSSIONS AND IMPLICATIONS OF FINDINGS

With the abundance of user-generated information online nowadays, the line between marketable content and non-marketable content is becoming increasingly blurred

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(Ferguson and Ellen 2006). Presenting sponsored reviews represents a way of marketing for the businesses being reviewed through crowd-sourcing (Krudy 2010), i.e., sourcing for the most informed yet advantageous customer opinions of your business and using it to your benefit. It is also a brand new form of revenue generation for the web platform making use of its user-generated content. In studying the market impact of such messages, general theoretical frameworks of how consumers respond to persuasion attempts may still apply (i.e., persuasion knowledge model, Friestad and Wright 1994). At the core are consumers' attributions of the marketer's intent and the content of the persuasive message (e.g., DeCarlo 2005). Indeed, while credibility is usually attributed to true word-of-mouth sources (Ferguson and Ellen 2006), in today's online world where marketers can intentionally make use of word-of-mouth to mask their true quality, consumers may make different attributions to such messages and doubt their validity. The sponsored review, usually presented with a salient marketing intention, is a typical example which naturally raises consumers' concern about its validity and thus evokes coping mechanisms. Hence, in order to induce consumption behaviors as intended, attention should be paid to alleviating the validity concerns in addition to magnifying the persuasive tone. For example, a one-sided sponsored review, although putting the product in more strongly favorable light as compared to a two-sided review, does not seem to exhibit a more favorable impact on product consumption. Hence, while previous studies suggest that unfavorable product information may have a considerable detrimental effect on consumption behavior (e.g., Ba and Pavlou 2002; Eisend 2006), our study shows that including aspects of unfavorable information in sponsored messages may actually achieve unexpected positive effects.

More specifically, since the sponsored review exhibits its influence within a rich information context, a particular presentation of a sponsored review may have different impacts depending on the information context. According to the Attribution Theory, people always make causal explanations for marketplace activities, and cues in the information environment can be used to facilitate such casual inferences. Our study shows that the congruence between the sponsored review and other ordinary reviews is a salient cue that aids consumers in inferring the motives of the sponsored review. If congruence is not observed, suspicion-oriented attribution becomes highly evident; in this case, a two-sided sponsored review may disconfirm and lower such suspicion, exhibiting a positive persuasive impact. However, this positive effect holds true only when other information is consistent among themselves, so that the aggregate unfavorable evaluation can be clearly understood. If, on the contrary, information in the environment exhibits high heterogeneity, then consumers will be conservative about making a positive judgment even if the average opinion is favorable to the product – plausibly due to the uncertainty caused by information inconsistency. In this case, a two-sided sponsored review again encourages consumption behaviors – by making the overall information environment less discordant and easier to interpret. In summary, it is the contention between the sponsored content, its congruence with the information context, and the heterogeneity within the context that determines the persuasive power of the sponsored message. The four reported experiments thus constitute a detailed response to the call for a more thorough understanding of two-sided advertising (Crowley and Hoyer 1994; Eisend 2006) and enhance the Attribution Theory by identifying important information dimensions that matter in consumers' response to persuasive stimuli. This also adds to the

adaptive selling literature (e.g., Sujan 1986) by demonstrating how a marketer should

adapt her promoting behaviors according to the specific information environment.

Overall, this study integrates research in consumer persuasion, attribution process,

and judgment under uncertainty in the increasingly socialized online platforms. It extends

the traditional stream of research, which focuses on the direct salesperson-consumer

interaction, to a more complicated context. This is a context where marketers may be able

to promote businesses without designing their own sales messages, and where consumers

may also be more sophisticated so that a very small "hint" of ulterior intent will be

sufficient to elicit significant backlash. Indeed, strategic usage of consumer reviews has

been an emerging phenomenon in today's online world but little research has been done

to investigate whether and how consumers cope with persuasive messages in such

contexts (e.g., Dellarocas 2003; Hu et al. 2009). Our study starts this investigation by

looking at a relatively more explicit and ethical form of strategic use of consumer reviews,

i.e., the sponsored review. The findings are expected to improve our understanding of

how consumers use causal attributions when dealing with such a persuasion encounter,

and how the marketer's strategic choice of review causes consumers to deflect their

suspicions and stimulate consumption.

This research is driven by practical needs and also provides some concrete

suggestions on how to choose and present the sponsored review so that a business can

benefit from it. Specifically, since a sponsored review is clearly identified as the

marketer's favorite review, managing consumer suspicion should be the primary

consideration when selecting and presenting the review. While some people may

probably assume that the sponsored review will not work for businesses whose public

consensus evaluation has been generally unsatisfactory, our research has actually shown that there might be a potential lifeline here. For example, even in the case when general consumer reviews unanimously conveyed low product evaluations (i.e., incongruence with low heterogeneity), presenting a two-sided sponsored review still achieved an above 4 positive rating on average (on a 7-point scale) in terms of consumption intention. From this perspective, presenting a deliberately-selected sponsored review actually provides the low-rated businesses an opportunity to advocate themselves in a wise, credible and prudent way[22].

4.8 LIMITATIONS AND FUTURE RESEARCH

This study is not without its limitations. First, this study only considered one type of business, i.e., F&B industry, which consumers can evaluate effectively after their experience. However, some professional services, such as those provided by accountants, lawyers, or health professionals (i.e., credence products), have many attributes that consumers do not have the knowledge or ability to evaluate. As a result, potential consumers may not treat ordinary reviews as important and reliable information to base their judgment on, regardless of different presentations or contexts. Having said that, since restaurants have been one of the major business categories on today's online review platforms and besides, the first practice of sponsored review, i.e., by Yelp.com, also targeted restaurants, we believe our choice of experimental product can be considered representative and well suited for the current research.

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[22] According to our observation, around 42.2% of the sponsored F&B businesses on Yelp.com have an overall rating of 3.5-star or lower, which is relatively low compared to the average rating of all F&B businesses registered on Yelp.

Second, this study looks at a product which users have no prior knowledge or experience on. In other words, the findings in this study are more applicable to the promotion of new or unknown products, because in this case, the sponsored review is the first piece of detailed product information exposed to users. Hence, a scenario that needs to be addressed in future research is the case in which a favorable or unfavorable prior attitude exists. It is possible that users' prior product attitudes, the content of sponsored review, and other reviews on the information page may interact with each other in influencing users' judgment formation.

Third, the findings of the present study may also be limited by the use of college student subjects. Students are generally young consumers and heavy Internet users; they may tend to rely more on the online information and resources when making judgments. Older consumers, on the other hand, may be more experienced and sophisticated when dealing with persuasion tasks as well as Internet marketing mechanisms. An investigation along these lines would help to further refine our understanding of how consumers deal with online marketing attempts. Nonetheless, we expect that the theoretical basis of consumer attribution and judgment under uncertainty is still valid and pertinent.

Further research can look into other factors which may also influence the persuasive effect of online promotion messages. For example, consumers visiting a highly reputable web platform may tend to be less suspicious about the information presented on the platform, including sponsored reviews, as they may think that the platform has controlled and maintained a high level of information quality and validity (Sia et al. 2009). Also, the design of web atmosphere which influences consumers' mood may also affect their processing of advertising messages. For example, happy people may

tend to discount the effects of ulterior motives because they are less likely to

systematically process all the information in the situation (Forgas 1998). In summary,

there is certainly ample room for future research to contribute to a better understanding of

various online marketing strategies.

CHAPTER 5 CONCLUSION

This thesis has focused on two themes of Internet technologies and applications that are particularly important to e-commerce. One is multimedia and VR technologies, and the other is social media applications based on user-generated information. The thesis consists of three empirical studies: Study One explores multimedia-based product presentation design on B2C e-commerce websites, and Study Two and Three focus on social information and applications on social product search and review websites.

Study One identifies the research gaps in the literature of multimedia-based product presentations and interaction design, and proposes a novel design concept, namely, incomplete interaction design. Particularly, the study compares three different presentation designs in terms of their impacts on enticing users to try the real products offline. The findings reveal a non-linear effect of product interactivity design, i.e., a design with incomplete interactivity may outperform both a non-interactive design and a highly interactive design in enticing consumers. Moreover, such enticing effect is more evident for users with more knowledge about the product class.

Study Two seeks to gain more insights into how the increasingly prevalent user-driven designs and social features on e-commerce websites create values for consumers. It focuses on users' product search in the social context and how it is shaped by different social search mechanisms. Particularly, two distinct types of social search mechanisms are of interest, i.e., attribute-based connected product tags and social connections to featured community users. The findings reveal the individual and interaction effects of the two search mechanisms on the diagnosticity and serendipity of users' search process.

Study Three continues to look at the social commerce context but focuses on how businesses (i.e., product vendors) can make use of and derive value from user-generated information. It investigates the persuasive effects of a controversial marketing vehicle based on user reviews, i.e., sponsored review. The findings from a series of four experiments demonstrate an interesting interplay among the sponsored review content, its congruence with the social information context, and the heterogeneity of opinions in the context itself.

These three studies are believed to contribute to both the academia and the practitioner arenas. Particularly, Study One reveals the unique value of a smart but incomplete interactivity design, which is intriguing given that previous studies have assumed a design can be either fully interactive or passive and reported inconclusive evidence about the comparisons. The perspective of leveraging IT-based design to influence consumers' cross-channel behavior is theoretically novel and practically important. The study also makes significant theoretical contributions by extending a well-known theory in cognitive psychology to the new context of online interactivity design, and enhances it by proposing a facilitating design factor, i.e., awareness cues, and an important boundary condition, i.e., users' existing product-class knowledge. Practically, this study provides important insights into how to smartly design interactive technology to achieve the intended effect. It suggests that the most complex and costly technology may not always be necessary and it is important to understand user psychology before designing "persuasive technology".

In the domain of multimedia-based interaction design, there is plenty of room for future research to conduct deeper investigations. For example, pertaining to the concept

of incomplete interaction design, future studies could examine whether different degrees of incompleteness will produce different effects. Also, how to specifically design the awareness-provoking cues during an online task deserves further investigations. In general, the existence of various interaction design possibilities facilitated by multimedia and VR technologies in the online environment points to the need for future development of theory-based design guidelines.

On the other hand, as social applications become increasingly popular in various aspects of life, social information and features have also emerged on e-commerce platforms. Study Two in this thesis tests how specific social features shape users' product search on a social product-search platform using real data of products, users, and user-generated information. Based on Information Foraging Theory, it provides a better understanding of product search behavior in social commerce environment and also extends the theory by considering different types of search cue designs. Different from prior information search and retrieval studies that have put much emphasis on relevance and convergence, this study advocates that a holistic understanding of users' search behavior in a social setting also includes the aspect of serendipity. Particularly, it reveals that different social mechanisms will induce distinct user behaviors and an integral use will lead to highly serendipitous discoveries. Practically, this study provides guidance on how to organize and exploit the potential of online social network and large-scale user-generated information. It also reveals an interesting role of experienced users in the community based on their social embeddedness and modeling role. Overall, it emphasizes the importance to understand the unique capability of different social mechanisms and their complementarities.

Besides the value of social applications in enriching consumers' informational experience online, Study Three turns the attention to businesses' marketing capabilities on the social commerce platforms. It integrates traditional research in consumer persuasion, attribution process, and judgment under uncertainty and extends this stream of research to a more complicated context. This is a context where businesses can promote their products using consumer-generated information and where various different sources of information coexist with the marketing message. The study provides a more thorough understanding of marketing message design in a rich social information context (Crowley and Hoyer 1994; Eisend 2006). Particularly, it suggests that businesses should bear in mind the mechanism of "adaptive selling" (e.g., Sujan 1986), i.e., to adopt the appropriate user endorsement according to their specific information environment.

Overall, increasingly more social commerce platforms are exploiting the power of social participation and user connection to create values for consumers and for businesses (i.e., the product vendors). Besides those investigated in this thesis, another interesting mechanism is to enable connection to consumers' acquaintances on the website so that they can directly get information and recommendations from the familiar people. This highlights a form of dynamic and synchronous user interaction beyond the connection to static user profiles, which deserves in-depth future research. Also, besides investigating how different social features facilitate users' information search activities, future studies should also look at how they influence the development and maintenance of online communities. This is an important aspect that social commerce platforms such as SPS websites are concerned about, because whether they can maintain a healthy community

and keep attracting high-quality social participation determines the development and sustainability of their business.

In a related vein, while making use of the user-generated data to help product vendors conduct effective marketing may create new revenue channels for the social platform, a critical question is whether there will be negative reaction from consumers towards the information platform itself due to the increasing penetration of advertisement. Indeed, while sponsored review represents a relatively ethical form of marketing because of the explicit label, with the abundance of user-generated information online and the various ways of presentation, the line between marketing content and non-marketing content could be increasingly blurred (Ferguson and Ellen 2006). The social commerce platforms thus need to think about how to achieve a balance between the power of consumers, i.e., those who contribute information to and also seek information from the platform, and of businesses, i.e., those who provide the products and are also a major source of revenue for the platform. Future studies could thus explore other potential forms of ethical and non-intrusive marketing tactics based on social information as well as ways to empower businesses through healthy business-consumer interactions. For example, some SPS websites (e.g., Tripadvisor.com) have started to allow registered businesses to reply to consumer reviews, thus providing an opportunity for businesses to communicate with individual consumers. Overall, there are certainly plenty of chances for future research to contribute to a better understanding of mechanisms on social commerce websites.

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APPENDIX A: FLOW CHART ILLUSTRATIONS OF THE THREE PRODUCT PRESENTATIONS

Flow charts of the non-interactive design, triggered interaction VPE, and full interaction VPE demonstrating part of steps of the photo editing function are illustrated.

(Legend:

 explains the steps that are demonstrated automatically without user interaction;

 explains the steps that require user interaction.)

1. No Interaction:

The demo automatically enters the *Menu*.

The demo automatically enters *Camera* function.

The demo automatically enters *Gallery* sub-function.

The demo automatically selects a photo from the gallery.

The demo automatically goes through the available editing effects on the selected photo.

When demonstrating *Adding a frame* effect,

The demo automatically selects a frame to apply to the selected photo.

2. Triggered Interaction VPE:

The demo automatically enters the *Menu*.

The demo automatically enters *Camera* function.

The demo automatically enters *Gallery* sub-function.

The demo suspends and waits for the user's input...

Then photo editing interface follows...

The demo then automatically goes through the available editing effects on the selected photo.

If the user clicks on the "Edit" button,

When demonstrating *Adding a frame* effect, the demo suspends and waits for the user's input...

Then the selected frame is applied to the selected photo, and the effect preview interface follows...

If the user clicks on the "Select" button,

3. Full Interaction VPE:

The user can directly access function *Calls* through the shortcut key or enter the *Menu*.

If the user enters the menu, she can choose a function, such as *Camera*.

If the user selects *Camera* function, she can choose a sub-function, such as *Gallery*.

The user can choose a photo in the gallery that she would like to edit.

The user can choose an effect that she would like to apply to the selected photo.

If the user chooses to *Add a frame* to the selected photo, she can choose an available frame.

APPENDIX B: SCREEN CAPTURE OF EXPERIMENTAL WEB PAGE WITH CONNECTED TAGS AND FEATURED USERS

Notes:

1. The sections of "restaurant name, location and contact information", "User review", and "Map" are provided for all the six conditions.

2. The section of "Tags" is only provided in conditions with connected tags and disconnected tags; but tags in the disconnected condition are not hyperlinked.

3. The section of "Featured Users" is only provided in the condition with featured users.

APPENDIX C: MEASUREMENT ITEMS FOR DIAGNOSTICITY AND SERENDIPITY

Perceived diagnosticity of the product search process (Adapted from Jiang and Benbasat 2004; Kempf and Smith 1998):

- This website helps me to systematically and effectively search among and compare many different restaurants in order to find the most suitable one.

- This website helps me to effectively evaluate the restaurants I browsed during the search process based on information from other consumers.

- Through this website I can quickly obtain a good understanding on the main features of the restaurants that I browsed during the search process.

- This website provides me a chance to search among and assess many restaurants in a systematic and effective way.

Perceived serendipity of the product search process (Adapted from Parboteeah et al. 2009):

- The restaurant search experience I just had helped me discover some restaurants which suit my needs but I had not planned for.

- My restaurant search on this website provided some unexpected but useful findings.

- During the search process I encountered many good restaurants which worth a try but were beyond my initial search plans.

- The website experience provided me with some surprising yet interesting findings about restaurants during the search process.

APPENDIX D: SCREEN CAPTURE OF A PRODUCT WEB PAGE WITH SPONSORED REVIEW ON YELP.COM

The Sponsored Review

APPENDIX E: THE CONTENT OF SPONSORED REVIEW

This restaurant has a great location, so it is quite accessible from many places. I went there to eat many times with my friends. It is so popular that it's usually quite difficult to get seated right away.

The more impressionable dishes were Sautéed Bullfrog in Chili Sauce and Catfish in Hot Chili Oil. The bullfrogs were really huge and the skin was absolutely delicious. The fish was very tender and fresh, while its flavor was just right! These two are really their specialties! The bold and spicy flavors were indulgingly wonderful!

The Steamed Pumpkin Stuffed with Glutinous Rice was also a great dish. It tasted good and the presentation looked attractive. The pumpkin was filled with glutinous rice and marmalade coated with sweet juices. I really liked it!

Many friends also liked the mashed potatoes. They tasted pretty good as well, more like an ice-cream dessert dish than a traditional side-dish.

In addition to the great-tasting dishes, the prices were quite reasonable. Maybe that's why this restaurant is so popular and packed.

*Notes: The above is the English translation of the sponsored review used in the experiment.

APPENDIX F: SCREEN CAPTURE OF EXPERIMENTAL WEB PAGES OF EXPERIMENT ONE

1.Sponsored Condition	

回到首页

新派川菜坊

★★★☆☆

地址: 黄浦区南京东路

网友推荐菜　水煮鲶鱼　馋嘴牛蛙　酸梅汤　钵钵鸡　糯米南瓜　麻酱油麦菜　口味猪蹄　土豆泥　飘香肥牛
川北凉粉　上上签　盆盆基围虾　毛血旺　干锅茶树菇　口水鲶鱼

点评

The Sponsored Review →

coolcci　　　　　　**新派川菜坊的赞助点评**
★★★★★ 2011-05-02 23:39
地段很好，从哪里过去都很方便的，，，所以经常和朋友去吃~~~ 每次去人气都是蛮足滴~~~
比较难忘的还是里面的馋嘴牛蛙，水煮鲶鱼的说~牛蛙么总是肉那么大块，皮那么好吃~鱼肉很嫩，味道也刚好~真的很招牌啊，辣得很过瘾！
还有那个糯米南瓜也不错的说，造型也很可爱，南瓜泥的模子里塞了糯米和蜜钱什么的还浇了甜甜的果汁~~ 喜欢的说~
还有很多朋友会喜欢土豆泥，呵呵，，，那个也蛮好吃的~~ 像冰激凌甜品什么的不像传统的~
价格也很实惠~~~ 所以每天生意都很火爆的说~~~

vylie
★★★☆☆ 2011-05-09 21:37
今天和同事到这家吃午饭，提前庆祝我生日。早就做好了功课，可是还没点完，姐就说太多了，吃不下的，只好作罢，事实证明姐姐是明智的，的确是吃不下，菜的分量挺足的。
不过，水煮鲶鱼一般，没什么特点，感觉特油（其实每个菜都很油了），配菜好像还不太新鲜。
牛蛙不错，油麦菜也有特色，口味猪蹄就不怎么样了，最后还是打包回家的。 口水鸡，这个点得比较后悔，貌似刚从冰箱里拿出来的，表面还有冻过的痕迹，不知道放多久了，咬了一口就没敢动了。。
因为我们是最后一桌走的，2点多服务员跑过来放了张单子，冷冰冰的说句，买单好伐？这个态度要批评！

公主Sissi
★★★★☆ 2011-04-30 16:21
比较适合多些朋友去~因为菜的量还是比较大的~口味相对来说已经经过改良~适合上海人的口味~
但就是人太多了~有一次我六点到~八点三刻才有位子~哎~而且是工作日哦~因为人比较多~而且大都是朋友相聚~难免高谈阔论一番~所以环境有些嘈杂~呵呵~不过还是很喜欢去它家吃饭的~

蜜桃的幸福
★★★☆☆ 2011-03-07 14:38
因为吃过很多地道的川菜，我对川菜是最苛刻的，所以嘛...一般般...不难吃...上海味大于川味吧。 我们点了大都是一些热门菜，味道还行

<table>
<tr>
<td>

2.Non-sponsored Condition

</td>
<td>

回到首页

新派川菜坊

★★★☆☆

地址: 黄浦区南京东路

网友推荐菜　水煮鲶鱼　馋嘴牛蛙　酸梅汤　钵钵鸡　糯米南瓜　麻酱油麦菜　口味猪蹄　土豆泥　飘香肥牛
川北凉粉　上上签　盆盆基围虾　毛血旺　干锅茶树菇　口水鲶鱼

点评

coolcci　　　　　　　　**最新点评**
★★★★★ 2011-05-09 23:39
地段很好，从哪里过去都很方便的，，，所以经常和朋友去吃~~~ 每次去人气都是蛮足滴~~~
比较难忘的还是里面的馋嘴牛蛙，水煮鲶鱼的说~牛蛙么总是肉那么大块，皮那么好吃~鱼肉很嫩，味道也刚好~其的很招牌啊，辣得很过瘾！
还有那个糯米南瓜也不错的说，造型也很可爱，南瓜泥的模子里塞了糯米和蜜钱什么的还浇了甜甜的果汁~~ 喜欢的说~
还有很多朋友会喜欢土豆泥，呵呵，，，那个也蛮好吃的~~ 像冰激凌甜品什么的不像传统的~
价格也很实惠~~~ 所以每天生意都很火爆的说~~~

vylie
★★★☆☆ 2011-05-02 21:37
今天和同事到这家吃午饭，提前庆祝我生日。早就做好了功课，可是还没点完，姐就说太多了，吃不下的，只好作罢，事实证明姐姐是明智的，的确是吃不下，菜的分量挺足的。
不过，水煮鲶鱼一般，没什么特点，感觉特油（其实每个菜都很油了），配菜好像还不太新鲜。
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因为我们是最后一桌走的，2点多服务员跑过来放了张单子，冷冰冰的说句，买单好伐？这个态度要批评！

公主Sissi
★★★★☆ 2011-04-30 16:21
比较适合多些朋友去~因为菜的量还是比较大的~口味相对来说已经经过改良~适合上海人的口味~
但就是人太多了~有一次我六点到~八点三刻才有位子~哎~而且是工作日哦~因为人比较多~而且大都是朋友相聚~难免高谈阔论一番~所以环境有些嘈杂~呵呵~不过还是很喜欢去它家吃饭的~

蜜桃的幸福
★★★☆☆ 2011-03-07 14:38
因为吃过很多地道的川菜，我对川菜是最苛刻的，所以嘛...一般般...不难吃...上海味大于川味吧。我们点了大都是一些热门菜，味道还行

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The Latest Review →

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3.Random Condition	

回到首页

新派川菜坊

★★★☆☆

地址: 黄浦区南京东路

网友推荐菜 水煮鲶鱼 馋嘴牛蛙 酸梅汤 钵钵鸡 糯米南瓜 麻酱油麦菜 口味猪蹄 土豆泥 飘香肥牛
川北凉粉 上上签 盆盆基围虾 毛血旺 干锅茶树菇 口水鲶鱼

点评

coolcci
★★★☆☆ 2011-05-09 23:39
今天和同事到这家吃午饭，提前庆祝我生日。早就做好了功课，可是还没点完，姐就说太多了，吃不下的，只好作罢，事实证明姐姐是明智的，的确是吃不下，菜的分量挺足的。
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vylie
★★★★☆ 2011-05-02 21:37
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因为吃过很多地道的川菜，我对川菜是最苛刻的，所以嘛...一般般...不难吃...上海味大于川味吧。 我们点了大都是一些热门菜，味道还行。不过馋嘴牛蛙和盆盆基围虾还是很不错的。还有就是麻酱油麦菜了，比较清口。
不过那天运气不是最好，旁边的一桌，坐的都是一些中年男子，香烟是一根接着一根的抽，怪呛人的。这就是中餐馆的缺点，从来不分吸烟区和非吸烟区。

蜜桃的幸福
★★★★★ 2011-03-07 14:38
地段很好，从哪里过去都很方便的，，所以经常和朋友去吃~~~ 每次去人气都是蛮足滴~~~
比较难忘的还是里面的馋嘴牛蛙，水煮鲶鱼的说~牛蛙么总是肉那么大块，皮那么好吃~鱼肉很嫩，味道也刚好~真的很招牌啊，辣得很过瘾！

APPENDIX G: THE CONTENT OF TWO-SIDED SPONSORED REVIEW

This restaurant has a great location, so it is quite accessible from many places. I went there to eat many times with my friends. It is so popular that it's usually quite difficult to get seated right away.

LIKES: The more impressionable dishes were Sautéed Bullfrog in Chili Sauce and Catfish in Hot Chili Oil. The bullfrogs were really huge and the skin was absolutely delicious. The fish was very tender and fresh, while its flavor was just right! These two are really their specialties! The bold and spicy flavors were indulgingly wonderful!

The Steamed Pumpkin Stuffed with Glutinous Rice was also a great dish. It tasted good and the presentation looked attractive. The pumpkin was filled with glutinous rice and marmalade coated with sweet juices. I really liked it!

Many friends also liked the mashed potatoes. They tasted pretty good as well, more like an ice-cream dessert dish than a traditional side-dish.

In addition to the great-tasting dishes, the prices were quite reasonable. Maybe that's why this restaurant is so popular and packed.

DISLIKES: The service was always a bit slow. The ambience and environment were just average, though it could get a bit noisy actually ... but with such good quality dishes at reasonable prices, I would not mind these issues.

*Notes: 1. The above is the English translation of the two-sided sponsored review used in the experiment.

2. The one-sided sponsored review does not have the "DISLIKES" part; other contents are the same.