TWO ESSAYS ON INTERFACE DESIGNS IN COLLABORATIVE AND SOCIAL E-COMMERCE

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DECLARATION

I hereby declare that this thesis is my original work and it has been written by me in its entirety. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

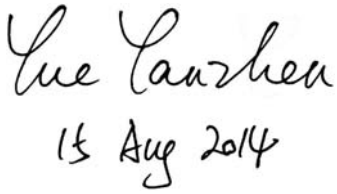

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TABLE OF CONTENTS

SUMMARY

Interface design has been widely accepted as one of the crucial factors that contribute to the success of e-commerce. With the rapid development of Internet technologies, increasingly more e-commerce websites are attempting to incorporate collaboration and social networking technologies in interface design to create values for both consumers and businesses via enhancing synchronous and asynchronous social interactions among users. In this thesis, two themes of interface designs that are particularly important to collaborative and social online shopping are investigated. One is navigation support designs that help to improve consumers' collaborative online shopping experience, and the other is interface display format designs that make the online social shopping website more intriguing.

This thesis consists of two empirical studies, with Study One focusing on interface design issues for consumers involving in synchronous social interactions while shopping online (i.e. collaborative online shopping), and Study Two concentrating on interface design concerns for consumers participating in asynchronous social interactions on the shopping website (i.e. online social commerce).

Specifically, Study One proposes two new types of navigation support designs on the website interface to address the research gap in collaborative online shopping. The impacts of different navigation support designs on collaborative consumers' actual and perceived mutual understanding were investigated in a laboratory experiment. Based on the data collected from 240 subjects (120 dyads), the experimental results reveals the effectiveness of different

navigation support designs to improve consumers collaborative shopping experience and a moderating role of collaborative consumers' group structure.

Study Two continues to look at the effects of interface design. Particularly, this study explores the effects of interface display format on consumer behavior on social commerce website by comparing two prevailing types of interface designs: matrix display format and waterfall display format. Drawing on environmental psychology model and cue selection effect, this study investigates how interface display format may influence consumer approach and herd behavior in online social shopping. A laboratory experiment using eye-tracking technology was designed and the eye-tracking results disclose a contingent influence of interface display format on consumer approach behavior and a main effect of it on consumer herd behavior, as well as the moderating effect of consumers' shopping motivation.

Overall, this thesis advances the Information Systems (IS) literature by investigating the critical role of interface design in collaborative and social e-commerce to create values for both consumers and businesses. This thesis concludes with a discussion on the theoretical contributions, practical implications and potential future research directions.

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

1.1.1 Interface Designs

Internet technologies have changed the way consumers shop online nowadays. With the development of collaboration technologies and social media applications, consumers now can shop with others in a collaborative and social environment, rather than in isolation (Goswami et al., 2007; O'Hara and Perry, 2001; Wang and Zhang 2012). Online businesses have great opportunities to provide more values to consumers and increase revenues and traffics through effectively deploying appropriate collaboration technologies and social media applications.

It is not uncommon to find that many e-commerce websites are attempting to incorporate social interaction features to improve consumers online shopping experience. Considering that social interaction among consumers could be either synchronous or asynchronous, two types of emerging shopping platforms are particularly evident with the current development of e-commerce: collaborative online shopping and online social shopping. On one hand, collaborative online shopping allows consumers to shop at an online store concurrently with their friends through synchronous social interactions (Zhu et al. 2010); on the other hand, online social shopping enables consumers to interact with other consumers in an asynchronous manner via social networking technologies (Liang et al. 2011).

Increasingly, more and more traditional e-commerce websites are attempting

to attract consumers by improving synchronous online interaction among users, as shoppers accompanied by others may generate more need recognition and spend more than when shopping alone (Butler, 2001; Kahn and McAlister, 1997; Osborn, 1957). Toward this end, the provision of navigation support features on the website interface has been increasingly popular (Huang et al. 2011; Yue et al. 2014). With the assistance of navigation support technologies inherent on the website interface, consumers can easily establish common ground with other shopping companions by navigating to the same web page content (Zhu et al. 2010).

Furthermore, there is also a trend for the merging of traditional e-commerce website with social networking website, leading to a newly emerging shopping platform, which is known as social shopping website (Wang and Zhang 2012). Accordingly, traditional e-commerce has been evolving towards online social commerce, which involves using social media that supports asynchronous social interactions and user contributions to assist online product search and evaluation. With the popularity from practitioners, there is an exponential growing numbers of social shopping websites (e.g. Pinterest.com, MeiLiShuo.com, Shopstyle.com, and etc.). Considering the increasingly fierce competition among social shopping websites, website designers are experimenting with different website interface designs to attract consumer attentions and retain consumers to ensure their success.

Both the interface designs for collaborative online shopping and online social shopping have attracted an increasing amount of attention from practitioners in recent years, yet limited research has been done to theoretically understand how interface design will influence consumers' collaborative and social

shopping behavior in collaborative and social e-commerce context. Although previous IS research has dealt with different aspects of interface design in traditional e-commerce (e.g. Hong et al. 2004 and Deng and Poole 2010), the lack of knowledge of the social nature of collaborative and social shopping platform makes it doubtful about whether previous findings can be still sustained and applicable.

To address the research gap, this thesis empirically investigates how interface designs in collaborative online shopping and online social shopping will influence consumers' collaboration and social shopping behavior.

1.1.2 Navigation Support Designs in Collaborative Online Shopping: Reviews and Problems

Collaborative online shopping benefits both online consumers and online vendors. On one hand, the collaboration with other friends may help consumers to make well informed decisions; on the other hand, the communication and cooperation between shopping companions may largely affect their attitudes towards both the online vendors and the products (Mangleburg et al., 2004), which in turn increases consumers' intention to revisit the website and improves the sales. For example, according to Internet Retailer (2010), collaborative shopping technology "ShopTogether", which facilitates close friends to shop online together, helps drive 15% increase in sales at a leading German skincare website.

Besides ShopTogether, various collaboration technologies with different navigation support designs have emerged recently to facilitate collaborative online shopping. For example, Plurchase (http://www.plurchase.com) provides

shopping companions with a plug-in navigation button to enable them to be aware of the web page their partners are viewing, while Brosix (http://www.brosix.com) and Twiddla (http://www.twiddla.com) allow shopping companions to navigate at the same pace by always staying on the same webpage to examine product information. Other navigation support designs include Clavardon (http://www.clavardon.com) and PageShare (http://www.pageshare.com), which allow consumers to be aware of their partners' exact navigation actions while separately navigating on the website. The navigation support designs provided by the above websites can be generally classified into three categories, and they are navigation support with location cue, tightly-bonded shared navigation and split screen navigation respectively.

Research has revealed that collaboration technologies that provide common ground are helpful to improve collaboration work (Carroll et al. 2003, 2009). Intuitively, tightly-bonded shared navigation support may be superior to navigation support with location cue and split screen navigation, as more common ground is provided by bonding both shopping companions on the same webpage. However, the potential conflict between shopping companions may lead to unexpected uncoupling problems when they do not well coordinate with each other while using tightly-bonded shared navigation, and alleviates its effectiveness to support effective collaboration. Thus the effectiveness of the three navigation support designs to enhance consumer collaboration is still unclear.

Hence, Study One explores different navigation support designs and investigates their effectiveness to improve consumers' collaborative shopping

experience.

1.1.3 Interface Display Format in Online Social Commerce: Reviews and Problems

Research findings from e-commerce literature implied that interface display format influences consumers attitude toward using the website and their information processing performance (Hong et al. 2004; Deng and Poole 2010).

In order to attract and retain consumers, social shopping websites are trying to apply different website display formats to provide intriguing website interface. While it is an important concern and of particular interest to web designers and online vendors to select the effective interface display format for their sites to attract consumers, prior research has shed little light on the relative efficacy of different interface display formats in inducing consumers' approach behavior towards the site, i.e., the extent to which consumers stay on the social commerce site and explore the site deeper.

Furthermore, comparing to traditional e-commerce websites, social commerce websites provide consumers with more connections with other users via the social networking applications. Through the social functions available on social commerce websites, consumers are granted with the access to social knowledge and experiences of others, and they can easily learn from others while making purchase decisions. Since one of the main aims of social commerce sites is to facilitate shopping-related information sharing among consumers, social information cues are often presented on the website interface to show other consumers' opinions or preferences toward these products. It is well acknowledged that consumers' shopping behavior can be

influenced by observing others' preferences or decisions. Especially, the phenomenon of consumers' following others' behavior has been labeled as herd behavior (Banerjee 1992; Bikhchandani et al. 1992). Consumers herd tendency may be more salient on social shopping website than on traditional e-commerce website, as other consumers' preference and behavior are more easily available via social information cues presented on the website interface. To better support online vendors to apply appropriate e-marketing strategies on social commerce sites, it is a must for them to understand how consumers shopping behavior are influenced by other users, i.e. consumers herd behavior. Marketing research has implied that shopping environments may influence consumers' processing of social information (Cheema and Papatla 2010, Zhou and Duan 2012, Zhu and Zhang 2010), thus interface designs, as one of the most salient online shopping environments features, may have the potential to influence consumers processing of social information and in turn their herd behavior. However, no prior research has investigated how interface display format influences consumers herd behavior on social commerce websites.

Meanwhile, prior social network and e-commerce research mostly focuses on opinion-based social information (e.g. user reviews, comments, or word-of-mouth), with little research exploring the influence of action-based social information (e.g. popularity information, purchase quantity, etc.). Since many researchers suggest that action-based social information is more influential than opinion-based social information on consumers' decision making (Cheung et al. 2014; Pavlou and Dimoka 2006), it is important to address how interface display format may influence consumers' use of action-based social information (i.e. popularity information in the present

study) and in turn their herd behavior.

In sum, Study Two investigates the effect of interface display format on consumers' approach and herd behavior.

1.2 RESEARCH FOCUS AND POTENTIAL CONTRIBUTIONS

1.2.1 Study I: Mutual Understanding and Navigation Support Designs

Navigation support design provides shopping companions with contextual information about the focal products that are being viewed by other consumers. It facilitates information sharing and user interactions to improve consumer collaboration in collaborative online shopping context.

As one of the most salient aspects of collaborative online shopping is the exchange of opinions or ideas about products among collaborative consumers, the needs to support effective communication and increase the likelihood of mutual understanding are particularly relevant to collaborative online shopping. Study One thus investigates the effectiveness of three navigation support designs (separate navigation with location cue, split screen navigation and tightly-bonded shared navigation) to enhance shopping companions' mutual understanding.

Moreover, consumers have often been seen to shop together with others in different group structures, and the commonly observed forms of group structure are (1) 'co-buyers' structure, and (2) 'buyer/advisor' structure. Study One thus also explores the moderating effect of group structure on the effects of navigation support designs on consumers' collaboration behavior.

1.2.2 Study II: Approach/Herd Behavior and Interface Display Format

Two main interface display format designs that prevail with current social commerce websites are “matrix display format”, which aligns product both vertically and horizontally with other products (e.g. Shopcade.com, Givvy, Shopstyle.com, and etc.), and “waterfall display format”, in which each product is only vertically, but not horizontally, aligned with other products, resulting in its horizontal position dynamically determined by other products in the same column (e.g. Pinterest.com, MoGuJie.com, MeiLiShuo.com, and etc.).

Comparing to traditional e-commerce websites, social commerce sites provide users with more access to other consumers’ preferences and decisions, and help them to make informed decisions by leveraging user-generated content. In order for online vendors to better apply appropriate e-marketing strategies on social commerce sites, they have to get well-understood of how consumers’ online shopping behavior is influenced by others. While different interface designs may lead consumers to process social information cues distinctly, their herd behavior on social commerce sites may be subject to interface display format. Therefore, Study Two examines the effect of the two interface display format designs on consumer herd behavior by objectively capturing consumers’ actual attention on various products.

Another equal, if not more, important question is how social commerce website can attract consumers to spend more time visit the website and explore the site deeper. Consumers approach behavior is of particular concern for the success of social commerce website. Study Two will thus also investigate the

effectiveness of matrix display format and waterfall display format to generate more consumer visit time on website interface and more products viewed by consumers.

As it is common for consumers to shop online with different motivations, Study Two also reveals whether (and if so, how) the influence of interface display format on consumers' approach and herd behavior differs for consumers with distinct shopping motivations.

1.2.3 Potential Contributions

This thesis attempts to benefit and contribute to both researchers and practitioners by investigating the navigation support designs and interface display format designs in collaborative and social e-commerce context. Specifically, by addressing the research gaps proposed in the previous sections, the two studies in this thesis are expected to make the following contributions.

Study One contributes to IS literature by empirically investigating the effectiveness of a wide range of navigation support designs for collaborative online shopping. With the consideration of the tradeoffs between common ground and grounding cost, this study investigates three navigation support designs, namely, separate navigation with location cue, split screen navigation, and tightly-bonded shared navigation.

Furthermore, Study One presents new insights to previous e-commerce studies by examining consumer behavior in collaborative online shopping context. Despite the prevalence of e-commerce, extant studies have focused mostly on consumers' individual shopping behavior. This study advances our theoretical understanding in IS field by disclosing the knowledge of consumers'

collaborative shopping behaviors.

Based on cognitive tuning theory and media synchronicity theory, Study One also contributes to IS literature by revealing the moderating effect of group structure. This study has shown that collaborative consumers with different group structure may benefit from different navigation support designs.

Study Two contributes to IS literature by investigating two prevailing interface display formats that influence consumers' approach behavior toward and herd behavior on social commerce website. This study reveals that, while interface display formats have the potential to influence consumers approach behavior, its effect depends on consumers' shopping motivation.

Moreover, Study Two enriches IS literature by improving our theoretical understanding of herd behavior on social shopping website. Drawing on cue selection effect, this study explores the effects of interface display format on consumers' processing of different types of information on the website interface. The findings of this study show that interface display format has the potential to influence consumers herd behavior.

Study Two also advances online herd behavior studies by introducing new measurements that objectively capture consumers' actual attention on popular products. This study implies that eye tracking technology seems to be appropriate for online herd behavior investigation.

Practically, this thesis is also expected to provide important insights into the interface design for collaborative and social e-commerce websites.

By investigating different forms of navigation support designs, Study One sheds light on how to develop and deploy appropriate navigation support

designs for website designers and online web stores. The findings suggests that rather than binding shopping companions on the same browser and navigating on the website at the same pace, the provision of more control for consumers to navigate on their own would be more helpful to improve consumers' collaborative online shopping experience.

Furthermore, the significant moderating effect of group structure implies that website designers should take consumers role combinations into consideration when they attempt to design appropriate navigation support designs for consumers.

Study Two provides implications for social commerce websites about how to make use of interface display format to attract consumers with the consideration of shopping motivation. Given that consumers herd behavior may be influenced by interface display format, the findings of this study also enlighten online vendors to apply appropriate e-marketing strategies on social commerce sites to increase their sales and revenues.

By combining Study One (collaborative online shopping where synchronous interaction among consumers are involved) and Study Two (online social shopping where asynchronous interaction among consumers are involved), this thesis would provide a complete and comprehensive view of how interface design may influence consumers' shopping behavior and experience while they interact with others in both synchronous and asynchronous way.

1.3 THESIS ORGANIZATION

This opening chapter has provided an overview of the entire study context and the general motivations based on the current research gaps. It highlights the

importance of the interface designs for both collaborative and social 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 collaborative online shopping and discussed relevant theoretical foundations. It then introduces two new navigation support designs and compares the effects of three different navigation support designs by considering the moderating role of collaborative online consumers' shopping group structures. A 3*2 experiment is conducted to test the proposed hypotheses. Discussion and implications are then discussed.

Chapter 3 reports the details of Study Two. It first reviews the literature on environmental impact and herd behavior in social context, and then presents the hypotheses of the joint effects of interface display format and shopping motivation on consumers' approach and herd behavior on social shopping website. A 2*2 experiment is conducted to test the proposed hypotheses. This chapter concludes with a discussion on the theoretical contributions and practical implications, as well as the limitations and future research directions.

Chapter 5 concludes this thesis by summarizing the findings and implications of the two studies, followed by discussion of potential future research directions.

CHAPTER 2: STUDY I: ENHANCING MUTUAL UNDERSTANDING IN COLLABORATIVE ONLINE SHOPPING

2.1 INTRODUCTION

Shopping is generally a social behavior, frequently done when one is accompanied by friends or family members (Evans et al. 1996). While prior research suggested that instant social interaction and communication is one of the prominent motivations for people to shop (Puglia et al. 2000; Tauber 1972; Westbrook and Black 1985), most of the e-commerce websites are designed for solitary use (i.e. consumers shop on the website on their own) and online consumers cannot easily interact with their close ones in real time.

As a new paradigm of e-commerce, collaborative online shopping or co-shopping (COS), defined by Zhu et al. (2010) as "the activity in which a consumer shops at an online store concurrently with one or more remotely located shopping partners", will have the potential to dramatically facilitate instant social interaction for online consumers. Specifically, COS provides collaboration support for shopping companions to share and exchange their opinions about products. It fulfills consumers' needs to shop with close ones in a social and collaborative environment, rather than in isolation (Goswami et al. 2007; O'Hara and Perry 2001). Through social interaction and communication, consumers will feel affiliated with and supported by their shopping companions (Kiecker and Hartman 1993, 1994). Recently, the trend for consumers to collaboratively shop online is increasingly common in everyday life (Huang et al. 2012). For example, two remotely located individuals

(friends or family members in different places) may buy some product or service online together for their mutual friend as a gift.

In spite of the evident demand for consumer collaboration in e-commerce, COS is not well supported by current systems (Benbasat 2010). With solitary-use e-commerce websites, collaborative consumers in undertaking COS have to use their web browsers independent of each other. Consequently, limited contextual information about the focal products could be transmitted between collaborative consumers. Research has shown that when remotely located collaborators don't have enough contextual information about each other, their communication would be ineffective (Cramton 2001; Dabbish and Kraut 2008; Olson and Olson 2000) and, in turn, impedimental to the collaborative task performance. Therefore, the inherent limitation of the solitary-use websites to present contextual information likely leads to collaborative consumers being less knowledgeable about each other's opinions about the products that are of interest to them, and less capable in coordinating their shopping process.

Since one of the most salient aspects of COS is the exchange of opinions or ideas about products among collaborative consumers, the needs to support effective communication and increase the likelihood of mutual understanding are particularly relevant to COS. Thus, it is imperative to design appropriate navigation mechanisms that could help consumers navigate to the same product information for discussion (Zhu et al. 2010). To better support consumer collaboration in COS, prior research has investigated tightly-bonded shared navigation support as a potential solution to create a referential context that both consumers could access for product discussion (Zhu et al. 2010).

Although tightly-bonded shared navigation support enables both collaborative consumers to synchronize their browsing paces via a shared browser so that one can always know what the other person is looking at, it leads to unexpected uncoupling problems when the two collaborators do not well coordinate with one another. Benbasat (2010) suggested that navigation designs need to be further improved to enhance consumers COS experience.

As previous e-commerce research and practice mainly focus on consumers' individual shopping behavior, the theoretical understanding towards collaborative consumers' behavior in COS is rather limited, and the practical guidelines for systems designers to develop appropriate COS technologies are rare. To address this research gap and further enhance collaborative consumers' shopping experience, this study proposes two new types of navigation support: separate navigation with location cue and split screen navigation. In the separate navigation with location cue condition, users could separately browse the web page in their own browsers and at the same time they are provided with a clickable visual location indicator, which displays the partner's real-time location information. The users can navigate to the web page that his/her partner is viewing by clicking on the location cue. Split screen navigation divides the browser into two separate and equal-sized screens, with one screen controlled by one user and the other screen instantly displaying the current web page his/her partner is viewing.

There are two main reasons for the present study to propose separate navigation with location cue and split screen navigation as the two new navigation support designs: (1) while maintaining awareness of collaborators, individuals also demand flexible means for their own interacting with the

website (Gutwin and Greenberg 1998; Greenberg 1998); (2) awareness can be provided from two different levels, i.e. abstract or full awareness (Dabbish and Kraut 2008). Accordingly, while providing awareness for consumer collaboration, both separate navigation with location cue and split screen navigation allow people to interact with the website in their own way, with the former navigation support providing abstract awareness of partners' web page through the location cue indicator and the latter one providing full awareness through the shared screen.

The present paper attempts to empirically investigate the effects of the three navigation support designs (i.e., separate navigation with location cue, split screen navigation, and tightly-bonded shared navigation) on collaborative consumers' mutual understanding. Two indicators of mutual understanding performance are evaluated: actual mutual understanding and perceived mutual understanding. To measure consumers' actual and perceived mutual understanding concurrently in this study is necessary, since consumers' self-reported perception towards the effectiveness of specific technology may not be the same as its actual effectiveness (Hoch 2002; Jiang and Benbasat 2007). The inclusion of actual as well as perceived mutual understanding would provide a more comprehensive view about the effects of various navigation support designs.

Another purpose of this study is to investigate the moderating effects of shopping group structure. Group structure is defined as an indication of the role combination among group members (Stewart and Barrick 2000). This objective is motivated by the observation that friends or family members shopping together may have different role combinations. Two commonly

observed forms of group structure are (1) ‘co-buyers’ structure, i.e. both users are intending to make a purchase (e.g. shopping companions buy a birthday gift together for their mutual friend), and (2) ‘buyer/advisor’ structure, with which only one user (the buyer) is intending to make a purchase, and other users (the advisors) only provide suggestions or give self-opinions to the buyer for his/her consideration (e.g. an individual, who wants to shop for clothes, asks his/her friends to accompany him/her and give suggestions). It has been found that group structure influences people’s perception and usage of enterprise systems in an organization context (Sasidharan et al 2012). Although there is such a possibility that group structure may also influence the effectiveness of various navigation support designs in online shopping context, its effect has not yet been explored and empirically investigated. Therefore, it is unknown whether the three aforementioned navigation support designs work differently for shopping companions with different group structure, and if so, how group structure moderates their effectiveness.

This paper is organized as follows. The next section reviews previous literature and theoretical foundations, followed by the proposed research model and hypotheses. After that we demonstrate the research method and report the analysis results. The last section concludes with discussions of the implications and future research directions.

2.2 REVIEW OF THEORETICAL FOUNDATION

2.2.1 Common Ground and Grounding Cost

Considering collaborative online shopping as a collaboration task, we argue that in order to make it an efficient and pleasant experience, shopping

companions have to establish common ground between each other, since effective collaboration requires collaborators to build mutual understanding of the work, the situation, and the information shared among them (Clark and Brennan 1991; Dourish and Bellotti 1992; Olson and Olson 2000).

Common ground refers to the knowledge held in common by the collaborators, combined with their awareness that they have the knowledge in common (Clark and Brennan 1991; Olson and Olson 2000; Zhu et al. 2010). Researchers have found that common ground among conversational participants has a primary role in defining the domain of interpretation (Clark 1992), and collaborators can have a shared referential base for discussion (Carroll et al. 2003). Common ground has a positive effect on reference resolution and improves the communication efficiency (Hanna et al. 2003). Moreover, findings in Gutwin and Greenberg (2002) suggest that helping people to stay aware of others improves the system's usability.

However, the benefit of common ground doesn't come without any cost. People have to devote efforts to sending information to collaborators, receiving information from them, and also dealing with the potential intra-group conflict when trying to establish their common ground. Clark and Brennan (1991) suggests a series of grounding costs that are required when people attempt to establish their initial common ground or update common ground status in collaborative activity. The grounding costs could be generally classified into three categories, i.e., sending cost, acceptance cost, and interaction cost.

Specifically, sending cost requires people who want to share information to encode messages to convey to their partners in order to let them acknowledge

the target information. While acceptance cost enforces customers to spend time and effort to receive and decode the accepted information. Acceptance cost also includes the effort required to pinpoint the target information when it is not evident to find. Interaction cost refers to the potential effort devoted to deal with the potential conflict and interference emerged across collaborative customers to smooth the information exchange and discussion process. For example, people, while working on the information at hand, may get interrupted by the behavior of the collaborators (Hill and Gutwin, 2004), and group/individual efforts have to be expended on resolving the conflict and adjusting the collective information processing activity (Greer and Jehn, 2007; Behfar et al., 2002; Jehn, 1997). The interaction cost of grounding was considered as a persistent negative influence on collaboration outcomes.

The preferences for grounding media is formed by considering both the costs associated with each media and the benefits it could provide. For example, in a group decision making context, group members sometimes want to get their partners' full attention when sharing information and opinions, yet they wish to avoid any interruption from their partners while individually processing information. Therefore, grounding technique is necessary to fulfill both the need of individual information processing and the need of group interaction, so that the decision making could be smoothly achieved (Dennis et al. 2001).

Appropriate navigation support technologies need to facilitate the achievement of common ground to guarantee the mutual understanding among shopping companions, and also to alleviate consumers' efforts to achieve that. Accordingly, we contend that for collaborative consumers in undertaking COS, the preference for various navigation support technologies depends on whether

the supporting media best serves the group members' purpose, i.e. facilitate the purpose to share and discuss product information, as well as help to avoid interrupting while consumers involve in the individual information processing stage.

2.2.2 Media Synchronicity Theory

Media synchronicity theory (MST) considers communication as a process in which participants create and share information with one another in order to reach mutual understanding (Dennis et al. 2008; Dennis and Valacich 1999). The theory postulates that communication can be classified into two fundamental processes, i.e. conveyance process and convergence process. Communication performance and mutual understanding will be improved if the synchronicity of a given media appropriately matches the synchronicity that a communication process (conveyance or convergence process) desires (Dennis et al 2008; Dennis and Valacich 1999).

Conveyance and convergence process are distinct from each other in terms of the characteristics of the information being transmitted (new/raw information or preprocessed information). On one hand, conveyance process is the transmission of a diversity of new information by the sender and the processing of that target information by the receiver to create and revise the mental model of the situation (Dennis et al. 2008). On the other hand, convergence process is the process of mutually negotiating the meaning of the information after the processing of that information, i.e. it is the process to discuss each individual's interpretation of the processed information.

The theory suggests that for conveyance processes, use of media low in

synchronicity will lead to better communication performance, and for convergence processes, use of media high in synchronicity will lead to better communication performance. The reasons are: during conveyance process, people often require time to engage in substantial information processing activities to digest the new information, in which case people don't need to work at the same time. Media low in synchronicity grants the required time for the complete processing of new information, whereas media high in synchronicity may harm the comprehensive apprehension of the new information since it generates expectations of rapid interaction and interfere with individual's deliberation process (Weick and Meader 1993).

Nonetheless, during convergence process, people would discuss each individual's information interpretation, and they often need rapid and frequent transmission of small quantities of preprocessed information. Media high in synchronicity could better support such needs through the increased level of interaction (Graetz et al. 1998). Yet, media low in synchronicity may increase delays for frequent message exchange and impede the rapid development of mutual understanding between people. For example, Murthy and Kerr (2003) find that media providing high synchronicity outperform media in low synchronicity when the communication process goal involves convergence.

The theory posits that the capability of different media to support these two fundamental processes varies in terms of media synchronicity (Dennis et al., 2008; Dennis and Valacich, 1999). Five capabilities that determine the synchronicity of supporting media have been identified: transmission velocity, parallelism, symbol sets, rehearsability, and reprocessability. In terms of the three types of navigation support designs to be studied in the present study, we

argue that the synchronicity increases in the order of separate navigation with location cue, split screen navigation, and tightly-bonded shared navigation. The reasons are elaborated in details in Appendix A.

2.2.3 Cognitive Tuning Theory

Cognitive tuning theory (Zajonc 1955) suggests that when an individual expects to deal with information about an object, a cognitive structure relevant to that object is "tuned in", and individual's processing of the incoming information will be mediated by this structure. People will activate different cognitive structures under different conditions of anticipating dealing with information (Harvey 1976; Mazis 1972). Zajonc (1955) differentiates two sets of "readiness" to deal with information: "transmission tuning" and "reception tuning". In "transmission tuning", the individual expects to communicate information to others, while in "reception tuning", he expects to receive additional information from others. The theory implies that cognitive structures of individuals in transmission tuning are more rigid and organized than those of receivers. The different structural configurations result in transmitters being more concerned with structuring their message than receivers (Mazis 1972).

Prior research indicated that cognitive processes are tuned to meet situational requirements (Lun et al. 2007; Schwarz 2002), and people in different cognitive structures would apply distinct strategies to search and process information (Brock and Fromkin 1968; Cohen 1961). For example, Leventhal (1962) finds that transmitters developed more simplified and unified impressions than did receivers. It seems possible that persons expecting to

transmit information about an object to others may feel the need to develop a clear, definitive interpretation of the object, whereas those expecting to receive information may not have such a strong need for clarity (Harvey et al. 1976). Moreover, since people in transmission tuning usually are accountable for the information they provide, they often have a higher accuracy motivation than people in reception tuning (Jonas and Frey 2003).

Mazis (1972) applies cognitive tuning theory to the decision maker and non-decision maker roles assumed by individuals in the buying process. He argued that when potential consumers expect to be confronted with a selling message about a product, they are set either to receive or to transmit information. People who anticipate receiving information are usually decision makers who will receive information to make judgments on whether or not to purchase the product. The transmitters are individuals who will transmit information to others who will make the purchase decision. The findings suggested that individuals in transmission tuning (non-decision makers) would focus their attention on understanding and remembering a limited amount of information in order to develop a clear cognitive picture which is easier to pass on to others. In contrast, when in reception tuning (decision makers), individuals' information search was more flexible, emphasizing new as well as familiar information.

It is reasonable to argue that cognitive tuning theory appears to be directly applicable to the group structure categorization in this study. Specifically, in "buyer/advisor" structure, people would take different tuning sets, with advisor be the non-decision maker and in "transmission tuning", while buyer be the decision maker and in "reception tuning". Conversely, in "co-buyers"

structure, both shopping companions are the decision makers and they take the same “reception tuning” to deal with product information. We could conclude that collaborative consumers in co-buyers structure have the same cognitive structure to process information, whereas consumers in buyer/advisor structure have different cognitive structure to process product information.

2.3 RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

2.3.1 Independent and Dependent Variables

In this study, we investigate the effectiveness of three types of navigation support technologies (i.e., separate navigation with location cue, split screen navigation, and tightly-bonded shared navigation) and explore the moderating role of group structure. The research model is proposed in Figure 2.1.

Separate navigation with location cue allows users to separately browse the web page in their own browsers and at the same time presents a clickable visual location indicator, which displays the partner’s real-time location information. Consumers could click on the location cue indicator to navigate to the web page that his/her partner is looking at. Split screen navigation divides the browser into two equal-sized screens, with one screen (personal screen) controlled by the consumer and the other screen (shared screen) instantly reflecting the current web page his/her partner is viewing. It enables consumers to monitor their partners’ web page and navigation actions on the shared screen while navigating independently on the personal screen. Tightly-bonded shared navigation binds collaborative consumers to a shared web browser and provides a completely synchronized view of the same web contents. Consumers would navigate on the website at the same pace, and the

navigation control power is equally distributed between them.

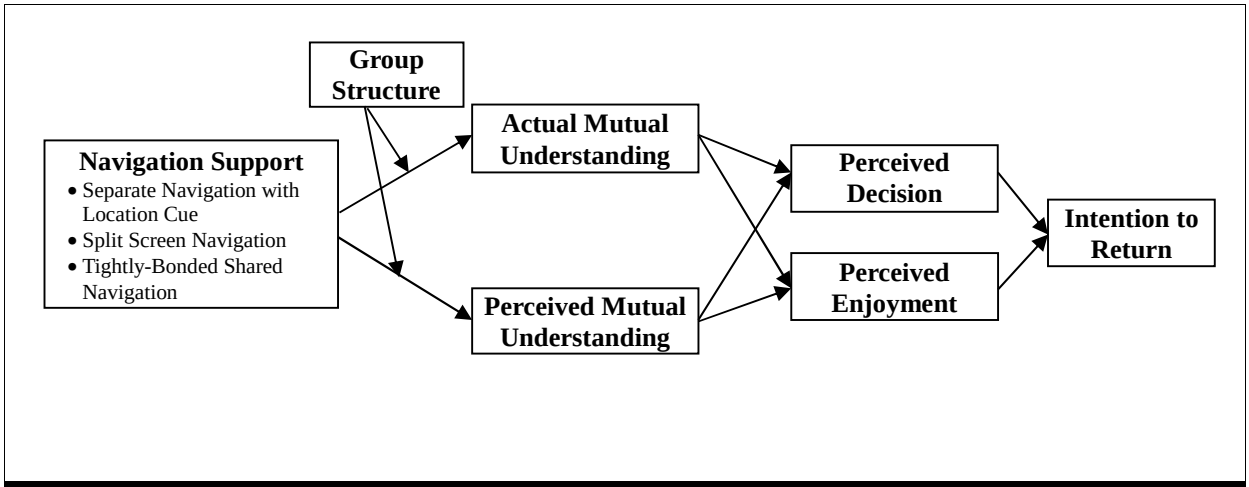


Figure 2.1: Study One Research Model

Two major dependent variables have been used to measure consumers' mutual understanding performance from two perspectives: actual and perceived. Actual mutual understanding refers to the extent to which consumers actually understand their shopping companions' opinions about the product. Perceived mutual understanding is defined as consumers' perceptions of the extent to which companions within the shopping group understand each other's opinions about the products. It is important to assess the effects of the three types of navigation support on perceptual construct since perceptions are key influences on intended behavior. Moreover, Goodhue et al. (2000) and Jiang and Benbasat (2007) suggest that users' self-reporting of their performance of using information systems is sometimes a poor surrogate for their objective performance. Thus it is necessary to also include the objective measurement of mutual understanding.

2.3.2 Split Screen Navigation vs. Separate Navigation with Location Cue

Being able to stay aware of others plays an important role in the fluidity and

naturalness of collaboration. Supporting awareness of others alleviates the barriers of remote collaboration and improves task performance (Gutwin and Greenberg 2002). Although both location cue navigation and split screen navigation are supposed to enable shopping companions to become aware of the web page their partners are viewing, their effectiveness to facilitate the establishment of mutual understanding is different. Location cue navigation provides consumers with abstract information of the product being viewed by their partner via the location indicator. In contrast, split screen navigation enables both consumers to have a full view of their partners' screen contents (via the shared screen), thus providing more common ground than location cue navigation for consumers to easily develop mutual understanding.

Moreover, since detailed product information is not evidently presented with abstract location cue in location cue navigation, consumers cannot immediately initiate the discussion based on what he/she sees in the abstract location cue. They have to take more time and effort to access the web page and locate the target information, in which case the acceptance cost for establishing common ground is high and less cognitive resource would be available for information processing. Thus, collaborative consumers' communication performance would be impaired. Based on common ground theory, we posit that

H1a: Split screen navigation leads to higher level of actual mutual understanding than separate navigation with location cue.

Due to the high acceptance cost, more effort is experienced by consumers during shopping process with location cue navigation than with split screen navigation, and thus they would feel use of split screen navigation could better

enhance mutual understanding than location cue navigation. Furthermore, media synchronicity theory suggests that during convergence process people need frequent message exchange among themselves (Dennis et al. 2008). Location cue navigation may impair the convergence process since simply based on the location indicator consumers could not pinpoint the specific information their partners want to discuss, and the exchange of individual interpretation would be delayed. By presenting a full view of the product information in the shared screen, split screen navigation permits higher level of shared focus than location cue navigation. With the increased level of shared focus, co-shoppers may exchange opinions and converge to a shared interpretation of the target information more efficiently by avoiding delays and cognitive efforts. Hence, we propose that

H1b: Split screen navigation leads to higher level of perceived mutual understanding than separate navigation with location cue.

2.3.3 Tightly-Bonded Shared Navigation vs. Split Screen Navigation

The potential intra-group process conflict concerns issues of resource allocation during collaborative work. People may get interrupted from the task at hand by the behavior of collaborators (Hill and Gutwin 2004). Such interaction cost of grounding has demonstrated a persistent negative influence on collaboration outcomes, as group and individual efforts are expended on resolving the conflict and adjusting the collective information processing activity (Greer and Jehn 2007; Behfar et al. 2011; Jehn 1997).

From the grounding cost perspective, intra-group process conflict (Jehn 1997; Jehn et al., 1999; Zou and Stormont 2005) can occur when considering control

power allocation and attention focus during the shopping process with tightly-bonded shared navigation (Zhu et al. 2010). For example, as collaborative consumers are strictly synchronized, one's control over his own preferred way of navigation may be interrupted by his partners' unannounced act of scrolling on the web page. In such a condition, shopping companions have to spend time and effort on dealing with each conflict. Compared to tightly-bonded shared navigation, split screen navigation generates less interaction cost for collaborative consumers, whilst enabling collaborative consumers get the up-to-the-moment knowledge of the product their partners are scrutinizing with visual and navigation cues in the shared screen. Specifically, split screen allows people to view the same Web page contents through the shared screen while having a full control over his preferred way of navigation in the personal screen, thus avoiding the potential process conflict in the shopping group. Smooth collaboration is expected to improve group communication performance. Therefore, we propose the following hypothesis:

H2a: Split screen navigation leads to higher level of actual mutual understanding than tightly-bonded shared navigation.

On the other hand, in tightly-bonded shared navigation, when one is paying attention to process some particular information, he may get confused by a sudden navigation initiated by his partner, thus the individual information processing is interrupted, and the corresponding interpretation and understanding of the selected information is impaired. According to media synchronicity theory, people must establish individual understanding of the target information via conveyance process before the development of mutual understanding (Dennis et al. 2008; Dennis and Valacich 1999). It is reasonable

to argue that when consumers perceive an incomplete individual understanding of the product information, they would experience low perceived mutual understanding. Contrarily, in split screen navigation condition, consumers' individual understanding would not be that easily influenced by their partners' behavior. The reason is that, while split screen navigation facilitates consumers' awareness about their partners' action and interest (Tee et al. 2009), it also enable consumers focus on the personal screen to examine the product information when their partners navigate to other web content, thus the individual information processing will be less likely to be interrupted by intra-group navigation conflict, and the development of perceived mutual understanding is improved based on the well-established individual understanding.

Therefore, we propose the following hypothesis:

H2b: Split screen navigation leads to higher level of perceived mutual understanding than tightly-bonded shared navigation.

2.3.4 Separate Navigation with Location Cue vs. Tightly-Bonded Shared Navigation

Clark and Brennan (1991) suggest that the preferences for grounding media is formed by weighing both the costs associated with each media and the benefits it could provide. Although tightly-bonded shared navigation provides more common ground than location cue navigation, its salient interaction grounding cost counteracts these benefits. Several researchers have recognized that when people collaborate, they shift back and forth between individual and shared work (Gutwin and Greenberg 2002). Gaver (1991) suggests that even when

people joined on a shared task, they frequently switch between working alone and working together, thus building systems that support these transitions is imperative.

With location cue navigation, shopping companions are enabled to keep track of their partners' activities via the location cue indicator when they are working in a loosely coupled manner. It is also easy for people to direct to the same webpage to initiate closer coupling and discuss the same product in detail. Therefore, location cue navigation is expected to be more feasible than tightly-bonded shared navigation for collaborative consumers to have efficient communication and collaboration.

H3a: Separate navigation with location cue leads to higher level of actual mutual understanding than tightly-bonded shared navigation.

Tightly-bonded shared navigation strictly ties collaborative consumers together, whereas it is quite common that conflicts may occur when collaborative consumers follow divergent product search paths at times (Zhu et al. 2010). Compared to location cue navigation, tightly-bonded shared navigation is less likely to facilitate consumers' individual interpretation of product information. Media synchronicity theory implies that when individual information process in conveyance process is impaired, the development of information understanding would be damaged and people's premature actions would be encouraged (Weick and Meader 1993). Hence, collaborative consumers would have less positive feeling during the product discussion, and misunderstanding between consumers would be more likely to happen in tightly-bonded shared navigation condition. Consequently, collaborative consumers would perceive that mutual understanding is not as well established

as that in location cue navigation condition.

Therefore, we propose the following hypotheses:

H3b: Separate navigation with location cue leads to higher level of perceived mutual understanding than tightly-bonded shared navigation.

2.3.5 Moderating Effect of Group Structure

Organizational theorists have defined structure as the configuration of relationships with respect to the allocation of tasks, responsibilities, and authority (Greenberg and Baron 1997; Jones 1995). Group structure is thus defined here as group relationships that determine the allocation of tasks, responsibilities, and authority (Stewart and Barrick 2000). Two commonly observed types of shopping group structure are ‘co-buyers’ and ‘buyer/advisor’.

We argue that collaborative consumers shopping in the two group structures would prefer different levels of media synchronicity during shopping process, and since the three navigation support designs in this study are inherent with different levels of synchronicity, group structure would moderates their effects on the development of mutual understanding between shopping companions. The reasons are elaborated as follows.

According to cognitive tuning theory, people in transmission tuning (advisors) may often have a higher accuracy motivation than people in acceptance tuning (buyers) as they (as friends) usually feel very accountable for the suggestions provided. It is also possible that advisors strategically spend more time on deeply understanding the information and develop a clear suggestion to create a favorable impression. In other words, advisors would have more needs than

buyers to focus their attention on understanding and remembering a limited amount of information in order to develop a clear cognitive picture which is easier to pass on to buyers (Mazis 1972). As the processing of the target information to create the mental model is a part of the conveyance process (Dennis et al. 2008), we contend that buyer/advisor structure, compared to co-buyers structure, would encourage collaborative consumers to engage more in conveyance process, which may be better supported by low media synchronicity (e.g. separate navigation with location cue, and split screen navigation) than by high media synchronicity (e.g. tightly-bonded shared navigation).

Furthermore, buyers and advisors will utilize different strategies to search and process product information (Brock and Fromkin 1968; Cohen 1961). With tightly-bonded shared navigation support, buyer and advisor are forced to strictly bind together to the same browser and have to experience a high degree of shared information search and process pattern. As a result, either the buyer or the advisor has to utilize a strategy or pace that does not best match with his needs. Consequently, the information processing by the buyer or advisor will be impaired, and in turn, the development of mutual understanding would be negatively influenced (Dennis et al. 2008). Nonetheless, the mismatch of information processing strategies between buyer and advisor would be alleviated when using a navigation support with lower synchronicity (e.g. separate navigation with location cue, and split screen navigation), as media with low synchronicity would grant the flexibility to support the different information processing strategies for both buyer and advisor.

In contrast to buyer/advisor structure, co-buyers structure will be more tolerant to shared navigation, as both shopping companions in co-buyers structure are the decision makers and they are expected to have more similar strategy to search and process product information than buyer/advisor (Leventhal 1962; Mazis 1972). Meanwhile, unlike buyer/advisor structure, in which the advisor's main task is to convey opinions or suggestions to the buyer for decision making and there's less need to discuss with the buyer to come out with a purchase decision that both parties could accept (Jonas and Frey 2003), co-buyers structure requires both parties to take responsibility to make purchase decision. Thus collaborative consumers in co-buyers structure will have more needs than those in buyer/advisor structure to make adequate convergence of the mutual interpretation and negotiate to reach a mutually agreed decision. When collaborators need to engage more in the convergence process, they often need rapid information transmission of small quantities of preprocessed information. Consequently, the navigation support with high media synchronicity will be more suitable for co-buyers (than for consumers in buy/advisor structure), as their increased needs to engage in convergence process could be better supported. Since the synchronicity of the three navigation support designs increases in the order of separate navigation with location cue, split screen navigation and tightly bonded shared navigation, we posit that

H4a: In terms of actual mutual understanding, the superiority of split screen navigation over tightly-bonded shared navigation will be less prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

H4b: In terms of actual mutual understanding, the superiority of separate navigation with location cue over tightly-bonded shared navigation will be less prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

H4c: In terms of actual mutual understanding, the superiority of split screen navigation over separate navigation with location cue will be more prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

However, in terms of perceived mutual understanding, the moderating effect of group structure may not function. This may be explained by the effect of "illusion of control" (Davis and Kottemann 1994). Davis and Kottemann (1994) suggest that users tend to over-estimate their decision performance simply because they have control over their decision making process. Prior IS research in online shopping context finds support for the existence of this effect. For example, Jiang and Benbasat (2007) conduct experiment to investigate the effects of different product presentation format, and they find that since VPEs allow consumers to control and interact with product demonstrations, the illusion of control causes consumers to consistently overestimate their understanding of products regardless of task complexity levels even though no actual performance difference was detected when the tasks become highly complex.

Collaborative consumers with shared navigation are deemed to have limited control as they have to compete with their partners for control of the navigation direction. In contrast, consumers with separate navigation with location cue and split screen navigation could fully control their search

process and freely navigate on the website via their person screens. Applying the effect of "illusion of control" to the context of navigation support, we argue that since separate navigation with location cue and split screen navigation allow consumers to control their navigation on the website, the illusion of control would lead consumers to consistently over-estimate their mutual understanding towards the opinions about products regardless of group structure forms. Hence, we propose the following hypotheses:

H5a: In terms of perceived mutual understanding, the superiority of split screen navigation over tightly-bonded shared navigation will not be less prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

H5b: In terms of perceived mutual understanding, the superiority of separate navigation with location cue over tightly-bonded shared navigation will not be less prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

H5c: In terms of perceived mutual understanding, the superiority of split screen navigation over separate navigation with location cue will not be more prominent for collaborative consumers in co-buyers group structure than for those in buyer/advisor group structure.

2.3.6 Impacts of Mutual understanding

Perceived decision quality is a subjective indicator of how consumers perceive their decision to be accurate, correct, precise, and reliable (Mennecke and Valacich 1998; Tan et al. 2010). Since mutual understanding helps shopping companions to better collaborate with each other and reach an outcome easily,

when more mutual understanding is achieved during the collaborative shopping process, consumers' positive feeling and attitude will be enhanced and the confidence toward the purchase decision is increased. When mutual understanding is achieved, consumers in the same dyad would better acknowledge each other's preferences or opinions towards the products. Hence, it is more likely that consumers with increased mutual understanding would find the most suitable product than when they misunderstand or don't get clear of each other's ideas or opinions about the alternative products.

Meanwhile, increased mutual understanding would enable shopping companions to more efficiently share and discuss product information, and in turn more alternative products could be collectively examined and more precise evaluations of the products could be made. With more mutual understanding, shopping companions could involve less effort in dealing with misunderstanding and more effort in the product examination process. Since the purchase decision is made based on the mutual understanding between shopping companions, both shoppers will be satisfied with the final product choice. Therefore,

H6: Actual mutual understanding has a positive relationship with perceived decision quality.

H7: Perceived mutual understanding has a positive relationship with perceived decision quality.

Mutual understanding is also expected to increase collaborative consumers' affective belief of perceived enjoyment. Perceived enjoyment refers to the extent to which the activity of collaboratively shopping online is perceived as

fun in its own right, apart from any performance consequences that may be anticipated (Davis et al. 1992). Perceived enjoyment is investigated here to assess the hedonic quality of collaborative consumers' shopping activity on the website.

Previous research has shown that increasing the ease of communication and reducing the potential for conflict lead people to feel more enjoyable during the group activity process (Al-Natour et al. 2011). In the present study, collaborative consumers would more easily communicate with each other when they clearly understand what their partners are thinking about towards the products during the shopping process. Meanwhile, mutual understanding reduces the occurrence of potential conflict between shopping companions and facilitates the solution of emerging conflict. Therefore, increased mutual understanding is likely to make shopping companions feel more enjoyable in the collaborative shopping environment.

H8: Actual mutual understanding has a positive relationship with perceived enjoyment.

H9: Perceived mutual understanding has a positive relationship with perceived enjoyment.

Consumers' intention to return to the website is a critical success factor for online vendors (Koufaris 2002). One of the ultimate goals of COS is to support collaborative consumers to purchase the most suitable product. Hence, when consumers perceive that they have made a good decision and their shopping goal is effectively accomplished, their satisfaction towards the website would be enhanced. The favorable attitudes towards shopping on the

website would reinforce the likelihood of consumers' return. Therefore,

H10: Perceived decision quality has a positive relationship with intention to return.

Shopping enjoyment has been found to be an important determinant of online consumer loyalty (Lee et al. 2003). Consumers who experience pleasure or enjoyment from shopping on an e-commerce website are more likely to form intentions to revisit the website in future. The relationship between people's perceived enjoyment and behavioral intentions has received empirical support from previous research (Van der Heijden 2004; Kamis et al. 2008; Fuller et al. 2009). For example, Koufaris (2002) finds that shopping enjoyment strongly predicts online consumers' behavioral intention to return to the shopping website. Hence, we posit that,

H11: Perceived enjoyment has a positive relationship with intention to return.

2.4 RESEARCH METHOD

2.4.1 Experimental Design

The hypotheses proposed in the present study are tested through a laboratory experiment with a 3×2 between-factorial design (i.e., 3 types of navigation support ×2 types of group structure). The three types of navigation support include: (1) separate navigation with location cue, (2) split screen navigation, and (3) tightly-bonded shared navigation (see Appendix B for navigation support designs). The two types of group structure are: (1) buyer/advisor and (2) co-buyers. In the present study, we focus on shopping group with two

persons, which is the most common situation in everyday life.

A total of 240 subjects (120 pairs) were recruited from a major public university campus and randomly assigned to the six treatment conditions. Each person who volunteered was asked to invite a friend to attend the experiment together with him/her, to emulate a real shopping context. Among the 240 subjects, 167 are females. The ages of the participants range from 18 to 28, with the average value of 21.6. The academic backgrounds of the participants are diverse, including social science, business, engineering, science, and etc. 226 participants are undergraduate students and the rest are graduate students. 20% of the subjects have known their shopping partners for more than four years, 32% between two and four years, 26% between one and two years, and 22% less than one year. Almost 75% of the subjects have used Internet for more than 10 years, with the average value of 10.8 years.

There is no significant difference across the six experimental conditions in terms of gender, age, past Internet experience, the length of time subjects had known their partners. It is reasonable to conclude that participants' demographics are quite homogeneous across the six conditions.

2.4.2 Experimental Procedures

The two subjects in the same dyad were allocated in two different rooms equipped with computers and monitors of the same type. They were asked to visit a website to book hotel room collaboratively with the assigned navigation support design, as if both of them (co-buyers structure) or only one of them (buyer/giver structure) need(s) to stay in for their/his coming overseas trip. Specifically, for those in co-buyers structure, they were asked to book two

separate rooms with the same type for them to stay in; while for those in buyer/advisor structure, they were asked to book only one room for the buyer to stay in. After finishing the hotel searching and selection, the subjects completed questionnaires and were paid $12 each as participation reward.

We provide subjects with a benchmark to evaluate the effectiveness of particular navigation support designs based on Helson's (1964) adaptation theory, which posits that people's judgments are based on (1) their past experiences, (2) a context or background, and (3) a stimulus (or treatments). People would make a judgment of the stimulus or treatment provided mainly by basing it on his or her own past experience (Zhu et al. 2010). Because individual participants are likely to have different past experiences, there is no common frame of reference on which to base a judgment (Kim and Benbasat 2006). To ensure that the context and background of all participants' experimental experiences are equivalent, we provide all shopping dyads with a common reference to control for differences in past experiences, so that the experimental outcomes are due to the differences among navigation support designs, and not due to differences in past experiences.

Specifically, before conducting the formal hotel booking task for the trip to Bali Island using particular navigation support designs, participants in the same dyad were requested to conduct a base hotel booking task for the trip to New York City using tightly-bonded shared navigation support. The same experimental design was also applied previously in the IS research by Kim and Benbasat (2006) and Zhu et al. (2010).

2.4.3 Measurement

The measurements used in this study are adapted from previous literatures, and when no prior measurement is available we develop scales on our own. Specifically, measurement items for perceived mutual understanding are adapted from Katz and Te'eni (2007) and Cornelius and Boos (2003). Measurement items for perceived decision quality are adapted from Tan et al. (2010). We adapt the items from Kofaris (2002) and Jiang and Benbasat (2007) for measuring perceived enjoyment and intention to return. According to the experiment design which is based on Helson's (1964) adaptation theory, the measurement was adjusted to ask participants to compare the particular navigation support design in the treatment condition with the base task navigation support (i.e. shared navigation). The measurement items are listed in the Appendix C.

Actual mutual understanding is measured by asking each subject in the same dyad to provide and rank two lists of hotels names, with the first list indicating the top 5 hotels that they would prefer to choose (for buyer) or suggest (for advisor) and the second list showing the top 5 hotels that they think their partners would like to choose or suggest. Then discrepancy analysis (Jiang and Klein 2002) is conducted to evaluate the extent to which participants in the same dyad understand each other's opinions.

We adapt Jiang and Klein's (2002) discrepancy analysis to calculate the distance between two lists. Specifically, subjects' actual mutual understanding is assessed by comparing his second hotel name list with his partners' first hotel name list using the following calculation method: (1) If the same hotel name appears in both lists with the same order, then 5 credits would be granted to this subject with regard to this hotel name; (2) If the same

hotel name appears in both lists with different order, then the credits granted to this subject with regard to this hotel name would be “5-(the order difference between the orders of the same hotel name in the two lists)”; (3)If the hotel name only appears in this subject’s second list but not in his partner’s first list, then 0 credits would be granted to this subject with regard to this hotel name.

The aggregate value would range from 0 to 25, with higher value indicating more mutual understanding.

2.5 DATA ANALYSIS

2.5.1 Manipulation Check

A manipulation check for the group structure variable asked subjects to evaluate the following statement, which was based on a seven-point Likert scale (from Strongly Disagree to Strongly Agree): the final decision about which hotel to pick is made by both my friend and me.

Subjects in co-buyers structure, on average, rated 5.56 on the statement. In contrast, subjects in buyer/advisor structure rated 3.02. The value difference is significant ($t=4.65$, $p<0.001$ respectively). The results suggested that the group structure manipulation was successful.

2.5.2 Examination of Synchronicity Difference

Four items have been generated to measure synchronicity (see Appendix C). The composite reliability and Cronbach alpha of synchronicity are 0.89 and 0.82 respectively. They are considered to be well above the generally acceptable level of 0.70 for adequate internal consistency (Jiang and Benbasat 2007). ANOVA test was conducted to verify the synchronicity difference

among the three navigation support designs. The results show that the three navigation support designs significantly affect subjects' perceptions of synchronicity ($p<0.001$). *Post hoc* multiple comparisons using the Sheffe test indicate three levels of perceptions of synchronicity (Table 2.1). Separate navigation with location cue support was perceived to have a lower level of synchronicity than split screen navigation (mean difference=-0.8969, p=0.042), whereas tightly-bonded shared navigation was perceived to have a higher level of synchronicity than split screen navigation (mean difference=0.9255, p=0.035). The ANOVA test results support our previous argument that the three navigation support designs in the present study have different levels of synchronicity, and the synchronicity increases from separate navigation with location cue, to split screen navigation, then to tightly-bonded shared navigation.

Table 2.1: Homogeneous Subsets Based on ANOVA

Navigation Support	**Synchronicity Subsets** (for alpha=0.05)		
	1	2	3
• Separate Navigation with Location Cue	-1.8098		
• Split Screen Navigation		-.9129	
• Tightly-Bonded Shared Navigation			.0125
Sig.	1.000	1.000	1.000

2.5.3 Results on Actual Mutual understanding

We first conducted MANOVA analysis on both actual mutual understanding and perceived mutual understanding. Since the results showed that the treatment effects are significant (p<0.05), ANOVAs were further conducted on the two dependent variables separately.

The results of ANOVA on actual mutual understanding indicate that there are

significant main effects of navigation support and group structure as well as the interaction effect between them (as shown in Table 2.2). *Post hoc* analysis based on Scheffe test reveals that (see Table 2.3, 2.4 and 2.5): (1) split screen navigation leads to higher actual mutual understanding than both separate navigation with location cue and tightly-bonded shared navigation, thus supporting H1a and H2a; (2) H3a is not supported as separate navigation with location cue didn't induce more actual mutual understanding than tightly-bonded shared navigation.

The significant interaction effect implies that the effects of navigation support are moderated by group structures. Specifically, when collaborative consumers are in buyer/advisor structure, they have significantly more actual mutual understanding when using split screen navigation than when using shared navigation ($p=0.012$). On the contrary, when they are in co-buyers structure, their actual mutual understanding doesn't differ significantly between split screen navigation condition and tightly-bonded shared navigation condition ($p>0.05$). Therefore, H4a is supported (see Figure 2.2). When comparing to separate navigation with location cue, split screen navigation leads to more actual understanding for collaborative consumers in co-buyers structure ($p=.027$), whereas the difference of actual understanding is not significant for collaborative consumers in buyer/advisor structure, thus H4c is supported. When running ANOVA by only considering separate navigation with location cue condition and tightly-bonded shared navigation condition, the results imply a significant moderating effect of group structure ($p=.013$), thus supporting H4b. Generally, the results for interaction effect support our argument that group structure moderates the effect of navigation support on

collaborative consumers' actual mutual understanding.

Table 2.2: ANOVA Summary: Actual Mutual understanding				
Source	**df**	**Mean square**	**F**	**Sig.**
Navigation Support	2	59.117	4.714	.010*
Group Structure	1	160.067	12.765	.000*
Navigation Support * Group Structure	2	49.717	3.965	.020*

Table 2.3: Results on Actual Mutual understanding: Multiple Comparisons of Navigation Support			
Group A	**Group B**	**Mean difference (A-B)**	**Sig.**
Separate Navigation with Location Cue (mean: 11.475)	Split Screen Navigation	-1.450	.037*
	Tightly-Bonded Shared Navigation	.075	.991
Split Screen Navigation (mean: 13.000)	Separate Navigation with Location Cue	1.450	.037*
	Tightly-Bonded Shared Navigation	1.525	.026*
Tightly-Bonded Shared Navigation (mean: 11.550)	Separate Navigation with Location Cue	-.075	.991
	Split Screen Navigation	- 1.525	.026*

Table 2.4: Results on Actual Mutual understanding: Multiple Comparisons of Navigation Support for Co-Buyers Group Structure			
Group A	**Group B**	**Mean difference (A-B)**	**Sig.**
Separate Navigation with Location Cue (mean: 11.789)	Split Screen Navigation	-1.975	.027*
	Tightly-Bonded Shared Navigation	-1.100	.317
Split Screen Navigation (mean: 13.631)	Separate Navigation with Location Cue	1.975	.027*
	Tightly-Bonded Shared Navigation	.875	.482
Tightly-Bonded Shared Navigation (mean: 12.921)	Separate Navigation with Location Cue	1.100	.317
	Split Screen Navigation	-.875	.482

Table 2.5: Results on Actual Mutual understanding: Multiple Comparisons of Navigation Support for Buyer-Advisor Group Structure			
Group A	**Group B**	**Mean difference (A-B)**	**Sig.**
Separate Navigation with Location Cue (mean: 11.578)	Split Screen Navigation	-.925	.546
	Tightly-Bonded Shared Navigation	1.625	.157
Split Screen Navigation (mean: 12.736)	Separate Navigation with Location Cue	.925	.546
	Tightly-Bonded Shared Navigation	2.550*	.012*
Tightly-Bonded Shared Navigation (mean: 9.631)	Separate Navigation with Location Cue	-1.625	.157
	Split Screen Navigation	-2.550*	.012*

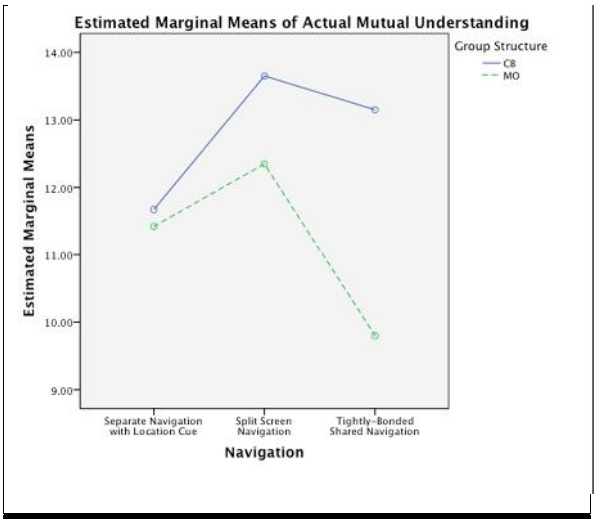


Figure 2.2: Results on Actual Mutual understanding

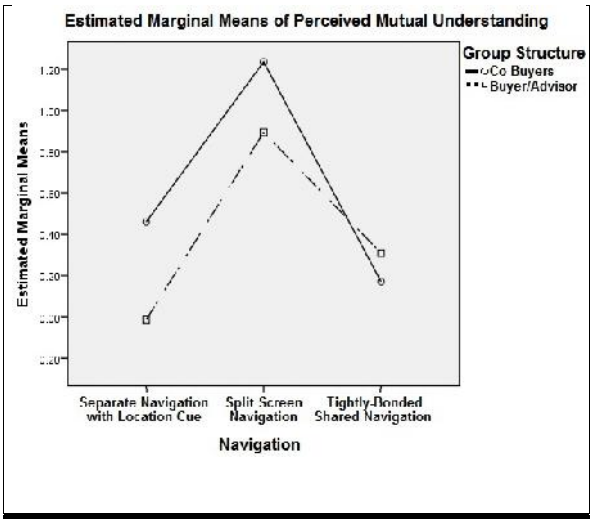


Figure 2.3: Results on Perceived Mutual understanding

2.5.4 Results on Perceived Mutual Understanding

The composite reliability and Cronbach alpha of perceived mutual understanding are 0.91 and 0.87 respectively. They are well above the generally acceptable level of 0.70 for adequate internal consistency (Jiang and Benbasat 2007).

The results of ANOVA on perceived mutual understanding imply that there is significant main effect of navigation support, whereas the interaction effect between navigation support and group structure are not significant (as shown

in Table 2.6). *Post hoc* analysis based on Scheffe test reveals that (see Table 2.7): (1) split screen navigation leads to higher perceived mutual understanding than separate navigation with location cue, thus supporting H1b; (2) split screen navigation leads to significantly higher perceived mutual understanding than tightly-bonded shared navigation, thus supporting H2b; (3) separate navigation with location cue has no significant difference from tightly-bonded shared navigation in terms of perceived mutual understanding, thus rejecting H3b.The insignificant interaction effect suggests that the effects of navigation support on perceived mutual understanding are not moderated by group structures (see Figure 2.3). Therefore, H5a, H5b and H5c are not rejected.

Table 2.6: ANOVA Summary: Perceived Mutual understanding

Source	df	Mean square	F	Sig.
Navigation Support	2	20.358	5.085	.007*
Group Structure	1	6.607	1.650	.200
Navigation Support * Group Structure	2	1.625	.406	.667

Table 2.7: Results on Perceived Mutual understanding: Multiple Comparisons of Navigation Support

Group A	Group B	Mean difference (A-B)	Sig.
Separate Navigation with Location Cue (mean: 0.219)	Split Screen Navigation	-.903	.018*
	Tightly-Bonded Shared Navigation	-.062	.981
Split Screen Navigation (mean: 1.122)	Separate Navigation with Location Cue	.903	.018*
	Tightly-Bonded Shared Navigation	.841	.031*
Tightly-Bonded Shared Navigation (mean: 0.281)	Separate Navigation with Location Cue	.062	.981
	Split Screen Navigation	-.841	.031*

Table 2.8: Cross Loadings of Measurement Items to Latent Constructs

	Perceived Mutual Understanding	Actual Mutual Understanding	Perceived Decision Quality	Perceived Enjoyment	Intention to Return
PMU1	**0.87**	0.04	0.54	0.38	0.48
PMU2	**0.87**	0.01	0.53	0.38	0.50
PMU3	**0.87**	-0.10	0.49	0.42	0.50
PMU4	**0.80**	-0.04	0.50	0.35	0.43
AMU	-0.03	**1.00**	0.12	0.06	0.08
PDQ1	0.59	0.10	**0.90**	0.52	0.59
PDQ2	0.55	0.07	**0.75**	0.45	0.49
PDQ3	0.50	0.11	**0.91**	0.45	0.54
PDQ4	0.44	0.13	**0.90**	0.52	0.60
ENJ1	0.35	0.04	0.44	**0.88**	0.56
ENJ2	0.44	0.07	0.55	**0.90**	0.77
ENJ3	0.37	0.05	0.49	**0.91**	0.63
ENJ4	0.44	0.04	0.54	**0.94**	0.67
INT1	0.55	0.09	0.63	0.69	**0.95**
INT 2	0.54	0.05	0.60	0.68	**0.97**
INT 3	0.52	0.10	0.61	0.71	**0.95**
INT 4	0.51	0.06	0.62	0.71	**0.94**

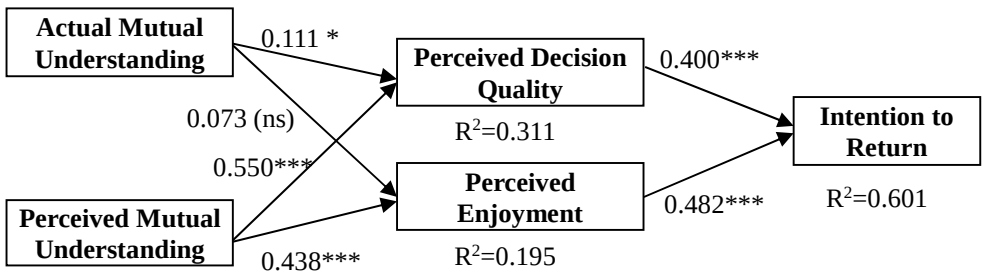
Note: Actual mutual understanding is indicated by a single index in the PLS model.

Table 2.9: Correlation of the Latent Variable Scores with the Square Root of AVE

	Cronbach's Alpha	Composite Reliability	PMU	AMU	PDQ	ENJ	INT
PMU	0.87	0.91	0.85				
AMU	1.00	1.00	-0.04	1.00			
PDQ	0.89	0.92	0.55	0.09	0.87		
ENJ	0.93	0.95	0.44	0.06	0.54	0.91	
INT	0.97	0.98	0.52	0.05	0.66	0.70	0.95

Notes:

1. Each diagonal element, which is the square root of the average variance extracted for the respective construct, exceeds all the correlations in the corresponding row and column (Fornell and Larcker 1981).
2. PSU: Perceived Mutual understanding; ASU: Actual Mutual understanding; PDQ: Perceived Decision Quality; ENJ: Perceived Enjoyment; INT: Intention to Return.



(*: p < 0.05; **: p < 0.01; ***: p < 0.001; ns: insignificant at the 0.05 level)

Figure 2.4: Study One Results of Structural Model Testing

2.5.5 Impacts of Mutual Understanding

In the present study, we apply PLS to test the impacts of actual and perceived mutual understanding on perceived decision quality and intention to return. Using Smart-PLS software, we first examined the measurement model to assess reliability and validity before testing the structural model. Tables 2.8 and 2.9 show the measurement model results, including information about reliability, validity, correlations and factor loadings. Both composite reliability and Cronbach alpha values are above 0.80, suggesting that the scales were reliable. The pattern of loadings and cross-loadings supports internal consistency and discriminant validity (Gefen and Straub 2005; Hair et al. 2011). Meanwhile, the square root of the AVE of all latent variables are greater than the correlation between this particular construct and other constructs, which further supports the discriminant validity (Barclay et al. 1995).

Structural model was then tested using bootstrap resampling technique, and the results are present in Figure 2.4. It suggests that perceived mutual understanding positively correlates with both perceived decision quality and perceived enjoyment, whereas actual mutual understanding only positively correlates with perceived decision quality but not perceived enjoyment. Therefore, H6, H7 and H9 are supported, but H8 is not. Moreover, the results indicate that perceived decision quality and perceived enjoyment have significant positive effect on intention to return, thus H10 and H11 are supported.

2.6 DISCUSSION AND CONCLUDING COMMENTS

2.6.1 Discussion of Results

The results show that split screen navigation in general is superior to separate navigation with location cue and tightly-bonded shared navigation in increasing collaborative consumers' actual and perceived mutual understanding (H1a, H1b, H2a, and H2b are supported). While split screen navigation provides full awareness of the partner's action on the website, it also enables consumers to interact with the website in their own way. Given that people have the tendency to discuss and base their judgment mainly on shared information in collaborative work, split screen is more likely to facilitate the communication and collaboration between collaborative consumers than location cue navigation, since through viewing objects in a visually shared virtual environment, collaborative consumers can build joint references to the products to discuss, achieve up-to-the-moment awareness of their partner's actions, and interpret collaborator's thoughts more easily (Gutwin and Greenberg, 1996). Meanwhile, increased awareness may also introduce competition in resources (e.g. control power) and people may get distracted or even interrupted from the task at hand by the behavior of the collaborators. The potential negative influence on collaboration outcomes yielded by tightly-bonded shared navigation can be alleviated by split screen navigation to a large extent, as its inherent medium level synchronicity enables collaborative consumers to interact with the website in their own way and alleviate the intra-grout conflict (Greer and Jehn 2007; Hill and Gutwin 2004).

In contrast to our expectation, separate navigation with location cue and tightly-bonded shared navigation are not different from each other (H3a and H3b are not supported). The reason may be that the benefits of separate navigation with location cue to enable collaborative consumers to have

flexible means to interact with the website by their own counteract the cost of less common ground when compared to tightly-bonded shared navigation, resulting in no significant differences between the two navigation support designs.

The results also indicate that group structure moderates the effects of navigation support on collaborative consumers' actual mutual understanding (H4a, H4b, and H4c are supported) but not the effects of navigation support on perceived mutual understanding (H5a, H5b, and H5c are not rejected). It seems that collaborative consumers in co-buyers group structure would utilize more similar strategies to search and process product information than those in buyer-advisor group structure (Brock and Fromkin 1968). Furthermore, as co-buyers need to reach a mutually agreed decision, more convergence process will be needed than buyer-advisor group (Jonas and Frey 2003). Collaborative consumers in co-buyers group structure are more likely than those in buyer-advisor group structure to tolerate shared navigation and may be better supported by high media synchronicity which facilitates timely discussion via convergence process and joint search throughout the whole shopping process. Therefore, group structure moderates the effects of navigation support on actual mutual understanding. However, both locate cue navigation and split screen navigation enable collaborate consumers to perceive a higher level of control than tightly-bonded shared navigation, which leads users to over-estimate their collaboration performance and the degree of mutual understanding regardless of group structure forms. Our findings further support the effect of "illusion of control" (Davis and Kottemann 1994).

Furthermore, our findings indicate that perceived mutual understanding

positively relates to perceived decision quality and perceived enjoyment, which in turn have positive influence on consumers' intention to return. However, the influence of actual mutual understanding on perceived enjoyment is insignificant. The findings imply that only perceived mutual understanding has an impact on perceived enjoyment, but actual mutual understanding doesn't.

2.6.2 Theoretical Contributions

The current study explores the effects of various navigation support designs on collaborative consumers' communication performance in undertaking COS. Two new navigation support designs are proposed and they are compared together with tightly-bonded shared navigation support. To the best of our knowledge, this is one of the first studies in IS discipline to empirically investigate the effectiveness of a wide range of navigation support designs in COS context.

While prior IS research and practice has focused mostly on consumers' individual shopping behavior in e-commerce (e.g. Xiao and Benbasat 2007, Cyr et al. 2009, and Luo et al. 2012), a recent trend is for consumers to buy things together online. This research advances our theoretical understanding in IS field by disclosing the knowledge of consumers' collaborative shopping behaviors in COS context. Both actual mutual understanding and perceived mutual understanding are assessed to provide objective as well as subjective indicators of consumers' communication performance while shopping together. Our results have indicated that navigation support designs have different effects on consumers' perceived and actual mutual understanding.

Furthermore, this study has proposed a structural model that illustrates how mutual understanding between shopping companions exerts influence on collaborative consumers' shopping experience. The findings suggest that perceived mutual understanding has significantly positive impact on both consumers' perceived decision quality and perceived enjoyment, which in turn influence consumers' intention to return. Dennis et al. (2008) proposed several antecedents that influence the development of mutual understanding for group members. This study extends these insights towards mutual understanding by investigating its consequences on consumers' online shopping experience.

Also, compared to previous studies that focus only on consumers shopping in one particular group structure (e.g. Zhu et al. 2010), this study investigates two different forms of shopping group structure that are most commonly seen in everyday life, i.e. co-buyers structure and buyer-advisor structure. Group structure has been widely investigated in prior organizational studies (e.g. Adamowicz et al. 2005; Green and Taber 1980; Ilgen et al. 2005; Souder 1977; Savadori et al. 2001). However, its effects in e-commerce field have not yet been explored. This study contributes to this knowledge gap by incorporating group structure in the research model, and its effects are explored by integrating insights from cognitive tuning theory and media synchronicity theory. This paper identified that group structure significantly moderate the effectiveness of navigation support technologies to induce actual mutual understanding.

2.6.3 Practical Implications

This paper would provide helpful insights for online vendors and website

designers to deploy and design appropriate navigation support according to different purposes. As prior studies in marketing research suggests that consumers accompanied by others generate more need recognition and spend more than when shopping alone (Butler 2001; Kahn and McAlister 1997; Kurt et al. 2011; Osborn 1957), it is reasonable to argue that COS would endow online vendors with more potential revenues. For example, according to Internet Retailer (2010), collaborative online shopping helps drive 15% increase in sales at a leading German skincare website.

Specifically, the results indicate that split screen navigation generally leads to more actual mutual understanding than separate navigation with location cue and tightly-bonded shared navigation. Therefore, the use of split screen navigation would be more helpful to improve consumers' actual knowledge of their partners' opinions towards the products. Meanwhile, in terms of perceived mutual understanding, split screen navigation appears to be a better design choice that shared navigation to improve consumers' COS experience.

Rather than binding shopping companions on the same browser and synchronously navigating at the same pace, the provision of more control for consumers to navigate at their own discretion would be helpful to enable more mutual understanding between shopping companions and improve their shopping experience. This finding is in accordance with the insights from prior groupware researchers who suggested that groupware or systems should be built to support group collaborators to shift between working alone and working together (Gaver 1991; Gutwin and Greedburg 1998).

Furthermore, as consumers in co-buyers structure and buyer/advisor structure have different needs for conveyance and convergence processes during the

shopping process, systems designers and online vendors should take group structure into consideration when they want to design or deploy appropriate collaboration support for consumers with different role combinations.

2.6.4 Limitations and Future Research

In the present study, we only investigated shopping group with two persons. While shopping group with two persons may be the most commonly seen shopping group in daily life, shopping group with more than two persons is also not uncommon. Group size has been found to be one of the factors that influence group interaction process (Forsyth 2009; Hackman and Morris 1975). Since the interaction pattern may be different when more people are involved in the shopping process (Bonner and Baumann 2008; Brewer and Kramer 1986; Littlepage 1991; Lowry et al. 2006), caution should be taken in generalizing our findings to groups with more than two people. Hence, future research could explore appropriate navigation support designs for shopping group with three or more people and test the effects of group size on the influence of various navigation support designs on collaborative consumers' coordination performances. Also, the effects of collaborative online shopping may depend on the type of products being evaluated. In our study, participants were requested to book hotels, which could be considered as experience goods. Caution should be taken in generalizing these results to other product categories. Hence, future research could test the effects of navigation support on consumers' shopping experience using search products and having more people in the same shopping group.

Moreover, since different navigation support may have distinct degree of

synchronicity, future study can explicitly measure and classify the synchronicity of various navigation support designs, and explore the effect of navigation support from synchronicity perspective.

Finally, although this study has found an overall moderating effect of group structure, it is possible that the effects of navigation support on consumers' collaborative online shopping experience may also be moderated by other possible factors (e.g. closeness or trust between shopping companions). Future research could devote more effort to explore other potential moderators in collaborative online shopping context.

CHAPTER 3: STUDY II: IMPACTS OF INTERFACE DISPLAY FORMAT AND SHOPPING MOTIVATION ON CONSUMERS APPROACH AND HERD BEHAVIOR IN ONLINE SOCIAL COMMERCE

3.1 INTRODUCTION

Social commerce, which combines social media and e-commerce to promote shopping-related information sharing and online purchase (Curty and Zhang 2013; Huang and Benyoucef 2013; Wang and Zhang 2012; Zhou et al. 2013), has received much attention from both academia and industry in recent years (Valck et al. 2009; Zhang et al. 2013). According to Forrester Research, online social commerce market will grow to US$30 billion in US by 2015 (Zhou et al. 2013). Social commerce platforms facilitate product information sharing among consumers. Through the social functions available at sites such as Pinterest and Fancy, users can access and learn from others while making purchase decisions. With the proliferation of social commerce sites, the competition is growing (Gnyawali et al. 2010; Zeng and Wei 2013; Zhou et al. 2013). While recognizing Web interface design as one of the crucial factors that influence the appeal of social commerce sites, web designers and online vendors have devoted much effort and resource to develop attractive Web interface for their sites. For example, it is not uncommon to find social commerce sites where products are presented in matrix display format, which lists products in a coherent and lucid manner (e.g. Fancy.com, Wanelo.com, Shopcade.com, Givvy.com, Shopstyle.com, and etc.). Nevertheless, an emerging trend is to present products in waterfall display format, which

presents products in an uneven and asymmetric way (e.g. Pinterest.com, Mogujie, Meilishuo, and etc.). Despite the prevalent use of both interface display formats by social commerce sites, empirical research investigating their effectiveness to attract users and influences on users' shopping behavior still lags in three critical aspects that motivate our study.

First, although it is well acknowledged that Web interface design plays a significant role in affecting consumers' online shopping performance and attitude toward the Web site (Griffith et al. 2001; Hong et al. 2004; Palmer 2002; Teo et al 2003), based on the best of our knowledge, there is little research investigating the effectiveness of different interface display formats to attract consumers in a social commerce site (Curty and Zhang 2013). While it is an important concern and of particular interest to web designers and online vendors to select the effective interface display format for their sites to attract consumers, prior research has shed little light on the relative efficacy of matrix format and waterfall format in inducing consumers' approach behavior towards the site, i.e., the extent to which consumers stay on the social commerce site and explore the site deeper. Prior research has indicated that consumers' approach behavior is highly related to the success of a website and implies more time spent on browsing, more varied products explored, a higher response to promotional incentives, and enhanced probability of purchasing (Deng and Poole 2010; Menon and Kahn 2002; Tai and Fung 1997). Thus, our study aims to assess the impacts of matrix format and waterfall format on consumers' approach behavior in the social commerce site.

Second, it is unclear whether and how interface display format influences consumers' use of social information cues, i.e. the cues that can convey

information of other consumers' preference towards products. As one of the most salient aspects of social commerce, social information cues are presented on the site to indicate other consumers' appreciation for the product and facilitate users' well-informed decision making. Prior research has identified an interaction effect between social information and contextual variables on consumers' online shopping behavior (Cheema and Papatla 2010, Zhou and Duan 2012, Zhu and Zhang 2010). For example, Zhu and Zhang (2010) suggests that consumers' reliance on user review is affected by contextual variables. Thus interface display format, as one of the main contextual variables for social commerce site, has the potential to influence consumers' use of social information cues. Indeed, social information cues can be generally categorized into opinion-based social information cue (e.g. user reviews, comments or word of mouth) and action-based social information cue (e.g. purchase quantity, number of favorites/likes, and popularity information) (Cheung et al. 2014). Prior social network and e-commerce research mostly focuses on the influence of opinion-based social information cue (i.e. users reviews or word of mouth) on consumers' decision making (e.g., Kumar and Benbasat 2006, Cheung and Thadani 2012; Duan et a. 2008; Gupta and Harris 2010; Kozinets et a. 2010; Zhou and Duan 2012), but overlooks the crucial impact of action-based social information cue. Among the few studies investigating the influence of action-based social information, Cheung et al. (2014) and Pavlou and Dimoka (2006) find that action-based social information is more influential than opinion-based social information on consumers' decision making.

Since action-based social information cue (e.g. popularity information) is

usually presented together with the products on the interface, it is highly possible that interface display format may pose a direct impact on consumers' use of such social information cues, and in turn influence consumers' decision making. Furthermore, prior research indicates that consumers are more likely to pay their attention to and make purchase of products that are popular among others (Chen 2008; Hanson and Putler 1996; Simonsohn and Ariely 2008). For example, people who eat out often pick the one with more seats occupied when there are two restaurants next to each other (Duan et al. 2009), and users searching for software applications usually try out the software that has received more downloading records when facing two alternatives (Walden and Browne 2009). The phenomenon of consumers' following others' behavior has been labeled as herd behavior (Banerjee 1992; Bikhchandani et al. 1992). Therefore, our study aims to investigate how interface display format influences consumers' herd behavior. The findings of our study will shed light on how consumers' use of action-based social information cues (i.e. popularity cues in the present research context) is influenced by interface display format. This is an important question needs to be addressed, since it is essential for online vendors to develop e-marketing strategies for effectively managing consumer online social interaction and transaction.

Third, prior research suggests that shopping motivation may moderate the effects of shopping environment on consumers' shopping behavior in both online and offline context (Deng and Poole 2010; Kaltcheva and Weitz 2006). While it is not uncommon for consumers to shop online with different motivations (Hong et al. 2004; Stone 1954; Tauber 1972), it is relatively less known how shopping motivation may influence the impact of interface display

format on consumers approach and herd behavior in social commerce site. In general, there are two major categories of online shopping motivations: recreational (or hedonic) motivation and task-oriented (or utilitarian) motivation. With recreational motivation, consumers engage in shopping to derive inherent satisfaction from the shopping activity itself, whereas with task-oriented motivation consumers involve in shopping to obtain needed products, services, or information with little or no inherent satisfaction derived from shopping activity itself (Kaltcheva and Weitx 2006). A typical example for recreational motivation is that consumers visit a social commerce site for leisure and they enjoy their spare time but rather plan to purchase any specific product. While consumers with task-oriented motivation usually have a target product in mind to purchase and they derive satisfaction from the acquisition of the needed product or service rather than from the shopping activity itself. For example, a consumer shops online to buy diaper for his/her child. To generate a comprehensive view of the impact of interface display format, it is imperative for research to determine whether interface display format makes a difference to consumers with different shopping motivations.

In sum, our research questions are thus: How does interface display format (i.e. matrix and waterfall display format) influence consumers' approach and herd behavior in social commerce site, and whether (if so, how) the influence is different for consumers with different shopping motivations. While prior research mainly applies subjective data captured via questionnaires to reflect users' perception of approach and herd tendency (e.g. Deng and Pool 2010; Sun 2014), our study will introduce eye-tracking technology to capture users' actual approach and herd behavior.

This paper is organized as follows. The next section reviews previous literature and theoretical foundations, followed by the proposed research model and hypotheses. After that we demonstrate the research method and data analysis. The paper concludes with discussions of the findings.

3.2 THEORETICAL FOUNDATIONS AND LITERATURE REVIEW

3.2.1 Environmental Impact on Consumer Behavior

The relationship between store environment and consumers behavior has been widely documented in marketing literature (Turley and Milliman 2000). Store environment has been found to influence consumer perception of retail products (Obermiller and Bitner 1984), and store approach/avoidance behaviors such as consumers' store patronage and spending (Donovan and Rossiter, 1982; Donovan et al. 1994).

Similar to its counterpart in physical stores, Internet atmospherics cues have also been considered as crucial features to attract consumers (McGaughey and Mason 1998). As one of the most salient Internet atmospherics features, interface display format is an important component of online shopping environment that may influence the psychological processes and information processing of online consumers.

This study applies the environmental psychology model proposed by Mehrabian and Russell (1974) as the framework for understanding consumer's behavioral responses to different interface display formats. Mehrabian and Russell's environmental psychology model has been the basis of most research on the impact of environmental factors on consumers shopping behavior. Specifically, the Mehrabian-Russell model (M-R model) implies that emotions

function to mediate the effects of environmental stimuli on behavior. It is suggested that environment stimuli influence people's affective responses, which in turn induce people's approach or avoid behavior towards the environment (Deng and Poole 2010; Donovan and Rossiter 1982; Russell and Pratt 1980).

Among various affective responses, arousal has been found to be the direct outcome of environmental stimulus. Arousal refers to the extent to which individual feels him/herself to be energy mobilized and reactive to stimuli (Apter 2001). Frijda (1986) indicates that arousal provides the basis for emotional response when a stimulus is detected, while the valence of the emotion (e.g. pleasantness) depends on people's interpretation of the felt arousal. Moreover, Kaltcheva and Weitz (2006) find that the emotion that shopping environmental characteristics influence directly is arousal, which in turn affects other emotions such as pleasantness.

In fact, the impact of shopping environmental characteristics on consumers' arousal has been widely studied in both marketing and information systems literature. For example, previous research findings suggest that warm colors, fast music tempo and complex environment have a positive relationship with consumers' arousal (Berlyne 1960; Holbrook and Gardner 1993; Kueller and Mikellides 1993). Furthermore, arousal increases with increasing complexity (Nasar 1987, 1997; Heath et al. 2000) and decreases with increasing order (Nasar 1987, 1997; Nasar and Hong 1999). Specifically, as the extent of webpage order decreases or complexity grows, the unity, coherence, and clarity to the online shopping environment reduce, the efforts required to comprehend the environment increase, and more energy allocation to the

stimulus will be required, thus leading to high arousal. Applying the M-R model in their study on webpage order and complexity effect, Deng and Poole (2010) reveal the negative influence of webpage order yet positive influence of webpage complexity on user's feeling of arousal, which in turn would induce users' approach or avoid behavior tendency towards the website.

3.2.2 Herd Behavior

Herd behavior happens when individuals observe what the similarly situated others are doing, and based their beliefs and decisions on it (Banerjee 1992; Bikhchandani et al. 1992; Chen and Wang 2010; Simonsohn and Ariely 2008). Herd behavior has been observed in various situations. For example, Avery and Zemsky (1998) find that in financial investment when traders are uncertain about the quality of the information they have, they tend to follow the trend of past trades. Walden and Browne (2009) also suggest that users searching for software applications usually try out the software that has received more downloading records when facing two alternatives. Moreover, Chen and Wang (2010) indicate that online bidders make more choices towards the products that have high feedback rating and that attract numerous questions and answers from other bidders.

Prior research has identified two primary conditions under which herd behavior would occur: uncertainty about the decision and observation of others' actions (Sun 2014). It has been found that when people are uncertain about the decision to be made, they are more likely to herd (Bikhchandani and Sharma 2000; Lieverman and Asaba 2006). Fiol and O'Connor (2003) suggest that uncertainty might lead to the restriction of people's independent choice

and contribute to following generally accepted patterns of others' behavior. Furthermore, Walden and Brown (2006) also argue that following the behavior of other similarly situated decision makers can be a useful strategy in adoption situations in which there is a great deal of uncertainty.

Meanwhile, observing others' actions is a necessary condition for herd behavior to occur. People learn from others' behavior to infer implicit information, especially when they obtain little private information on hand and there is high uncertainty in the environment (Gaba and Terlaak 2013). Before taking actions or making decisions, people often observe what others have behaved and decided (Simonsohn and Ariely 2008). There are abundant evidences showing that observing other's behaviors can influence people's decision and behaviors in various social contexts. For example, in an empirical investigation of a movie review website, Duan et al. (2008) find that the number of user postings regarding a movie has a positive impact on box office revenues, and a recent increase in the number of postings for a movie is more likely to elicit more user reviews in the following day.

Consumers' herd behavior can be particularly prominent in the online social commerce context. Social commerce websites facilitate the information sharing and transmission among consumers worldwide. The tremendous amount of product information has led to information overload for social commerce website users. It is almost impossible for consumers to examine and compare all the products before making their decisions. The uncertainty to make the optimal purchase decision out of hundreds and thousands of competing products may lead consumers to follow others' choices as the most efficient and rational way to make decision. The influence of others' behavior

can be so substantial that it determines consumers' decision choice (Duan et al. 2009).

Indeed, online social commerce sites facilitate the provision of other consumers' choices and opinions, which can be easily observed by online users. Social information such as the numbers of likings or reviews of products has been displayed together with product information. For example, the total number of times each product is marked as "Like" or "Favorite" is displayed on the website. Zeng and Wei (2013) suggest that this marking serves a social function by communicating a consumer's appreciation for the product and a product marked as a "Like" or "Favorite" more times is considered to be more popular. Such information that implies the popularity of products serves as an indicator of the choices made by previous consumers (Duan et al. 2009; Zeng and Wei 2013). Consumers will then tend to focus on and purchase the products with more popularity. Indeed, consumer herd behavior highlights the influence of popular products on social commerce website.

3.2.3 Interface Display Format: Matrix versus Waterfall

Interface display format refers to how product information is presented and organized on website interface (Hong et al. 2004). In this study, we focus on two prevailing formats to present products on the website interface: matrix display format and waterfall display format.

With matrix display format, products are presented in regular and static matrix square area and are aligned both vertically and horizontally with other products. The height of all grid elements is constant. Waterfall display format

presents products in full length, and products are aligned only vertically but not horizontally with each other on the interface, as the height of all grid elements is different. Thus waterfall display format leads the position of the grid elements on the website to be randomized for each product.

While matrix display format provides a sense of clear and coherent organization of products, waterfall display format results in a feeling of randomness and unevenness in the visual field for consumers. Given the same product information presented on the interface, waterfall display format differs from matrix display format in terms of the order of products and interface complexity. Specifically, the order of an environment is related to the degree of organization of the environment, as reflected in the extent of coherence, congruity, legibility, and clarity it exhibits (Deng and Poole, 2010; Nasar 1999), whereas complexity implies the multiplicity of the relationships among the different parts and it is related to visual diversity and unevenness of information in an environment (Deng and Poole, 2010; Nasar 1999). Since the grid elements position is randomized on interface with waterfall display format, the interface lacks coherence, congruity and clarity compared to that with matrix display format; meanwhile, the distance between the grid elements on waterfall display format is highly varied and the relationship (e.g. above, below, left, right) between the grid elements implies more multiplicity. Moreover, the visual diversity and unevenness of product information on interface with waterfall display format is more than that on interface with matrix display format. Thus, it is reasonable to argue that matrix display format is inherent with a higher level of product order and lower level of interface complexity when comparing to waterfall display format.

While both of these two interface display formats present product information cues (product images and brief descriptions) and social information cues (product popularity among other consumers, e.g. the number of likings from others) on the interface, consumers' reliance and processing of these two types of cues may be different with different display formats. To analyze the difference between the two interface display formats, we apply the cue selection effect (Pham 1996) from the Marketing literature in the following subsection.

3.2.4 Cue Selection Effect

Pham (1996) proposes the cue selection effect to explore the influence of impaired working memory capacity on the way that consumers process information. In general, cue selection effect implies that decreased ability to process information will tend to increase the influence of cues that are more diagnostic and dilute the influence of cues that have less information value.

Specifically, the cue selection effect suggested that, in order to cope with their impaired working memory capacity people would selectively processing certain cues at the expense of others, and the selection of cues to process is based on the information value of these cues. In other words, faced with impaired capacity, consumers tend to selectively process cues that have high information value at the expense of cues that have little information value. Applying the cue selection effect in his advertising persuasion study, Pham (1996) finds that subjects suffering from impaired working memory capacity are more likely to rely on cues that are more diagnostic for brand evaluation.

The underlying principle of cue selection effect has also been supported in

other studies. For example, Pham and Avnet (2004) indicate that consumers focus on different information in judgment and in persuasion because they perceive different types of information have different levels of diagnosticity, but not because different types of information have different desired levels of elaboration. The cue selection processing effect is also consistent with research on decision-making that suggests people often attempt to reduce the processing strain by basing their choice on more important attributes (Tversky, Sattath, and Slovic 1988).

In summary, as one of the main atmospheric variables of social commerce website, interface display format should influence consumers' approach and herd behavior. Meanwhile, based on the cue selection effect, consumers may use the information on the website interface distinctly, since matrix and waterfall display format present product information in different ways that require different level of cognitive capacity for consumers to react.

3.3 RESEARCH MODEL AND HYPOTHESES DEVELOPMENT

The research model is shown in Figure 3.1.

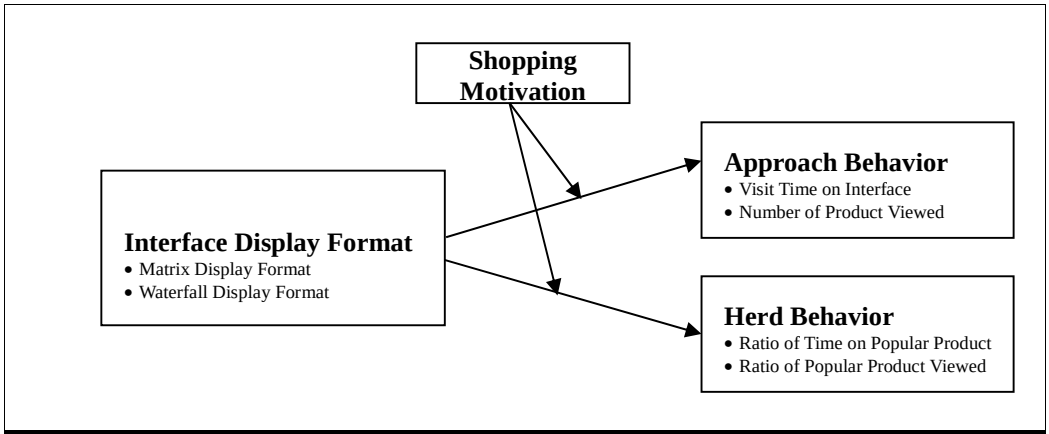


Figure 3.1: Study Two Research Model

3.3.1 Dependent Variables

This study explores the effects of interface display format on consumers approach behavior and herd behavior on social commerce website. There are two types of behavior that are of particular concerns for both social commerce sites that attempt to attain consumers and marketers that promote new products on social platforms. On one hand, approach behavior indicates whether social commerce website attracts and retains consumers successfully by having them to stay on the website and explore the website deeper. On the other hand, herd behavior implies the extent to which consumers are influenced by other users' behavior and focus mainly on popular products. In our study, we will apply eye-tracking technology to capture consumers' actual behavior and measure the two dependent variables using objective measures.

Accordingly, two indicators that are relevant to the extent of consumers approach behavior towards a website are: the time they stay on the website interface and the number of products they view. Furthermore, in order to appropriately capture the extent to which consumers pay their attention to popular products, we apply ratio of time on popular products and ratio of popular products viewed as the indicators for consumers herd behavior. These two indicators suggest (1) the proportion of the time consumers spend on popular products over the total time they spend on the website interface, and (2) the proportion of the number of popular product viewed over the total number of products viewed.

3.3.2 Impact on Approach Behavior

When consumers have more approach behavior towards a particular website, they would enjoy staying with the website and exploring the site deeper (Deng

and Poole 2010; Richard 2005), rather than avoid the website and switch to other websites. Approach behavior toward a shopping environment implies that consumers have formed a positive attitude toward the environment stimulus (Donovan and Rossiter 1982; Donovan et al. 1994). Prior research has found that consumers would spend more time browsing the website and explore more varied products when they tend to approach the website (Menon and Kahn 2002).

According to Mehrabian and Russell's (1974) environmental psychology model, atmospheric variables influence consumers' affective responses which in turn affect their behavioral responses to shopping environment stimuli (Eroglu et al. 2003; Richard 2005). In online social commerce context, website interface serves as the online shopping environment for consumers. Different interface display formats are expected to generate distinct affective responses for online consumers. Prior research has found that webpage order reduces consumers' arousal feeling while webpage complexity positively correlates with their arousal level (Deng and Poole 2010). Specifically, as the extent of webpage order grows or webpage complexity reduces, the website brings consumers with clarity to the environment and calls for less energy allocation to the stimulus, leading to low arousal for consumers.

Matrix display format presents products in regular matrix square area and provides a unity and coherent sense by aligning them both horizontally and vertically with each other. In contrast, waterfall display format presents products in full length and results in a feeling of randomness and unevenness in the visual field for consumers by aligning only vertically but not horizontally with each other on the interface. Comparing to matrix display

format, waterfall display format generate more sense of webpage complexity and less feeling of product organization order. Accordingly, waterfall display format is expected to lead consumers to have more affective responses of arousal (Deng and Pool 2010).

As prior research suggests that shopping motivation determines consumers' interpretation of arousal and consumers are more likely to approach a shopping environment when the arousal level matches their shopping motivation (Deng and Poole 2010; Kaltcheva and Weitz 2006), it is reasonable to argue that interface display format would exert contingent effect on consumers' approach behavior on the website.

Specifically, compared to consumers with recreational motivation, those with task-oriented motivation are more likely to derive satisfaction from the acquisition of the needed product or service rather than from the activity itself. Kaltcheva and Weitz (2006) find that consumers with task-oriented motivation seek to spend *least effort* to complete the shopping activity and get the needed product or service with *minimum expense* of energy. Since shopping environment that generates high arousal will require high energy involved to respond to the stimulus and more effort to complete the shopping activity (Apter 2001), such shopping environment will be perceived as unfavorable, Compared to waterfall display format, matrix display format which presents products in a clear order with less complexity, may be helpful for consumers with task-oriented motivation to search and compare different alternatives efficiently with less energy involved.

In contrast, for consumers with recreational motivation who look for enjoyment and excitement from the shopping activity itself, shopping

environment that generates high arousal would be perceived as favorable. The reason is that consumers with recreational shopping motivation are activity-oriented and excitement-seeking, and they can derive intrinsic rewards such as excitement and rich experience from such shopping environment. Nevertheless, shopping environment that generates low arousal makes consumers to be less activated and thus will be perceived as boring and unpleasant (Deng and Poole 2010; Kaltcheva and Weitz 2006). Accordingly, waterfall display format may be more preferred by consumers with recreational motivation than matrix display format.

Therefore, consumers with task-oriented shopping motivation are more likely to approach websites with matrix display format, leading to more time spent on visit those website and more products viewed, whereas consumers with recreational shopping motivation are more likely to approach websites with waterfall display format and they would visit the website for more time and view more products. Hence, we hypothesize that

H1: Shopping motivation moderates the effect of interface display format on consumers' approach behavior.

Specifically,

H1a: Shopping motivation moderates the effect of interface display format on consumers' visit time on the interface, i.e., comparing to matrix display format, waterfall display format leads to more visit time on interface for consumers with recreational-oriented shopping motivation but less visit time on interface for consumers with task-oriented shopping motivation.

H1b: Shopping motivation moderates the effect of interface display format on the number of products viewed by consumers, i.e., comparing to matrix display format, waterfall display format leads to more products viewed for consumers with recreational-oriented shopping motivation but less products viewed for consumers with task-oriented shopping motivation.

3.3.3 Impact on Herd Behavior

Herd behavior implies that consumers tend to follow the actions of other consumers (Banerjee 1992; Bikhchandani et al. 1992). As suggested by Sun (2009, 2014), one primary condition for herd behavior to happen is the observation of others behavior. In online social commerce context, social cues (such as number of likings towards the products) serve as an appropriate indicator that implies how other consumers rate and prefer the products on the website. People may infer from the social cue information and find out which products are preferred more by other consumers or are more popular. Consumers' processing of social cue information and the ability of observing others behavior may be influenced by interface display format.

In the matrix display format condition, products are presented to consumers with the sense of orderliness and coherence. Compared to consumers with recreational motivation, those with task-oriented motivation are expected to experience more uncertainty. Uncertainty refers to consumers' difficulty in evaluating products characteristics, and predicting how a product will perform in the future (Dimoka et al. 2012). Consumers with task-oriented motivation engage in shopping activity to obtain needed products or services and they have to pay attention to available information to make appropriate decision

regarding which product or service to purchase. In contrast, consumers with recreational motivation engage in shopping activity to derive inherent satisfaction from the shopping activity itself without a targeted shopping goal in mind (Deng and Pool 2010; Hong et al. 2004). Since consumers with task-oriented motivation have more concerns in predicting how a product will perform in the future and more difficulty in evaluating products characteristics than those with recreational motivation, they will experience more uncertainty during their shopping experience in social commerce sites.

Findings from herd literature suggested that consumers often imitate what they observe from other consumers' behavior and preference, especially when they face uncertainty in the shopping environment (Bikhchandani and Sharma 2000; Fiol and O'Connor 2003; Lieverman and Asaba 2006; Sun 2014). Consumers with task-oriented motivation tend to collect all possibly available information (i.e. *both* product information cues and social information cues) that could be helpful for them to reduce uncertainty and make better decision. Nevertheless, consumers with creational motivation are more activity-oriented, and their browsing on the sites may focus on *either* the product information cue *or* social information cue, *or both* these two types of information cues. Therefore, comparing to consumers with recreational motivation, those with task-oriented motivation are more likely to rely on social information cues while shopping on the website. Thus, in the matrix display format condition, consumers with task-oriented motivation are more likely to herd than those with recreational motivations.

However, in the waterfall display format condition, products are presented to consumers with a sense of randomness and unevenness. Such layout is

unbalanced and asymmetric, which makes parsing of information and readability more difficult for consumers. Cognitive capacity has to be expended to organize all the product information presented on the web interface in mind in an orderliness manner (Goldstein 2009), leading to less cognitive capacity available for consumers to use during their website visit. In other words, both consumers with task-oriented motivation and those with recreational motivation will suffer from impaired cognitive capacity when they visit social commerce site with waterfall display format.

According to cue selection effect, when consumers face with impaired cognitive capacity they would rely more on cues that have more information value and are more diagnostic (Pham 1996). Accordingly, as two main types of information presented on web interface, product information cues (including product image and brief product description) and social information cues (i.e. the popularity cue) may be processed differently by consumers in waterfall display format condition. Product information cues usually present direct and relevant information of the products, such as color, shape, appearance, name, attributes and etc., whereas social information cues cannot express the product information directly, but rather the mere implication of the extent to which other consumers rate or prefer the product. Therefore, for consumers attempting to understand and evaluate a product, product information cues are inherent with more product information value compared to social information cues. Hence, cue selection effect suggests consumers will pay more attention on product information cues and less on (or even ignore) social information cues when they are in waterfall display format condition than when they are in matrix display format. This will lead consumers to avoid observing others

behavior and in turn there will be less herd behavior on waterfall display format than on matrix display format. Since both consumers with task-oriented motivation and those with recreational motivation will suffer from impaired cognitive capacity when they visit social commerce site with waterfall display format, they will both rely mostly on product information cues and rarely on social information cues, leading to similar level of herd behavior between them.

While waterfall display format alleviates the attention on and processing of social information cues, its effect to reduce herd behavior will be stronger for consumers with task-oriented motivation than for those with recreational motivation. Hence, it is reasonable to argue that shopping motivation will moderate the effect of interface display format on consumers herd behavior. Accordingly, we propose that

H2: Shopping motivation moderates the effect of interface display format on consumers' herd behavior.

Specifically,

H2a: Shopping motivation moderates the effect of interface display format on the ratio of time on popular product, i.e., the decrease of ratio of time on popular product by waterfall display format would be more significant for consumers with task-oriented shopping motivation than for consumers with recreational-oriented shopping motivation.

H2b: Shopping motivation moderates the effect of interface display format on the ratio of popular products viewed, i.e., the decrease of ratio of popular products viewed by waterfall display format would be more significant for

consumers with task-oriented shopping motivation than for consumers with recreational-oriented shopping motivation.

3.4 RESEARCH METHOD

The hypotheses proposed in the present study are tested through a laboratory experiment with a 2×2 between-factorial design (i.e., 2 types of interface display format × 2 types of shopping motivation). The two types of webpage display format include: (1) matrix display format and (2) waterfall display format. The two types of shopping motivation are: (1) task-oriented shopping motivation and (2) recreational shopping motivation.

In order to ensure sufficient statistical power of 0.8 for medium effect size (f=.25) (Cohen 1988), we have 30 subjects participated in each condition, and hence a total of 120 subjects for the whole experiment.

3.4.1 Experimental Website Design

Two experimental websites are developed, with one website presents products in matrix display format on the interface and the other one in waterfall display format.

For website with matrix display format, products are displayed in static matrix square area on the home page, and they are both vertically and horizontally aligned with other products, whereas for waterfall display format, products are presented in dynamic grid square area on the home page, and the products are only vertically but not horizontally aligned with other products (see Appendix D for interface display format designs). Exactly the same product information is provided on the interface of the two experimental websites, with the only

difference in the interface display format. Subjects are able to browse naturally on the website. If they click on some specific product on the interface for further information, the product page will appear to display the information for the product selected. Both experimental websites apply the same design for the product page.

For each product presented on the interface, both the product image and the number of likings are displayed. To alleviate the potential gender bias generated by product types, we include both products for men and products for women, as well as neutral products. The aim of the experimental website design is to ensure that the only difference between these two websites is in the way how the products were displayed (matrix display format vs. waterfall display format), but not the information amount or information type.

Among all the products displayed on the interface, around 10% are randomly selected as popular products. Specifically, for the products that are selected as popular ones, the numbers of likings are set to more than 100, whereas for other products the numbers of likings are set to significantly less than 100.

Overall, to the best of our efforts, product information content is kept uniform across different interface display format and the only difference is the interface display format.

3.4.2 Shopping Motivation Manipulation

Shopping motivation is manipulated by presenting subjects with two different experimental scenarios before starting the experiment (Deng and Poole 2010; Kaltcheva and Weitz 2006). Specifically, subjects with task-oriented motivation are presented with a task-oriented instruction, which describes a

scenario that requires subjects to purchase a birthday gift for his/her friend. On the contrary, subjects with recreational motivation are provided with a recreational instruction, which describes a scenario that asks subjects to visit the social commerce website for enjoyment. The scenarios are presented in the Appendix E.

3.4.3 Experimental Procedures

Subjects were recruited from a university campus. They were randomly assigned to one of the four experiment conditions, i.e. (1) matrix display format, task-oriented shopping motivation; (2) matrix display format, recreational shopping motivation; (3) waterfall display format, task-oriented shopping motivation; and (4) waterfall display format, recreational shopping motivation.

Before being exposed to the experimental website, subjects are presented with an introduction of the experiment scenario to induce either task-oriented shopping motivation or recreational shopping motivation. After reading the instruction, subjects are shown to the experimental website on a laboratory computer and then they browse the website on their own. The website visit process end when the subjects would like to stop visit the web site. After finishing the website visit, the subjects are asked to complete questionnaires and were paid $ 6 as participation reward.

3.4.4 Measurements

The measurement instruments for the manipulation check of shopping motivation are adapted from Kaltcheva and Weitz (2006)' scales and are listed in the Appendix F.

We apply eye-tracking technology to measure subjects' actual approach behavior and herd behavior on the social commerce website. The eye-tracking system used in this study is Tobii Eye Tracker TX60, which can record and process gaze data and video footage in real-time.

With the support of eye-tracking system, visit time on interface is measured in seconds by recording the time subjects spent on the website interface. Number of product viewed is measured by counting the number of products that have received subjects' eye fixations. Ratio of time on popular product is calculated as the proportion of the time subjects fixed their attention on popular products over total visit time on the website interface. Ratio of popular product viewed is calculated as the proportion of the number of popular products that received subjects' eye fixation over total number of product viewed on the website interface.

3.5 DATA ANALYSIS

3.5.1 Subject Information

The 120 subjects are recruited from a university campus with diverse academic backgrounds. Among these subjects, 79 (65.8 percent) are female and 41 (34.2) are male. 93% of them are between 19 to 23 years old, and the average age of the participants is 21.3. 90% of the participants have over 7 years of Internet experience. There is no significant difference in gender, age and other demographic distribution across the four experiment conditions.

3.5.2 Manipulation Check

ANOVA test was conducted to check whether the manipulation of different shopping motivation is successful. The composite reliability and Cronbach alpha of shopping motivation are 0.81 and 0.76 respectively. They are considered to be well above the generally acceptable level of 0.70 for adequate internal consistency. The ratings of shopping motivation checking questions were summed and averaged for analysis. Subjects for task-oriented shopping motivation rated 4.86 on average, while those for recreational shopping motivation rated 3.16 on average. The value difference is significant ($p<0.001$). The results suggested that the shopping motivation manipulation was successful.

3.5.3 Hypotheses Testing: Results on Approach Behavior

We first conducted MANOVA analysis on all four measurements, namely visit time on interface, number of products viewed, ratio of time on popular products, and ratio of popular products viewed. Since the results showed that the treatment effects are significant ($p<0.05$), ANOVAs were further conducted on the four measurements separately.

Corresponding results on approach behavior are shown in Table 3.1-3.4 and Figures 3.2 and 3.3. In particular, Table 3.1 shows the ANOVA test results on the visit time on interface. The significant interaction effect between interface display format and shopping motivation implies that the effect of interface display format is moderated by consumers' shopping motivation ($p = .000$). Further analysis indicates that, for consumers with recreational shopping motivation, their visit time on interface with waterfall display format is

significantly more than their visit time on interface with matrix display format (mean difference = 58.083, p = .004); whereas for consumers with task-oriented shopping motivation, their visit time on interface with waterfall display format is significantly less than their visit time on interface with matrix display format to waterfall display format (mean difference = -56.730, p = .002). Therefore, H1a is supported.

The ANOVA test results shown in Table 3.3 indicates that, in terms of the number of product viewed, there is a significant interaction effect between interface display format and shopping motivation (p = .000). Further analysis indicates that, for consumers with recreational shopping motivation, the number of product they viewed on interface with waterfall display format is significantly more than the number of product they viewed on interface with matrix display format (mean difference = 10.266, p = .054); whereas for consumers with task-oriented shopping motivation, the number of product they viewed on interface with waterfall display format is significant less than the number of product they viewed on interface with matrix display format (mean difference = -21.600, p = .000). Therefore, H1b is supported.

Table 3.1: ANOVA Summary: The Visit Time on Interface

Source	df	Mean square	F	Sig.
Interface Display Format	1	13.754	.003	.959
Shopping Motivation	1	1300.693	.251	.617
Interface Display Format * Shopping Motivation	1	98864.682	19.095	.000*

Table 3.2: Descriptive Statistics: The Visit Time on Interface

	Matrix Display Format	Waterfall Display Format	Mean
Task-Oriented Shopping Motivation	159.314	102.584	130.949
Recreational Shopping Motivation	95.323	153.406	124.364
Mean	127.318	127.995	

Table 3.3: ANOVA Summary: The Number of Product Viewed				
Source	**df**	**Mean square**	**F**	**Sig.**
Interface Display Format	1	963.333	2.364	.127
Shopping Motivation	1	43.200	.106	.745
Interface Display Format * Shopping Motivation	1	7616.133	18.691	.000*

Table 3.4: Descriptive Statistics: The Number of Product Viewed			
	Matrix Display Format	Waterfall Display Format	Mean
Task-Oriented Shopping Motivation	127.300	105.700	116.500
Recreational Shopping Motivation	110.167	120.433	115.300
Mean	118.733	113.067	

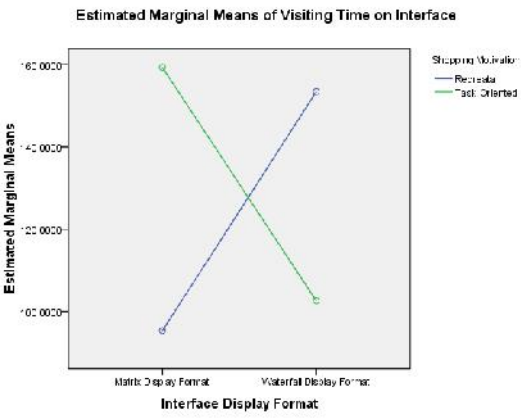


Figure 3.2: Results on Visit Time on Interface

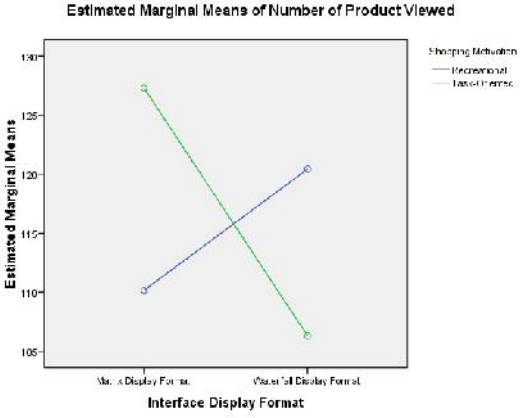


Figure 3.3: Results on Number of Product Viewed

3.5.4 Hypotheses Testing: Results on Herd Behavior

The ANOVA test results on herd behavior are shown in Tables 3.5-3.8 and Figures 3.3 and 3.4.

Specifically, Table 3.5 indicates that the main effect of interface display format on the ratio of time on popular products is significant (p = .025), suggesting that waterfall display format effectively reduces consumers' attention on popular products as comparing to matrix display format. Therefore, H2a is supported. The interaction effect between interface display

format and shopping motivation is also significant (p = .046), indicating that the influence of interface display format is moderated by shopping motivation. In particular, the decrease of the ratio of time on popular product is more significant for consumers with task-oriented motivation than for those with recreational motivation. Therefore, H2a is supported.

Table 3.7 shows the effect of interface display format on the ratio of popular products viewed. The main effect of interface display format and interaction effect are not significant, indicating that waterfall display format is not different from matrix display format in influencing the ratio of popular products viewed, regardless of the shopping motivation that consumers have in mind, thus H2b is not supported.

Table 3.5: ANOVA Summary: The Ratio of Time on Popular Products

Source	df	Mean square	F	Sig.
Interface Display Format	1	.010	5.169	.025*
Shopping Motivation	1	.012	6.046	.015*
Interface Display Format * Shopping Motivation	1	.008	4.080	.046*

Table 3.6: Descriptive Statistics: The Ratio of Time on Popular Product

	Matrix Display Format	Waterfall Display Format	Mean
Task-Oriented Shopping Motivation	.138	.103	.120
Recreational Shopping Motivation	.102	.099	.100
Mean	.120	.101	

Table 3.7: ANOVA Summary: The Ratio of Popular Product Viewed

Source	df	Mean square	F	Sig.
Interface Display Format	1	0.0005	.271	.604
Shopping Motivation	1	0.00008	0.005	.946
Interface Display Format * Shopping Motivation	1	0.0003	.179	.673

Table 3.8: Descriptive Statistics: The Ratio of Popular Product Viewed			
	Matrix Display Format	Waterfall Display Format	Mean
Task-Oriented Shopping Motivation	.106	.103	.105
Recreational Shopping Motivation	.105	.105	.105
Mean	.105	.104	

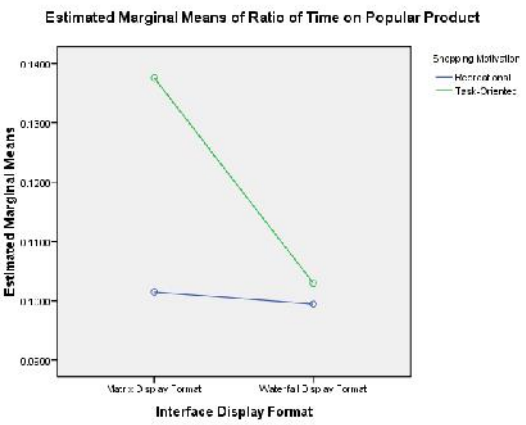


Figure 3.4: Results on Ratio of Time on Popular Product

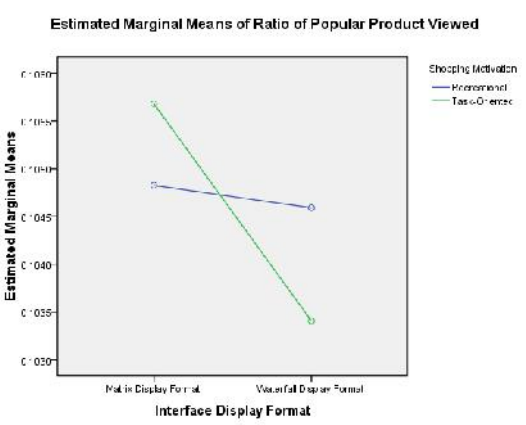


Figure 3.5: Results on Ratio of Popular Product Viewed

3.5.5 Additional Analysis

Recall that we have mentioned previously that cue selection effect will influence consumers' focus on different information cues. Specifically, the impaired working memory capacity when visit social commerce websites with waterfall display format may likely to lead consumers to select cues that have more information value on the cost of cues that have low information value. Consequently, when visit social commerce websites with waterfall display format (vs. those with matrix display format), consumers are less likely to focus on social information cues and leave more attention on product information cues. In order to test this conjecture, we examined subjects' actual attention on social information cues based on the gaze data captured by eye tracker. When visit on social commerce websites with matrix display format,

subjects spent 9.88 seconds in total on social information cues, which account for 8.1% of their total time on website interface. While visit on social commerce websites with waterfall display format, they spent 4.52 seconds in total on social information cues, which is 3.8% of their total time on website interface. The difference is significant for both the time on social information cue and the proportion of time on social information cue (time on social cue: difference 5.36, $p < .001$; proportion of time on social cue: difference 4.3%, $p < .001$). The results generally show that waterfall display format leads consumers to rely less on social information cues. Overall, our findings about consumers' attention on social information cue support our earlier conjecture.

3.6 CONCLUSION AND DISCUSSIONS

3.6.1 Discussion of Results

The results in the present study show that there is a significant interaction effect between interface display format and shopping motivation on consumer approach behavior towards a social commerce website (H1a and H1b are supported). Specifically, waterfall display format will lead to more visit time on the interface and more products to be viewed for consumers with recreational shopping motivation, but not for consumers with task-oriented shopping motivation. In contrast, matrix display format will lead to more visit time on the interface and more products to be viewed for consumers with task-oriented shopping motivation, but not for those with recreational shopping motivation. The effect of interface display format on consumers approach behavior depends on the shopping motivation consumers have in mind. Our findings show further support for Kaltcheva and Weitz's (2006)

argument that consumers with task-oriented motivation, compared to those with recreational motivation, would have more favorable behavior towards shopping environment that generates low arousal emotion and more sense of product organization order. While website with matrix display format provide more sense of clarity to shopping experiment for consumers with task-oriented motivation to efficiently acquire the needed products, website with waterfall display format generates high arousal emotion and enables consumers with recreational motivation derive satisfaction from the shopping activity itself (Deng and Poole 2010).

Moreover, the results also indicate that interface display format could influence consumers' herd behavior with the moderation effect of shopping motivation (H2a is supported). Specifically, compared to matrix display format, waterfall display format leads consumers to spend less proportion of their visit time on popular products and more attention would be paid to those that are not popular, thus alleviate consumers tendency to herd. The results indicate that consumers visit website with waterfall display format are less likely to rely on social cue information but more likely on product information (image/description) than those visit website with matrix display format. The findings may further support cue selection effect (Pham 1996) since the results imply that consumers with impaired cognitive capacity would reply more on cues that have more information value (i.e. product image/description). Furthermore, the impact of waterfall display format to reduce consumers' ratio of time on popular product is stronger for consumers with task-oriented motivation than those with recreational motivation.

In contrast to our expectation, the main effect of interface display format and its interaction effect with shopping motivation on the ratio of popular product viewed are not significant (H2b is not supported). The reason may be that, when consumers search for products on the interface, they are usually involved in the scan mode first to have a general glance of the products in their visual field, and then switch to the information-processing mode when they decide which products they may want to pay more attention and examine for more information. In other words, when consumers scan some particular product and find the product image is attractive or the social cue is high, then they may switch to information processing mode and gaze more on that product for further examination. For both of the two interface display formats, the possibility to scan on a popular product is the same since the proportion of popular products over the total products is identical. Therefore, the ratio of popular products viewed is similar on both interface display format but the ratio of time on popular product is different.

3.6.2 Theoretical Contributions

With the popularity of social shopping websites from practitioners, little is known about how consumer behavior would be influenced by their interface display format. Thus firstly, this study provides a comprehensive perspective to understand two types of consumer behavior that are crucial for business success, while previous research often focuses on only one type of consumer behavior. Consumer approach behavior implies consumers' overall attitude towards a social shopping website, while herd behavior implies how consumer would be influenced by others on the same social shopping website. By

analyzing our gaze data using eye tracking technology, our findings indicate that both approach behavior and herd behavior are influenced by interface display format of social shopping website.

Secondly, this paper explores the impacts of website interface display format on consumer approach and herd behavior by integrating the moderating effect of consumers shopping motivation. The presence of significant moderating effects of consumers shopping motivation imply that the effect of interface display format on consumer approach behavior is contingent and its effect on consumer herd behavior is more salient for consumers with task-oriented shopping motivation than for those with recreational shopping motivation.

Moreover, the findings in the present study indicated that consumer social behavior (herd behavior) on social shopping website can be influenced by atmospheric cues (e.g. interface display format). We investigated consumer herd behavior from cognitive perspective, i.e. interface display format affects consumer cognitive capacity to herd. Waterfall display format is found to reduce consumers' herd behavior on social shopping website when comparing to matrix display format. Our findings provide further support for the existence of the interaction effect between social information and contextual variables on consumers' online shopping behavior (Cheema and Papatla 2010, Zhou and Duan 2012, Zhu and Zhang 2010).

Furthermore, this study provides a new measurement for investigating consumer approach and herd behavior. Specifically, actual herd behavior was captured by objectively measuring the attention consumers paid on popular products, and actual approach behavior was captured by objectively measuring the number of products that gained consumers' gaze fixations. Our findings

shed light on the use of eye tracking technology in social shopping approach behavior and herd behavior research.

3.6.3 Practical Implications

By investigating approach behavior and herd behavior together, this study provides an integrative view of how interface display format may create values for both the social shopping websites and the companies that utilize social shopping platform for new product marketing.

Our findings suggest that consumers with different shopping motivations may prefer different types of interface display format. Specifically, consumers with task-oriented motivation are in favor of website with matrix display format, and the main reason may be due to its clear and coherent presentation of products for consumers to efficiently search and compare different alternatives. In contrast, consumers with recreational motivation seem to be more likely to have favorable attitude towards website with waterfall display format, which may provide consumers with the sense of excitement. The results imply that social shopping website designers need to take consumer shopping motivation into consideration while designing for effective website interface.

Moreover, waterfall display format may better fulfill consumers' diversified preference for different products, rather than constrain their attention on few popular products. Furthermore, waterfall display format may also benefit companies that attempt to promote new and novel products on social shopping platforms. Previous research has found that consumers' attention is usually attracted by few popular products, which is unfavorable from the perspective

of marketing for novel products and new brands, since it is hard for new products and brands to gain initial attraction on those websites. However, on waterfall layout, consumers allocate relatively less attention to socially popular product, and relatively more attention to normal product. Hence consumers are more likely to be aware of novel products and new brands on waterfall layout websites.

3.6.4 Limitations and Future Research

Our study attempted to simulate a real social shopping context by developing two new websites with different interface display format. Although we tried to provide abundant product alternatives on the website for consumers to search and compare, the amount of products may still be considered as low comparing to a real social shopping website where there are usually more than thousands of alternative available. When products number on the website increases, consumers may feel more uncertain due to more difficulty to scrutinize all the potential products. Therefore, consumers on social shoppin website may be more likely to herd and the influence of interface display format and shopping motivation may be different. Future study may investigate the effect of product amount on consumers shopping behavior on social shopping website.

Furthermore, in order to alleviate the confounding effect of product type, we include various types of products on the website, e.g. products for men, products for women and neutral products. Besides categorizing products types in terms of gender factor, products could also be classified as experience goods or search goods. Search goods are products or services of which the

characteristics (such as quality and price etc.) are easy to identify and evaluate before purchase, while experience goods are products or services of which characteristics are difficult to judge in advance, but can be assessed after purchasing or consumption. Accordingly, when facing with experience goods, it is potential that consumers are more likely to rely on social cue information for more informed evaluation. Hence, product type may influence the effect of interface display format on consumer herd tendency. Future study may explore how product type moderates the effects of interface display format.

Additionally, as waterfall display format has the potential to reduce consumers' attention on popular products, the findings of this research may be further extended by investigating the effect of interface display format on long tail effect. Long tail effect envisages that more niche products offered in online stores better fulfill and satisfy consumers' diversified preferences toward different products and thus have the potential to outgrow the demand for those popular products, and in turn create paramount values for businesses (Aderson 2006; Zhou and Duan 2012). The potential findings can be of particular interest to both researchers and practitioners who may view social shopping website as a promising platform for niche products marketing and business revenue enhancement.

CHAPTER 4 CONCLUSION

This thesis has focused on two themes of interface designs that are particularly important to collaborative and social e-commerce. One is navigation support designs in collaborative online shopping, and the other is interface display format designs in online social shopping. The thesis consists of two empirical studies, with Study One investigates navigation support designs in collaborative online shopping and Study Two explores interface display format designs in online social shopping.

Specifically, Study One identifies the research gaps of navigation supports design in collaborative online shopping literature and propose two new types of navigation support designs. This study compares three different types of navigation support designs in terms of their effects on influencing consumer collaborative behavior. Drawing on cognitive tuning theory and media synchronicity theory, this study also investigates the important moderating role of consumers' shopping group structure. The findings indicate that split screen leads to more mutual understanding than both separate navigation with location cue and tightly-bonded shared navigation. In terms of actual mutual understanding, the superiority of split screen over separate navigation with location cue is more prominent for collaborative consumers in co-buyers structure than for those in buyer-advisor structure, whereas the superiority of split screen over tightly-bonded shared navigation is less prominent for collaborative consumers in co-buyers structure than for those in buyer-advisor structure.

Study Two attempts to gain more insights into how the prevailing interface

designs on social shopping website influence consumers behaviors and create value for businesses. This study focuses on consumers approach behavior toward social shopping website and their herd behavior in the social shopping context, as well as how consumer behaviors are influenced by different interface display format. In particular, two prevailing types of interface display format of social shopping website are of interest: matrix display format and waterfall display format. The study shows that interface display format has a significant effect on consumer approach behavior with the consideration of consumers' shopping motivation. Specifically, comparing to matrix display format, waterfall display format leads to more approach behavior for consumers with recreational motivation but not for those with task-oriented motivation. On the contrary, matrix display format leads to more approach behavior for consumers with task-oriented motivation than for those with recreational motivation, comparing to waterfall display format. Furthermore, waterfall display format is found to reduce consumer herd behavior comparing to matrix display format. Such decrease is more evident for consumers with task-oriented motivation than for those with recreational motivation.

The two studies are believed to provide a solid understanding of interface designs in collaborative and social e-commerce context, and to contribute to both academic and practitioners. Overall, the two studies highlight the crucial role of interface design in influencing consumer behavior and creating values for both consumers and businesses in various online shopping contexts where more than one consumer is involved. Particularly, Study One enhances our understanding of consumer collaborative behavior in synchronous online shopping interactions by comprehensively comparing a wide rage of

navigation support designs. While previous research assumes the benefit of common ground in improving consumer collaboration performance, this study reveals the necessity of considering the tradeoff of common ground and grounding cost. Furthermore, this study also makes theoretical contributions by extending a well-known marketing theory to the new context of collaborative online shopping. Given that most of previous e-commerce research focused on consumer individual behavior, this study may serve as a solid basis for further e-commerce study on consumers' synchronous online collaborative behavior.

The findings provide helpful practical implications for designers and online vendors to develop and deploy appropriate navigation support designs. This study suggests that the complex technology that seek to provide most common ground may not always be outperforming and it is imperative to consider the tradeoffs and collaborative consumers' group structure when designing appropriate navigation support designs.

Besides the value of interface designs in improving consumers' collaborative online shopping experience where consumers' interaction with each other is synchronous, Study Two shifts the attention to the business values that interface design can provide in online social shopping context where asynchronous interaction is involved among consumers. By investigating approach behavior and herd behavior together, this study provides an integrative view of how interface display format may create values for social shopping websites and helps online vendors to better understand consumers' shopping behavior in social commerce context. Given that the focus of previous research on interface design is mostly on one type of consumer

behavior, this study provides a comprehensive perspective to understand the effect of interface designs on approach behavior and herd behavior together, both of which are of particular concerns for creating business values. The findings highlight the important role of consumer shopping motivation in influencing the effect of interface display format on consumer approach behavior. Also, this study contributes to herd literature by considering the effect of different types of interface display format in online social shopping context. This study enlightens website interface designers by incorporation of consumer shopping motivation. While designing intriguing website interface with different interface display format, it is crucial for designers to consider the role of shopping motivation to achieve effective designs. Meanwhile, this study also provides insight for online vendors to apply appropriate e-marketing strategies on social commerce sites with different interface designs.

Overall, increasingly more shopping platforms are trying to incorporate social interaction (i.e. synchronous social interaction in collaborative online shopping and asynchronous social interaction in online social shopping) to create values for both consumers and businesses. Besides the effects of interface designs investigated in this thesis, future research may explore the underlying mechanism of how navigation support designs and interface display format designs influence consumers behavior. For example, navigation support designs may be inherent with different levels of synchronicity and autonomy. Also, different navigation support designs may focus on different aspects of awareness of others' behavior (e.g. action awareness, social awareness, etc. (Carroll et al. 2009)).

Moreover, future research may explore the effect of interface designs of online social shopping website on long tail effect. Long tail effect envisages that the various niche products offered in online stores may better fulfill and satisfy consumers' diversified preferences toward different products than popular products and thus have the potential to outgrow the demand for those popular products, and in turn create paramount values for businesses (Aderson 2006; Zhou and Duan 2012). Since interface design in online social shopping has the potential to influence consumers' herd behavior, it may provide chances for both researchers and practitioners to explore long tail effect in online social context. Overall, there are plenty of opportunities for future research to contribute to a better understanding of the effect of interface designs in collaborative and social e-commerce websites.

BIBLIOGRAPHY

Adamowicz, W., Hanemann, M., Swait, J., Johnson, R., Layton, D., Regenwetter, M., Reimer, T., and Sorkin, R. 2005. “Decision Strategy and Structure in Households: A ‘Groups’ Perspective,” *Marketing Letters* (16:3/4), pp. 387-399.

Aderson, C. 2006. The Long Tail: Why the Future of Business Is Selling Less of More. Hyperion Press, New York.

Al-Natour, S., Benbasat, I., and Cenfetelli, R. 2011. “The Adoption of Online Shopping Assistants: Perceived Similarity as an Antecedent to Evaluative Beliefs,” *Journal of the Association for Information Systems* (12:5), pp. 347-374.

Apter, M. J. 2001. Motivational Styles in Everyday Life: A Guide to Reversal Theory. American Psychological Association, Washington, DC.

Avery, C., and Zemsky, p. 1998. “Multidimensional Uncertainty and Herd Behavior in Financial Markets,” *The American Economic Review* (88:4), pp. 724-748.

Babin, B. J., Darden, W. R., and Griffin, M. 1994. ”Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value,” *Journal of Consumer Research* (20:4), pp. 644-656.

Banerjee, A. V. 1992. “A Simple Model of Herd Behavior,” The Quarterly *Journal of Economics* (107:3), pp. 797-817.

Barclay, D., Thompson, R., and Higgins, C. 1995. “The Partial Least Squares (PLS) Approach to Causal Model: Personal Computer Adoption and Use as an Illustration,” *Technology Studies* (2:2), pp. 285-309.

Barsalou, L. W. 1993. “Flexibility, Structure, and Linguistic Vagary in Concepts: Manifestations of a Compositional System of Perceptual Symbols,” in Theories of Memory, Collins, A. F. and Gathercole, S. E. eds. Hillsdale, NJ: Lawrence Erlbaum Associates, 29-101.

Batra, R., and Ray, M. L. 1986. “Affective Responses Mediating Acceptance of Advertising,” *Journal of Consumer Research* (13), pp. 234-249.

Behfar, K. J., Mannix, E. A., Peterson, R. S., and Trochim, W. M. 2011. “Conflict in Small Group: The Meaning and Consequences of Process Conflict,” *Small Group Research* (42:2), pp. 127-176.

Bellenger, D. N. and Korgaonkar, P. K. 1980. “Profiling the Recreational Shopper,” *Journal of Retailing* (56), pp. 77-92.

Benbasat, I. 2010. “HCI Research: Future Challenges and Directions”, *AIS Transactions on Human-Computer Interaction* (2:2), pp. 16-21.

Berlyne, D. E. 1960. Conflict, Arousal, and Curiosity. New York: McGraw-Hill.

Bikhchandani, S., Hirshleifer, D., and Welch, I. 1992. “A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades,” *Journal of Political Economy* (100:5), pp. 992-1026.

Bikhchandani, S., and Sharma, S. 2000. “Herd Behavior in Financial Market,” IMF Staff Papers (47:3), pp. 279-310.

Bonner, B. L. and Baumann, M. R. 2008. “Informational Intra-group Influence: The Effects of Time Pressure and Group Size,” *European Journal of Social Psychology* (38), pp. 46-66.

Brewer, M. B. and Kramer, R. M. 1986. “Choice Behavior in Social Dilemmas: Effects of Social Identity, Group Size, and Decision Framing,” *Journal of*

Personality and Social Psyhology (50), pp. 543-549.

Brock, T. C., and Fromkin, H. L. 1968. "Receptivity to Discrepant Information," *Journal of Personality* (36:1), pp. 108-125.

Business Insider. 2013. "Pinterest Is Powering A Huge Amount of Social Commerce, And Twitter Isn't Too Shabby Either," http://www.businessinsider.com/twitter-and-pinterest-in-social-commerce-2013-10?IR=T&, visited on Jun, 2014.

Butler, B. S. 2001. "Membership Size, Communication Activity, and Sustainability: A Resource-Based Model of Online Social Structures," *Information Systems Research* (12:4), pp. 346-362.

Cacioppo, J. T., Petty, R. E., Kao, C. F., and Rodriguez, R. 1986. "Central and Peripheral Routes to Persuasion: An Individual Difference Perspective," *Journal of Personality and Social Psychology* (51), pp. 1032-1043.

Carroll, J. M., Neale, D. C., Isenhour, P. L., Rosson, M. B., and McCrickard, D. S. 2003. "Notification and Awareness: Synchronizing Task-Oriented Collaborative Activity," *Internation Journal of Human-Computer Studies* (58:5), pp. 605–632.

Cheema, A., and Papatla, P. 2010. "Relative Importance of Online versus Offline Information for Internet Purchases: The Effect of Product Category and Internet Experience," *Journal of Business Research* (69:9), pp. 979-985.

Chen, Y. F. 2008. "Herd Behavior in Purchasing Books Online," *Computers in Human Behavior* (24), pp. 1977-1992.

Chen, Y., and Wang, Y. 2010. “Effect of Herd Cues and Product Involvement on Bidder Online Choices,” *CyberPsychology, Behavior, and Social Networking* (13: 4), 2010.

Cheung, C. M., Sia, C., and Kuan, K. K. 2012. “Is this Review Believable? A Study of Factors Affecting the Credibility of Online Consumer Reviews from An ELM Perspective,” J*ournal of the Association for Information Systems* (13:8), pp. 618-635.

Clark, H. H. 1996. *Using Language*. Cambridge University Press, New York.

Clark, H. H., and Brennan, S. E. 1991. “Grounding the Communication,” in *Perspectives on Socially Shared Cognition*, S. D. Teasley (eds.), APA, Washington, DC, pp. 127–149.

Cohen, A. R. 1961. “Cognitive Tuning as a Factor Affecting Impression Formantion,” *Journal of Personality* (29:2), pp. 235-245.

Cohen, J. 1988. Statistical Power Analysis for the Behavioral Sciences (2nd Edition). Lawrence Erlbaum Associates, Hillsdale, NJ.

Cornelius, C., and Boos, M. 2003. “Enhancing Mutual Understanding in Synchronous Computer-Mediated Communication by Training: Trade-Offs in Judgmental Tasks,” *Communication Research* (30:2), pp. 147-177.

Cramton, C. 2001. “The Mutual Knowledge Problem and Its Consequences for Distributed Collaboration,” *Organization Science* (12:3), pp. 346-371.

Cyr, D., Head, M., Larios, H., and Pan, B. 2009. “Exploring Human Images in Website Design: A Multi-Method Approach,” *MIS Quarterly* (33:3), pp. 539-566.

Curty, R. G., and Zhang, P. 2013. “Website Features That Gave Rise to Social Commerce: A Historical Analysis,” *Electronic Commerce Research and*

Applications (12), pp. 260-279.

Dabbish, L., and Kraut, R. 2008. "Awareness Displays and Social Motivation for Coordinating Communication," *Information Systems Research* (19:2), pp. 221-238.

Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1992. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace," *Journal of Applied Social Psychology* (22:14), pp. 1111-1132.

Davis, F. D., and Kottemann, J. E. 1994. "User Perceptions of Decision Support Effectiveness: Two Production Planning Experiments," *Decision Sciences* (25:1), pp. 57-78.

Deng, L., and Poole, M. S. 2010. "Affect in Web Interfaces: A Study of the Impacts of Webpage Visual Complexity and Order," *MIS Quarterly* (34:4), pp. 711-730.

Dennis, A. R., and Valacich, J. S. 1999. "Rethinking Media Richness: Towards a Theory of Media Synchronicity," In *Proceedings of the 32nd Hawaii International Conference on System Sciences*, Los Alamitos, CA: IEEE Computer Society Press, Volume 1.

Dennis, A. R., Fuller, R. M., and Valacich, J. S. 2008. "Media, Tasks, and Communication Processes: A Theory of Media Synchronicity," *MIS Quarterly* (32:3), pp. 575-600.

Dholakis, U. M., and Soltysinski, K. 2001. "Coveted or Overlooked? The Psychology of Bidding for Comparable Listings in Digital Auctions," *Marketing Letters* (12:3), pp. 225-237.

Donovan, R. J., and Rossiter, J. R. 1982. “Store Atmosphere: An Environmental Psychology Approach,” *Journal of Retailing* (58), pp. 334-357.

Donovan, R. J., Rossiter, J. R., Marcoolyn, G., and Nesdale, A. 1994. “Store Atmosphere and Purchasing Behavior,” *Journal of Retailing* (70:3), pp. 198-199.

Dourish, P., and Bellotti, V. 1992. “Awareness and Coordination in Shared Workspaces,” In *Proceedings of the 1992 ACM conference on Computer-supported cooperative work*, New York: ACM Press, pp. 107-114.

Duan, W., Gu, B., and Whinston, A. B. 2008. “Do Online Reviews Matter?-An Empirical Investigation of Panel Data,” *Decision Support Systems* (45), pp. 1007-1016.

Duan, W., Gu, B., Whinston, A. B. 2008. “The Dynamics of Online Word-of-Mouth and Product Sales—An Empirical Investigation of the Movie Industry,” *Journal of Retailing* (84:2), pp. 233-242.

Duan, W., Gu, B., and Whinston, A. B. 2009. “Information Cascades and Software Adoption on the Internet: An Empirical Investigation,” *MIS Quarterly* (33:1), pp. 23-48.

Eisensee, T., and Stromberg, D. 2007. “News Droughts, News Floods, and U.S. Disaster Relief,” *The Quarterly Journal of Economics* (122:2), pp. 693-728.

Eroglu, S. A., Machleit, K. A., and Davis, L. M. 2003. “Empirical Testing of A Model of Online Store Atmospherics and Shopper Response,” *Psychology & Marketing* (20:2), pp. 139-150.

Evans, K. R., Christiansen, T., and Gill, J. D. 1996. “The Impact of Social Influence and Role Expectations on Shopping Center Patronage Intentions,” *Journal of the Academy of Marketing Science* (24:3), pp. 208-218.

Evans, D., and McKee, J. 2010. Social Media Marketing: the Next Generation of Business Engagement. Wiley Publishing, Indianapolis, IN.

Eysenck, M. W. 1982. Attention and Arousal, Congnition and Performance. Springer, New York.

Fiol, M., and O’Connor, E. J. 2003. “Waking Up! Mindfulness in the Face of Bandwagons,” *Academy of Management Review* (28:1), pp. 54-70.

Fornell, C., and Larcker, D. 1981. “Evaluating Structural Equation Models with Unobservable Variables and Measurement Error,” *Journal of Marketing Research*, (18:1), pp. 39-50.

Forsyth, D. R. 2009. Group Dynamics (4th edition). Belmont CA.: Wadsworth Cengage Learning, pp. 29-309.

Frijda, N. H. 1986. The Emotions. Cambridge University Press, New York.

Fuller, J., Muhlbacher, H., Matzler, K., and Jawecki, G. 2009. “Consumer Empowerment through Internet-Based Co-creation,” *Journal of Management Information Systems* (26:3), pp. 71-102.

Gaba, V., and Terlaak, A. 2013. “Decomposing Uncertainty and Its Effects on Imitation in Firm Exit Decisions,” *Organization Science* (24:6), pp. 1847-1869.

Gaver, W. 1991. “Sound Support for Collaboration,” in *Proceedings of the Second European Conference on Computer Supported Cooperative Work (ECSCW)*, Amsterdam, Netherlands, pp. 293-308.

Gefen, D., and Straub, D. 2005. “A Practical Guide to Factorial Validity Using

PLS-Graph: Tutorial and Annotated Example," *Communications of the Association for Information Systems* (16), pp. 91-109.

Gillin, P. 2008. Secrets of Social Media Marketing. Quill Driver Books, Fresno, CA.

Gnyawali, D. R., Fan, W., and Penner, J. 2010. "Competitive Actions and Dynamics in the Digital Age: An Empirical Investigation of Social Networking Firms," *Information Systems Research* (21:3), pp. 594-613.

Goldstein, E. B. 2009. "Perceiving Objects and Scenes: The Gestalt Approach to Object Perception". In Sensation and Perception (8th ed.). Cengage Learning. pp. 95-124.

Goodhue, D. L., Klein, B. D., and March, S. T. 2000. "User Evaluation of IS as Surrogates for Objective Performance," *Information and Management* (38), pp. 87-101.

Graetz, K. A., Boyle, E. S., Kimble, C. E., Thompson, P., and Garloch, J. L. 1998. "Information Sharing Face-to-Face, Tele-Conferencing, and Electronic Chat Groups," *Small Group Research* (29:6), pp. 714-743.

Green, S. G., and Taber, T. D. 1980. "The Effects of Three social Decision Schemes on Decision Group Process," *Organizational Behavior and Human Performance* (25), pp. 97-106.

Greenberg, S. 1998. "Real Time Distributed Collaboration," in *Encyclopedia of Distributed Computing*, Kluwer Academic Publishers.

Greenberg, J., and Baron, R. A. 1997. *Behavior in Organizations (6th ed..)*, Upper Saddle River, NJ: Prentice-Hall.

Greer, L. L., and Jehn, K. A. 2007. "The Pivotal Role of Negative Affect in Understanding the Effects of Process Conflict on Group Performance," In

Research on managing groups and teams, E. A. Mannix, M. A. Neale, and C. Anderson (Eds.), Stanford, CT: JAI, pp. 23-45.

Griffith, D. A.; Krampf, R. F.; and Palmer, J. W. 2001. "The role of interface in electronic commerce: Consumer involvement with print versus online catalogs," *International Journal of Electronic Commerce* (5:4), pp. 135-153.

Gupta, P., and Harris, J. 2005. "How e-WOM Recommendations Influence Product Consideration and Quality of Choice: A Motivation to Process Information Perspective," *Journal of Business Research* (63), pp. 1041-1049.

Gutwin, C., and Greenberg, S. 1998. "Design for Individuals, Design for Groups: Tradeoffs between Power and Workspace Awareness," in *CSCW '98 Proceedings of the 1998 ACM conference on Computer supported cooperative work*, New York, NY, USA, pp. 207-216.

Gutwin, C. and Greenberg, S. 2002. "A Descriptive Framework of Workspace Awareness for Real-Time Groupware," *Computer Supported Cooperative Work* (11), *pp. 411-446.*

Hackman, J. R., and Morris, C. G. 1975. "Group Tasks, Group Interaction Process, and Group Performance Effectiveness: A Review and Proposed Integration," *Advances in Experimental Social Psychology* (8), pp. 47-99.

Hair, J. F., Ringle, C. M., and Sarstedt, M. 2011. "PLS-SEM: Indeed a Silver Bullet," *Journal of Marketing Theory and Practice* (19:2), pp. 139-151.

Hanna, J. E., Tanenhaus, M. K., and Trueswell, J. C. 2003. "The Effects of Common Ground and Perspective on Domains of Referential Interpretation," *Journal of Memory and Language* (49), pp. 43-61.

Hansen, F. 1976. “Psychological Theories of Consumer Choices,” *Journal of Consumer Research* (3:3), pp. 117-142.

Hanson, W. A., and Putler, D. S. 1996. “Hits and Misses: Herd Behavior and Online Product Popularity,” *Marketing Letters* (7:4), pp. 297-305.

Harvey, J. H., Harkins, S. G., and Kagehiro, D. K. 1976. “Cognitive Tuning and the Attribution of Causality,” *Journal of Personality and Social Psychology* (34:4), pp. 708-715.

Heath, T., Smith, S. G., and Lim, B. 2000. “Tall buildings and the urban skyline: The effect of visual complexity on preferences,” *Environment & Behavior* (32:4), pp. 541-556.

Helson, H. 1964. *Adaptation-Level Theory*, Harper & Row, New York.

Hoch, S. J. 2002. “Product Experience Is Seductive,” *Journal of Consumer Research* (29:3), pp. 448-454.

Holbrook, M. B., and Gardner, M. P. 1993. “An Approach to Investigating the Emotional Determinants of Consumption Durations: Why Do People Consumer What They Consumer for as Long as They consumer It?” *Journal of Consumer Psychology* (2), pp. 123-142.

Hong, W., Thong, J. Y. L., and Tam, K. Y. 2004. “The Effects of Information Format and Shopping Task on Consumers’ Online Shopping Behavior: A Cognitive Fit Perspective,” *Journal of Management Information Systems* (21:3), pp. 149-184.

Huang, S, Benbasat, I., and Burton-Jones, A. 2011. “The Role of Product Recommendation Agents in Collaborative Online Shopping,” in *Proceedings of the 32nd International Conference on Information Systems*, Shanghai, China.

Huang, Z., and Benyoucef, M. 2013. “From E-Commerce to Social Commerce: A Close Look at Design Features,” *Electronic Commerce Research and Applications* (12), pp. 246-259.

Grange, G., and Benbasat, I. 2010. “Online Social Shopping: The Functions and Symbols of Design Artifacts,” *Proceedings of the 43rd Hawaii International Conference on System Science*. IEEE Computer Society.

Huang, J., and Chen, Y. 2006. “Herding in Online Product Choice,” *Psychology & Marketing* (23:5), pp. 413-428.

Humphreys, M. S. and Revelle, W. 1984. “Personality, Motivation, and Performance: A Theory of the Relationship between Individual Differences and Information Processing,” *Psychological Review* (41), pp. 153-184.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., and Jundt, D. 2005. “Teams in Organizations: From Input-Process-Output Models to IMOI Models,” *Annual Review of Psychology* (56), pp. 517-543.

Internet Retailer. 2010. “Social Shopping Tool Helps Drive 15% Increase in Sales at a Skincare Site,” http://www.internetretailer.com/2010/03/23/social-shopping-tool-helps-drive-15-increase-in-sales-at-a-skin. Accessed on Feb 10, 2013.

Jehn, K. 1997. “Affective and Cognitive Conflict in Work Groups: Increasing Performance through Value-Based Intragroup Conflict,” in *Using Conflict in Organizations*, C. K. W. De Dreu and E. Van de Vliert (Eds.), London: Sage, pp. 87–100.

Jehn, K., Northcraft, G. B., and Neale, M. A. 1999. “Why Differences Make a Difference: A Field Study of Diversity, Conflict, and Performance in

Workgroups," *Administrative Science Quarterly* (44), pp. 741–763.

Jiang, Z., and Benbasat I. 2007. "The Effects of Presentation Formats and Task Complexity on Online Consumers' Product Understanding," *MIS Quarterly* (31:3), pp. 475-500.

Jiang, J., and Klein, G. 2002. "A Discrepancy Model of Information Systems Personnel Turnover," *Journal of Management Information Systems* (19), pp. 249-272.

Jonas, E., and Frey, D. 2003. "Information Search and Presentation in Advisor-Client Interactions," *Organizational Behavior and Human Decision Processes* (91), pp. 154-168.

Jones, G. R. 1995. *Organizational Theory*, Reading, MA: Addison-Wesley.

Jonides, J., and Gleitman, H. 1972. "A Conceptual Category Effect in Visual Search: O as Letter of as Digit," *Perception and Psychophysics* (12:6), pp. 457-460.

Kahn, B. E., and McAlister, L. 1997. *Grocery Revolution: The New Focus on the Consumer*, Reading, MA: Addison-Wesley.

Kaltcheva, V. D., and Weitz, B. A. 2006. "When Should a Retailer Create an Exciting Store Environment," *Journal of Marketing* (70:1), pp. 107-118.

Kamis, A., Koufaris, M., and Stern, T. 2008. "Using an Attribute-Based Decision Support System for User-Customized Products Online: An Experimental Investigation," *MIS Quarterly* (32:1), pp. 159-177.

Katona, Z., Zubcsek, P. P., and Sarvary, M. 2011. "Network Effects and Personal Influences: The Diffusion of an Online Social Network," *Journal of Marketing Research* (48:3), pp. 425-443.

Katz, A., and Te'eni, D. 2007. "The Contingent Impact of Contextualization

on Computer-Mediated Collaboration," *Organization Science* (18:2), pp. 261-279.

Kiecker, P., and Hartman, C. L. 1993. "Purchase Pal Use: Why Buyers Choose to Shop with Others," in *1993 AMA Winter Educators' Conference Proceedings*. Chicago: American Marketing Association.

Kiecker, P., and Hartman, C. L. 1994. "Predicting Buyers' Selection of Interpersonal Sources: The Role of Strong and Weak Ties," in *Advances in Consumer Research*, Chris T. A. and D. R. John (eds.), Provo, UT: Association for Consumer Research.

Kim, D., and Benbasat, I. 2006. "The Effects of Trust-Assuring Arguments on Consumer Trust in Internet Stores: Application of Toulmin's Model of Argumentation," *Information Systems Research* (17:3), pp. 286-300.

Koufaris, M. 2002. "Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior," *Information Systems Research* (13:2), pp. 205-223.

Kueller, R., and Mikellides, B. 1993. "Simulated Studies of Color, Arousal, and Comfort," in Environmental Simulation: Research and Policy Issues, Marans, R. W. and Stokols, D. eds. New York: McGraw-Hill.

Kurt, D., Inman, J., and Argo, J. J. 2011. "The Influence of Friends on Consumer Spending: The Role of Agency-Communion Orientation and Self-Monitoring," *Journal of Marketing Research* (48:4), pp. 741-754.

Lee, J., Pi, S., Kwok, R. C., and Huynh, M. Q. 2003. "The Contribution of Commitment Value in Internet Commerce: An Empirical Investigation," *Journal of the Association for Information Systems* (4), pp.39-64.

Leventhal, H. 1962. "The Effects of Set and Descrepancy on Impression

Change,” *Journal of Personality* (30), pp. 1-15.

Liang, T.P., Ho, Y. T., Li, Y. W, and Turban, E. 2011. “What Drives Social Commerce: The Role of Social Support and Relationship Quality,” *International Journal of Electronic Commerce* (16:2), pp. 69-90.

Limayem, M. B., and Asaba, S. 2006. “Why Do Firms Imitate Each Other?” *Academy of Management Review* (31:2), pp. 366-385.

Littlepage, G. E. 1991. “Effects of Group Size and Task Characteristics on Group Performance: A Test of Steiner’s Model,” *Personality and Social Psychology Bulletin* (17), pp. 449-456.

Lowry, P. B., Roberts, T. L., Romano, N. C., Cheney, P. D., and Hightower, R. T. 2006. “The Impact of Group Size and Social Presence on Small Group Communication: Does Computer-Mediated Communication Make a Difference?” *Small Group Research* (37), pp. 631-661.

Lun, J., Sinclair, S., Whitchurch, E. R., and Glenn, C. 2007. “(Why) Do I Think What You Think? Epistemic Social Tuning and Implicit Prejudice,” *Journal of Personality and Social Psychology* (93:6), pp. 957-972.

Luo, J., Ba, S., and Zhang, H. 2012. “The Effectiveness of Online Shopping Characteristics and Well-Designed Websites on Satisfaction,” *MIS Quarterly* (36:4), pp. 1131-1144.

Mazis, M.B. 1972. “Decision-Making Role and Information Processing,” *Journal of Marketing Research* (9:4), pp. 447-450.

Mazis, M. B. 1973. “Cognitive Tuning and Receptivity to Novel Information,” *Journal of Experimental Social Psychology* (9), pp. 307-319.

McGaughey, R. E., and Mason K. H. 1998. “The Internet as a marketing Tool,” *Journal of Marketing Theory and Practice* (6:3), pp. 1-11.

Mehrabian, A., and Russell, J. A. 1974. An Approach to Environmental Psychology. MIT Press, Cambridge, MA.

Mennecke, B. E., and Valacich, J. S. 1998. “Information Is What You Make of It: The Influence of Group History and Computer Support on Information Sharing, Decision Quality, and Member Perceptions,” *Journal of Management Information Systems* (15:2), pp. 173-197.

Menon, S., and Kahn, B. 2002. “Cross-Category Effects of Induced Arousal and Pleasure on the Internet Shopping Experience,” *Journal of Retailing* (78), pp. 31-40.

Moe, W. W., and Trusov, M. 2011. “The Value of Social Dynamics in Online Product Ratings Forums,” *Journal of Marketing Research* (48:3), pp. 444-456.

Murthy, U. S., and Kerr, D. S. 2003. “Deicision Making Performance of Interacting Groups: An Experimental Investigation of the Effects of Task Type and Communication Mode,” *Information and Management* (40), pp. 351-360.

Nasar, J. L. 1997. New developments in aesthetics for urban design. In Zube E. H. and Moore G. T. (eds.) *Advances in Environment, Behavior, and Design*. Plenum Press, New York, NY, pp. 149-193.

Nasar, J. L., and Hong, X. 1999. “Visual preferences in urban signscapes,” *Environment and Behavior* (31), pp. 671-691.

Obermiller C., and Bitner, M. J. 1984. “Store Atmosphere: A Peripheral Cue in Product Evaluation,” American Psychological Association Annual Conference Proceedings.

O’Hara, K., and Perry, M. 2001. “Shopping Anytime Anywhere”, In

Proceedings of ACM Conference on Human Factors in Computing Systems (CHI 2001), Seattle, Washington, USA.

Olson, G. M., and Olson, J. S. 2000. "Distance Matters," *Human Computer Interaction* (15:2), pp. 139-178.

Osborn, A. F. 1957. *Applied Imagination: Principles and Procedures of Creative Problem Solving*, New York: Charles Scribner's Sons.

Palmer, J. W. 2002. "Web site usability, design, and performance metrics," *Information Systems Research* (13:2), pp. 151-167.

Pavlou, P. A. and Dimoka, A. 2006. "The nature and role of feedback text comments in online marketplaces: Implications for trust building, price premiums, and seller differentiation," *Information Systems Research* (17:4), pp. 391-412.

Petty, R. E., and Cacioppo, J. T. 1986. Elaboration Likelihood Model. In L. Berkowitz (Ed.), Advances in Experimental Social Psychology. Academic Press, San Diego, CA.

Petty, R. E., and Wegener, D. T. 1999. "The Elaboration Likelihood Model: Current Status and Controversies," in Dual-Process Theories in Social Psyhology, S. Chaiken and Y. Trope (Ed.). Guilford Press, New York.

Pham, M. T. 1996. "Cue Representation and Selection Effects of Arousal on Persuasion," *Journal of Consumer Research* (22:4), pp. 373-387.

Pham, M. T., and Avnet, T. 2004. "Ideals and Oughts and the Reliance on Affect versus Substance in Persuasion," *Journal of Consumer Research* (30:3), pp. 503-518.

Poyry, E., Parvinen, P. and Malmivaara, T. 2013. "Can We Get from Liking to Buying? Behavioral Differences in Hedonic and Utilitarian Facebook

Usage," *Electronic Commerce Research and Applications* (12), pp. 224-235.

Puglia, S., Carter, R., and Jain, R. 2000. "MultECommerce: A Distributed Architecture for Collaborative Shopping on the WWW," in *Proceedings of the ACM Conference on Electronic Commerce (EC'00)*, Minneapolis, Minnesota, USA.

Random House. 1987. *Random House Dictionary of the English Language (2nd ed.)*, New York: Random House.

Richard, M. 2005. "Modeling the Impact of Internet Atmospherics on Surfer Behavior," *Journal of Business Research* (58), pp. 1632-1642.

Russell, J. A., and Barrett, L. F. 1999. "Core Affect, Prototypical Emotional Episodes, and Other Things Called Emotion: Dissecting the Elephant," *Journal of Personality and Social Psychology* (76), pp. 805-819.

Russell, J. A., and Pratt, G. A. 1980. "Description of the Affective Quality Attributed to Environments," *Journal of Personality and Social Psychology* (38:2), pp. 311-322.

Sanbonmatsu, D. M., and Dardes, F. R. 1988. "The Effects of Physiological Arousal on Information Processing and Persuasion," *Journal of Consumer Research* (15), pp. 379-386.

Sasidharan, S., Santhanam, R., Brass, D. J., and Sambamurthy, V. 2012. "The Effects of Social Network Structure on Enterprise Systems Success: A Longitudinal Multilevel Analysis," *Information Systems Research* (23:3), pp. 658-678.

Savadori, L., Van Swol, L. M., Sniezek, J. A. 2001. "Information Sampling and Confidence within Groups and Judge Advisor," *Communication*

Research (28:6), pp. 737-771.

Schwarz, N. 2002. “Situated Cognition and the Wisdom of Feelings: Cognitive Tuning,” in *The Wisdom in Feeling*, L. Feldman Barrett and P. Salovey (eds.), New York: Guilford Press, pp. 144-166.

Simonsohn, U., and Ariely, D. 2008. “When Rational Sellers Face Nonrational Buyers: Evidence from Herd on eBay,” *Management Science* (54:9), pp. 1624-1637.

Souder, W. E. 1977. “Effectiveness of Nominal and Interacting Group Decision Processes for Integrating R&D and Marketing,” *Management Science* (23:6), pp. 595-605.

Stewart, G. L. and Barrick, M. R. 2000. “Team Structure and Performance: Assessing the Mediating Role of Intrateam Process and the Moderating Role of Task Type,” *The Academy of Management Journal* (43:2), pp. 135-148.

Stone, G. P. 1954. “City Shoppers and Urban Identification: Observations on the Social Psychology of City Life,” *American Journal of Sociology* (60), pp. 36-45.

Sun, H. 2009. “Understanding Herd Behavior in Technology Adoption and Continued Use: A Longitudinal Perspective,” in Proceedings of 2009 Diffusion Interest Group in Information and Technology (DIGIT), Paper 11.

Sun, H. 2014. “A Longitudinal Study of Herd Behavior in the Adoption and Continued Use of Technology,” *MIS Quarterly* (37:4), pp. 1013-1041.

Tai, S., and Fung, A. 1997. “Application of An Environmental Psychology Model to In-Store Buying Behavior,” *The International Review of Retail, Distribution and Consumer Research* (7:4), pp. 311-337.

Tan, C. H., Teo, H. H., and Benbasat, I. 2010. “Assessing Screening and Evaluation Decision Support Systems: A Resource-Matching Approach,” *Information Systems Research* (21:2), pp. 305-326.

Tauber, E. M. 1972. “Why Do People Shop?” *Journal of Marketing* (36), pp. 46-49.

Tee, K., Greenberg, S., and Gutwin, C. 2009. “Artifact Awareness through Screen Sharing for Distributed Groups,” *International Journal of Human-Computer Studies* (67), pp. 677-702.

Teo, H. H.; Oh, L. B., Liu, C. and Wei, K. K. 2003. “An empirical study of the effects of interactivity on Web user attitude,” *International Journal of Human-Computer Studies* (58:3), pp. 281-305.

Teraji, S. 2003. “Herd Behavior and the Quality of Opinions,” *Journal of Socio-Economics* (32), pp. 661-673.

Turley, L. W., and Milliman, R. E. 2000. “Atmospheric Effects on Shopping Behavior: A Review of the Experimental Evidence,” *Journal of Business Research* (49:2), pp. 193-211.

Tversky, A., Sattath, S., and Slovic, P. 1988. “Contingent Weighting in Judgment and Choice,” *Psychological Review* (95:3), pp. 371-384.

Valck, K., Bruggen, G. H., and Wierenga, B. 2009. “Virtual Communities: A Marketing Perspective,” *Decision Support Systems* (47), pp. 185-203.

Van der Heijden, H. 2004. “User Acceptance of Hedonic Information Systems,” *MIS Quarterly* (28:4), pp. 695-704.

Walden, E. A., and Browne, G. J. 2009. “Sequential Adoption Theory: A Theory for Understanding Herd Behavior in Early Adoption Novel Technologies,” *Journal of the Association for Information Systems* (10:1), pp. 31-62.

Wang, C., and Zhang, P. 2012. “The Evolution of Social Commerce: The People, Management, Technology and Information Dimensions,” *Communications of the Association for Information Systems* (31).

Weick, K. E., and Meader, D. K. 1993. “Sensemaking and Group Decision Systems,” in *Group Support Systems: New Perpectives*, L. M. Jessup and J. S. Valacich (eds). New York: Macmillan, pp. 230-252.

Westbrook, R. A., and Black, W. C. 1985. “A Motivation-Based Shopper Typology”, *Journal of Retailing*, (61:1), pp. 78-103.

Xiao, B., and Benbasat, I. 2007. “E-Commerce Product Recommendation Agents: Use, Characteristics, and Impact,” *MIS Quarterly* (31:1), pp. 137-200.

Yue, Y., Ma, X., and Jiang, Z. 2014. “Share you View: Impact of Co-Navigation Support and Status Composition in Collaborative Online Shopping,” in Proceedings of 2014 ACM conference on Human Factors in Computing Systems.

Zajonc, R. B. 1995. “Cognitive Structure and Cognitive Tuning,” Unpublished doctoral dissertation, University of Michigan.

Zeng, X., and Wei, L. 2013. “Social Ties and User Content Generation: Evidence from Flickr,” *Information Systems Research* (24:1), pp. 71-87.

Zhang, P., Zhou, L., and Zimmermann, H.D. 2013. “Advances in Social Commerce Research: Guest Editors’ Introduction,” *Electronic Commerce Research and Applications* (12), pp. 221-223.

Zhou, W., and Duan, W. 2012. “Online User Reviews, Product Variety, and the Long Tail: An Empirical Investigation on Online Software Downloads,” *Electronic Commerce Research and Applications* (11), pp. 275-289.

Zhou, L., Zhang, P., and Zimmermann, H. D. 2013. “Social Commerce Research: An Integrated View,” *Electronic Commerce Research and Applications* (12), pp. 61-68.

Zhu, L., Benbasat, I., and Jiang, Z. 2010. “Let’s Shop Online Together: An Empirical Investigation of Collaborative Online Shopping Support,” *Information Systems Research* (21:4), pp. 872-891.

Zhu, F., and Zhang, X. 2010. “Impact of Online Consumer Reviews on Sales: The Moderating Role of Product and Consumer Characteristics,” *Journal of Marketing* (74:2), pp. 133-148.

Zou, S., and Stormont, S. 2005. “Two Sides of the Story: Media Choice and Media Use of Web Based eMail and Live Chat Consumer Services,” in *Proceedings of the 11th Americas Conference on Information Systems*, Omaha, Nebraska, USA.

APPENDIX A: STUDY I SYNCHRONICITY OF NAVIGATION SUPPORT DESIGNS

Synchronicity is defined as the capability of a media to support individuals working together at the same time with a shared pattern of coordinated behavior (Dennis et al., 2008; Dennis and Valacich, 1999). Five capabilities that determine the synchronicity of supporting media have been identified in media synchronicity theory: transmission velocity, parallelism, symbol sets, rehearsability, and reprocessability. Specifically, symbol sets and transmission velocity positively correlate with media synchronicity (i.e., more symbol sets and faster transmission velocity lead to higher media synchronicity), yet parallelism, rehersability and reprocessability, negatively influence media synchronicity.

Since separate navigation with location cue provides shoppers with only abstract thumbnail image and name of the product, the multiplicity of cues and information variety is significantly less than that provided by split screen navigation and tightly-bonded shared navigation, which present shoppers with more detailed web page content being viewed by partners. Therefore, separate navigation with location cue provides less symbol set than split screen navigation and tightly-bonded shared navigation.

Transmission velocity refers to the speed at which people can send and receive information with a media (Dennis et al. 2008). Tightly-bonded shared navigation presents the same web page to both shoppers, and no time or effort is needed to send and receive the target information, so when shopping companions want to share product information on a web page, they can

achieve that without any delay. Split screen navigation displays the partner's web page in the shared screen concurrently, and as a result, shopping companions don't have to spend effort and time to send and receive the target information when a need of information sharing emerges. Nonetheless, when using separate navigation with location cue, shoppers have to spend time and effort to click on the location cue to get a complete sense of the web page information that their partner wants them to receive. Although there's no time delay to send information for shoppers who want to initiate a sharing of interested product, the time and effort needed to receive the complete information will cause delay in information acceptance process. Therefore, separate navigation with location cue provides lower transmission velocity than split screen navigation and tightly-bonded shared navigation.

Parallelism is the extent to which information from multiple shoppers can be transmitted over the media simultaneously (Dennis et al., 2008; Dennis and Valacich, 1999). Separate navigation with location cue and split screen navigation allow shopping companions to separately browse on the website while they coordinate their shopping processes, in which case both co-shoppers have control of their web page simultaneously. They can visit the web page in their own way without the constraint to stay on the same web page as their partners. The information of the partner's web page is displayed in the location cue for separate navigation with location cue or in the shared screen for split screen navigation. Both shoppers can generate web page information and transmit to each other concurrently. While tightly-bonded shared navigation only permits one shopper to have control of the web page at a time, with his/her partner passively follows at the same time, which implies

that the web page information can be generated and transmitted by only one shopper (the shopper who is in control) at a time, rather than both shoppers. Since both shoppers are tied together on the same web page and only one shopper could have control at a time, parallel information transmission is not available. As a result, the parallelism is lower than that inherent in separate navigation with location cue and split screen navigation.

We contend that rehearsability and reprocessability are not different across the three navigation support designs.

Rehearsability is the extent to which the media enables the shopper to rehearse or fine tune the information before sending (Dennis et al., 2008; Dennis and Valacich, 1999). Since all the three kinds of navigation support designs timely transmit the shopper's web page information to his/her partner when the information is generated, we contend that the rehearsability are low for all of them, and there's no difference with regard to this capability across the three navigation support designs.

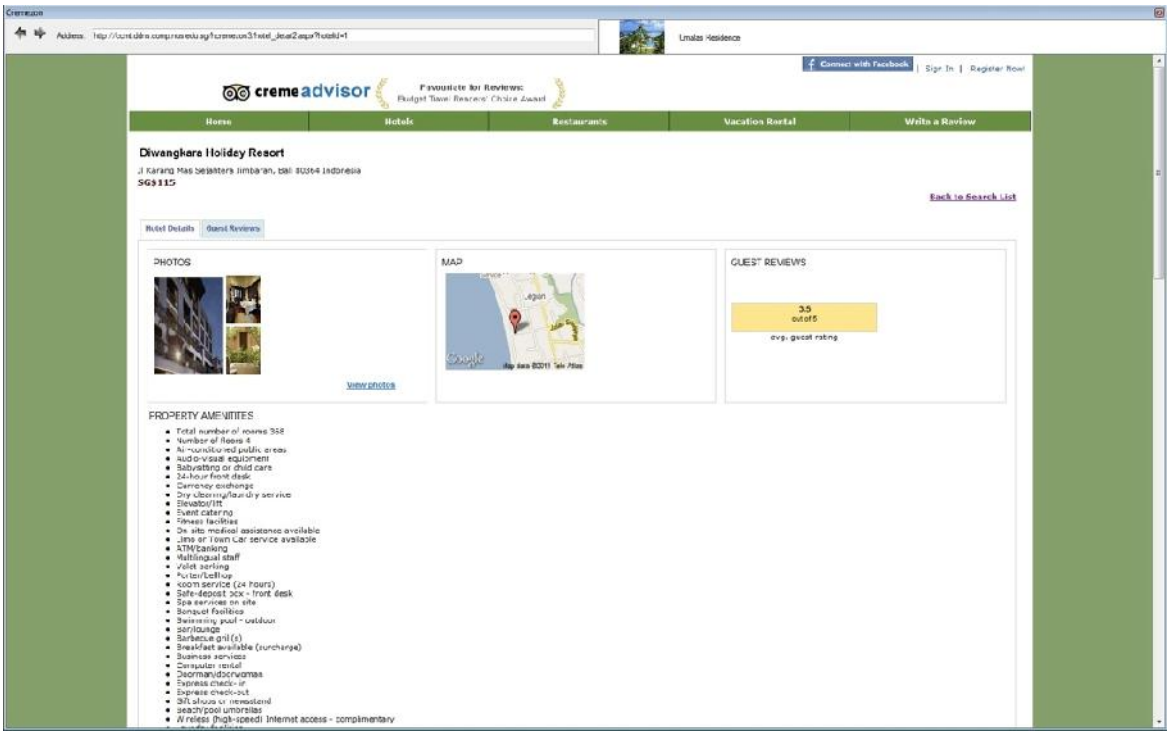
Reprocessability refers to the degree to which the media enables the information to be reexamined or processed again (Dennis et al., 2008; Dennis and Valacich, 1999). Shoppers can easily go back to previous web page to reprocess product information by clicking on the back button provided by all the three navigation support designs, so that the reprocessability is ensured. Accordingly, we assert that the three navigation support designs have the same capability to provide reprocessability.

The navigation support designs and their corresponding synchronicity are summarized in Table A.1.

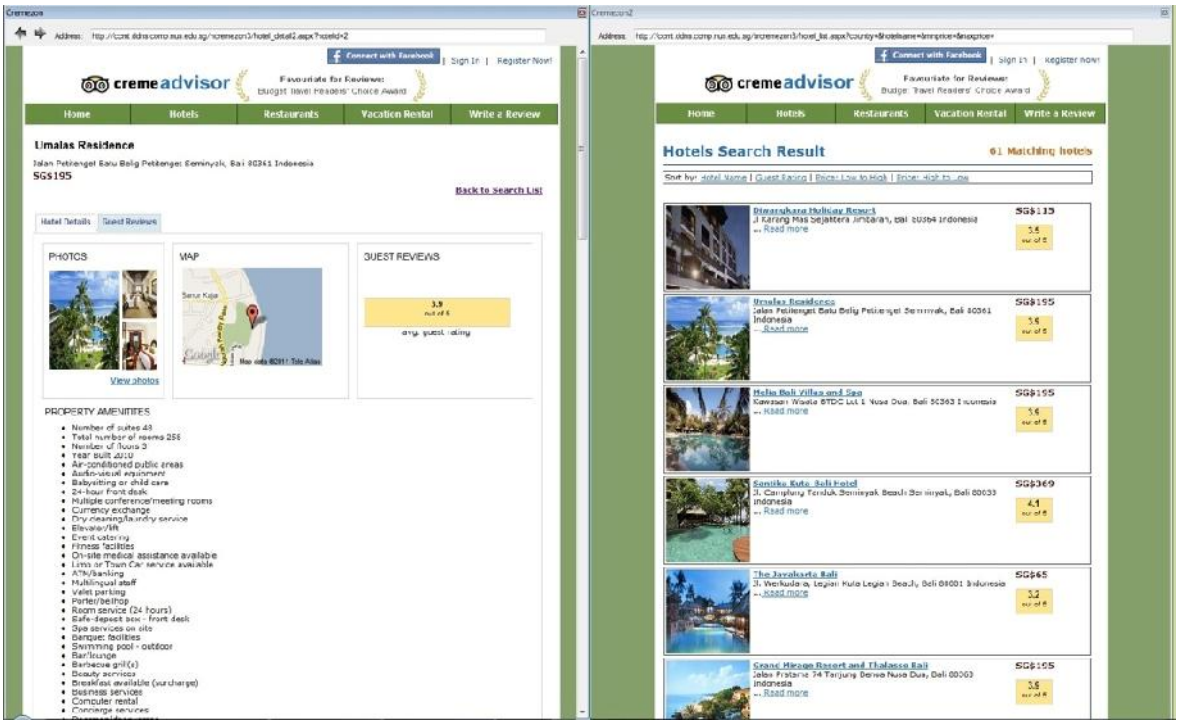
Table A.1: Synchronicity of Navigation Support Designs						
Navigation Support Designs	**Degree of Synchronicity**	**Media Capability**				
		Symbol Set	**Transmission Velocity**	**Parallelism[1]**	**Rehearsability[1]**	**Reprocessability[1]**
Separate Navigation with Location Cue	Low	Low	Low	High	Low	High
Split Screen	Medium	High	High	High	Low	High
Tightly-Bonded Co-Navigation	High	High	High	Low	Low	High
Note: 1. Parallelism, rehearsability, and reprocessability negatively correlate with the synchronicity of the media.						

APPENDIX B: STUDY I NAVIGATION SUPPORT DESIGNS

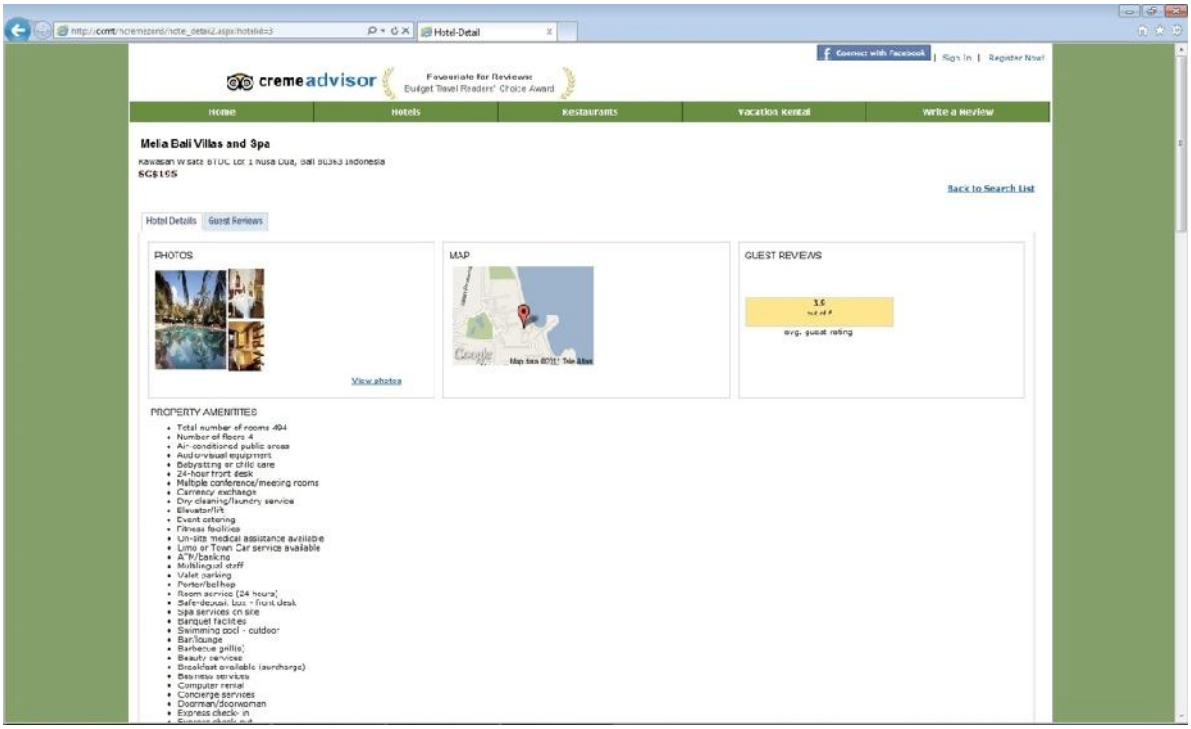
Separate Navigation with Location Cue



Split Screen Navigation



Tightly-Bonded Shared Navigation



APPENDIX C: STUDY I MEASUREMENTS

Synchronicity (Four items were created to measure synchronicity)

SYN1: Which navigation support was more likely to allow you and your partner to search for hotels at the same pace?

The ***First*** navigation support used in the base task			Equal	The ***Second*** navigation support used in the formal task		
-5	-4	-3	-2	-1	0	

SYN2: Which navigation support was more likely to allow you and your partner to browse the same web pages simultaneously?

SYN3: Which navigation support was more likely to allow you and your partner to evaluate the same hotels simultaneously?

SYN4: With which navigation support were you and your friend's web navigation more synchronized with each other?

Perceived Mutual understanding (Adapted from Katz and Te'eni, 2007)

PSU1: Which navigation support allowed you and your partner to understand more about each other's opinions on each hotel that you two evaluated together?

PSU2: With which navigation support could you and your partner more easily understand each other during the collaborative hotel booking process?

PSU3: With which navigation support were you and your partner more able to understand each other's viewpoints throughout the collaborative hotel booking process?

PSU4: Which navigation support was more likely to allow you and your partner to know about what the other person was thinking throughout the

collaborative hotel booking process?

Perceived Decision Quality (Adapted from Tan et al., 2010)

PDQ1: With which navigation support were you and your partner more likely to believe that you two have made the best choice of hotels on the website?

PDQ2: With which navigation support would you and your partner more likely to make the same choice if you two had to book a hotel on the website collaboratively again?

PDQ3: With which navigation support were you and your partner more likely to believe that the hotel finally selected is the most suitable on the website?

PDQ4: With which navigation support were you and your partner more likely to think you two have picked a good hotel on the website?

Perceived Enjoyment (Adapted from Koufaris 2002, and Jiang and Benbasat 2007)

ENJ1: Which navigation support made the collaborative hotel booking experience with your partner on the website more interesting?

ENJ2: Which navigation support made the collaborative hotel booking experience with your partner on the website more enjoyable?

ENJ3: Which navigation support made the collaborative hotel booking experience with your partner on the website more exciting?

ENJ4: Which navigation support gave you and your partner more fun during the collaborative hotel booking experience on the website?

Intention to Return (Adapted from Koufaris, 2002)

INT1: Should you and your partner need to book a hotel when you two are at different locations, with which navigation support is it more likely for you two to visit the website again?

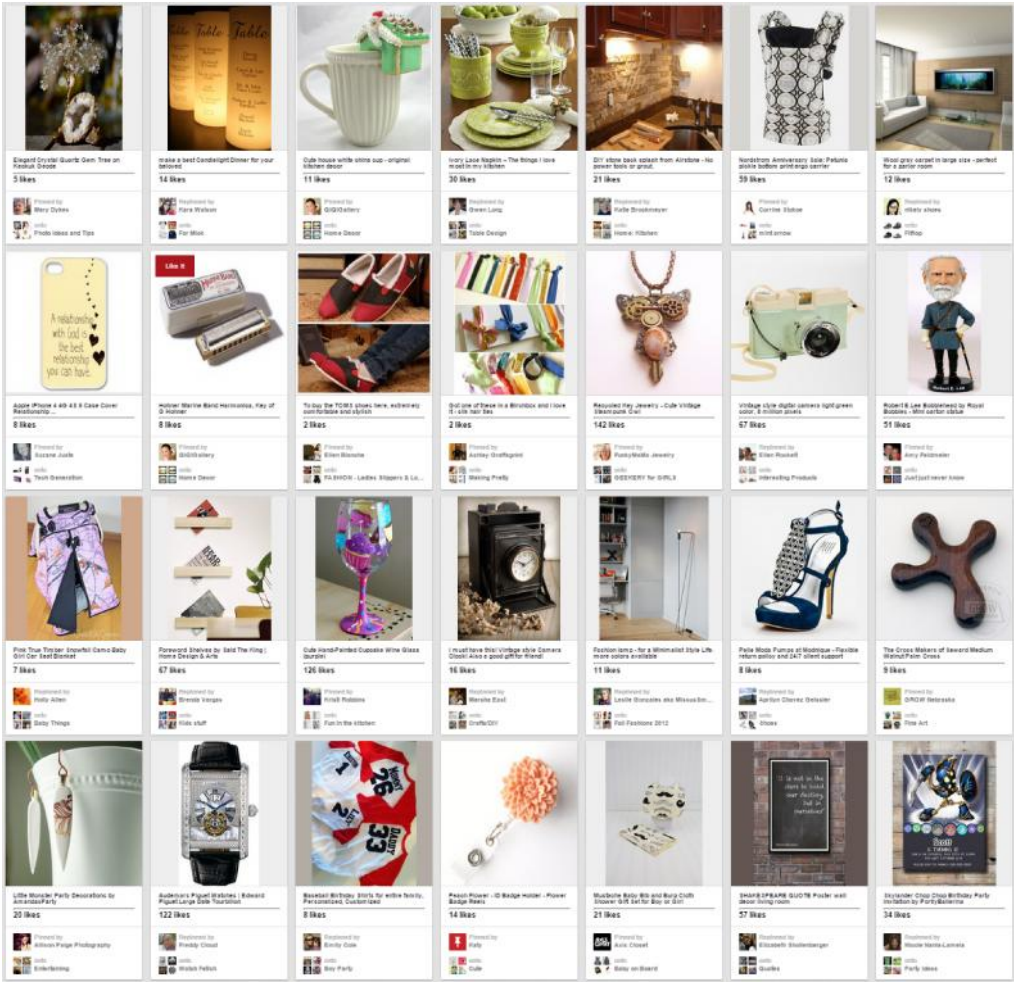
INT2: Should you and your partner need to book a hotel when you two are at different locations, with characteristics similar to which navigation support is it more likely for you two to visit the website?

INT3: With which navigation support is it more likely for you and your partner to revisit the website in the future?

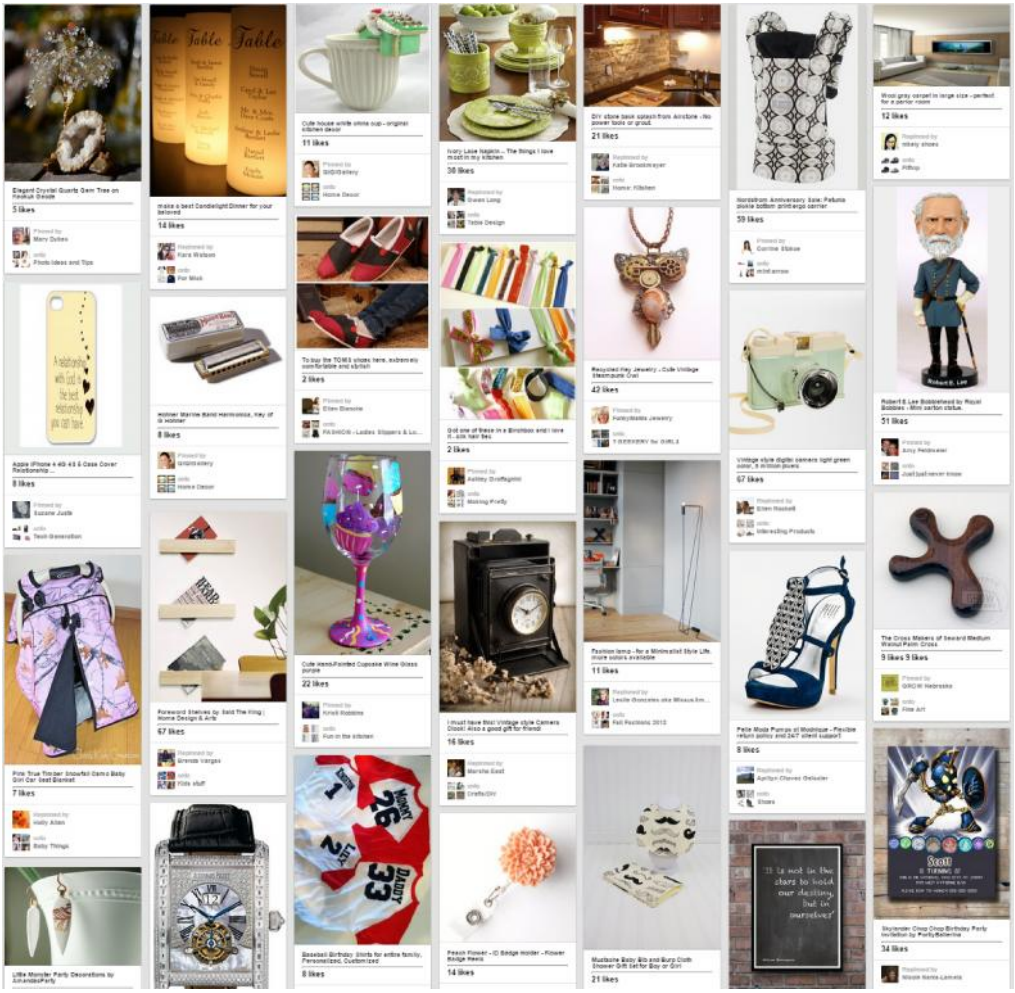
INT4: With which navigation support is it more likely for you and your partner to recommend the website to other friends?

APPENDIX D: STUDY II INTERFACE DISPLAY FORMAT DESIGNS

Matrix Display Format



Waterfall Display Format



APPENDIX E: STUDY II EXPERIMENTAL SCENARIOS

Scenario for Task-Oriented Shopping Motivation

It is late at night and you plan to go to sleep. However, you just remember that your best friend‘s birthday is coming soon, and you really want to buy a gift for him/her to show your best wishes.

You plan to search a gift on a social shopping website called Postyle.sg. You have to make the purchase by tonight so that the gift could be delivered to your friend's house in time. You opened the home page and typed “gift” in the search box, and now you are being redirected to the result web page.

What you would have to do now is to perform a product search on the website, and pick a gift that meets your needs/preferences to purchase.

Scenario for Recreational Shopping Motivational

You are at home in a cozy Saturday afternoon.

You turn on the TV and find that shows are rebroadcasts of yesterday. You turn off the boring TV shows and call your friends, but they tell you they are all busy with work. You feel very dull and decide to browse a newly launched e-commerce website Postyle.sg to relieve the sense of boredom.

Since you don‘t have anything specific in mind to buy, what you would do is just to look for some Fun stuff on the website and Enjoy the weekend. All you want to do is to spend some Enjoyable time online by yourself.

APPENDIX F: STUDY II MEASUREMENTS

Manipulation Check of Shopping Motivation (7-point Likert scale with 1 Strongly Disagree and 7 Strongly Agree)

- I visited this website in order to find some product to purchase.
- I would primarily want to get my product search task done when I used the website.
- I visited this website mainly for enjoyment. (reversed)
- I visited this website mainly for fun. (reversed)