TWO STUDIES ON STRATEGICALLY DESIGNED INTERVENTION

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A THESIS SUBMITTED

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF INFORMATION SYSTEMS

NATIONAL UNIVERSITY OF SINGAPORE

2017

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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 this thesis.

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

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25 May 2017

ACKNOWLEDGEMENTS

It is a pleasure to thank the many people who made this thesis possible.

First and foremost, it is difficult to overstate my sincere gratitude to my supervisors, Prof. Chan Hock Chuan and Prof. Heng Cheng Suang. I appreciate all their contributions of time, ideas, and funding to my research work, as well as their guidance, support, and care throughout the entire doctoral study. Prof. Chan is an inspiring mentor with expert knowledge, enlightening instructions, and greatest patience. Prof. Heng has taught me the importance of being passionate and thinking outside of the box in order to be a genuine researcher. The combination of their support has been instrumental for this work. Furthermore, the joy and enthusiasm they have for research has been contagious and motivational for me. Their teaching and guidance will be the founding stones of my academic career. I am also very grateful for the excellent examples they have provided as rigorous, modest, and diligent scholars and teachers. I feel lucky to be their student and look forward to working with them in the future as well.

I am deeply indebted to my co-authors Prof. Sun Heshan and Prof. Iris W. Hung, who have provided enlightening advice and insightful comments throughout my research journey. It has been a great honor to work with excellent researchers like them. Their immense knowledge and research attitudes greatly inspired my research.

My sincere thanks also go to my graduate research paper committee and thesis committee, Prof. Atreyi Kankanhalli and Prof. Klarissa Chang Ting Ting, for their expert comments and constructive feedback. I would like to

thank many other professors, who have taught me and supported me at different stages of my research, especially, Prof. Goh Khim Yong, Prof. Huang Ke-Wei, Prof. Hahn Jungpil, Prof. Chen Yuanyuan, Prof. Thompson Teo, Prof. Pan Shan-Ling, Prof. John Lymm, Prof. Anindya Datta, Prof. Kaushik Dutta, Prof. Zhang Yan, Prof. Leonard Lee, Prof. James Lincoln, Prof. Mike Cheung, and Prof. Tsai Fen-Fang.

I thank my fellow students and friends at NUS for their help, care, and warmth. I had valuable experience collaborating with them. Our comradeship is invaluable.

Last but not least, I would like to thank my family, my parents Shen Menglin and Qiu Anmin, and my grandparents, Qiu Shen, Zhang Yuling, Shen Zhixiang, and Shen Zengyu, for the unconditional support and love. To them I dedicate this thesis.

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SUMMARY

Despite the commercial interest in various forms of distractions, research on interface design typically cautions against the use of such distractions. This dissertation, which comprises two studies, is aimed at understanding whether "distracting" website features can be constructive if used strategically.

The first study (Chapter 3) examines the effects of distracting website features that are strategically evoked to trigger unconscious thought in complex decision making. E-commerce consumers face complex product choices and purchase decisions. Due to limited cognitive capacity, consumers do not always make the best product choice. The existing research has been focusing on providing decision aids to help consumers make complex product choices based on conscious thinking. From an Unconscious Thought Theory (UTT) perspective, the first paper provides a different perspective, positing that unconscious thought may sometimes outperform conscious thought for complex decisions. Accordingly, e-commerce websites can strategically design interventions to induce unconscious thought to help consumers make superior product choices. An experiment was conducted to test our hypotheses. The findings show that unconscious thought induced by interventions performs better than conscious thought for complex product choices, especially when there is an asynchrony between consumers' circadian preference (optimum decision time of the day based on circadian timing) and actual time of decision. Theoretically, the findings from this research somewhat explain the conflicting findings in prior work on UTT. Practically, this research suggests that the seemingly "distracting" website features on e-

commerce websites, if used strategically, can be constructive for consumer decision-making.

The second study (Chapter 4) investigates consumers' affective responses to an emotionally interesting but potentially distracting presentation of user-generated content (i.e., *danmaku*) in the context of entertainment marketing. Drawing on the literature on affect and word-of-mouth communication, we hypothesize that commentary presentation, as an environmental stimulus, is capable of influencing consumers' affective states, which in turn affect consumers' approach and avoidance behavior. The results from an experiment indicated that traditional separate commentary presentation (as opposed to *danmaku*) induced a higher sense of control and dominance. Furthermore, the effect of commentary presentation on affective states is contingent on the commentary content communicated. Specifically, the emotional benefits of *danmaku* (compared with separate commentary) presentation in terms of arousing interest would be more salient when it is leveraged to convey humorous comments. In contrast, traditional separate commentary presentation outperforms *danmaku* in promoting dominance, when it is employed to disseminate informational content and facilitate consumer learning. This study advances current knowledge about affect and Word-of-Mouth (WOM), and provides important implications for the design of social media advertising platforms.

Together, the two studies highlight the potential of using disruptive features creatively to facilitate online consumers' cognitive and affective responses. Contributions and implications of the thesis are discussed (Chapter 5).

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CHAPTER 1. INTRDOUCTION

1.1. Background and Motivation

Conventional research on website design typically advises against the rampant use of distracting website features, such as pop-ups, banner ads and animations, because they might disrupt Internet users' information processing process (e.g., Burns and Lutz 2006; McCoy et al. 2007). Distracting website features, as non-primary information stimuli, have been found to result in negative impacts on cognitive and affective dimensions of human-computer interactions. For instance, research on visual attention suggests that attention-grabbing distractors can impair ongoing cognitive performance due to competition for limited attentional resources (Miller 1991; Spieler et al. 2000; Treisman 1991). Furthermore, prior studies on affect-related concepts in ICT literature has documented that distractions are capable of causing annoyance (Burns and Lutz 2006; Hausman and Siekpe 2009; McCoy et al. 2007). By disrupting the content of interest and interfering with Internet users' primary goals, the presence of these distractors hinders the actions that users can take to attain their goals, creating negative feelings such as irritation and frustration (Bahr and Ford 2011; Edwards et al. 2002; Gao and Koufaris 2006; Li et al. 2002; McCoy et al. 2008). Thus, it is generally believed that such attention-attracting features are "disruptive", "obtrusive" and "fatiguing" (McCormick 1970; Stewart 1976).

Yet, a growing body of research documents the latent benefits of distracting website features (e.g., Parmentier et al. 2010; Tan et al. 2015).

These studies argue that individuals can leverage certain forms of distractors to enhance performance. Nevertheless, a contingency approach which investigates when distractions are beneficial is rare. In general, human-computer interaction (HCI) and consumer research have recognized that distracting website features have the potential to attract consumers' attention, but more conclusive evidence is needed to evaluate specific cases of how distracting website features can enhance consumers' online experience and outcomes.

Furthermore, with the rapid development of multimedia and Internet technologies, multitudes of distracting features have been introduced to support varying aspects of consumer information processing and evaluation. A review of the HCI literature shows that distracting website features are primarily employed to attract users' attention to specific information (e.g., commercial messages) on the screen (Davenport and Beck 2001; Gao et al. 2005). For example, researchers are interested in the use of distracting website features, such as banner ads, to attract users' attention and to increase the click-through rates (e.g., Cho et al. 2001; Dahlen 2001; Hong et al. 2004; Sundar and Kalyanaraman 2004; Zhang 2000). However, distracting website features are increasingly applied to serve other roles, such as interaction mediators (e.g., live help pop-ups), social actors (e.g., animated user-generated content) and decision making intervener (e.g., pop-ups with task-related information). Therefore, a more balanced and contingent perspective of the use and evaluation of distracting website features is needed (Al-Natour and Benbasat 2015; Brajnik and Gabrielli 2010).

1.2. Research Objectives

This motivates us to investigate the following research questions: (1) as a non-primary information source, whether distracting website features could be constructive to consumer information processing and evaluation, if used strategically? And (2) if so, under what conditions would the latent benefits of distracting website features be more salient? To address these questions, two studies are proposed to empirically examine the cognitive (Study One) and affective (Study Two) factors inducted by strategically designed interventions. Overall, this thesis is expected to provide intriguing implications and provoke new thoughts on the use and evaluation of distracting website features.

1.3. Thesis Organization

The opening chapter has provided an overview of the research context and general motivations based on the current research gaps. It raises the research questions that will be addressed in the studies and advocates that more effort should be devoted to understanding the latent benefits of distracting website features. The subsequent chapters of the thesis are organized as follows.

Chapter 2 provides a brief review of the use and evaluation of distracting website features in HCI and consumer research. It then introduces the concept of strategically designed intervention and highlights its implications for HCI literature.

Chapter 3 describes Study One in detail. It first reviews the literature on Unconscious Thought Theory and discusses its implications for the design and use of strategically designed interventions. It then presents the hypotheses

and describes the experiment which has been conducted to test the hypotheses. Discussions and implications are then reported.

Chapter 4 reports Study Two in detail. It first reviews the literature on affect and word-of-mouth. A research model is presented to examine the effects of an affect-eliciting design feature on consumers' affective responses. An experiment has been conducted to test the research model and hypotheses. Discussions and implications are then reported.

Chapter 5 concludes this thesis by summarizing the research objectives and implications of the two studies.

CHAPTER 2. CONCEPTUAL BACKGROUND

2.1. Designing and Using Distractions

Distracting website features, such as pop-ups, banner ads, and animation, are commonly employed by online platform owners to attract Internet users' attention and convey commercial messages (Davenport and Beck 2001; Gao et al. 2005). A distraction is defined as "something that directs attention away from some ongoing activity" (Baron 1986, p.4). This term is sometimes used interchangeably with "interruption", which refers to an external discrete event that breaks the continuity of one's focus on a primary task and requires immediate attention (Covey 1989; Speier et al. 1999). With the rapid development of multimedia and specialized graphic and animation packages, distracting website features become very easy to produced and have been widely used in various Web interfaces. Table 2.1 summarizes a few distracting website features that are prevalent and important for both researchers and practitioners (Burns and Lutz 2006; Li and Leckenby 2007; Tutaj and van Reijmersdal 2012). These features are different in location and orientation, which are the most prominent elements recognized by peripheral vision after consumers have extracted the gist of a website (Navon 1977; Pieters and Wedel 2008; Treisman and Gelade 1980).

Among these, the most controversial distracting feature is the pop-up, given the mix of its popularity and irritation potential (Diao and Sundar 2004; Jain et al. 2010; Liu and Shrum 2002). A pop-up consists of a small window that pops up over the main browser window and contains a combination of text and graphics designed to convey commercial messages. This small

window can jump into sight when users open a Web page, browse the page, and sometimes close the page. The appearance of a pop-up window creates a sudden change in the visual field and captures involuntary attention (Corbetta and Shulman 2002; Gibson and Kelsey 1998; Jonides and Yantis 1988; Lambert et al. 1987; Müller and Rabbitt 1989; Yantis and Hillstrom 1994; Yantis and Johnson 1990; Yantis and Jones 1991; Yantis and Jonides 1996). Nevertheless, forced viewing of pop-ups often leads to the feelings of intrusiveness and avoidance of the content of the pop-ups (Edwards et al. 2002; Li et al. 2002).

Table 2.1. Distracting Website Features

Feature	**Description**
Pop-up *	A small window or light-box that that pops up over the main browser, and must be closed or minimized in order to be removed from the screen
Banner	A horizontal, rectangular-shaped graphical element that usually occupy the top area of a Web page
Skyscraper	A tall and narrow element whose height exceeds its width, usually placed to the right of content on a Web page
Floating ad	A rich media element that appears uninitiated, superimposed over the current browser window, and disappears after a specific time period
Interstitial	A full screen element that covers the current browser and is appeared at natural transition points between two content pages
Animation *	A dynamic visual element and structure, evolving through movement over time

* Examined in this dissertation (in Study 1 and Study 2, respectively), for the following reasons: (1) they represent the most prevalent and popular features among practitioners; (2) the content carried can be feasibly manipulated by researchers; (3) the insights into these distractions might be readily generalized to other types of distracting features.

Animation is another popular form of distraction when it appears on the screen as additions to the original content on the screen. It is a dynamic visual statement, form, and structure evolving through movement over time (Baecker and Small 1990). Animation is found to be more powerful than text within the limited display area of a computer screen (Gonzalez and Kasper

1997). The design and utilization of animations is based on the understanding that human beings respond involuntarily to moving objects (Lang et al. 2002; Reeves and Nass 1996). Animated ads have been shown to induce higher ads recognition but lower ads recall compared with pop-up ads (Diao and Sundar 2004). Yet, when an animation carries information that is irrelevant to individuals' information-seeking tasks or informational needs, it impedes individuals' performance (Zhang 2006).

2.2. Evaluating Distractions

2.2.1. Cognitive Evaluation

Designing for *usability* has been the primary foci of conventional research on human-computer interaction (Al-Natour and Benbasat 2015). Task performance in terms of effectiveness and efficiency of interface in supporting users' tasks has been considered central to the evaluation of interface design. For example, Norman and Draper (1986) posit that user performance is the primary criteria that should be met when designing websites.

From the *cognitive* perspective, distractions increase the complexity of the website (Liu and Li 2012; Nadkarni and Gupta 2007). More specifically, these attention-grabbing devices typically distract individuals from their primary task (e.g., information-seeking and evaluation), and thus impede their task performance (Smith et al. 2006; Zhang 2000; Zhang 2006; Zhang and Massad 2003).

Although distracting website features have been proven effective in grabbing attention and boosting click-through rates (e.g., Cho et al. 2001;

Dahlen 2001; Hong et al. 2004), they are believed to bring about two negative consequences for platform owners. First, distracting website features that prevent users from focusing on their primary task would increase the overall transaction cost of a platform, resulting in users avoiding a transaction or even switching to a competitor (Carter et al. 2014). Second, forced exposure to distracting website features is likely to induce users' psychological reactance against the persuasive intent of the commercial messages conveyed by the distractions (Edwards et al. 2002; Li et al. 2002).

Research on the cognitive aspects of interface design has produced numerous guidelines, tools, and methods for developing useful and easy to use interface. Specifically, it advocates that interface should be distraction-free and facilitates user performance. The cognitive perspective typically assumes that a conscious, distraction-free, and systematic information processing process allows individuals to focus their attention on the most relevant information (e.g., Smith et al. 2006) and hence improves decision quality (Blackwell et al. 2006). Nevertheless, the assumption has been challenged by the Unconscious Thought Theory (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006), which argues that unconscious thought may outperform conscious thought for complex decisions. It has been shown that unconscious thought can be triggered through the use of distracting website features in the context of online shopping (Tan et al. 2015). Therefore, the same distracting website feature can be used in ways other than that of conveying commercial messages. Indeed, it can be strategically designed and employed to intervene individuals' decision-making (e.g., by inducing unconscious thought mode) and thus enhance decision quality for complex online shopping tasks.

2.2.2. Affective Assessment

In addition to the cognitive perspective, researchers are increasingly paying closer attention to the affective aspects of user interface design (for reviews, see Sun and Zhang 2006; Zhang 2013). In contrast to the usability approach to interface design which emphasizes measurable criteria of user performance, the affective perspective relates the assessment of design features to the affective experience of users with the interface in a specific context of use. It has become increasingly evident that users' evaluation and perception of an interface is intrinsically subjective and is based on their personal interpretation of the interface and their interaction with it (Agarwal and Venkatesh 2002; Dillon 2001; Norman 2004). Affect is therefore closely related to attitudes toward and adoptions of design features. It influences and mediates many aspects of interaction with a user interface (Norman 2002).

Prior research has found that certain forms of distractions, particularly, pop-ups and animated banners, would elicit intrusiveness and frustration in users (Burns and Lutz 2006; Edwards et al. 2002; Hausman and Siekpe 2009; McCoy et al. 2007; McCoy et al. 2008). The distractions divert users' attention from their content of interest and interfere with their primary information needs so that they cannot continue their tasks at hand, leading to negative affective states such as irritation and frustration (Edwards et al. 2002; Li et al. 2002). Yet, this effect might be dampened and less evident when the distractor carries information that is relevant and congruent with users' tasks at hand (Czerwinski et al. 2000; Gluck et al. 2007; Tan et al. 2015). For example, for a consumer visiting an online shopping website, a pop-up that informs coupons that can be used during the promotional period would

probably be perceived as more task congruent and less intrusive than a pop-up related to an online video game. This implies that, when strategically designed, distracting website features may not be always irritating and annoying.

Driven by the constantly changing role of IT artifacts, distracting website features are increasingly applied to serve new roles. For instance, live chat pop-ups are applied as invitations to initiate a live-chat conversation with online sales assistants. In this case, the pop-ups mediate the communication between consumers and online sales assistants, and are likely to be appreciated when consumers spend time and look for contact information on self-help or informational Web pages (Jones 2015). Therefore, distractions, if strategically designed and employed, might induce positive affective states and lead to favorable evaluations. Despite the commercial interests in these new forms of distractions, the theoretical investigation into their affective quality and potential affective outcomes still lags.

2.3. Strategically Designed Intervention

The review of the studies on distracting website features indicates that distracting website features, when strategically designed, are capable of bringing performance gains and evoking favorable affective outcomes. The thesis focuses on the use and evaluation of *strategically designed intervention*, which is defined as the strategic composition of distracting website features that crafts users' decision making.

While traditional definitions of design are about creating discrete solutions to meet product specifications or service requirements, "strategic design" focuses on crafting decision making and achieving a specific plan,

mission, or goal (Ling 2009). Expanding the concept of “strategic design” to the design and use of distracting website features, strategically designed intervention is about designing and using website features that serve a strategic objective or function. Similar to the concept of strategic management that concerns how to achieve and sustain competitive advantage of firms (Rumelt et al. 1994), strategically designed intervention is applied to serve strategic objectives for the Website in order to gain competitive advantages. Creating unique value propositions for key stakeholders is one source of competitive advantages (Valacich and Schneider 2016). Hence, it works better when the intervention is evoked in an appropriate context of use, with a strategic aptitude to deliver unique value propositions for stakeholders.

The thesis presents two examples of strategic designed intervention, with different conceptualizations of distractions and foci of evaluation. Study One conceptualizes distractions as decision-making interveners that are applied to induce unconscious thought in the context of e-commerce. The key stakeholder of the e-commerce platform is online consumers and the unique value created for them could be better decision quality. In particular, consumers who are experiencing asynchrony between circadian preference and the time of decision could take advantage of such distracting website features to achieve better decision making.

Study Two examines a distracting commentary presentation format, which is capable of arousing interests and evoking emotional user experience. Such distractors are strategically designed to feature an emotional interaction for users who seek fun and enjoyment, and to help marketers to achieve

favorable consumers' responses (when displaying humorous content). Table 2.2 summarizes the strategic use of interventions in two studies.

Table 2.2. Strategic Use of Interventions in Two Studies

	Study One	**Study Two**
Distracting feature	Pop-ups	Animated or "flying" comments display
Strategic objective	To attract users' attention (by evoking unconscious thought)	To arouse and maintain users' interest
Values created (for key stakeholders)	Consumers: better decision quality	Consumers: arousing watching experience Marketers: favorable consumer responses
Appropriate context	Complex decision making, non-synchronized time of decision	Displaying humorous content

CHAPTER 3. STUDY ONE

STRATEGICALLY DESIGNED INTERVENTIONS FOR COMPLEX PRODUCT CHOICES: AN UNCONSCIOUS THOUGHT THEORY PERSPECTIVE

3.1. Introduction

Bewildered by the overwhelming amount of products online, e-commerce consumers often face complex purchase decisions. They are inundated with a colossal amount of information in various formats (e.g., text, images, and videos) about products, other consumers' evaluations, and personalized recommendations from the vendor (e.g., Amazon's Gold Box). Although online purchase is largely goal-directed (Bettman et al. 1998), consumers often do not achieve their goal of making optimal product choices, largely due to limited information processing capacity (Gao et al. 2012). Moreover, the design features of e-commerce websites can either aid or impede consumers' information processing (Ivory and Megraw 2005; Jiang and Benbasat 2007a; Suh and Lee 2005). Hence, it has always been a focal topic to study how to help consumers make better purchase decisions in the face of complexity in online shopping (e.g., Cyr et al. 2009; Everard and Galletta 2005; Jiang and Benbasat 2007a; Jiang et al. 2010).

Unlike extant research, which has focused on providing decision aids and recommendation systems to facilitate consumers' *conscious* thought (e.g., Wang and Benbasat 2008), this research offers a novel perspective of facilitating consumer decision-making from the perspective of *unconscious*

thought. Still in its relatively nascent stage, some preliminary work on Unconscious Thought Theory (UTT; Dijksterhuis and Nordgren 2006) has suggested that temporarily distracting users from the conscious decision process may lead to superior outcome for complex decisions in certain contexts (Dijksterhuis et al. 2006). Although it is generally accepted that conscious thought outperform unconscious thought when the decisions are simple (e.g., Acker 2008; Dijksterhuis 2004; Dijksterhuis et al. 2006; Strick et al. 2011), the findings about complex decision-making tasks are far from consistent. For example, Tan et al. (2015) reported support of unconscious thought in the context of e-commerce whereas other researchers (e.g., Acker 2008; Lassiter et al. 2009; Newell et al. 2009) did not.

Given the inconsistent findings regarding the effects of UTT, we believe that investigating the circumstances under which unconscious thought outperforms conscious thought can help us better understand how to facilitate consumers' decision making in online shopping, as well as contribute to a better understanding of UTT. Therefore, this research aims to contribute to the current literature by showing that both individual (e.g., circadian preference) and contextual factors (e.g., time of decision) matter to explain under what conditions unconscious thoughts outperform conscious thoughts. In particular, we are interested in the synchrony between individuals' circadian preference and time of decision. We concentrate on complex product choices where consumers have to decide among products that are complex with multiple attributes. Our paper aims to address two research questions: (1) Does unconscious information processing outperform conscious information processing in making complex product choice? And (2) how this effect will be

moderated by the synchrony between individuals' circadian preference and time of decision?

This research contributes to information systems (IS) research in three critical ways. First, it elucidates the importance of unconscious thought in online decision-making. In addition, this research unravels a vital moderating factor that has been overlooked in the extant research. This moderating factor (synchrony between individuals' circadian preference and time of decision) somewhat explains the mixed findings in prior research regarding the impact of unconscious thought on complex decision-making. Second, this research gives us a novel perspective about intervening (or "distracting") website features, positing that when strategically employed, these features can induce unconscious thought and thus facilitate online purchase. This changes our view of these features as inhibitors rather than facilitators of online shopping. Third, this research introduces consumers' circadian preference to IS research by accentuating the synchrony between an individual's circadian preference and the time at which consumer decisions are made as being an important factor for making optimal product choices.

3.2. Literature Review

3.2.1. Distracting Website Features

Distracting website features, such as pop-ups and animated banners (Burns and Lutz 2006; Hong et al. 2007), typically carry information that is not essential to consumers' main task in online shopping. These features have been believed to be distractive because they make it difficult for consumers to concentrate on the purchase decision. Indeed, the utilization of distracting

website features in various online contexts is based on the findings that individuals respond involuntarily to moving objects. Thus, distractions often interrupt and annoy consumers with irrelevant information (Zhang 2000; Zhang 2006).

The existing research on distracting website features has drawn heavily on the information processing theory (Miller 1956; Miller et al. 1960; Miller 2002). According to the information processing theory, consumers have limited information processing capacity which affects their ability to memorize and process product attributes (Gao et al. 2012). The span of information processing for a human being is typically limited to a temporary 'store' of about seven items (Miller 1956), at 10-60 bits per second, much slower than the 11,200,000 bits per second processing speed of the entire human system (Dijksterhuis and Nordgren 2006). In the context of e-commerce, attention to distracting website feature in addition to consumers' online shopping task increases cognitive demands (Norman and Bobrow 1975). Hence, distracting website features, when used to carry irrelevant information, may cause confusion and restrain consumers' ability to process, respond, and perceive information (Schick et al. 1990). By interrupting the process of product information gathering and evaluation, distracting website features lead to consumers' greater processing and cognitive load (Speier et al. 1999; Tan et al. 2015). As a result, Human-Computer Interaction (HCI) research generally cautions against the rampant use of distracting website features (e.g., Blackwell et al. 2006; Hausman and Siekpe 2009; Wang and Benbasat 2009). This proposal, however, is a bit unrealistic in that in recent years, HCI researchers have found that distracting features may be necessary. Specifically,

they can be used as “social actors.” For instance, live help pop-ups have been employed to mediate consumer purchase decision and build trust (Qiu and Benbasat 2005). Thus, instead of suggesting getting rid of distractive features all together, this research suggests that we should change our perspective and study how to strategically design and employ them.

Notwithstanding the extent research’s exclusive focus on cognitive information processing, human beings do possess very limited cognitive capacities in relation to the often complex consumer product choices (Baddeley 1999). As a result, an entirely different perspective is needed. We conjecture that human beings’ unconscious capacity can be exploited in light of the fact that it is virtually infinite and thus allows individuals to process more information than conscious capacity (Augusto 2010).

3.2.2. Unconscious Thought Theory

In recent years, Unconscious Thought Theory (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006) has emerged that may provide an alternative perspective and a possible solution to the limited cognitive capacity problem. The motif of UTT is that the capacity of unconscious thinking is virtually infinite and may lead to more satisfying or better decision in the context of *complex decisions*. For simple decisions, on the other hand, unconscious thinking does not have much advantage (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006).

Researchers in cognitive and social psychology acknowledge two distinct modes of thought, namely, conscious thought and unconscious thought (Evans 2008). Conscious thought is defined as “thought or deliberation while

conscious attention is directed at the problem at hand," whereas unconscious thought refers to "thought or deliberation in the absence of conscious attention directed at the problem" (Dijksterhuis et al. 2006, p.1005). The major differences between conscious thought and unconscious thought is summarized in Table 3.1.

Table 3.1. Conscious vs. Unconscious Thought (Summarized based on Dijksterhuis and Nordgren 2006)

	Conscious Thought	**Unconscious Thought**
Attention	With attention to the decision	Without explicit attention to the decision (the attention is directed elsewhere)
Capacity	Constrained by the low cognitive capacity	Not constrained due to a much larger capacity
Bottom-up vs. Top-down	Works bottom-up, guided by expectancies and schemas	Works top-down, aschematically, by slowly integrating information to form objective summary judgment
Weighting	Often leads to suboptimal weighting because it disturbs the natural weighting process	Naturally weights the relative importance of all attributes
Rule	Follows strict rules, precise	Arrives through estimates

Specifically, there exist two major advantages of unconscious thought over conscious thought when decision-making is complex. First, unconscious thought is less capacity constrained than conscious thought. As mentioned earlier, cognitive thought is restricted by human being's limited cognitive capacity (Miller 1956). The limited conscious thought causes consumers to take into account only a subset of all relevant information when making a choice (Dijksterhuis 2004). Unconscious thought, on the other hand, has a virtually infinite capacity, which allows people to process much more information at the same time. Second, unconscious thought is good at

naturally weighting the relative importance of all product attributes and then forming a global or holistic impression of the product alternatives. Conscious thought, however, might cause suboptimal or biased weighting of the importance of some attributes (Dijksterhuis 2004; Dijksterhuis and Nordgren 2006). Yet, such advantages of unconscious thought may be less salient for simple tasks (Acker 2008; Dijksterhuis 2004; Dijksterhuis et al. 2006; Strick et al. 2011).

Researchers applying UTT show an intense interest in empirical validations and tests, and typically adopt an experimental paradigm as suggested by Dijksterhuis and colleagues. Specifically, to induce unconscious thought, Dijksterhuis and colleagues (Dijksterhuis 2004; Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006) have employed a number of distracter tasks, such as n-back tasks, anagrams, and word search puzzles. All of these tasks share one paradigm: to effectively distract individuals from their primary decision-making task and thus evoke unconscious thought processing (McMahon et al. 2011). For simple products (i.e., those with very few attributes), the results generally favor the conscious thought process over unconscious thought process. The results for complex decision tasks (i.e., those involving many product attributes) are mixed. Some studies have found support for the superiority of unconscious thought (e.g., De Vries et al. 2010; Dijksterhuis et al. 2006; Lerouge 2009; Payne et al. 2008), whereas other studies have found little support (e.g., Huizenga et al. 2012; Lassiter et al. 2009; Smith et al. 2008).

Although the mechanisms of unconscious thought (summarized in Table 3.1) has been the most popular explanation of the UTT effect, UTT has

been challenged by a few alternative explanations. In particular, one plausible alternative explanation for UTT is that consumers might have entirely stopped thinking about the product evaluation during the distraction period and switched their minds to the distraction tasks. Consequently, they might benefit from the process of context switching or set shifting as they would have a fresh, unbiased new start after putting aside the task for a while (Schooler and Melcher 1995). In addition, an interruption might have changed the means of processing product attributes, thereby affecting preferences and choices (Liu 2008). Thus, the problem is whether the better decision quality is due to the temporary absence of conscious thought (i.e., mere interruption and context switching), while the unconscious thought itself does not help. To rule out this alternative explanation, prior studies have included a mere interruption condition whereby participants were told to stopped thinking about the product evaluation altogether during the distraction window, and found that the unconscious thought condition significantly outperformed the mere interruption condition for complex decision making (e.g., Rey et al. 2009; Tan et al. 2015).

The conflicting empirical findings suggest that there may exist unexplored but important moderating factors. This is part of the focus in this study: to theorize and test such a potentially important moderating factor that can reconcile the existing conflicting findings. Based on existing theory and empirical research on UTT, two dimensions of the choice environment (i.e., individual and contextual) may interact with distractions, and influence consumer purchase decision quality. For instance, a few studies have investigated the moderating effects of individual factors, and suggested that

individuals perform better under unconscious thought than under conscious thought if they are in the state of feeling less powerful (Smith et al. 2008), if they are subject experts (De Vries et al. 2010; Dijksterhuis et al. 2009), or if they tend to have coherent representations of product in memory (Lerouge 2009). Other researchers have examined the impacts of contextual factors, suggesting that unconscious thought has an advantage over conscious thought under time constraints (Payne et al. 2008), in the presence of large quantity of high-quality information (Gao et al. 2012), or when a first impression is available (Waroquier et al. 2010).

Despite the mixed empirical support for UTT, the current understanding of UTT has two important implications for HCI research, particularly on distracting website features. First, instead of reducing distraction on the website to facilitate conscious thought, UTT suggests that distracting features that temporarily direct consumers' attention away from the primary task of online shopping, if strategically designed and properly employed, may result in superior purchase decisions in some circumstances (Tan et al. 2015). Second, the choice environment in favor of unconscious thought can be created in an e-commerce setting, where the task demand is susceptible to the interaction of individual factors and contextual factors, which can be manipulated on the e-commerce website. For example, e-commerce websites can organize product choices by brands to induce a configural mindset (Lerouge 2009), present high quality product information (Gao et al. 2012) in proper units to minimize the contrast in attribute magnitude (Payne et al. 2008), and present product attributes simultaneously (Acker 2008), or imposing a time limit for transactions (Payne et al. 2008).

Taking advantage of strategically designed interventions is vital to consumers' online shopping experience, in light of the fact that the amount of product information often exceeds the information processing capability of online consumers. For instance, unconscious thought alleviates the information overload problem (Gao et al. 2012), because it has an unconstrained processing channel and helps consumers distinguish between relevant and irrelevant choice attributes (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006). In addition, the superior decision quality resulting from unconscious thought triggered by interventions might attenuate or even cancel out the negative feeling of annoyance caused by interventions (Tan et al. 2015).

We argue that it is crucial to take into account the interaction of the presence of distractions with individual and contextual dimensions of the choice environment when considering how to facilitate complex consumer product choices. We next expound on an important individual difference, i.e., circadian preference and how it interacts with the distractions and time of decision to influence the processing of product information.

3.2.3. Synchronizing Consumer Circadian Preference and Time of Decision

Researchers have started to study the direct and moderating effects of time-related individual and contextual variables on consumer cognition and behavior (Hornik and Miniero 2009; Hornik et al. 2010). Circadian rhythm is found to be a fundamental and universal factor of human behavior (Cavallera and Giudici 2008; Kruglanski and Pierro 2008). It refers to the 24-hour cycles

of increases and decreases in a range of biological, physiological, and cognitive functions, including body temperature, heart rate, and hormone secretion (Folkard 1982; Hasher et al. 2002; Hrushesky 1994; Moore-Ede et al. 1982). Prior research demonstrates that most individuals have a certain time of day when they are most alert and able to perform at their best in various tasks, such as proactive interference (Hasher et al. 2002), long term memory access (Anderson et al. 1991), reaction time and concentration (Buela Casal et al. 1990), recall and recognition (Intons-Peterson et al. 1999; Petros et al. 1990), visual search (Natale et al. 2003), and other complex reasoning tasks (Bodenhausen 1990). It is believed that circadian rhythm affects the energy dimension of activation and alertness (Tankova et al. 1994), which is an antecedent to attention and cognitive resource availability (Matthews and Davies 2001) and subsequently to information processing (Hornik et al. 2010).

Though generally active during the day, individuals display widely varying daily cycles, with peak times ranging from morning to evening hours, corresponding to the common categorization of individuals into morning types (i.e., “early birds”) and evening types (i.e., “night owls”) (Hornik and Tal 2010). The Morningness-Eveningness Questionnaire (Horne and Östberg 1977) has been developed to assess individual differences in circadian preferences by reference to self-reported assessment of intellectual and physical peak times.

Time-of-day (ToD) has received attention in consumer behavior literature as a situational factor or behavioral settings at points in time and space (Belk 1975). According to Smith (1992), differences in consumer decision-making performance vary with the time of day of the decision. An interaction has been reported between individual circadian preference and

time-of-day for memory recall tasks (Monk and Leng 1982). Specifically, there may be a synchrony effect (May and Hasher 1998) between an individual's circadian preference and the time at which consumer decisions are made, with morning types performing better in the morning than in the evening and evening types performing better in the evening than in the morning. Yet, there is no investigation on whether this synchrony will affect decision making under conscious thought and unconscious thought differently.

The interplay or match between individual circadian preference and time of decision could be crucial toward better understanding conscious and unconscious consumer decision-making in e-commerce settings, available 24/7. First, the interaction effect between consumers' circadian arousal and their ability to evaluate information (Yoon et al. 2000) may suggest a systematic variation across the day in their information processing strategies and abilities. Second, with consumers displaying different optimal functioning at different times of decision, it may be the case that consumers also respond to distracting website features differently at different times of the day. Thus, the synchrony effect may provide implications for more appropriate intraday activation of distracting website features. Theoretically, this newly proposed interaction effect might help bridge the mixed empirical findings as reported by existing studies on UTT (Acker 2008; Lassiter et al. 2009). In addition, along with the advances in data analytical techniques, it is more and more feasible for e-commerce sites to gain more insight into customers including their circadian preferences (e.g., by studying their typical browsing and purchase time) and accordingly to present different customized design features to them.

3.2.4. Synchrony Effects in Cognitive Inhibition

Of particular interest to this research is the impact of the synchrony effect on cognitive efficiency (see Adan et al. 2012 for a review). The synchrony between peek circadian arousal period and time of decision would influence cognitive efficiency through influencing cognitive inhibition, a process critical for control of thoughts (e.g., Hasher and Zacks 1988; May 1999; May and Hasher 1998; Yoon et al. 2000). Cognitive inhibition refers to the mind's ability to suppress stimuli that are irrelevant to the task at hand (Allport 1989; Hasher et al. 1999; Navon 1989a). Prior literature suggests that cognitive inhibition controls the content of individuals' working memory through three functions (Dagenbach and Carr 1994; Gernsbacher and Faust 1991; Hasher and Zacks 1988; Navon 1989a; Navon 1989b; Simpson and Kang 1994; Zacks and Hasher 1994). First, the *access* function prevents irrelevant, off-task information from entering the working memory, and hence limiting access to goal-relevant information. Second, cognitive inhibition is believed to *delete* or dampen activation of information that is marginally relevant, or that was once relevant but has become obsolete or no longer appropriate for current goals. Last, cognitive inhibition *restrains* strong responses to be evaluated for appropriateness. In sum, the access, deletion and restrain functions of cognitive inhibition operate to minimize the interference from distracting materials during information processing (Yoon et al. 2000).

Individuals are expected to experience some deficits in cognitive inhibition at asynchronous time of decision (a.k.a. off-peak time), especially for complex tasks which rely heavily on working memory (May and Hasher 1998). Individuals who experience inefficient cognitive inhibition would be

more susceptible to distracting and irrelevant information, which may be generated from external sources (e.g., advertisements, animated banners, pop-up messages and other distracting website features) or internal sources (e.g., task-unrelated thoughts about personal concerns). Furthermore, the impaired deletion function which is supposed to clear away previously relevant but currently inappropriate information may lead to heightened interference, resulting in difficulties in attending to, encoding and retrieving more relevant information (Yoon et al. 2000).

As the efficiency in cognitive inhibition is a critical determinant of the content of individuals' working memory, complex consumer product choice that heavily relies on working memory would be susceptible to synchrony effects. Inhibition efficiency is particularly important in making complex product choices and purchase decisions, in which relevant product information is likely to be emitted quickly due to limited capacity of working memory and the interference from distracting, off-task stimuli. Thus, it is important that we explore whether consumers would leverage the mode of thought (conscious or unconscious) to offset the consequences of deficiencies in cognitive inhibition at off-peak times of decision.

3.3. Theoretical Development

3.3.1. The Dependent Variable: Quality of Online Purchase Decision

Following UTT paradigm (Dijksterhuis 2004; Dijksterhuis and Nordgren 2006), the quality of actual choice is used as the outcome variable when evaluating the benefits of a particular decision. In this context, one objective indicator of purchase decision quality is whether a consumer makes an optimal

product choice based on pre-defined decision-making criteria. Indeed, our variable of interest is not the probability of choosing the "best" option, but that of identifying the alternative with most relevant information (i.e., best-ranking attributes). Optimal purchase decision is important as it increases the possibility that consumers' expectations of the product are well met, and thus may lead to greater consumer satisfaction (Churchill Jr and Surprenant 1982; Wang and Benbasat 2008).

3.3.2. Mode of Thought and Quality of Online Purchase Decision

We expect that strategically designed distracting features can trigger the unconscious mode of thought as described in UTT and subsequently lead to better purchase decisions for complex products (i.e., those with many attributes). For example, smartphones are considered complex products because they often have many attributes (such as internal memory capacity, battery standby, weight, and camera quality) that consumers need to consider when making choices. In contrast, books are less complex despite having numerous attributes, as many of the attributes (e.g., ISBN etc.) are not essential to most consumers when making a purchase decision.

Evaluating complex products is particularly difficult for conscious thought, because of its limited processing capability. Such limited processing capability could lead consumers to consider only a subset of all relevant information when making a purchase decision. In contrast, unconscious thought has a virtually unlimited capacity, allowing consumers to expand their attentional span to incorporate all product information (Dijksterhuis 2004; Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006).

Furthermore, conscious thought often leads to suboptimal weighting and consequently an erroneous focus on a few attributes which are weighted heavily. Unconscious thought, on the contrary, operates on holistic representation of product attributes and is good at naturally weighting the relative importance of all product attributes (Dijksterhuis 2004; Dijksterhuis and Nordgren 2006). Hence, we posit that:

H1: For complex product choice, unconscious thought resulting from distracting website features will lead to higher decision quality than conscious thought.

3.3.3. Mode of Thought, Circadian Preference and Time of Online Purchase Decision

Processing product information often requires individuals to retrieve information from long-term memory as well as effectively process it in working memory (Perfetti and Lesgold 1979). Prior research reveals that consumers reach optimal performance of memory recall when there is a synchrony between peak circadian periods and time of decision making, because the synchrony facilitates efficient retrieval of consolidated information in memory (Hornik and Miniero 2009; Hornik et al. 2010). Synchrony triggers a higher level of arousal, or the psychological state of activation (Eysenck 1983). People actively process information when the arousal level is high. Arousal is an antecedent to attention and resource availability (Matthews and Davies 2001), which in turn determines information processing capacity (Yoon 1997). Hence, when decision times

coincide with peak arousal periods, individuals will likely achieve optimal performance on cognitive tasks.

Furthermore, the synchrony between peak circadian arousal and time of decision would influence cognitive inhibition which operates to suppress irrelevant off-task information, and thereby facilitates concentration on task-relevant thoughts (Hasher and Zacks 1988; Navon 1989a; Navon 1989b). Arguably, consumer decision-making might exhibit circadian effects because it requires cognitive inhibition for decision quality to be optimal (Hasher et al. 2002). Prior literature has shown that the access, deletion and restrain functions of the cognitive inhibition tend to be more efficient for individuals tested during synchrony times as compared to asynchrony times (May 1999; May and Hasher 1998; Yoon et al. 2000).

In summary, a synchrony between consumer circadian preference and time of decision implies higher circadian arousal, which enhances consumers' capacity and efficiency of working memory (Anderson et al. 1991; Folkard et al. 1983; Natale and Cicogna 1996). Furthermore, a circadian synchrony also means that consumers have better control over the content of working memory and are less likely to be disrupted by any distractions (Hasher et al. 1999; May 1999; May and Hasher 1998). Therefore, this synchrony effect may result in better decision-making outcomes under conscious thought, making the relative advantages of unconscious thought less significant.

In contrast, an asynchrony between circadian preference and time of decision may lead to low level of arousal, and consequently deterioration of conscious thought (Hornik 1988). Such mismatch would lead to a constraint

on one's cognitive efficiency and more dependence on the capacity of working memory, as compared with that of unconscious thought (Dijksterhuis and Nordgren 2006).

Furthermore, conscious thought and unconscious thought rely on two different routes of retrieval of information from memory (Gabrieli et al. 1995). Conscious thought undertakes a deliberate route that requires careful and purposeful attempts to retrieve product attribute information stored in the explicit memory whereas unconscious thought adopts an unintentional route from implicit memory, as consumers' behavior are activated by the past without conscious awareness (Dijksterhuis and Nordgren 2006). Hence, the disadvantages of conscious thought in terms of capacity of working memory and weighting of product attributes become more salient when circadian preference is not synchronized with time of decision.

Noteworthy, the current understanding of synchrony is that it enhances conscious thought. There is no theory or empirical finding relating synchrony to unconscious thought. The rationale is unlike those based on conscious thought, purchase decisions based on unconscious thought depend less on working memory (Dijksterhuis and Nordgren 2006) and consequently suffer less from the deficiencies in cognitive inhibition resulted from asynchrony. Hence, automatic, unconscious efforts to retrieve and process information from implicit memory may be more successful at asynchrony than synchrony times. In essence, the advantages of unconscious thought over conscious thought for complex purchase decisions is likely more salient when there is circadian asynchrony. Hence, we hypothesize the following moderating effect:

H2: Unconscious thought will have a greater positive effect on online purchase decision quality when circadian preference is not synchronized with the time of decision than when circadian preference is synchronized with the time of decision.

3.4. Research Methodology

We conducted an experiment to test our hypotheses. The experiment is about consumer purchase of smartphones in online auctions. We set the context as an online auction because we want to manifest the effects of unconscious thought under time constraint, which has been shown to be a boundary condition of UTT (Payne et al. 2008). The auction closure mechanism in auction websites is a natural time constraint without compromising the realism of experimental settings, as compared to, for instance, introducing an artificial time limit for subjects to make a product decision (Tan et al. 2015). Indeed, shopping under time restriction is not uncommon. Many e-commerce sites provide flash sales: customers have to finish shopping within a limited period of time to enjoy some promotions. For example, Amazon.com provides personalized Gold Box deals and "lighting deals" for customers, which only appear in a limited time window. Therefore, setting time constrains does represent many real-world scenarios.

We created two identical online auction websites to represent the two treatment groups, namely Conscious Thought (CT) and Unconscious Thought (UT). Appendix A depicts the screenshots of the website. This design is consistent with UTT experimental paradigm (e.g., Dijksterhuis 2004; Dijksterhuis et al. 2006; Dijksterhuis and van Olden 2006). The UTT

experimental paradigm typically utilizes a decision-making task in which individuals are presented information about product alternatives (e.g., cars or apartments). Each alternative is described by the same set of attributes, but with different attribute values. Several studies (e.g., Dijksterhuis 2004; Dijksterhuis et al. 2006; Dijksterhuis and van Olden 2006) use four alternatives described by 12 attributes (i.e., a total of 48 pieces of information) as complex decision situations. In this paradigm, product information acquisition stage is separated from the choice stage, which is manipulated to be either conscious or unconscious. Following the presentation of product information, participants were randomly assigned to different thought conditions. Participants assigned to the conscious thought condition were asked to choose the best alternative after a period of intentional conscious deliberation, whereas participants in the unconscious thought condition were distracted for some time before they choose.

Based on the principle that a conscious information processing capacity is limited to a temporary "store" of seven items (Miller 1956) and the manipulation of product complexity in the UTT paradigm (e.g., Dijksterhuis 2004), smartphones with 12 attributes were chosen as the product for consideration. According to UTT, a complex decision can be manipulated by having at least 12 attributes. The attributes have ordinal and interval values (e.g., low vs. high camera resolutions). The four smartphones were ranked based on the aggregate of all their attribute rankings.

3.4.1. Procedure and Manipulations

Figure 3.1 summarizes the different manipulations in the experiment. Participants were introduced with the instructions that (a) during the experiment, they would be asked to evaluate several smartphones from an online auction website; (b) to help them make product judgment, a set of product evaluation criteria will be provided; (c) they need to choose the best smartphone among the four in terms of their overall quality; (d) the task is an online auction with time limit: they have 15 seconds for evaluating each phone and 15 seconds for making the final decision, with a break in between; (e) they are required to make the choice based on the attributes provided, NOT their personal preference; and (f) each product attribute is equally important to them (see Appendix D for details).

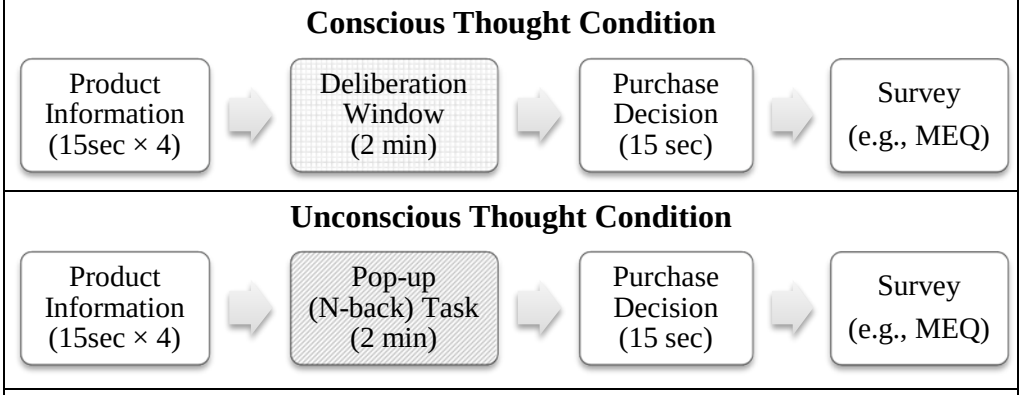


Figure 3.1. Procedure and Tasks (with Durations) for Conscious Thought vs. Unconscious Thought

To eliminate the possible confounding effects of brand preference, prior brand awareness or pricing (e.g., participants may simply choose the cheapest phone), we used hypothetical phones with the same price (USD 450) and fake brands (M series). To further motivate participants to pick the optimal product, they were informed that apart from being reimbursed $5 for

participation, they could earn an additional $6 if they selected the best product, $4 if they selected a mediocre product and $2 otherwise.

The subjects then interacted with the experimental website. The website had four webpages, representing the four smartphones respectively. The sequence in which the four smartphones pages were presented was randomized to avoid possible order effects. Furthermore, to control for possible order or recency effect, the order of 12 attributes was randomized for each smartphone. Consistent with prior UTT studies (e.g., Dijksterhuis 2004; Dijksterhuis et al. 2006; Payne et al. 2008), each product was presented for 15 seconds so that the absorption of all relevant information was adequate but insufficient for systematic deliberation (which was manipulated later)[1]. Subjects were automatically directed to the next smartphone page specification page after 15 seconds.

Mode of thought was manipulated by a treatment of an n-back task, as shown to be effective in offline decision making settings (e.g., Dijksterhuis 2004; Dijksterhuis et al. 2006; McMahon et al. 2011) as well as online shopping context (Tan et al. 2015). Participants in the UT group completed a two-minute n-back task presented in the form of a pop-up window (Appendix B). In an n-back task, a participant is presented with a sequence of stimuli and is required to indicate whether a current stimulus matches the one presented n steps earlier in the sequence (Jonides et al. 1997). While an n-back task is irrelevant to participants' primary task of product decision-making, it demands

[1] The 15 seconds time constraint was pre-tested by an independent sample of participants to ensure that it was adequate for participants to grasp all product information but insufficient to deliberately think about their product choice. Aforementioned in the literature review section, such time constraint is found to be boundary condition of UTT and thus is needed to manifest UTT (Payne et al. 2008).

considerable cognitive resources so as to eliminate conscious thought from the main task (Dijksterhuis 2004). After the n-back task, subjects were directed back to the auction site and asked to indicate their product choices before the auction closed in 15 seconds. Participants in the CT group, however, did not receive this manipulation but instead had the same two minutes to elaborate on the products. During the 2-minuate deliberation window, they were shown an instruction page telling them to carefully think about the product information and their decision for 2 minutes, without any distraction or access to product information again (Appendix B).

To check the match/mismatch between circadian preference and time of the day, we recorded the experiment time for each subject and match it with his/her circadian preference. There is synchrony when for example, a morning-type subject participated in the experiment in the morning, and there is asynchrony when for example, an evening-type subject participated in the morning.

After the experiment, the subject needs to finish a survey. Whenever possible, we adapted survey questions from the existing literature. The survey questionnaire includes items from Home and Ostberg's (1976) Morningness-Eveningness Questionnaire (MEQ) to measure the subject's circadian preference, and questions for demographic and academic background information. Demographic information, such as age and gender, were included as control variables in our statistical analysis. Quality of online product decision was measured by whether a participant chose the optimal smartphone.

If a participant chose the optimal smartphone, the decision quality is coded as "1" and "0" otherwise[2].

3.4.2. Participants

As students are often online consumers, they are highly suitable and relevant for our experimental participation. One hundred and seventy-one university student subjects (mean age = 18.65 years, SD = 1.07, range = 17-23) were randomly assigned to one of the two treatment groups. 82 of them were randomly assigned to the Conscious Thought (CT) group, and the other 89 participants were assigned to the Unconscious Thought (UT) group. There is no significant difference in age or gender across the two conditions. The numbers are summarized in Table 3.2.

Table 3.2. Number of Participants in Each Condition

Groups	Synchrony	Asynchrony	Total
Conscious Thought	48	34	82
Unconscious Thought	35	54	89
Total	83	88	Total: 171

3.5. Results

3.5.1. Manipulation Checks

On average, the participants completed the n-back task with a good hit rate (mean correctness = 66.9%, *SD* = 21.5%), indicating that all participants had devoted considerable cognitive resources to the distraction task and directed attention away from conscious thought of product evaluation. To further check

[2] The measurement of decision quality in the present study, consistent with the UTT paradigm, is based on the idea of an objective standard for quality. The more better-ranking attribute values the product possesses the better the product is. Thus, irrespective of an individual's preference or utility function, the purchase of the alternative with the most better-ranking attributes indicates that s/he made an optimal decision.

the synchrony/asynchrony classification, we asked participants to indicate the extent to which they find performing the choice task during the experiment time comfortable (on a 1 to 7 Likert scale). As expected, participants were significantly more comfortable (M = 3.75, SD = 1.54) with making the choice decision when there is a synchrony between their circadian preference and experiment time than those without the synchrony between their circadian preference and experiment time (M = 2.74, SD = 1.61, F (1, 169) = 17.53, $p <$ 0.01). This shows that manipulation of the synchrony between circadian preference and decision time was effective.

3.5.2. Hypotheses Testing

As predicted by H1, a greater proportion of participants (27.0%) in the unconscious thought group, as compared with those in the conscious thought group (14.6%) made the best choice, and the difference was significant (χ^2 (1, N = 171) = 3.905, $p < 0.05$, φ =0.151). According to the power analysis, this ensures a sufficient statistical power of 0.8 for a medium effect size (Cohen 1988). Therefore, H1 is supported. The result is illustrated in Figure 3.2.

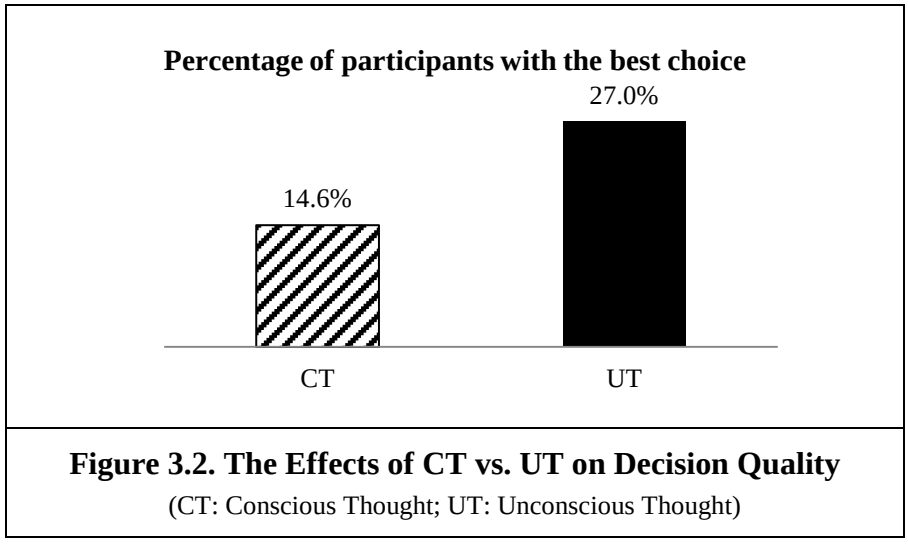


Figure 3.2. The Effects of CT vs. UT on Decision Quality
(CT: Conscious Thought; UT: Unconscious Thought)

As predicted by H2, participants tested at asynchrony times benefited from unconscious thought as a significantly higher proportion of them made the optimal choice (χ^2 (1, N = 88) = 4.464, $p < 0.05$, $\varphi = 0.225$). Also consistent with H2, individuals who made the choice at synchrony times did not show a significant difference in their performance between the conscious thought and unconscious thought groups (χ^2 (1, N = 83) = 0.153, p = n.s., $\varphi = 0.043$). This suggests that unconscious thought is more beneficial for asynchrony times than for synchrony times. Therefore, H2 is supported. The result is illustrated in Figure 3.3.

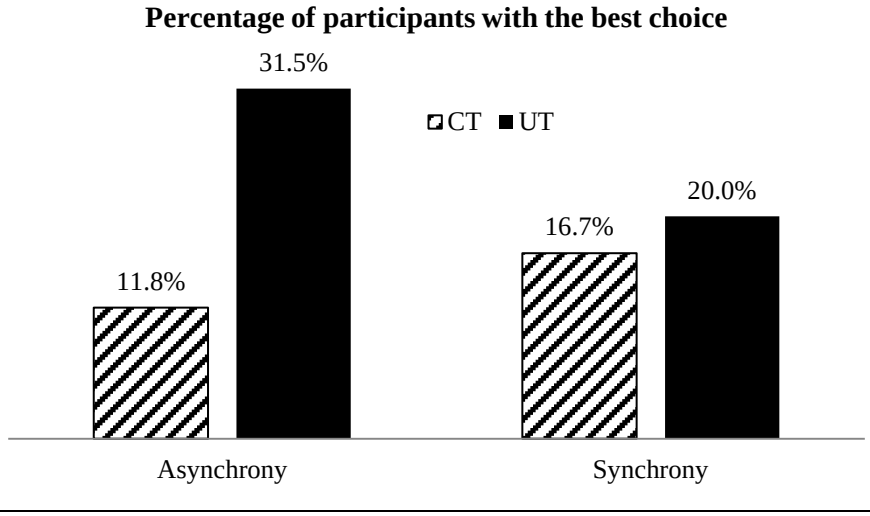


Figure 3.3. The Effect of Mode of Thought and Synchrony on Decision Quality

(CT: Conscious Thought; UT: Unconscious Thought)

3.5.3. Additional Analysis: Chi-Square Tests with Repeated Random Samples

Although we are confident of our results for H1 and H2, we are aware that some researchers have raised concerns over the reliability and validity of prior UTT experiments after conducting meta-analyses of UTT. For instance, Acker

found that those experiments had “the largest effect sizes but at the same time the smallest sample sizes” (Acker 2008, p. 299). Likewise, Nieuwenstein et al. (2015) questioned whether prior UTT studies employed underpowered small sample sizes that are insufficient to balance out potential confounding factors.

To address these potential concerns, we have decided to further boost the confidence of our results by embarking on the bootstrapping test. This technique resamples with replacement from the original experiment data and generates multiple bootstrap samples as proxy to the independent real samples (Efron 1979; Efron and Tibshirani 1994). It has been used widely in applied statistics (Edgington and Onghena 2007; Good 2005). We hope to establish empirical support of UT effect and the boundary condition with different sample sizes by drawing repeated random samples from our experiment data. This will help further validate and test the stability and reliability of our hypotheses.

We followed the suggested technique and procedures (Efron 1979; Efron and Tibshirani 1994; Levesque 2011). First, we determined the suitable sizes of each resampled dataset. The meta-analysis of UTT studies conducted by Acker (2008) shows that the number of subjects assigned to each experiment condition was around 20 to 50. Furthermore, our review of recent studies on UTT also confirms that UTT experiments typically employ a group size of around 20 to 50. Thus, we set random samples equal to 20, 30, 40, and 50. Second, for each group size, we constructed 1,000 resamples under three conditions: (1) resampling from the original experiment dataset, (2) resampling from the subset of synchrony participants, and (3) resampling from the subset of asynchrony participants. The first condition represents existing

research that does not consider the synchrony factor, whereas the second and third conditions show the effects when the synchrony factor is considered, as tested in the present study.

We conducted chi-square tests for each resample and test whether the effect of unconscious thought is significantly better than that of conscious thought. Table 3.3 summarizes the results. First of all, as expected, bigger samples lead to higher chances of finding a statistical significance. Column 1 suggests that, when the synchrony factor is not considered at all, the superiority of conscious thought over unconscious thought is trivial (i.e., less than 1%). Column 2 suggests that, when the synchrony factor is not considered, it is also not easy to validate UTT. Even at a sample size of 50 per resampling, the chances of finding support for UTT is about 21%, or roughly 1 in 5 experiments. Thus, this resampling analyses somewhat explain why the existing UTT literature often fails to confirm that unconscious thought leads to better decision outcomes compared with conscious thought (e.g., Acker 2008; Lassiter et al. 2009; Payne et al. 2008). Nevertheless, comparing Column 1 and Column 2, we can see that overall, unconscious thought outperforms conscious thought for complex decision-making.

Examining the last four columns of Table 3.3 (i.e., Columns 3 to 6) further reveals that considering circadian preference greatly enhances the explanatory power of our model. When there is synchrony (Columns 3 and 4), the difference between conscious and unconscious thoughts is not obvious, although the pattern is that conscious thought slightly outperforms unconscious thought (3.7% vs. 1.9%, 3.6% vs. 2.2%, 4.3% vs. 2.1%, and 5.1% vs. 1.2%, respectively). This is consistent with previous empirical studies (e.g.,

May and Hasher 1998; Schmidt et al. 2007; Yoon et al. 2000). When there is asynchrony, the superior effects of unconscious thought are obvious, especially when the group size gets larger (see Table 3.3, Column 6 vs. 2 and 4). Combined, the *post hoc* analyses suggest the importance of considering the synchrony between circadian preference and time of decision when explaining under what conditions unconscious thought is more likely to outperform conscious thought.

Table 3.3. Results of Chi-Square Tests with Repeated Random Samples

	Simulation of Prior Studies		**Our Study** [a, b, c, d]			
Resampling Group Size	**When the synchrony factor is ignored**		**Synchrony Subjects**		**Asynchrony Subjects**	
CT / UT	(Column 1) CT>UT	(2) UT>CT	(3) CT>UT	(4) UT>CT	(5) CT>UT	(6) UT>CT
20	0.9%	11.8%	3.7%	1.9%	0.0%	22.0%
30	0.0%	14.2%	3.6%	2.2%	0.0%	37.2%
40	0.2%	17.1%	4.3%	2.1%	0.0%	50.4%
50	0.0%	21.6%	5.1%	1.2%	0.0%	60.5%

a. Numbers in % indicate the percentage of trials which show the superiority of CT (i.e., CT>UT), and the superiority of UT (i.e., UT>CT), respectively.
b. For each group size, the percentages in Column 1, 3, 5 differ significantly from one another at the .05 level.
c. For each group size, the percentages in Column 2, 4, 6 differ significantly from one another at the .05 level.
d. UT: Unconscious Thought; CT: Conscious Thought.

3.6. Discussion

3.6.1. Summary of Findings

Existing e-commerce and human-computer interaction research has typically focused on how to facilitate e-commerce consumers' conscious information processing to make better purchase decisions. However, it is not an easy task in light of the fact that consumers are limited by how much information they

can process. This research adopts a radically different approach by switching our attention to the power of unconscious thought, based on UTT (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006). Instead of insisting on enhancing conscious information process, we can take advantage of consumers' unconscious thought abilities. We conjecture how unconscious thought interacts with synchrony of individual circadian preference and time of the day to influence online purchase decision-making. The results from our experiment showed that unconscious thought outperforms conscious thought for complex decision-making tasks and this effect is especially strong when there is an asynchrony between individual's circadian preference and time of decision-making. Along with the advances in the application of business analytics/intelligence techniques in e-commerce (e.g., Amazon's recommendation system), it is likely to collect customers' circadian information and accordingly employ our findings to e-commerce practices.

There are several important findings from our study. First, our research suggests that in general, consumers are more likely to choose the best product alternative with unconscious thought than conscious thought when the selection of product choices is complex. Our experiment results suggest that when the purchase decision is complex, distracting website features should be strategically designed and employed to disrupt the continuity of product evaluation to trigger the unconscious mode of thought. This may lead to better purchase decisions for complex product choices. The experimental design in which there is no dominant alternative[3] in the choice set allows us to test an important intermediate result of UTT: unlike conscious thought which makes

[3] One alternative dominates others if it is better on at least one attribute and at least as good on every other attributes.

consumers focus narrowly on a few attributes and leads to suboptimal weighting of product attributes, unconscious thought helps consumers expand their processing capacity and consider all relevant information (i.e., all the positive attributes). Our results reveal that participants in unconscious thought condition were more likely to consider more positive attributes and thus make more balanced choices that take into account as many possible attributes as possible.

Second, this research emphasizes the moderating effects of the asynchrony of circadian preference and time of decision. Our results show that unconscious thoughts are more beneficial when asynchrony between a consumer's circadian preference and time of decision is present. The details of the interaction are further evident in our supplementary analysis via repeated sampling. In essence, consumer decision-making for complex products may be particularly vulnerable to effects from synchrony, in light of the fact that processing the product information requires more cognitive resources than simple products.

3.6.2. Limitations

Despite our effort to design a rigorous study, we have to acknowledge the limitations of our study. First, the subjects were college students. Although college students are typical users of e-commerce websites, it is necessary to validate the results for individuals of more diverse age groups in that aging affects cognitive ability and thus technology-related human behavior (Hong et al. 2013). Also, college students (i.e., young subjects) may exhibit potentially different circadian preference from older adults (May et al. 1993).

Second, we also acknowledge that in order to enhance the internal validity of our experiment, there is some trade-offs in terms of realism so as to control for the possible influence of environmental factors. In most experimental designs, environmental factors have to be strictly controlled, especially in the context of e-commerce (Eroglu et al. 2001; Eroglu et al. 2003; Kim and Lennon 2010; Sheng and Joginapelly 2012). We thus designed our experiment in a way that minimizes the influence of common environment factors such as the ability to surf internet, multiple advertisements, etc. Further research can explore how to re-test our findings in a more realistic online shopping setting. For example, the n-back task can be replaced by a real pop-up advertisement window.

3.6.3. Theoretical Contributions and Implications

Theoretically, our study has challenged the long-held assumption in existing e-commerce literature that more conscious thought during product evaluation always leads to optimal choices. This research elucidates a novel perspective by arguing that unconscious information processing can, under certain conditions, lead to optimal purchase decisions. Consistent with Unconscious Thought Theory (Dijksterhuis et al. 2006; Dijksterhuis and Nordgren 2006), our findings confirm the presence of the effects of UTT in e-commerce contexts for complex product choices, where distracting website features can be evoked to trigger unconscious thought. This enriches our understanding of seemingly “disturbing” features on e-commerce websites and proposes that they can be strategically used for better purchase decision-making. In doing so, we have transformed the role of distracting website features from a destructive one to a constructive one.

This research also contributes back to the UTT literature. UTT is a valuable theory in that it reveals the power of unconscious thought. Nevertheless, it is a relatively new theory and has suffered from mixed findings. To explain why the UTT paradigm (e.g., Dijksterhuis 2004) could not be consistently confirmed in a few studies (Acker 2008), it is believed that the unconscious thought effect is constrained by a number of boundary conditions. Based on the literature about circadian preference and cognitive function, we zoom in on a very important boundary condition. Specifically, we find strong evidence of better performance of unconscious thought over conscious thought under asynchrony condition. As demonstrated in the resampling statistics, the synchrony factor could be the reason for the conflicting findings reported in UTT experiments. Since past experiments cannot be reanalyzed without synchrony data of subjects, we cannot be sure. However, this study points the way forward for future experiments about UTT. Future UTT experiments must measure synchrony for subjects. This will either confirm synchrony as the missing explanatory factor, or point to the need to look for more personal characteristics.

Our study focuses not only on task-related contextual phenomena (i.e., complexity of the decision task), but also on temporal conditions that shape individual decision-making. Distractions are, by nature, temporal events that are situated in particular contexts. By explicitly focusing on the temporal nature of distracting website features, we can have a better understanding of their impacts on decision-making. For instance, our experiment revealed that a distraction may be beneficial to consumers when their circadian preference is not synchronized with the time of decision. Thus, our research underscores the

importance to incorporate the temporal aspect of context in human-computer interaction research.

As IS researchers attempt to better understand how consumers interact with e-commerce websites in their decision-making, it becomes vital to explore the temporal moderating influences of website design features. In particular, the emerging interests in studying the direct and moderating effects of time-related individual and contextual variables on consumer behavior and cognition (Hornik and Miniero 2009; Hornik et al. 2010) have cautioned that prior static consumer decision making models or static website design principles are too far removed from reality. Individual circadian preference will always be inherent in consumers. For future studies to correctly model the dynamics of consumer decision making, we have elucidated the importance of this pervasive consumer factor of circadian preference and its potential influence that should be accounted for in future online shopping research.

The present study also has implications for the broad research on user adoption and continued use of technology in that many information technologies are complex innovations and the adoption decisions are difficult. Prior research has focused on utilitarian and hedonic factors such as perceived usefulness and perceived enjoyment (Davis 1989; Van der Heijden 2004; Venkatesh et al. 2003). Most of the research in this area assumed a conscious thought mode: users consciously develop perceptions about the attributes of a technology, based on which their behavioral intention to use it is formed. Our research suggests that adoption decision may also be made in the unconscious thought mode. More importantly, such adoption decisions may even be better than would they been made in the conscious thought mode. Therefore, how

users make adoption and continued use decisions unconsciously is a topic of value. A fruitful way to do this may be through business analytics. Data-mining or text-mining techniques can be applied to estimate a customer's circadian preference. Accordingly, different strategies (UT or CT) can be used to facilitate purchase decision-making.

3.6.4. Practical Implications

A bit counter-intuitively, our study reveals that distracting website features may be at times beneficial to both e-commerce retailers and consumers if they could strategically manipulate various contextual factors of consumer choice environment. This research suggests to e-commerce retailers that strategically designed interventions can help consumers leverage the power of unconscious thought to make optimal purchase decisions. Consequently, it should influence the way e-commerce retailers design and schedule distractions, such as pop-ups, for optimal consumer decision-making. Strategically designing distractions at appropriate time of decisions is feasible by using computerized measures that can automatically record time stamps in e-commerce website interactions, taking into account differences in individuals' consumer behavior and time zones. In the present data-rich online environment (i.e., Big Data), many e-commerce retailers have developed systematic processes to gather and analyze personal and behavioral information from their consumers on a regular basis, so as to create massive databases for better customer relation management (CRM). Hence, information on customers' circadian preferences can be gathered by collecting and analyzing consumers' most active period through their click stream data (e.g., active browsing of product information) and demographic information

(e.g., habits and hobbies). Also, some demographic information and interaction records might be proxies for MEQ measurement when the latter is not available. For example, prior research has found that older adults prefer activities earlier in the morning, whereas younger adults prefer the evening (May et al. 1993), indicating that age may be a proxy for circadian preference. Although online retailers can hardly manipulate consumers' characteristics (e.g., circadian preference), they could tactically decide the time when distractions are triggered for different consumers, which interact with circadian preference in affecting consumer decision making.

Consumers may also leverage the strategically designed interventions to improve their decision-making quality for complex product choices. Our findings suggest that unconscious thought resulting from distracting website features may help consumers offset the inefficiency in cognitive inhibition resulting from asynchrony (Yoon et al. 2000). This is especially true when consumers are making complex purchase decisions which rely heavily on working memory and when the efficiency in cognitive inhibition is critical. Thus, consumers might consider attending to distractions and switch off from conscious mode of thought when making complex purchase decisions at non-optimal times.

3.7. Conclusion of Study One

This study examines the effects of strategically designed interventions on consumer decision quality for complex product choices in the context of online shopping. Our findings show that consumers generally perform better for complex purchase decisions under unconscious thought triggered by

distracting website features than under conscious thought supported by distraction-free websites. Furthermore, we have elucidated consumer's circadian preference as a significant boundary condition on this effect. We have clearly demonstrated that asynchrony between individuals' circadian preference and time of decision enables unconscious thought to perform better than conscious thought for complex product choices, and furthermore, when there is synchrony, the difference between conscious thought and unconscious thought is not obvious. This vital revelation may potentially explain the seemingly conflicting findings in prior works on UTT. Given the increasing complexity of consumer product choices online, our study is novel and fruitful in demonstrating a constructive, rather than destructive, use of distracting website features.

CHAPTER 4. STUDY TWO

LET THE COMMENTS FLY: AFFECTIVE RESPONSE TO FLYING COMMENTARY PRESENTATION

4.1. Introduction

One of the most interesting phenomena in the entertainment industry is that everyone seems to have an opinion (Lieberman and Esgate 2002). Entertainment consumers are increasingly consulting peer opinions rather than information from producers or advertisers for their consumption decisions (Bickart and Schindler 2001; Dhar and Chang 2009; Susarla et al. 2012). The advancement of social media has facilitated the development of word-of-mouth (WOM) as a form of user-generated opinion, which is actively contributed by consumers and accessible to a multitude of people via online channels (Hennig-Thurau et al. 2004; Kimmel and Kitchen 2014; Kozinets et al. 2010). It is easy for consumers to find out what others think about a particular movie from a proliferation of movie listing and review sources, including movie databases (e.g., IMDb), peer review sections of online trailers (e.g., Youtube.com), movie portals (e.g., Yahoo Movies), movie recommendation sites (e.g., Moviefine), and social networking sites (e.g., Twitter).

One emerging form of such user-generated content is a real-time commentary presentation system called *danmaku*, which enables users to view and add commentary subtitles on videos. The most notable feature of *danmaku* video sharing websites is the scrolling marquee comments, which are overlaid

directly onto the video, and synchronized to a specific playback time. Such comments are displayed as streams of moving subtitles overlaid on the video playback screen, visually resembling a *danmaku* (literally bullets in Japanese) shooter game. Thus, the real-time commentary subtitle system is named *danmaku*. Unlike traditional video sharing sites (e.g., Youtube.com) where user-generated comments appear in a separate space outside the video, *danmaku* video sharing sites enable comments on a video to be simultaneously broadcasted to all viewers in real (video) time. This allows users to view comments in synchronization with the video, and to write their own comments. Once users post comments, the comments immediately appear on the video, usually moving from right to left on the screen. *Danmaku* keeps all user comments in a separate comments pool near the video as well, but it selects the latest ones to be displayed on the video playback screen, preventing potential overloading of comments on the screen. Therefore, the *danmaku* system enables users to communicate with one another in novel ways, creating a sense of shared watching experience. However, *danmaku* might also be perceived as a source of distraction and interference, because it might direct users' attention away from the primary task of video watching to comments reading. To alleviate the possible annoyance resulting from *danmaku*, the system offers users various subtitle editing tools, including style, format, and movement, to customize the setting and display of the "flying" comments when viewing the video together with the comments.

Table 4.1 summarizes the key differences between *danmaku* and separate commentary presentation systems. The difference in terms of location and timeline implies that users of a *danmaku* video sharing site would

typically view and comprehend the peers' comments while watching the video, whereas users of a traditional video sharing site with separate commentary presentation may read the comments before or after watching the video.

As an entertaining but distracting form of content presentation, *danmaku* commentary presentation raises an important question of whether it could be strategically used to influence consumer responses. More specifically, *how do commentary presentation systems elicit consumers' affective states, which determine consumers' affective responses?*

Table 4.1. *Danmaku* vs. Separate Commentary Presentation System

	Danmaku	Separate Commentary
Location of comments	Displayed as streams of moving subtitles overlaid on the video playback screen	Displayed in a separate space near a video
Timeline of comments	Broadcasted to viewers and synchronized to video time[4]	Support timeline commenting and tagging
Examples	Nicovideo.jp, acfun.tv, bilibili.com	Youtube.com, viddler.com

Figure 4.1. An Illustration of *Danmaku* Commentary Presentation

[4] When many users are watching the same video at the same time, their comments will be broadcast will be broadcasted to others in real time.

Answers to this question are timely and important to both practitioners and researchers. As marketers are increasingly incorporating social media as an integral part of their promotional mix, inquiries into the impacts of WOM on consumers' judgmental evaluation via social media become vital. The power of social influence via WOM communication is undeniable. What people share and buy is largely driven by peers around them (Christakis and Fowler 2009; Godes and Mayzlin 2004a; Godes and Mayzlin 2009; Godes et al. 2005; Iyengar et al. 2011). Bolstered by burgeoning social media technologies (e.g., Facebook and Youtube.com), marketers are investing more resources in word-of-mouth and viral marketing campaigns (Godes et al. 2005). Hence, the share of advertising allocated to social media is likely to increase due to the probable role that WOM communications plays in driving revenue (Eliashberg et al. 2006). The objective of social media marketing is to get people to spread the word about their products, boosting sales and speeding new product adoption.

Much attention in marketing and consumer research has been devoted to understanding the volume, valence (i.e., overall sentiment, positive vs. negative), and vividness (vivid face-to-face vs. pallid printed WOM) of WOM conveyed by social media (e.g., Herr et al. 1991; Mudambi and Schuff 2010). Even though some research has attempted to examine the textual content in peer comments (e.g., Zhang et al. 2012), empirical evidence on the persuasive effects of specific categories of WOM is sparse.

Furthermore, *danmaku* video sharing websites are drawing huge online traffic. For instance, Alexa ranked nicovideo.jp at 76 and bilibili.com at 180 among worlds' most popular websites in February 2016 (Alexa 2016).

Despite the commercial interest in *danmaku*, its impact on consumer experience remains unclear. Practically, understanding consumers' affective responses to *danmaku* commentary presentation provides critical insights into design guidelines for social media platforms. For researchers, it opens up an interesting and timely research context to study affective interface design. Existing research on interface design has predominantly emphasized the cognitive factors, which facilitate the communication and internalization of information conveyed (e.g., Komiak and Benbasat 2006; Wang and Benbasat 2009). Yet, non-cognitive factors, such as affect, are frequently overlooked by the literature. Nevertheless, affect plays a crucial role in the context of online video sharing website, because consumers typically seek pleasure and enjoyment beyond just information gathering and evaluation. Despite the prevalence of affect in social media context, little effort has been devoted to understanding the value of affect-eliciting interface design features for social media marketing. This research recognizes the value of affect-eliciting features, especially for markets which have high economic importance in the global economy such as the entertainment industry (Eliashberg et al. 2006). Thus, this study attempts to address how to design a video sharing website to facilitate desirable affective states and evaluation of consumers of entertaining products (e.g., movies).

The entertainment (and specifically the motion picture) marketing represents a perfect context for investigating consumers' affective responses to commentary presentation for the following reasons. First, WOM is found to be a major springboard driving box office revenues (Dellarocas et al. 2007; Liu 2006). Diffusion of new movies is largely driven by social factors. While

some new movie information comes from advertisement, interpersonal communication often provides an important source of information and influence (Goldenberg et al. 2009; Van den Bulte and Wuyts 2007). For instance, consumers are more likely to buy DVDs which are recommended by their friends (Leskovec et al. 2007). Second, to captivate consumers' attention and promote movies, the industry heavily relies on advertisements known as "film trailers" which are commonly shared via video sharing websites. Third, affect is crucial in the current context because consumers seek fun and enjoyment when watching trailers. Lastly, the findings might be generalized to other entertainment contexts such as gaming and television, and enhance our understanding of the interface between technology and entertainment products in the digital age. Thus, understanding the impacts of movie trailer showed on *danmaku* systems presents important insights into how distracting commentary presentation could be strategically employed as an integral part of marketing campaign.

4.2. Theoretical Background

4.2.1. Affect

Affect is an umbrella term that encompasses mood, emotions, and feelings (Bagozzi et al. 1999; Liljander and Mattsson 2002; Russell 2003). It is conceived as a fundamental aspect of human beings, influencing reflex, perception, cognition and behavior (Russell 2003). At the heart of all affective concepts is *core affect*, a neurophysiological state consciously accessible as the simplest non-reflective feelings evident in moods and emotions (Barrett et al. 2007; Russell 2003; Russell 2009). As consciously experienced, core affect

is mental, but not cognitive or reflective (Russell 2009; Zajonc 2000). Core affect can change due to individual genetic differences, internal factors, and external factors (Russell 2003; Russell 2009). Through attribution, core affect can be directed at a *stimulus*, or a psychological representation which can be real, imagined, remembered, or anticipated (Russell 2003). Unlike core affect which resides within individuals, *affective quality* exists in the stimulus and represents a property of the stimuli: its capacity to change core affect. The *perception of affective quality*[5] is a perceptual process that estimates this property (Russell 2003).

Furthermore, affect is often characterized by three dimensions: pleasure, arousal, and dominance (Mehrabian and Russell 1974; Russell and Mehrabian 1977). *Pleasure* refers to the degree of pleasantness of emotional experience, which ranges on a continuum from unpleasant to pleasant. *Arousal* represents the degree of activation associated with the affect, and is characterized as a range of affective states from calm to exciting. *Dominance* stands for the level of attention or rejection of affect, and is synonymous to control and attention. This dimensional approach has been applied to examine emotions during consumption in retail environments (Mano and Oliver 1993; Sherman et al. 1997).

Prior research on marketing and consumer behavior has demonstrated that affect explains a significant amount of variance in consumers' behavior (Bagozzi et al. 1999; Kim et al. 2007). There is much empirical evidence on consumers performing product evaluations by monitoring their subjective

[5] The perception of affective quality is also described as evaluation, automatic evaluation, affective judgment, appraisal, affective reaction and primitive motion is prior literature on affect.

affective responses to the target (e.g., Damasio 1994; Pham 1998; Schwarz and Clore 2007; Wyer Jr et al. 1999). For example, Murry Jr et al. (1992) conjecture that affective states directly influence consumers' attitudes toward advertisements and brands. Furthermore, recent advance in research on affect reveals that affect sometimes outperforms cognition in predicting judgment. For instance, the affect-object paradigm emphasizes the role of core affect in human behavior, and indicates that elicited core affect has better predictive power for behavioral responses compared with a well thought-out plan of action (Mohr 1996). Furthermore, as Pham et al. (2001) rationalize, affect might provide judgmental responses that are potentially faster, more consistent across individuals, and thus more predictive than cognition.

4.2.2. The Environmental Psychology Model

The environmental psychology model proposed by Mehrabian and Russell (1974) has been applied widely to relate features of the environment to consumer behavior through the mediating effects of induced affective states within the environment (e.g., Babin et al. 1994; Bitner 1992; Donovan et al. 1994). Drawing on the Stimulus-Organism-Response (S-O-R) paradigm, the theory suggests that environmental stimuli would result in either approach or avoidance behaviors (responses), mediated by individual's internal states (organism), such as affective states induced by environmental stimuli. Specifically, the Mehrabian and Russell (M-R) model posits that three basic affective states (pleasure, arousal, and dominance) mediate approach-avoidance behavior in any environment (Mehrabian and Russell 1974).

Regarding the specific relationships between each affective state and approach-avoidance behavior, the M-R model conjectures that (a) pleasure would be significantly related to approach-avoidance; and (b) arousal would interact with pleasure in determining approach-avoidance, such that a higher level of arousal promotes approach behavior in pleasant environments but leads to avoidance behavior in unpleasant environments (Biggers and Rankis 1983; Mehrabian and Russell 1974). Similarly, Thayer (1986)'s two-dimensional approach of arousal differentiates energetic arousal characterized by energy, activity, and readiness from tense arousal that is associated with fear and anxiety. Furthermore, energetic arousal is positively associated with pleasure and prepares the body for movement and approach behavior. In contrast, tense arousal is negatively related to pleasure, and prepares the organism for avoidance and inhibition (Thayer 1986). Yet, for theoretical reasons as well as lack of empirical support in a few studies, the dominance dimension is sometimes omitted in studies using the M-R model (Donovan and Rossiter 1982; Russell and Pratt 1980). Particularly, Russell and Pratt (1980) argue that the dominance dimension requires a cognitive interpretation by the individual and is therefore not purely applicable to situations calling for affective responses.

Extant research on store environment has applied the M-R model to examine the effects of offline retail environmental factors such as music, lighting, color, and product display method (Bellizzi and Hite 1992; Dubé et al. 1995; Ha et al. 2007; Milliman 1986; Yalch and Spangenberg 1990).

Figure 4.2. The Mehrabian-Russel Model of Environmental Influence (Adapted from Mehrabian and Russell 1974)

The M-R model has also been applied to online contexts to examine the effects of Web design features on consumer behavior (e.g., Adelaar et al. 2003; Brunner-Sperdin et al. 2014; Deng and Poole 2010; Ha and Lennon 2010). In the context of Web design, design features are environmental cues that would influence consumer behavior (Eroglu et al. 2001; Eroglu et al. 2003). For example, consumers' affective states evoked by the visual complexity and order design features of a webpage will have an impact on their approach behavior toward the website (Deng and Poole 2010). Similarity, atmospheric cues of online retail stores, such as colors, graphics, layout, vividness, and interactivity, would influence consumers' affective states and consequently their shopping outcomes, especially their attitude toward the online stores (Eroglu et al. 2003; Kim and Lennon 2010; Sheng and Joginapelly 2012).

The M-R model has proven to be robust in predicting the relationships between intervening variables (especially pleasure and arousal) and response. However, the relationship between dominance and approach-avoidance behavior remains unclear (Donovan and Rossiter 1982; Gilboa and Rafaeli 2003; Russell and Pratt 1980). Numerous studies have related pleasure and arousal to various behaviors in online context, but dominance has been

ignored or controlled, especially in recent studies (e.g., Deng and Poole 2010; Ha and Lennon 2010). Yet, we believe that the dominance dimension might be important in the current context in which social interaction among consumers is crucial. A greater feeling of dominance has been found to promote psychological empowerment (Mehrabian 1980; Mehrabian 1981; Mehrabian and Russell 1974), which is positively related to social interaction and enhanced communications among consumers (Liden et al. 2000; Yuksel et al. 2016).

Furthermore, the M-R model does not define an appropriate configuration of the features of the environment that arouse the affective states (Donovan and Rossiter 1982), although there is much empirical evidence from other sources about what does and does not influence affective states and behavior (e.g., Bellizzi and Hite 1992; Dubé et al. 1995; Ha et al. 2007; Milliman 1986; Yalch and Spangenberg 1990). It remains critical while challenging to determine the variations in environmental stimuli that will result in changes in affective states and hence affective responses. Relevant to the current context, we argue that commentary presentation is one environmental stimulus which is likely to affect consumers' affective responses to movie trailers. Nevertheless, the problem of appropriate stimulus configuration becomes even more complicated in that the stimulus variations might result from platform design factors (e.g., commentary presentation), and their interaction with consumer-generated variations (e.g., commentary content). Meanwhile, on the practical side, the platform owner is able to manipulate stimulus variations systematically and, via simultaneous measurement of the intervening variables, to predict the probable consumer

responses to such variations in the environment. Thus, further experimentation will be needed to determine which specific stimulus configuration (e.g., commentary presentation, commentary content, and their interaction) evokes which affective state so as to influence consumer responses.

Although people can experience affect privately, affect is often interpersonal or group-based responses (Bagozzi et al. 1999). Unfortunately, the vast majority of investigations into the effects of environmental cues on consumers' affective responses emphasize the privately experienced affective states and responses with an individualistic interpretation of environmental cues. Yet, the entertainment marketing via video sharing website seems to be a context where social construction and interpretation of environmental cues would be critical. For example, comments generated by peers on video sharing websites, as an environmental cue, might be interpreted as a signal of social proof and thus influence consumers' affective responses. Therefore, social conceptualization of environmental cues deserves further inquiry.

4.2.3. Affect-Eliciting Design Features

Much research in human-computer interaction and interface design has been devoted to understanding the impacts of design features on cognitive dimensions of human behavior (e.g., cognitive load), which determine users' attitudes toward the interface. For instance, prior research has studied the influence of decision aids and recommendation systems on the cognitive load of consumer judgments, and subsequently, consumers' satisfaction of the interface (Komiak and Benbasat 2006; Wang and Benbasat 2009). However, researchers are increasingly examining affective factors in human-computer

interaction (for reviews, see Sun and Zhang 2006; Zhang 2013). For instance, researchers have examined various affect-related concepts, such as affective user interface (Johnson and Wiles 2003), cognitive absorption (Agarwal and Karahanna 2000), computer playfulness (Webster and Martocchio 1992), emotions on information technology use (Beaudry and Pinsonneault 2010; Xu et al. 2012; Yin et al. 2014), flow (Csikszentmihayli 2000; Finneran and Zhang 2003; Finneran and Zhang 2005; Ghani and Deshpande 1994), funology (Blythe et al. 2004), and perceived affective quality (Zhang and Li 2005). These studies have prompted researchers to shift from usability-centric design (e.g., Norman 1983; Norman 1988; Norman 1993) to affective design (e.g., Norman 2002; Norman 2004; Norman et al. 2003). Furthermore, Zhang (2013) proposes the affective response model (ARM) to conceptualize various affective concepts and their relationships. Particularly, ARM posits that the affective characteristics resides within a particular design feature would induce individuals' affective states during an interaction episode with the feature. The induced affective reactions, subsequently, will influence individuals' affective evaluations.

Prior literature on affect, particularly, the affective response model, has several implications for interface design of social media platforms. First, interface design features might contain affective information, and thus have the potential to elicit affective states. Second, consumers may appraise a design feature during an emotional episode where the affective characteristics of the design feature would induce consumers to react affectively in the form of induced states and affective evaluations. Yet, research on how affect could be elicited by interface design features still lags.

In this study, we conceptualize *commentary presentation* (independent of the content of the comments) as an affect-eliciting design feature. Unlike many previous studies on affect-as-information, the present research focuses on affect that is elicited by a design feature of video sharing websites, specifically, the manner in which peer comments are displayed together with the video content. It conjectures that *danmaku* commentary presentation represents a strategic composition of interface design features in order to create an emotional watching experience. Although it intervenes and modifies the traditional way of watching videos (e.g., movie trailers), it serves to foster entertaining and emotional social interactions among peers with a novel composition of video content and comments. We argue that, affect-eliciting website features, if strategically designed, could evoke desirable affective states and consequently result in favorable affective responses.

4.2.4. Word of Mouth

Word-of-mouth (WOM) and interpersonal communication impact consumer decision and behavior. WOM refers to oral, informal, interpersonal communication between perceived noncommercial communicators and receivers regarding a brand, an organization, a product, or a service (Harrison-Walker 2001; Higie et al. 1987). WOM influence others by making others aware of a brand, an organization, a product, or a service, making positive recommendation to others, and extolling a brand or a company's quality orientation (be it positive, neutral, or negative). It is a process of conveying information from person to person and plays a major role in consumer purchase decisions (Richins and Root-Shaffer 1988).

Prior research has documented two effects of WOM and interpersonal communication, namely, informative effect and persuasive effect. WOM plays an informative role when it informs consumers about the existence of products or conveys information about product characteristics, be it observable or unobservable (Grossman and Shapiro 1984; Milgrom and Roberts 1986). On the other hand, WOM exerts a persuasive effect if it enters the consumers' utility functions directly and shifts consumers' tastes and preferences (Ackerberg 2001; Becker and Murphy 1993).

The emergence of Internet-based media has facilitated the development of electronic WOM (eWOM), which is accessible to people via online channels (Hennig-Thurau et al. 2004). Moreover, eWOM enables consumers to socially interact with one another, exchange attitudes or opinions about products or services, and make informed purchase decisions via computer-mediated conversations (Blazevic et al. 2013; Hoffman and Novak 1996; King et al. 2014).

WOM communication via social media has been studied empirically from a variety of perspectives (De Bruyn and Lilien 2008; King et al. 2014). For example, one stream of research focuses on the reasons why consumers proactively spread the word about products and services they have experienced (i.e., why do people talk online). The extant research has identified factors that motivate consumers to engage in WOM, such as impression management (Angelis et al. 2012; Berger and Heath 2007; Chung and Darke 2006; Hennig-Thurau et al. 2004; Packard and Wooten 2013; Sedikides and Gregg 2008), emotion regulation resulting from extreme satisfaction or dissatisfaction (Anderson 1998; Bowman and Narayandas 2001;

Hennig-Thurau et al. 2004; Rimé 2009; Sundaram et al. 1998), social bonding (Berger and Heath 2007; Lakin et al. 2008; Maner et al. 2007), information acquisition (Hennig-Thurau et al. 2004; Rimé 2009), and commitment to the brand or company (Dick and Basu 1994; Wangenheim and Bayon 2004).

Studies in the second stream aim to better understand why certain sources of interpersonal communication exert more influence than others. Prior research has revealed a few antecedents of WOM influence, such as source expertise (Bansal and Voyer 2000; Duhan et al. 1997; Gilly et al. 1998), tie strength (Brown and Reingen 1987; Frenzen and Nakamoto 1993), demographic similarity (Brown and Reingen 1987), and personal affinity (Gilly et al. 1998).

Another stream has focused on the characteristics (especially quantitative aspects) of WOM and investigated their impacts on products sales and diffusion (Chevalier and Mayzlin 2003; De Bruyn and Lilien 2008; Lee et al. 2009). For instance, researchers have reported that the quantitative aspects of WOM, such as volume and valence (or rating), would positively affect product sales in various contexts, such as movies (Chintagunta et al. 2010; Duan et al. 2008; Liu 2006), video games (Zhu and Zhang 2010), books (Chevalier and Mayzlin 2006), and beauty products (Moe and Trusov 2011).

Recently, there has been a surge of interest in explicitly relating qualitative aspects (e.g., textual content) of WOM to product sales and diffusion. For instance, Pavlou and Dimoka (2006) extracted “benevolence” and “credibility” embedded in textual comments in an online auction site and found evidence of price premiums for creditable sellers. Similarly, Ghose and

Ipeirotis (2011) examined the subjectivity and readability of WOM content and reported their positive impacts on product sales. Even though these studies have attempted to examine the rich textual content of WOM and underscored their vital impacts, empirical evidence on the persuasive effects of specific categories of WOM is sparse. One possible explanation for such relative lack of research on WOM content is that traditional WOM communications typically occur verbally and incidentally (Li and Zhan 2011). As consumers are increasing using the social media to share their opinions with one another in writing, researchers and practitioners have more opportunities to explore the nature and effects of WOM content (Hung and Li 2007). The current study aims to fill this gap by empirically examining specific categories of commentary content and their interaction with commentary presentation.

4.3. Research Model and Hypotheses

Synthesizing the theorizing and findings from affect literature, environmental psychology research, and studies on word-of-mouth, we formulated a research model depicted in Figure 4.3. We examine two types of video sharing websites with different commentary presentation systems, namely *danmaku* video sharing websites pioneered by nicovideo.jp, and video sharing websites with separate commentary presentation systems, such as Youtube.com. We propose that commentary presentation, as an environmental stimulus, will influence consumers' affective responses to movie trailers. This effect is mediated by the evoked affective states that can be characterized in terms of pleasure, arousal, and dominance dimensions, which are factorial orthogonal (Mehrabian and Russell 1974).

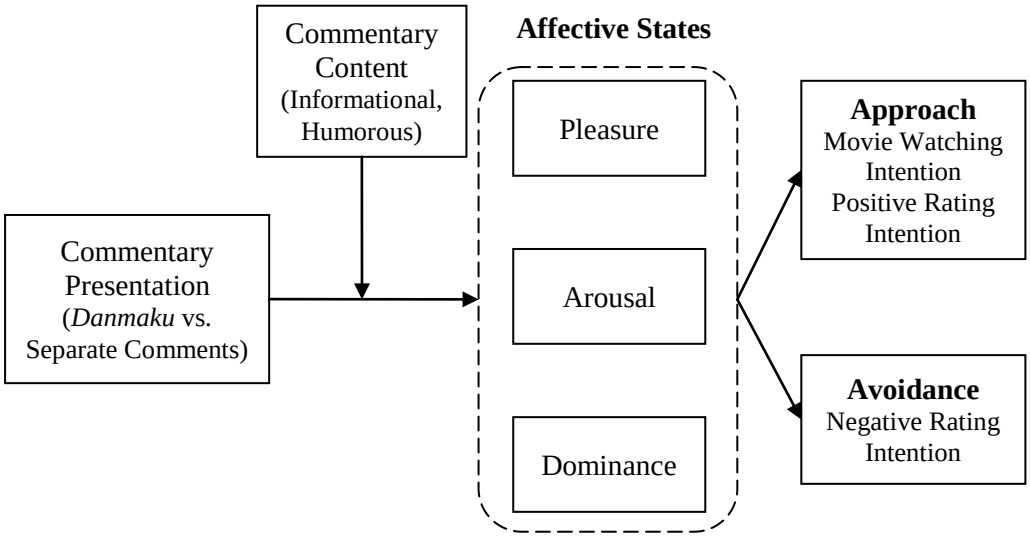


Figure 4.3. Research Model

4.3.1. The Effects of Commentary Presentation on Induced Affective States

The environmental psychology model proposed by Mehrabian and Russell (1974) has been applied widely to relate features of the online environment to consumer behavior through the mediating effects of induced affective states within the environment (e.g., Brunner-Sperdin et al. 2014; Deng and Poole 2010; Ha and Lennon 2010). Specifically, the environmental stimuli, including that of online video sharing websites, will evoke affective states that can be characterized in terms of pleasure, arousal, and dominance dimensions (Mehrabian and Russell 1974). Furthermore, the differences in the ways consumers appraise the environment result in different affective states (Lazarus 1982).

Although *danmaku* and traditional separate review section differs in a number of ways, two key dimensions are noteworthy: (1) order and (2) complexity. Order refers to the degree of organization of the environment, as reflected in the extent of coherence, congruity, legibility, and clarity it exhibits

(Nasar 2000). The order can be affected by "where" comments are displayed. *Danmaku* allows WOM to be displayed as streams of moving subtitles overlaid onto the video playback screen, whereas WOM is displayed in a separate review section in traditional video sharing websites. The traditional separate commentary presentation reflects a higher degree of order by differentiating the video content and user-generated comments in two separate sections. The logical organization of video content and comments makes it easier to understand and comprehend the user-generated comments deliberately either before or after watching the video content. Thus, the higher degree of order and legibility supported by separate commentary presentation reduces the effort required to comprehend the environment, and thus stimulates a pleasant video watching experience (Brunner-Sperdin et al. 2014; Gilboa and Rafaeli 2003; Kaplan and Kaplan 1982; Nasar 2000). In contrast, when the flying commentary subtitles are enabled, consumers will view video content and the comments at the same time. Consequently, the user-generated comments interfere with the primary task of watching a video (e.g., a movie trailer). The low contrast between video content and user-generated comments leads to a lower level of order and makes it difficult for consumers to comprehend the content of the movie trailer and the user-generated comments at the same time. Consequently, consumers might interpret such difficulties as a source of interruption and annoyance. Therefore, we hypothesize that:

***H1a**: The danmaku (vs. separate commentary) presentation will induce a lower level of pleasure.*

Complexity reflects the degree of visual richness, information rate, diversity, and variety of information in an environment (Nasar 2000).

Complexity, which stems from "when" and "where" comments are displayed, can be a double edged sword. On the one hand, complexity is advantages because it provides diverse and rich information cues by allowing consumers to view others' comments in sync with a specific scene of the trailer (in *danmaku*) and also in real (video) time. Such diverse and rich information offers opportunities for immediate *exploration* (Singh et al. 2005). Consequently, the higher level of complexity provided by *danmaku* commentary presentation is more likely to arouse and maintain consumers' interest in the environment (i.e., the video sharing website), and motivate them to more deeply explore the video and comments (Brunner-Sperdin et al. 2014; Deng and Poole 2010). This is not the case for communication via separate commentary presentation, which is less complex due to the lack of additional information cues from the timelines of comments. Furthermore, moving subtitles with high information rate, compared with static once, inherently induce greater arousal (Detenber and Reeves 1996; Lang et al. 1995) and attract attention (Lang et al. 2002; Reeves and Nass 1996). Thus, *danmaku* comments could serve as a source of stimulation and inspiration, provoking a higher level of energy mobilization and a high level of arousal in individuals. The interactive and "crowded" video watching environment (together) will make consumers feel stimulated, excited and alert. Thus, it is argued that:

> ***H1b**: The danmaku (vs. separate commentary) presentation will induce a higher level of arousal.*

On the order hand, complexity may be disadvantageous because it requires considerable attention and cognitive resources to view and comprehend the diverse information cues. Specifically, moving subtitles with

high information rate (in *danmaku*) involuntarily capture consumers' attention. Consequently, consumers might find it difficult to freely decide whether they want to concentrate on video content, or to explore both the video content and comments generated by peers at the same time. Hence, when comments are presented by *danmaku*, the feelings of dominance and control might be hampered by the complex user-generated comments which are moving rapidly and involuntarily directing consumers' attention away from the video content. Therefore, it is hypothesized that:

***H1c**: The danmaku (vs. separate commentary) presentation will induce a lower level of dominance.*

4.3.2. The Interaction Effect of Commentary Presentation and Commentary Content

To validate our hypothesized association between commentary presentation and affective states, we examine the interaction effect of commentary presentation and commentary content on affective states. Specifically, we investigate two specifically categories of WOM content, namely informational content and humorous content. These two categories of WOM content are examined because (1) they are prevalent on video sharing websites, and (2) they are found to affect the informative effect and persuasive effect of WOM communication, respectively (e.g., Korfiatis et al. 2012; Lee and Mason 1999; Weinberger and Gulas 1992). We expect that congruence (incongruence) between commentary content and commentary presentation will lead to more (less) favorable interpretation and evaluation of the environment.

In the current context, informational comments are generated to provide background knowledge of the movie and help peer consumers better understand and evaluate the movie (e.g., “this is an American epic space opera franchise based on a novel”). They exert informative effects by conveying helpful information about observable (e.g., who are the cast, who wrote the storyline, etc.) and unobservable (e.g., the reputation of the directors and producers, the quality of other movies produced by the same director, the popularity of the actors and actresses, etc.) attributes of the movies.

Humorous content refers to the content that causes amusement in individuals (Bardon 2005; Martin 2007). Humorous comments are posted to make others laugh. Humor can be an effective tool in persuasion (Djambaska et al. 2016; Weinberger and Gulas 1992). Humorous WOM may exert persuasive effect by gaining attention, rapidly creating rapport, and increasing liking (Djambaska et al. 2016; Sternthal and Craig 1973).

We expect that informational content would facilitate the comprehension of movie content and enhances consumers’ knowledge of the movie by providing task-relevant information. Thus, when informational content is displayed to convey helpful information, the goal of information processing becomes more salient. In particular, when informational content is presented in a separate review section, its informative effect would be stronger because the orderly and legible structure supported by separate commentary presentation would facilitate the processing and evaluation of informational content before and/or after watching the video. In contrast, when information content is presented via *danmaku*, it requires even more cognitive resources to comprehend the comments, making it even more likely to be interpreted as a

source of distraction and annoyance. In addition, the informational content might not help arouse and maintain consumers' interest in the video or motivate them to more deeply explore the video and comments because the task-specific information is less likely to be interpreted as a source of stimulation and inspiration. Furthermore, involuntarily attending to informational content which requires considerable cognitive resources might further direct consumers' attention away from video watching, and prevent consumers from freely deciding whether they want to concentrate on the video content or not, leading to a lower level of control and dominance. Therefore, we conjecture that:

***H2a**: Informational content will moderate the effect of commentary presentation on pleasure. Specifically, when comments are more informational, the negative effect of danmaku (vs. separate commentary) presentation on pleasure would be stronger.*

***H2b**: Informational content will moderate the effect of commentary presentation on arousal. Specifically, when comments are more informational, the positive effect of danmaku (vs. separate commentary) presentation on arousal would be weaker.*

***H2c**: Informational content will moderate the effect of commentary presentation on dominance. Specifically, when comments are more informational, the negative effect of danmaku (vs. separate commentary) presentation on dominance would be stronger.*

In contrast, humorous content persuades others by making others amused and interested (Kaplan and Kaplan 1982). Hence, when humorous

content is presented to gain attention and create rapport, the goal of exploration and entertainment seeking would be more salient. Specifically, when humorous content is conveyed via *danmaku*, it is more likely to be interpreted as emotionally interesting rather than annoying. Additionally, when commentary content is more humorous, it is likely to attract consumers' attention even more rapidly and foster greater interests by making them amused and aroused. When consumers are interested and involved, they are more willing to exert the additional energy required to carefully read the flying comments moving rapidly in the *danmaku* system, leading to higher arousal (Wells and Petty 1980; Zajonc and Markus 1982). In addition, consumers are more likely to employ a variety of means to interact with peers to restore the sense of dominance (Yani-de-Soriano and Foxall 2006). Hence, it is expected that:

***H3a**: Humorous content will moderate the effect of commentary presentation on pleasure. Specifically, when comments are more humorous, the negative effect of danmaku (vs. separate commentary) presentation on pleasure would be weaker.*

***H3b**: Humorous content will moderate the effect of commentary presentation on arousal. Specifically, when comments are more humorous, the positive effect of danmaku (vs. separate commentary) presentation on arousal would be stronger.*

***H3c**: Humorous content will moderate the effect of commentary presentation on dominance. Specifically, when comments are more*

humorous, the negative effect of danmaku (vs. separate commentary) presentation on dominance would be weaker.

4.3.3. Affect and Consumer Response

Affect is increasingly recognized as central to consumer judgment (e.g., Pham et al. 2001). The affect-objective paradigm argues that individuals are programmed to experience affect when sensing the environment, attending to those environmental stimuli that are critical to us at the moment (Aggleton and Mishkin 1986). Consequently, affective responses are stimulated immediately, triggering fast and automatic responses (Adolphs and Damasio 2001; Elfenbein 2007; Zajonc 1998). The affective response model further supports this assertion by suggesting that affective states induced by design features would influence consumers' affective responses, during consumers' interactions with the social media platform (Zhang 2013).

The environmental psychology approach conjectures that all consumer responses to an environment can be considered as approach or avoidance behavior (Mehrabian and Russell 1974). Three aspects of approach-avoidance behavior are particularly relevant in the context of movie advertisement: (a) consumers' intention or willingness to watch the movie, (b) an intention to positively rate the movie trailer, and (c) an intention to negatively rate the movie trailer. Prior research on film marketing has documented an important impact of movie rating on box office revenue, such that positive rating is associated with higher movie sales, whereas negative rating is associated with lower movie sales (Liu 2006; Rui et al. 2013). Therefore, consumer responses

in terms of these three factors represent important predictors of box office revenue.

Researchers have investigated the role of each dimension of affective states in determining consumer response. Individuals in pleasant affective states have been shown to make more positive evaluations than those in neutral or unpleasant states (e.g., Gorn et al. 1993; Levine et al. 1994; Pham 1998). According to the affect-as-information theory (Schwarz 1990; Schwarz and Clore 2007), individuals may assume that their affective states are reactions to the object being evaluated and thus based their evaluations on their affective states.

In addition, individuals might infer the strength of their responses by monitoring the intensity of these feelings, that is, the level of arousal elicited by the target (Gorn et al. 2001). Both the M-R model (Mehrabian and Russell 1974) and two-dimensional arousal theory (Thayer 1986) posit that arousal will stimulate approach behaviors in a pleasant environment. In the context of entertainment marketing, energetic arousal is more salient than tense arousal, because entertaining media content is found to associated with hedonic goals and increased energetic arousal (Rieger et al. 2014). Therefore, a higher level of arousal prompts approach behavior in entertainment-seeking context (Deng and Poole 2010).

Furthermore, researchers have shown that online content (e.g., videos and comments) that evokes higher arousal are more likely to be shared (Berger and Milkman 2012). This is because arousal is characterized by activation of the autonomic nervous system, and the mobilization provided by this

excitatory state may boost action-related behavior such as content sharing (Berger 2011; Gross and Levenson 1995; Heilman 1997). Consequently, a pleasant and exciting trailer watching experience is likely to stimulate approach behavior but impede avoidance behavior. Specifically, when consumers feel pleasant and exciting watching a movie trailer, they are more likely to watch the movie after it is released and more likely to rate the movie trailer positively and recommend it to peers, but less likely to rate the movie trailer negatively. Hence, it is conjectured that:

***H4a**: Higher pleasure will lead to higher movie watching intention.*

***H4b**: Higher pleasure will lead to higher positive rating intention.*

***H4c**: Higher pleasure will lead to lower negative rating intention.*

***H5a**: Higher arousal will lead to higher movie watching intention.*

***H5b**: Higher arousal will lead to higher positive rating intention.*

***H5c**: Higher arousal will lead to lower negative rating intention.*

Moreover, prior research documents an interaction effect of pleasure and dominance on approach-avoidance behavior. It is because the feeling of dominance will lead to a higher level of psychological empowerment and behavioral selectivity, allowing individuals feel more free to enact either approach or avoidance behaviors (Biggers and Rankis 1983). Consequently, consumers would feel as if they have the permission to approach pleasant interactions and avoid unpleasant ones in the dominance eliciting situation. When consumers find it pleasant and joyful to watch a movie trailer, a higher level of dominance allows them to feel free to approach the movie trailer. In contrast, when consumers find it irritating to watch the trailer, a lower sense of

dominance might lead consumers to avoid the trailer (e.g., negatively rate the movie trailer) in order to restore the feelings of control and dominance.

Furthermore, we expect that the sense of behavioral selectivity and could be more important for avoidance behaviors than for approach behaviors. Individuals tend to present themselves in as positive a fashion as possible (Goffman 1959). While giving likings and positive ratings accords with such self-presentation needs, the desire to engage in avoidance behavior (e.g., providing negative ratings) is frequently at odds with such needs. Thus, giving negative ratings might require more sense of empowerment and assurance than giving positive ratings (Day 1978; Lau and Ng 2001). This is because consumers who have a higher sense of dominance and assurance tend to perceive less risk of embarrassment in engaging in avoidance behaviors (Crie 2003; Singh 1990). Consequently, although the interaction between pleasure and dominance could affect both approach behaviors and avoidance behaviors, the effect is expected to be stronger on avoidance behavior. Thus, we hypothesize that:

***H6a**: The interaction between dominance and pleasure will have a stronger effect on negative rating intention than on movie watching intention.*

***H6b**: The interaction between dominance and pleasure will have a stronger effect on negative rating intention than on positive rating intention.*

4.4. Research Methodology

4.4.1. Overview and Design

We tested the research model and hypotheses in an experiment. The experiment is about watching a movie trailer on a video sharing website. The experiment employed a three-condition (commentary presentation: *danmaku* only, separate commentary only, and both *danmaku* and separate commentary) between-subjects experiment design. The third condition was included to account for possible effects resulting from the differences in the amount of comments and the specific comments displayed by *danmaku* and separate commentary presentation.

Four actual movie trailers were used in constructing the stimulus material (Appendix E). Subjects were randomly assigned to watch one of the four movie trailers. The trailers were from different genres, including comedy, documentary, biography, and drama. They were carefully selected to be unfamiliar to the average participants (e.g., not part of movie series, will be released a few month later, etc.) so that participants are less likely to have pre-existing attitude or feelings toward the movie.

4.4.2. Manipulations

An actual *danmaku* video sharing website (bilibili.com) was adapted for the experiment. In the *danmaku* only condition, subjects were directed to a webpage with a video from bilibili.com embedded in the webpage, but without any separate section to host user-generated comments. The *danmaku* feature was enabled. Hence, subjects were exposed to video content and *danmaku*

comments at the same time when watching the movie trailer (for a screenshot, see Appendix F).

In the separate commentary only condition, subjects were directed to a movie trailer hosted at bilibili.com, but with *danmaku* feature disabled. Similar to the video watching experience on Youtube.com, subjects could watch the movie trailer first, and then scroll down to read the user-generated comments in a separate review section below the video playback screen.

In the last condition which both *danmaku* and separate comments were provided, subjects were directed to a video hosted at bilibili.com, with *danmaku* feature enabled. Subjects could read user-generated comments displayed by *danmaku* (while watching the movie trailer) and that hosted in a separate review section below the video playback screen (after watching the movie trailer).

4.4.3. Procedure

Subjects were randomly assigned to one of the three conditions just described. They were introduced to the study with the instructions that (a) the purpose of this study is to investigate individuals' reactions to the information they encountered on a typical video sharing website, (b) we are particularly interested in their reactions to movie trailers of the sort that often appear in video sharing websites, such as Youtube.com, and (c) they should view a movie trailer and post their comments on the trailer in much the same way they would if they encountered the same trailer at their favorable video sharing website.

With this preamble, participants started reading a mock-up movie blog which briefly introduced a new movie and provided a link to the movie trailer (for a screenshot, see Appendix F). Subjects were randomly exposed to one of the four movie trailers selected. By clicking the link to movie trailer, they could start watching the movie trailer (and comments generated by peers) at their own pace. After viewing the movie trailer, participants will be required complete a survey with measures of their perception of commentary content, behavioral intentions, affective states, and a few checks.

4.4.4. Measurement

To verify the effectiveness of manipulating commentary presentation, we asked participants to rate the perceived order and complexity of the video sharing website, which represented two major differences between *danmaku* and separate commentary presentation. To ensure that the manipulation did not inadvertently caused changes in confounding factors, we measured subjects' perception of technology novelty (adapted from Wells et al. 2010) and information amount (adapted from Kim and Lennon 2010; Mazaheri et al. 2011).

Following prior literature on behavior intentions, we measured subjects' intention to watch the movie (adapted from Jiang and Benbasat 2007b; Verhagen et al. 2014), and their intention to provide positive and negative ratings (adapted from Bock et al. 2005).

Measurement items for informational and humorous content were adapted from Mathwick et al. (2008) and Duncan et al. (1984), respectively.

Measures for three affective states are adapted from Mehrabian and Russell (1974) and Mazaheri et al. (2011).

We also included several control variables in the model, which are potential drivers for approach and avoidance behaviors. One such variable is familiarity with the movie (including the trailer itself, the storyline, the directors, and the cast). Furthermore, we controlled individuals' dispositional attitude which reflects how much they tend to like or dislike things in general (Hepler and Albarracín 2013). In addition, the Need to Evaluate Scale (NES) was included to measure individual differences in chronic tendency to engage in the assessment of the positive and/or negative qualities of information (Jarvis and Petty 1996). All the measurement items were administered using seven-point Likert scales anchored from strongly disagree to strongly agree. Other control variables include the demographic information, such as age and gender.

4.4.5. Subjects

As students are visiting online video sharing websites and movie theaters frequently, they are highly suitable for our experimental participation. Two hundreds and nine subjects were recruited from eight faculties or schools, representing diverse academic backgrounds. Among the student subjects, 138 were female (66%) and 71 (34%) were male. The average age of the subjects was 21.75 (*SD* = 1.91). Furthermore, 47 (22.5%) of them visited *danmaku* video sharing websites (e.g., bilibili.com) before, whereas the others 162 (77.5) were first time visitors of such video sharing websites. They were randomly assigned to one of the three conditions: 69 of them were assigned to the

danmaku only condition, 70 of them were assigned to the separate commentary only condition, and the other 70 were assigned to the condition in which both *danmaku* and separate commentary presentation were supported. According to power analysis for between-subjects design, this sample size could assure sufficient statistical power of 0.8 for medium effect size (f = 0.25) (Cohen 1988).

There was no significant difference exist across demographic information of the participants, such as age (F (2, 206) = 0.85, p = n.s.), gender (χ^2 (2, N = 209) = 0.24, p = n.s.), or prior experience with *danmaku* video sharing website (F (2, 206) = 0.58, p = n.s.).

In general, the subjects considered movies as good entertainment (M = 5.64/7, SD = 0.78). The majority of them watched movies (in a theater, or on DVD, or from video sharing websites, etc.) quite often: 54 subjects watched movies several times a year (25.8%), 80 of them watched movies once a month (38.3%), and 63 of them watched movies 2-3 times a month (30.1%). In addition, the subjects found the movie trailers unfamiliar to them (M = 2.76/7, SD = 1.22), so that they were unlikely to have pre-existing attitude toward the movie trailers before the experiment. Again, there is no difference in terms of subjects' attitude towards movies in general, their movie watching frequencies, or their familiarity with the movie trailers across the three conditions.

4.5. Results

4.5.1. Manipulation Checks and Instrument Validity

The study employed three commentary presentation formats with different levels of legibility and complexity. To check our manipulation, we first checked subjects' perceived order of the video sharing website. The results showed that commentary presentation elicited varying perception of order (F (2, 206) = 9.79, $p < 0.01$). Pairwise comparisons indicated that compared with *danmaku* (M = 4.55, SD = 1.19), separate commentary (M = 5.37, SD = 0.93) was perceived to be more legible and well arranged (t (206) = 4.41, $p < 0.01$). There was no significant difference between *danmaku* presentation and that implemented both *danmaku* and separate commentary (Ms = 4.55 vs. 4.90, t (206) = 1.90, p = n.s.).

Table 4.2. Manipulation Checks

Order	N	M	SD	Mean Difference		
				VS. (1)	VS. (2)	VS (3)
Danmaku (1)	69	4.55	1.19	-		
Separate (2)	70	5.37	0.93	0.82* (0.19)	-	
Both (3)	70	4.90	1.16	0.35 (0.19)	-0.47 (0.19)	-
Complexity	N	M	SD	Mean Difference		
				VS. (1)	VS. (2)	VS (3)
Danmaku (1)	69	4.46	1.47	-		
Separate (2)	70	2.85	1.17	-1.61* (0.23)	-	
Both (3)	70	4.00	1.34	-0.45* (0.23)	1.16 (0.23)	-

*. The mean difference is significant at the .05 level
Numbers in ( ) are standard errors.

Second, subjects' perception of website complexity was submitted to one-way ANOVA. The analysis revealed that commentary presentation elicited different perception of complexity (F (2, 206) = 27.00, $p < 0.01$). Pairwise comparisons indicated that compared with separate commentary (M

= 2.85, *SD* = 1.17), *danmaku* (*M* = 4.46, *SD* = 1.19) was perceived to be more complex (*t* (206) = 7.12, $p < 0.01$). In addition, *danmaku* is more complex than the website which implemented both *danmaku* and separate commentary (*M* = 4.00, *SD* = 1.34, *t* (206) = 2.00, $p < 0.05$). The results of manipulation checks were summarized in Table 4.2.

To test whether the manipulation inadvertently produced changes in measures of related but conceptually different constructs, checks of confounding effects were performed (Perdue and Summers 1986). A successful manipulation of commentary presentation was expected to elicit different levels of order and complexity, but have no direct impact on other related measures, such as technology novelty or information amount. One-way ANOVA indicated that there was no significant difference across three conditions on technology novelty (*F* (2, 206) = 0.24, *p* = n.s.) or information amount (*F* (2, 206) = 0.83, *p* = n.s.). Although *danmaku* is believed to be an emerging and relatively new feature, subjects did not found it to be more novel. This might be due to the fact that the majority of the subjects (77.5%) had not visited the experimental website (i.e., bilibili.com) before, and thus found their interaction with the video sharing website with different commentary presentation equally new and refreshing.

To test our research hypotheses, we first assessed the validity and reliability of our constructs. Then, we interpret the results of both the MANCOVA (multivariate analysis of covariance) and the PLS (partial least squares) analysis.

Descriptive statistics and psychometric properties of key constructs are presented in Table 4.3. On average, the respondents had a higher intention for positive rating than for negative rating (*M*s = 4.91 vs. 2.02), which is consistent with prior finding that positive WOM is more common than negative WOM (East et al. 2007; Godes and Mayzlin 2004b).

Table 4.3. Descriptive Statistics and Psychometric Properties of Key Constructs

	Mean	Std. Deviation	Cronbach's Alpha	Composite Reliability
Informational Content (INF)	3.62	1.65	0.97	0.98
Humorous Content (HUM)	4.04	1.61	0.94	0.96
Pleasure (PLE)	5.13	1.27	0.94	0.97
Arousal (ARO)	5.00	1.17	0.84	0.90
Dominance (DOM)	4.39	1.20	0.82	0.90
Movie Watching Intention (MWI)	5.17	1.32	0.94	0.96
Positive Rating Intention (PRI)	4.91	1.27	0.75	0.90
Negative Rating Intention (NRI)	2.02	1.06	0.83	0.91

Table 4.4. Correlations between Key Constructs

	INF	HUM	PLE	ARO	DOM	MWI	PRI	NRI
INF	**0.95**							
HUM	0.77	**0.95**						
PLE	0.23	0.29	**0.95**					
ARO	0.23	0.26	0.77	**0.87**				
DOM	0.41	0.43	0.33	0.32	**0.86**			
MWI	0.18	0.23	0.70	0.68	0.32	**0.92**		
PRI	0.23	0.29	0.61	0.60	0.40	0.73	**0.90**	
NRI	-0.05	-0.08	-0.39	-0.35	-0.20	-0.37	-0.39	**0.92**

Note. The bolded numbers on the diagonal are square roots of the average variance extracted (AVE).

Reliability was assessed by Cronbach's alpha and Composite Reliability (CR). Cronbach's alphas were greater than 0.7 and CRs exceeded 0.7, verifying reliability (Chin 1998b; Nunnally 1978). *Convergent validity* was assessed by item loadings, t-values of loadings, and AVE (Hair et al.

1998). AVEs were above the threshold of 0.5, indicating that the constructs can account for at least 50% of variance in the items. Additionally, all item loadings were higher than 0.7 and their t-values indicate that they were significant at the level of 0.01 (Table 4.5). Moreover, *discriminant validity* was verified by comparing the square root of AVEs with inter-construct correlations and comparing loadings with cross-loadings. The result revealed that the square root of AVE for each construct was greater than the correlations involving the construct (Chin 1998a). Also, item-factor loadings were all greater than item-unintended factor loadings (Cook et al. 1979). Thus, the discriminant validity was acceptable.

Table 4.5. Loadings and Cross-loadings for Key Constructs

	INF	HUM	PLE	ARO	DOM	MWI	PRI	NRI
INF1	**0.96**	0.73	0.23	0.25	0.47	0.19	0.28	-0.09
INF2	**0.97**	0.75	0.24	0.24	0.40	0.20	0.28	-0.07
INF3	**0.97**	0.74	0.24	0.23	0.39	0.19	0.25	-0.08
INF4	**0.91**	0.71	0.15	0.15	0.31	0.10	0.15	-0.02
HUM1	0.77	**0.92**	0.22	0.22	0.42	0.20	0.28	-0.11
HUM2	0.69	**0.97**	0.29	0.25	0.36	0.23	0.29	-0.07
HUM3	0.71	**0.96**	0.30	0.28	0.43	0.22	0.31	-0.10
PLE1	0.20	0.26	**0.96**	0.75	0.35	0.69	0.59	-0.41
PLE2	0.20	0.28	**0.97**	0.75	0.33	0.68	0.61	-0.42
PLE3	0.26	0.28	**0.93**	0.71	0.28	0.62	0.60	-0.37
ARO1	0.18	0.20	0.74	**0.89**	0.25	0.62	0.55	-0.33
ARO2	0.27	0.27	0.66	**0.87**	0.29	0.61	0.55	-0.29
ARO3	0.15	0.21	0.61	**0.84**	0.30	0.54	0.51	-0.38
DOM1	0.37	0.36	0.20	0.24	**0.82**	0.23	0.34	-0.18
DOM2	0.38	0.37	0.33	0.28	**0.87**	0.29	0.34	-0.22
DOM3	0.34	0.37	0.33	0.30	**0.89**	0.31	0.37	-0.19
MWI	0.15	0.19	0.67	0.64	0.26	**0.93**	0.70	-0.43
MWI	0.17	0.23	0.63	0.61	0.29	**0.91**	0.66	-0.34
MWI	0.14	0.19	0.61	0.59	0.33	**0.88**	0.70	-0.36
MWI	0.20	0.23	0.66	0.66	0.31	**0.95**	0.68	-0.38
PRI1	0.15	0.21	0.48	0.49	0.35	0.61	**0.88**	-0.27
PRI2	0.30	0.33	0.64	0.61	0.39	0.72	**0.92**	-0.56
NRI1	-0.11	-0.14	-0.46	-0.44	-0.27	-0.47	-0.56	**0.97**
NRI2	0.02	0.00	-0.27	-0.19	-0.11	-0.22	-0.22	**0.87**

In addition, supportive analysis in linear regression by SPSS revealed that the VIF, condition index, and Durbin-Watson statistics are within their acceptable thresholds (VIF<3.3, condition index<30, and Durbin-Watson≈2). Therefore, we concluded that there is no serious threat of multicollinearity.

4.5.2. Results on Affective States

First, we ran multivariate ANCOVA (MANCOVA) involving commentary presentation, commentary content (informational and humorous), and three affective states, as well as controlling for the effects of video (i.e., movie trailer). The objective is to gain an overarching empirical assessment of the interplay between commentary presentation and commentary content in influencing affective states.

The result showed a marginally significant main effect of commentary presentation (Wilk's $\Lambda = 0.94$, F (6, 378) = 1.95, $p < 0.1$, partial $\eta^2 = 0.03$), a significant main effect of humorous content of comments (Wilk's $\Lambda = 0.95$, F (3, 189) = 3.62, $p < 0.05$, partial $\eta^2 = 0.05$), and a marginally significant interaction effect of commentary presentation and humorous content of comments (Wilk's $\Lambda = 0.94$, F (6, 378) = 1.83, $p < 0.1$, partial $\eta^2 = 0.03$). The insignificant Box's test suggested that the equality of variance-covariance matrices assumption was satisfied.

4.5.3. The Effects of Commentary Presentation

The marginally significant main effect indicated that there were marginally significant differences among different commentary presentations on a linear combination of the three affective states.

Univariate tests using ANCOVA were conducted separately for each of the affective states. Table 4.6 and 4.7 summarize the between-subjects effects and parameter estimates obtained from ANCOVA tests[6].

Commentary presentation had a significant effect on dominance (F (2, 191) = 4.62, $p < 0.05$, partial $\eta^2 = 0.05$), but not for pleasure (F (2, 191) = 2.08, p = n.s., partial $\eta^2 = 0.02$) or arousal (F (2, 191) = 1.46, p = n.s., partial $\eta^2 = 0.02$).

Follow-up tests were conducted to evaluate pairwise differences among the adjusted means for three affective states (Table 4.8 and 4.9). To control for Type I error across multiple comparisons, Bonferroni procedure was used. Planned contrast between *danmaku* and separate commentary presentation revealed that separate commentary induced a higher level of dominance than *danmaku* (adjusted means = 4.62 vs. 4.11, F (1, 191) = 6.96, $p < 0.05$, $\eta^2 = 0.04$). Thus, H1c was supported.

Yet, *danmaku* and separate commentary presentation did not differ significantly in pleasure (adjusted means = 5.06 vs. 5.20, F (1, 191) = 0.56, p = n.s., $\eta^2 = 0.003$) or arousal (adjusted means = 5.05 vs. 4.97, F (1, 191) = 0.15, p = n.s., $\eta^2 = 0.001$). Hence, H1a and H1b were not supported. Nevertheless, interaction effects between commentary presentation and commentary content were found (explained in the following section).

[6] The results remained meaningfully unchanged after including additional covariates, e.g., objectivity of comments, valence of comments (i.e., positive vs. negative), and subjects' demographic information.

Table 4.6. Summary of Between-Subjects Effects					
ANCOVA Summary for *Pleasure*					
Source	**DF**	**Mean Square**	**F**	**Sig.**	**Partial η^2**
CP	2	2.33	2.08	0.13	0.02
INF	1	0.01	0.01	0.92	0.00
HUM	1	3.54	3.15	0.08	0.02
CP × INF	2	0.11	0.10	0.90	0.00
CP × HUM	2	1.64	1.46	0.24	0.02
Movie	3	24.53	21.82	0.00	0.26
Movie × CP	6	0.31	0.28	0.95	0.01
ANCOVA Summary for *Arousal*					
Source	**DF**	**Mean Square**	**F**	**Sig.**	**Partial η^2**
CP	2	1.68	1.46	0.23	0.02
INF	1	0.60	0.52	0.47	0.00
HUM	1	1.65	1.44	0.23	0.01
CP × INF	2	2.77	2.41	0.09	0.02
CP × HUM	2	5.41	4.70	0.01	0.05
Movie	3	7.66	6.65	0.00	0.09
Movie × CP	6	0.25	0.22	0.97	0.01
ANCOVA Summary for *Dominance*					
Source	**DF**	**Mean Square**	**F**	**Sig.**	**Partial η^2**
CP	2	5.19	4.62	0.01	0.05
INF	1	1.72	1.53	0.22	0.01
HUM	1	11.27	10.03	0.00	0.05
CP × INF	2	0.55	0.49	0.61	0.01
CP × HUM	2	1.63	1.45	0.24	0.01
Movie	3	0.53	0.47	0.70	0.01
Movie × CP	6	1.13	1.01	0.42	0.03

Note: CP = commentary presentation (*danmaku*, separate, or both *danmaku* and separate), INF = informational content, HUM = humorous content

Table 4.7. Parameter Estimates						
	DV = Pleasure		*DV = Arousal*		*DV = Dominance*	
Parameter	*B*	*t*	*B*	*t*	*B*	*t*
Intercept	4.37	10.54**	4.11	9.79**	2.41	5.81**
[CP=*danmaku*]	-0.01	-0.02	0.25	0.44	0.78	1.37
[CP=separate]	0.97	1.59	0.76	1.23	1.69	2.77**
[CP=both]	0.00[a]	.	0.00[a]	.	0.00[a]	.
INF	-0.01	-0.05	-0.03	-0.27	0.18	1.44
HUM	0.22	1.81*	0.26	2.06**	0.38	3.07**
[CP=*danmaku*]×INF	-0.02	-0.10	-0.05	-0.27	-0.18	-0.99
[CP=separate]×INF	0.06	0.33	0.32	1.77*	-0.08	-0.48
[CP=both]×INF	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=*danmaku*]×HUM	0.00	-0.01	-0.01	-0.04	-0.12	-0.68
[CP=separate]×HUM	-0.27	-1.51	-0.49	-2.73**	-0.30	-1.70*
[CP=both]×HUM	0.00[a]	.	0.00[a]	.	0.00[a]	.
[Movie=A]	0.46	1.31	0.13	0.36	-0.16	-0.44
[Movie=B]	-1.36	-3.78**	-.94	-2.59**	0.15	0.41
[Movie=C]	0.09	0.23	0.15	0.40	-0.44	-1.16
[Movie=D]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=*danmaku*]× [Movie=A]	0.04	0.08	0.20	0.40	-0.28	-0.58
[CP=*danmaku*]× [Movie=B]	0.46	0.85	0.38	0.70	-0.01	-0.02
[CP=*danmaku*]× [Movie=C]	-0.13	-0.24	0.04	0.07	0.35	0.66
[CP=*danmaku*]× [Movie=D]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=separate]× [Movie=A]	0.24	0.47	0.20	0.40	0.10	0.19
[CP=separate]× [Movie=B]	0.14	0.28	0.52	1.04	-0.59	-1.18
[CP=separate]× [Movie=C]	-0.14	-0.25	0.07	0.13	0.46	0.85
[CP=separate]× [Movie=D]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=both]× [Movie=A]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=both]× [Movie=B]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=both]× [Movie=C]	0.00[a]	.	0.00[a]	.	0.00[a]	.
[CP=both]× [Movie=D]	0.00[a]	.	0.00[a]	.	0.00[a]	.
	$F_{(17, 208)} = 6.22$ $p < 0.01$ $R^2 = 0.36$ Adj. $R^2 = 0.30$		$F_{(17, 208)} = 3.33$ $p < 0.01$ $R^2 = 0.23$ Adj. $R^2 = 0.16$		$F_{(17, 208)} = 4.52$ $p < 0.01$ $R^2 = 0.29$ Adj. $R^2 = 0.22$	

a. This parameter is set to zero because it is redundant.

Note: DV = dependent variable; CP = commentary presentation (*danmaku*, separate, or both *danmaku* and separate), INF = informational content, HUM = humorous content

* $p < 0.1$, ** $p < 0.05$

Table 4.8. Estimated Marginal Means of Affective States					
Dependent Variable	Commentary Presentation [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	1	5.06	0.14	4.78	5.33
	2	5.20	0.13	4.94	5.47
	3	5.05	0.13	4.80	5.30
Arousal	1	5.05	0.14	4.77	5.33
	2	4.97	0.14	4.70	5.24
	3	4.86	0.13	4.60	5.11
Dominance	1	4.11	0.14	3.84	4.39
	2	4.62	0.13	4.36	4.89
	3	4.48	0.13	4.22	4.73

a. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)

b. Covariates appearing in the model are evaluated at the following values: INF = 3.62, HUM = 4.04

Table 4.9. Pairwise Comparisons of Commentary Presentation							
Dependent Variable [a]	(I) [b] Commentary Presentation	(J) [b] Commentary Presentation	Mean Difference (I-J)	Std. Error	Sig. [c]	95% Confidence Interval for Difference [c]	
						Lower Bound	Upper Bound
Pleasure	1	2	-0.14	0.19	1.00	-0.61	0.32
		3	0.01	0.19	1.00	-0.45	0.46
	2	1	0.14	0.19	1.00	-0.32	0.61
		3	0.15	0.19	1.00	-0.29	0.60
	3	1	-0.01	0.19	1.00	-0.46	0.45
		2	-0.15	0.19	1.00	-0.60	0.29
Arousal	1	2	0.08	0.20	1.00	-0.40	0.55
		3	0.19	0.19	0.97	-0.27	0.65
	2	1	-0.08	0.20	1.00	-0.55	0.40
		3	0.11	0.19	1.00	-0.34	0.57
	3	1	-0.19	0.19	0.97	-0.65	0.27
		2	-0.11	0.19	1.00	-0.57	0.34
Dominance	1	2	-0.51*	0.19	0.03	-0.98	-0.04
		3	-0.36	0.19	0.16	-0.82	0.09
	2	1	0.51*	0.19	0.03	0.04	0.98
		3	0.15	0.19	1.00	-0.30	0.59
	3	1	0.36	0.19	0.16	-0.09	0.82
		2	-0.15	0.19	1.00	-0.59	0.30

a. Based on estimated marginal means

b. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)

c. Bonferroni adjustment was used to control for Type I error across multiple comparisons

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

4.5.4. The Interaction Effect of Commentary Presentation and Commentary Content

The univariate tests indicated a marginally significant interaction effect of commentary presentation and informational content on arousal (F (2, 191) = 2.41, $p < 0.1$, partial $\eta^2 = 0.03$), but not for pleasure (F (2, 191) = 0.10, p = n.s., partial $\eta^2 = 0.001$) or dominance (F (2, 191) = 0.49, p = n.s., partial $\eta^2 = 0.01$). To examine the nature of the interaction effect, we performed simple contrasts.

When comments are less informational, the *danmaku* elicited a marginally higher level of arousal (adjusted means = 5.19 vs. 4.51, F (1, 191) = 3.54, $p < 0.1$, $\eta^2 = 0.02$) as opposed to separate commentary presentation. In addition, there was no significant difference between *danmaku* and separate commentary presentation in pleasure (adjusted means = 5.10 vs. 5.12, F (1, 191) = 0.002, p = n.s.) or dominance (adjusted means = 4.11 vs. 4.46, F (1, 191) = 0.96, p = n.s.). Table 4.10 summarizes the estimated marginal means of three affective states when the commentary content is less informational and average humorous.

When comments are more informational, the *danmaku* elicited a marginally lower level of dominance (adjusted means = 4.11 vs. 4.78, F (1, 191) = 3.49, $p < 0.1$, $\eta^2 = 0.02$), compared with separate commentary presentation. Furthermore, there was no significant difference between *danmaku* and separate commentary presentation in pleasure (adjusted means = 5.02 vs. 5.29, F (1, 191) = 0.58, p = n.s.) or arousal (adjusted means = 4.91 vs. 5.44, F (1, 191) = 2.14, p = n.s.). Table 4.11 summarizes the estimated

marginal means of three affective states when the commentary content is highly informational and average humorous.

Table 4.10. Estimated Marginal Means of Affective States (Less Informational)

Dependent Variable	Commentary Presentation [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	1	5.10	0.23	4.65	5.55
	2	5.12	0.28	4.57	5.66
	3	5.06	0.24	4.58	5.54
Arousal	1	5.19	0.23	4.74	5.64
	2	4.51	0.28	3.95	5.06
	3	4.92	0.24	4.43	5.40
Dominance	1	4.11	0.23	3.67	4.56
	2	4.46	0.28	3.92	5.01
	3	4.18	0.24	3.70	4.65

a. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)
b. Covariates appearing in the model are evaluated at the following values: INF = 1.97, HUM = 4.04

Table 4.11. Estimated Marginal Means of Affective States (More Informational)

Dependent Variable	Commentary Presentation [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	1	5.02	0.29	4.44	5.59
	2	5.29	0.21	4.87	5.70
	3	5.04	0.24	4.56	5.52
Arousal	1	4.91	0.29	4.33	5.49
	2	5.44	0.21	5.02	5.86
	3	4.80	0.25	4.31	5.29
Dominance	1	4.11	0.29	3.54	4.68
	2	4.78	0.21	4.36	5.19
	3	4.77	0.24	4.29	5.25

a. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)
b. Covariates appearing in the model are evaluated at the following values: INF = 5.27, HUM = 4.04

Therefore, informational content moderated the effect of commentary presentation on arousal and dominance. When comments are more

informational, the marginal benefit of *danmaku* (as opposed to separate commentary) in arousal becomes non-significant. Furthermore, the disadvantage of *danmaku* in terms of dominance becomes more salient. Thus, H2b and H2c were supported. As there was no significant interaction effect of informational content and commentary presentation on pleasure, H2a was not supported.

Furthermore, the univariate tests indicated a significant interaction effect of commentary presentation and humorous content on arousal (F (2, 191) = 4.70, $p < 0.05$, partial $\eta^2 = 0.05$), but not for pleasure (F (2, 191) = 1.46, p = n.s., partial $\eta^2 = 0.02$) or dominance (F (2, 191) = 1.45, p = n.s., partial $\eta^2 = 0.02$).

When comments are less humorous, the *danmaku* elicited a marginally lower level of arousal (adjusted means = 4.65 vs. 5.35, F (1, 191) = 3.71, $p < 0.1$, $\eta^2 = 0.02$), and a significantly lower level of dominance (adjusted means = 3.70 vs. 4.50, F (1, 191) = 5.13, $p < 0.05$, $\eta^2 = 0.03$), compared with separate commentary presentation. In addition, there was no significant difference between *danmaku* and separate commentary presentation in pleasure (adjusted means = 4.70 vs. 5.28, F (1, 191) = 0.46, p = n.s., $\eta^2 = 0.002$). Table 4.12 summarizes the estimated marginal means of three affective states when the commentary content is less humorous and average informational.

Table 4.12. Estimated Marginal Means of Affective States (Less Humorous)					
Dependent Variable	Commentary Presentation [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	1	4.70	0.28	4.16	5.25
	2	5.28	0.23	4.82	5.74
	3	4.69	0.24	4.22	5.16
Arousal	1	4.65	0.28	4.09	5.20
	2	5.35	0.23	4.89	5.81
	3	4.44	0.24	3.97	4.92
Dominance	1	3.70	0.28	3.16	4.25
	2	4.50	0.23	4.04	4.96
	3	3.87	0.24	3.40	4.34

a. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)
b. Covariates appearing in the model are evaluated at the following values: INF = 3.62, HUM = 2.43

When comments are more humorous, the *danmaku* elicited a significantly higher level of arousal (adjusted means = 5.45 vs. 4.59, F (1, 191) = 5.80, $p < 0.05$, $\eta^2 = 0.03$) as opposed to separate commentary presentation. Yet, there was no significant difference between *danmaku* and separate commentary presentation in pleasure (adjusted means = 5.41 vs. 5.13, F (1, 191) = 0.61, p = n.s., $\eta^2 = 0.003$) or dominance (adjusted means = 4.52 vs. 4.74, F (1, 191) = 0.46, p = n.s., $\eta^2 = 0.002$). Table 4.13 summarizes the estimated marginal means of three affective states when the commentary content is highly humorous and average informational.

Table 4.13. Estimated Marginal Means of Affective States (More Humorous)					
Dependent Variable	Commentary Presentation [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	1	5.41	0.24	4.95	5.88
	2	5.13	0.26	4.61	5.64
	3	5.41	0.23	4.95	5.87
Arousal	1	5.45	0.24	4.98	5.92
	2	4.59	0.26	4.07	5.12
	3	5.27	0.24	4.81	5.74
Dominance	1	4.52	0.24	4.05	4.99
	2	4.74	0.26	4.23	5.26
	3	5.08	0.23	4.62	5.54

a. Commentary Presentation: *danmaku* only (1), Separate commentary only (2), and both *danmaku* and separate commentary (3)
b. Covariates appearing in the model are evaluated at the following values: INF = 3.62, HUM = 5.65

Hence, humorous content moderated the effect of commentary presentation on arousal and dominance. Specifically, when comments are more humorous, the positive effect of *danmaku* (as opposed to separate commentary) on arousal becomes stronger. Moreover, the disadvantage of *danmaku* in dominance diminished. Therefore, H3b and H3c were supported, whereas H3a was not supported.

Figure 4.4 and 4.5 depict the interaction effect of commentary presentation and commentary content.

Figure 4.4. The Interaction Effect of Commentary Presentation and Informational Content

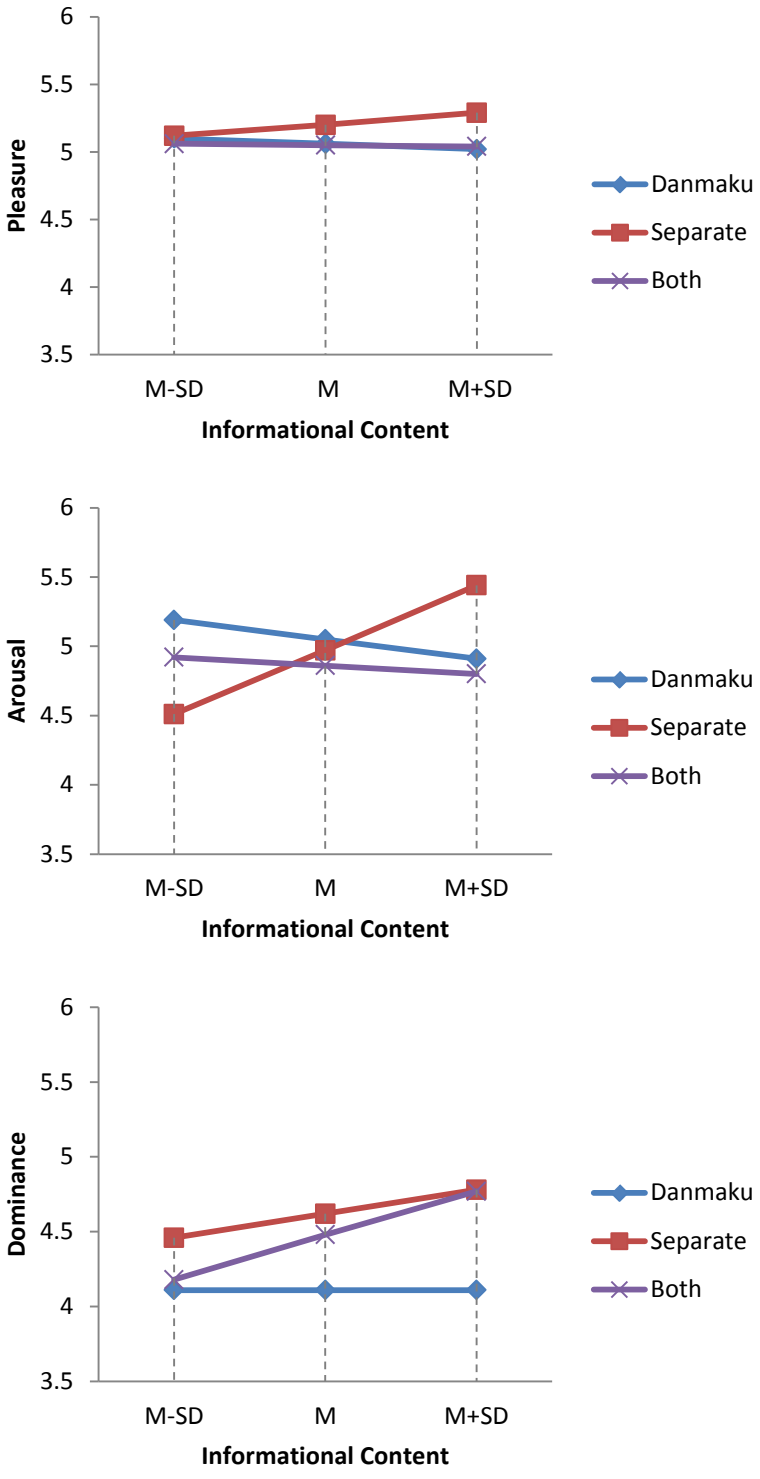
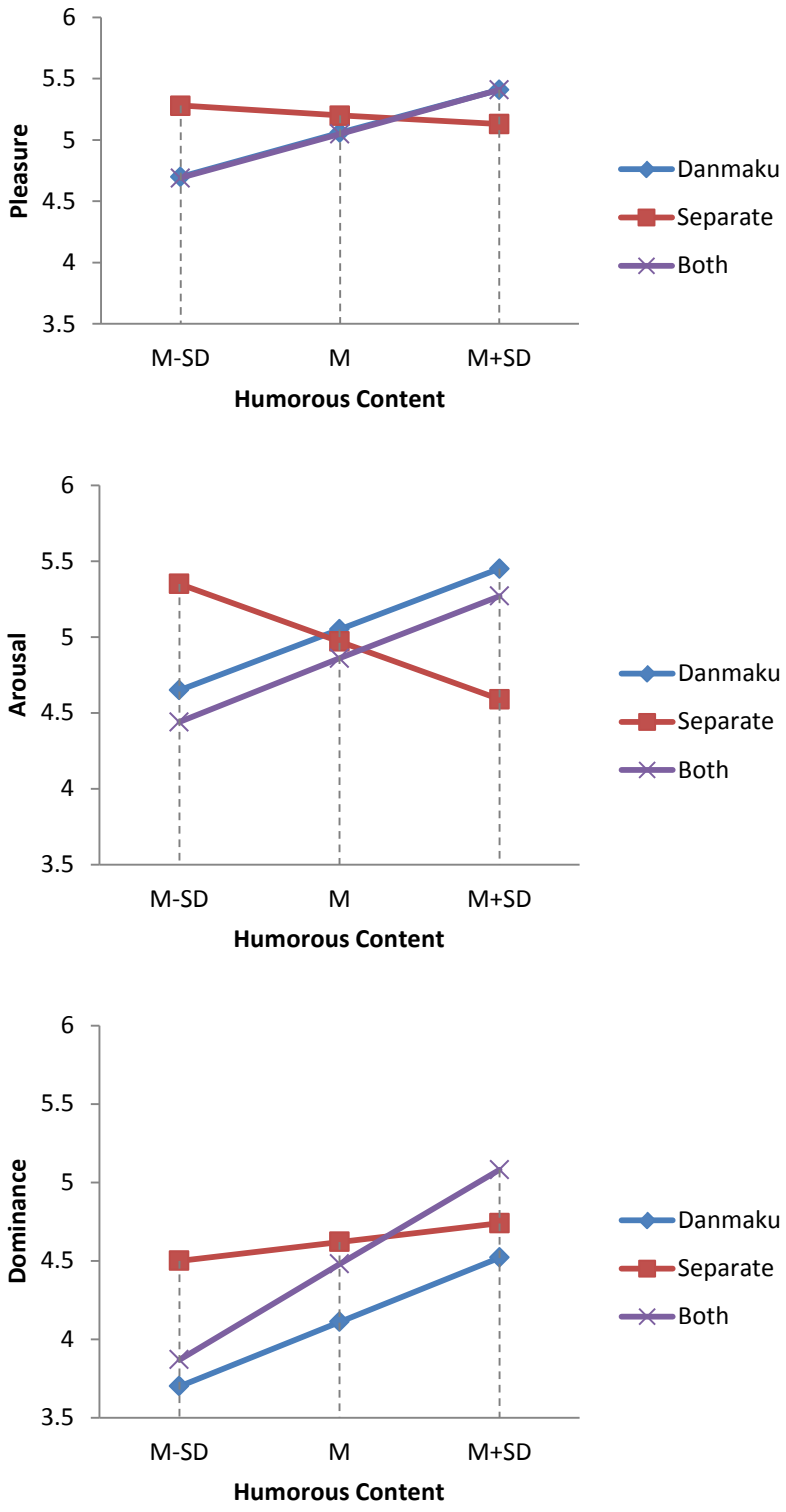


Figure 4.5. The Interaction Effect of Commentary Presentation and Humorous Content



4.5.5. The Effects of Video Content

First, the multivariate ANCOVA (MANCOVA) analysis showed a significant main effect of video content (Wilk's $\Lambda = 0.69$, F (9, 460) = 8.35, $p < 0.01$, partial $\eta^2 = 0.12$). The interaction effect of video content and commentary presentation was not significant (Wilk's $\Lambda = 0.94$, F (18, 535) = 0.64, p = n.s., partial $\eta^2 = 0.02$).

Second, univariate tests using ANCOVA were conducted separately for each of the dependent variables. Video content had a significant impact on pleasure (F (2, 191) = 24.53, $p < 0.01$, partial $\eta^2 = 0.26$) and arousal (F (2, 191) = 7.66, $p < 0.01$, partial $\eta^2 = 0.10$), but not on dominance (F (2, 191) = 0.53, p = n.s., partial $\eta^2 = 0.01$). Furthermore, there was no interaction effect of commentary presentation and video content on pleasure, arousal, or dominance.

Table 4.14. Estimated Marginal Means for Movies

Dependent Variable	Movie [a]	Mean [b]	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Pleasure	A	5.81	0.15	5.52	6.10
	B	4.10	0.16	3.78	4.41
	C	5.25	0.16	4.93	5.58
	D	5.25	0.14	4.98	5.53
Arousal	A	5.27	0.15	4.98	5.56
	B	4.37	0.16	4.05	4.68
	C	5.20	0.17	4.87	5.52
	D	5.01	0.14	4.72	5.29
Dominance	A	4.30	0.15	4.01	4.58
	B	4.46	0.16	4.14	4.77
	C	4.34	0.16	4.02	4.67
	D	4.51	0.14	4.23	4.79

a. Movie Trailer: A (A Dog's Purpose), B (Audrie & Daisy), C (A United Kingdom), D (Collateral Beauty)

b. Covariates appearing in the model are evaluated at the following values: IV = 3.62, HUM = 4.04

Table 4.15. Pairwise Comparisons of Movies							
Dependent Variable [a]	(I) Movie Trailer	(J) Movie Trailer	Mean Difference (I-J)	Std. Error	Sig. [c]	95% Confidence Interval for Difference [c]	
						Lower Bound	Upper Bound
Pleasure	A	B	1.71*	0.21	0.00	1.14	2.29
		C	0.56	0.22	0.07	-0.02	1.14
		D	0.55*	0.20	0.04	0.02	1.09
	B	A	-1.71*	0.21	0.00	-2.29	-1.14
		C	-1.16*	0.23	0.00	-1.77	-0.54
		D	-1.16*	0.21	0.00	-1.72	-0.59
	C	A	-0.56	0.22	0.07	-1.14	0.02
		B	1.16*	0.23	0.00	0.54	1.77
		D	0.00	0.22	1.00	-0.58	0.58
	D	A	-0.55*	0.20	0.04	-1.09	-0.02
		B	1.16*	0.21	0.00	0.59	1.72
		C	0.00	0.22	1.00	-0.58	0.58
Arousal	A	B	0.90*	0.22	0.00	0.33	1.48
		C	0.07	0.22	1.00	-0.51	0.66
		D	0.26	0.20	1.00	-0.28	0.80
	B	A	-0.90*	0.22	0.00	-1.48	-0.33
		C	-0.83*	0.23	0.00	-1.46	-0.21
		D	-0.64*	0.21	0.02	-1.21	-0.07
	C	A	-0.07	0.22	1.00	-0.66	0.51
		B	0.83*	0.23	0.00	0.21	1.46
		D	0.19	0.22	1.00	-0.40	0.77
	D	A	-0.26	0.20	1.00	-0.80	0.28
		B	0.64*	0.21	0.02	0.07	1.21
		C	-0.19	0.22	1.00	-0.77	0.40
Dominance	A	B	-0.16	0.21	1.00	-0.73	0.41
		C	-0.05	0.22	1.00	-0.63	0.53
		D	-0.22	0.20	1.00	-0.75	0.32
	B	A	0.16	0.21	1.00	-0.41	0.73
		C	0.12	0.23	1.00	-0.50	0.73
		D	-0.05	0.21	1.00	-0.62	0.51
	C	A	0.05	0.22	1.00	-0.53	0.63
		B	-0.12	0.23	1.00	-0.73	0.50
		D	-0.17	0.22	1.00	-0.75	0.41
	D	A	0.22	0.20	1.00	-0.32	0.75
		B	0.05	0.21	1.00	-0.51	0.62
		C	0.17	0.22	1.00	-0.41	0.75

a. Based on estimated marginal means

b. Movie Trailer: A (A Dog's Purpose), B (Audrie & Daisy), C (A United Kingdom), D (Collateral Beauty)

c. Bonferroni adjustment was used to control for Type I error across multiple comparisons

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

Lastly, follow-up tests were conducted to evaluate pairwise differences among the adjusted means for three affective states (Table 4.14 and 4.15). To control for Type I error across multiple comparisons, Bonferroni procedure was used. The tests revealed that the content of movie trailers differed in terms of pleasure and arousal, but not dominance.

4.5.6. Results on Consumer Responses

PLS was used to test the structural model proposed on the right-hand side of the research model. Bootstrapping resampling was performed on the structural model to examine path significance.

The model explained 56% of the variance of movie watching intention (MWI), 50% of the variance of positive rating intention (PRI), and 24% of the variance of negative rating intention (NRI). These numbers suggest that our research model is substantive enough to explain a large proportion of the variance in consumer responses.

The PLS analysis revealed that pleasure had a positive effect on MWI (β = 0.40, t = 4.15), a positive effect on PRI (β = 0.29, t = 3.16), and a negative effect on NRI (β = -0.31, t = 3.31). A pleasant trailer watching experience is likely to stimulate greater intention to watch the movie after it is released, greater intention to provide positing rating on the movie trailer and share it to social media friends, and less likelihood to provide negative rating on the movie trailer. Hence, H4a, H4b, and H4c were supported.

In addition, arousal was a significant predictor of MWI (β = 0.31, t = 3.79) and PRI (β = 0.29, t = 3.38), but not NRI (β = -0.10, t = 1.13). This suggested that when consumers felt excited watching the movie trailer, they

are more likely to watching the movie later and provide positive feedback on the movie trailer. Yet, arousal did not predict their tendency to provide negative feedback on the movie trailer. Thus, H5a and H5b were supported, while H5c was not supported.

Furthermore, dominance had a positive effect on PRI (β = 0.19, t = 3.44), but not on MWI (β = 0.06, t = 1.00) or NRI (β = -0.10, t = 1.53). The interaction of dominance and pleasure had a positive effect on NRI (β = 0.15, t = 2.25), but not on MWI (β = -0.07, t = 1.28) or PRI (β = -0.04, t = 0.69). This indicated that the relationship between pleasure and negative rating intention is moderated by dominance. Yet, dominance did not moderate the effect of pleasure on approach behavior, i.e., MWI or PRI. The interaction effect between dominance and pleasure is stronger on avoidance behavior (NRI) than on approach behavior (MWI and PRI). Hence, H6a and H6b were supported.

Table 4.16. Results of PLS Analysis

	DV = MWI		*DV = PRI*		*DV = NRI*	
	β	*t*	β	*t*	β	*t*
Predictors						
Pleasure	0.40**	4.15	0.29**	3.16	-0.31**	3.31
Arousal	0.31**	3.79	0.29**	3.38	-0.10	1.13
Dominance	0.06	1.00	0.19**	3.44	-0.10	1.53
Dominance × Pleasure	-0.07	1.28	-0.04	0.69	0.15*	2.25
Controls						
Age	0.00	0.04	0.08	1.66	0.15*	2.27
Gender	0.04	0.76	0.04	0.67	0.08	1.17
Trailer Familiarity	0.07	1.35	0.09	1.59	0.08	0.90
General Attitude toward Movies	0.05	1.02	0.08	1.36	0.03	0.40
Need to Evaluate	-0.01	0.10	-0.02	0.26	0.10	1.62
	R^2 = 0.56		R^2 = 0.50		R^2 = 0.24	

* $p < 0.05$; ** $p < 0.01$

Among the control variables, age was positively associated with NRI (β = 0.15, t = 2.27). The results of PLS analysis were summarized in Table 4.16.

Table 4.17. Hypotheses Testing Results	
Hypotheses	**Supported?**
(1) Commentary Presentation → Affective States	
H1a: CP→ PLE	No
H1b: CP → ARO	No
H1c: CP → DOM	Yes (*danmaku* < separate)
(2) Commentary Presentation × Commentary Content→ Affective States	
H2a: CP × INF → PLE	No
H2b: CP × INF → ARO	Yes (low INF, *danmaku* > separate)
H2c: CP × INF → DOM	Yes (high INF, *danmaku* < separate)
H3a: CP × HUM → PLE	No
H3b: CP × HUM → ARO	Yes (high HUM, *danmaku* > separate)
H3c: CP × HUM → DOM	Yes (low HUM, *danmaku* < separate)
(3) Affective States → Approach & Avoidance	
H4a: PLE → MWI	Yes
H4b: PLE → PRI	Yes
H4c: PLE → NRI	Yes
H5a: ARO → MWI	Yes
H5b: ARO → PRI	Yes
H5c: ARO → NRI	No
H6a: DOM × PLE → NRI >MWI	Yes
H6b: DOM × PLE → NRI >PRI	Yes

Note: CP = commentary presentation (*danmaku*, separate, or both *danmaku* and separate), PLE = pleasure, ARO = arousal, DOM = dominance, INF = informational content, HUM = humorous content, MWI = movie watching intention, PRI = positive rating intention, NRI = negative rating intention

4.6. Discussion

4.6.1. Summary of Findings

Drawing insights from the environmental psychology approach to affect and the literature on word-of-mouth communication, this study seeks to understand

the consumers' responses to affect-eliciting commentary presentation. There are several important findings from our study.

First, our results showed that environmental stimuli, especially commentary presentation and commentary content, would influence the affective states experience by consumers. After controlling for the video content, *danmaku* (as opposed to separate commentary) presentation would induce a lower level of dominance. Yet, the disadvantage of *danmaku* in dominance could be mitigated by displaying more humorous commentary content. In addition, the advantage of *danmaku* (compared with separate commentary) in arousing interests would be more salient when the comments presented are less informational and more humorous. This indicated that our findings are not merely driven by video content. Rather, environmental stimuli would interact and impact the level of arousal and dominance experience by consumers. Furthermore, the non-significant interaction between video content and commentary presentation indicated that the observed results are not due to a video of a particular genre, but rather consistent across videos of different genres. Nevertheless, video content itself is more influential in affecting the pleasure experience by consumers.

Second, this research underscored the impacts of specific categories of commentary content. The observed interaction effect between commentary presentation and commentary content (informational and humorous) on arousal and dominance suggested that commentary presentation should be strategically employed to support different functions of WOM communication. Our results indicated that *danmaku* commentary presentation works better with humorous content by facilitating the persuasive effect of WOM. In

contrast, separate commentary presentation is more suitable to convey informational content by enabling the informative effect of WOM.

Third, the non-significant difference between *danmaku* only condition and the condition which provides both *danmaku* and separate commentary ruled out the alternative explanation of the amount of comments presented. Our results remained meaningfully unchanged in terms of magnitude and significance if we performed the analyses omitting the last condition.

Furthermore, our analyses revealed that approach and avoidance behavior could be driven by different dimensions of affect. Approach behavior (e.g., movie watching intention and positive rating intention), could be predicted by the pleasure and arousal experienced by consumers, whereas avoidance behavior (e.g., negative rating intention) can be affected by pleasure and its interaction with dominance. This implies that approach and avoidance behavioral intentions should be treated as separate variables, because they are different behaviors which may be affected differently by the antecedent constructs (e.g., affective states). This confirms prior literature on WOM which suggests that positive and negative WOM are distinct behaviors (East et al. 2007; Lau and Ng 2009; Naylor and Kleiser 2000).

4.6.2. Theoretical Contributions

The present study extended prior literature in several noteworthy ways. First, it aims to show that seemly distracting features, when strategically designed (e.g., to convey humorous content in order to persuade others), can be transformed from a destructive role to a constructive one. The present study advances the literature in human-computer interaction by investigating how a

real-time commentary subtitle system, i.e., *danmaku*, would be able to elicit excited and aroused affective states, which in turn lead to favorable consumer responses.

Second, it complements the conventional cognition-driven approach in studying website design features by highlighting the impact of affect-eliciting features (i.e., commentary presentation). By conceptualizing commentary presentation as an affect-eliciting design feature, the present study helps establish the connection between affect experienced by consumers and the possible affect-eliciting quality of interface design features. Our results suggested that commentary presentation has the potential to affect the arousal and dominance experienced by users, and thereby influence their affective responses.

Third, this research expands the literature on word-of-mouth. The present work is one of the first to conceptualize and empirically demonstrate the effect of the interaction between WOM presentation (*danmaku* vs. separate commentary presentation) and the specific content of WOM (informational and humorous), mediated by the affective states induced. In essence, it highlights the importance of studying the qualitative aspects of WOM and the need for a holistic view considering both "what" and "how" WOM comments are presented.

Finally, this study also enriches the environmental psychology approach to affect. It offers a novel stimulus taxonomy which would evoke affective states so as to influence consumers' responses. Additionally, it underscores the impact of social conceptualization of environmental stimuli

through an investigation into the effects of commentary presentation, commentary content, and their interaction. Furthermore, it advocates the role of dominance in predicting approach-avoidance behavior. The dominance dimension is a part of the original M-R model, but is often omitted in recent studies. This study elucidates the importance of incorporating the dominance dimension when examining approach-avoidance behavior in social contexts.

4.6.3. Practical Implications

Entertainment marketing practitioners have long been concerned about the design issues of advertising platforms. Social media with commentary systems represent a powerful means by which consumers may obtain valuable information about entertainment, such as movies. Despite the commercial interest in various social media platforms as new conduit for movie advertising, the question of how to leverage the capabilities of such new media to achieve communication objectives is still not foreordained.

This study provides important implications for the design and leverage of affect-related capabilities of social media. This research calls for practitioners' attention to design features with possible affect-eliciting quality.

Specifically, our research suggests that to leverage the persuasive power of online commentary presentation systems, marketers could strategically employ *danmaku* to attract users' attention and arouse their interests, especially when humorous comments are presented. Our findings suggested that *danmaku* commentary subtitle system would be highly encouraged (as opposed to traditional commentary presentation) for showing movie trailers, together with humorous comments.

Furthermore, our results imply that consumers are more likely to experience the arousing video watching experience when humorous comments are presented and when they are looking for fun and enjoyment. When consumers are looking for helpful information about the movie, traditional separate commentary presentation will be more effective in conveying such informational content.

In addition, our findings indicate that it is important for *danmaku* platforms to cultivate a humorous community whereby users love to make others laugh.

4.6.4. Limitations and Future Research

We note a few limitations to the current study. For example, we only consider a limited set of movie trailer (of four common movie genres) in our experiments. The experimental stimuli were purposely chosen to be unfamiliar to the average participants. Consequently, participants were less likely to have pre-existing attitude or feelings toward the movie. Different results may have been obtained with movie trailers which are part of a movie series or adapted from a famous novel. Trailers of such movies might also elicit pre-existing feelings about the movie or a mental presentation of movie by imaging how screenwriters may adapt the plots of the novel. However, it is beyond the ability of this study to consider several movie genres of varying degree of familiarity simultaneously within a single research model. Future study might consider the different mechanisms through which affect might be elicited for different movie trailers, by the same design feature (e.g., commentary presentation).

In addition, our research focuses on two specific categories of WOM (i.e., informational and humorous), which are most common in the context of movie and entertainment. Future studies might consider other qualitative aspects of WOM and how they interact with different WOM presentation.

Lastly, the *danmaku* commentary presentation employed in the experiments does not support the editing of the *danmaku* subtitle (e.g., adjusting font size, font color, font transparency of the comments, etc.) while viewing the movie trailer. It is possible that some special effects generated by these disabled editing tools might increase the perceived playfulness of the interface and consumers' enjoyment during the processes of viewing and posting comments. Future research may investigate how the increase in playfulness and enjoyment enabled by editing tools would influence the affective states of consumers.

4.7. Conclusion of Study Two

This research investigates consumers' response to an emotionally interesting but potentially distracting presentation of user-generated content (i.e., *danmaku*) in the context of entertainment marketing. Our findings indicate that environmental stimuli, such as commentary presentation, are capable of eliciting affect, which in turn affects consumers' approach and avoidance behavior. Furthermore, the effect of commentary presentation on affective states is contingent upon the commentary content. In particular, the emotional benefits of *danmaku* (compared with separate commentary) presentation in terms of arousing interest would be more salient when it is leveraged to convey humorous comments. In contrast, traditional separate commentary

presentation outperforms *danmaku* in promoting dominance, when it is employed to disseminate informational content and facilitate consumer learning. This study advances current knowledge about affect and WOM, and provides important implications for the design of social media advertising platforms.

CHAPTER 5. CONCLUSION

Despite the commercial interest in various forms of distractions (e.g., pop-ups, animations, etc.), research on interface design typically cautions against the rampant use of such distractions. Yet, a growing body of research has reported the latent benefits of distracting website features (e.g., Parmentier et al. 2010; Tan et al. 2015). These studies conjecture that Internet users and platform owners can leverage certain forms of distractions to craft decision making and enhance decision quality. Nevertheless, a contingency approach which investigates when distractions are beneficial is rare. This thesis, which comprises two studies, is aimed at understanding (1) whether "distracting" website features can be constructive if used strategically, and (2) when would the latent benefits of distracting website features be more salient.

Answers to these questions are timely and important to both practitioners and researchers. As marketers and platform owners are increasingly employing multitudes of distracting features to support various aspects of user interaction (e.g., to mediate user-interface interaction, to foster pleasant social interaction, to intervene decision making, etc.), inquiries into the use and evaluation of distracting website features become vital.

Furthermore, a review of the Human-Computer Interaction (HCI) literature suggests that distracting website features are primarily employed to attract users' attention to specific information (e.g., commercial messages) on the screen (Davenport and Beck 2001; Gao et al. 2005). Yet, a growing body of literature has documented more innovative use of distracting website features, such as interaction mediators (e.g., live help pop-ups), social actors

(e.g., animated user-generated content) and decision making intervener (e.g., pop-ups with task-related information). Therefore, researchers are calling for a more balanced and contingent perspective of the use and evaluation of distracting website features (Al-Natour and Benbasat 2015; Brajnik and Gabrielli 2010).

The thesis provides two examples of strategically designed intervention. The first study conceptualizes distracting website features (operationalized as pop-ups) as decision interveners that could be strategically evoked to leverage the benefits of unconscious thought. Moreover, consumers who are experiencing asynchrony between the circadian preference and time of decision are more likely to benefit from the unconscious thought compared with those experiencing synchrony between the circadian preference and time of decision, when making complex purchase decisions. It implies that distracting website features could be strategically designed to intervene and craft decision making (e.g., by disrupting the continuity of product evaluation and consequently inducing unconscious thought) in the context of complex online shopping. The cognitive benefits (e.g., performance gains) of such strategically designed intervention could be more salient when it is tactically evoked for specific groups of users at specific times (e.g., when consumers are experiencing asynchrony between their circadian preference and time of decision).

The second study examines an affect-eliciting distracting feature (*danmaku* commentary presentation) which could be strategically applied to induce exciting interaction with the social media platform in entertainment marketing settings. It shows that a distracting form of commentary

presentation (as opposed to traditional commentary presentation with separate review sections) is capable of eliciting more exciting but less dominant user experience, which in turn affects consumers' approach and avoidance behavior. Furthermore, the emotional benefits of *danmaku* (compared with separate commentary) presentation in terms of arousing interest would be more salient and the emotional disadvantages of *danmaku* in terms of dominance could be mitigated when it is leveraged to convey humorous comments. Hence, *danmaku*, as a strategically designed intervention, works better when it is employed to display humorous content for users who are seeking fun and enjoyment.

The thesis contributes to prior literature on information systems (especially HCI) and a few reference disciplines (e.g., psychology) in several noteworthy ways.

First, this thesis challenges and re-defines intervening (or "distracting") website features. Specifically, the first study challenges the long-held assumption in HCI literature that conscious thought supported by distraction-free Website always leads to optimal choices. The second study further enriches our understanding of seemingly "distracting" feature on video sharing websites (i.e., *danmaku*) and suggests that it could be employed to arouse interests in users, especially when it is conveying humorous content. Together, these two studies advance the literature in human-computer interaction by transforming the role of distracting website features from a destructive one to a constructive one.

The second study further complements the conventional cognition-driven approach to HCI by elucidating the role of affect-eliciting features (i.e., commentary presentation) in the context of entertainment marketing. By conceptualizing commentary presentation as an affect-eliciting design feature, it establishes the connection between affect experienced by consumers and the possible affect-eliciting quality of interface design features.

Second, our research also has important implications for the broad topic on user adoption and continued use of technology in that many information technologies are complex innovations and the adoption decisions are difficult. For example, the first study suggests that users' perception about the attributes of a technology and their adoption decision may also be made in the unconscious thought mode. Indeed, such unconscious adoption decisions may even be better than would they been made in the conscious thought mode. Additionally, the second study advocates that the adoption and use of social media platforms should consider both the characteristics of the media (e.g., order and complexity) and the messages intended to convey via the media (e.g., informational or humorous content). How users make adoption and continued use decisions is a topic of value. A fruitful way to expand this stream of literature may be through data analytics. For instance, the first study implies that data mining techniques can be applied to estimate a customer's circadian preference. Accordingly, different strategies (UT or CT) can be evoked at different time periods to facilitate consumer decision making. Similarly, the second study points to the value of text mining and content analysis of user-generated content and the opportunities for platform owners to populate or de-populate certain content at different social media platforms (e.g., to make

humorous content more accessible and information content less accessible on a *danmaku* video sharing website).

Furthermore, the thesis has made important contributions to the literature on psychology. For instance, the first study extends the Unconscious Thought Theory (UTT) by manifesting the unconscious thought effect in a novel bounding condition. UTT is a relatively immature theory and suffers from mixed empirical findings. To explain why the UTT paradigm (e.g., Dijksterhuis 2004) could not be consistently manifested in a few studies (Acker 2008), it is believed that the unconscious thought effect is constrained by a number of boundary conditions. Drawing on the literature about circadian preference and cognitive function, we zoom in on a very important boundary condition. Specifically, we find strong evidence of better performance of unconscious thought over conscious thought under asynchrony condition. Hence, this study points the way forward for future experiments about UTT and advocates the need to examine the interplay between personal characteristics and temporal factors.

Furthermore, the second study advances our understanding of the environmental psychology approach to affect. Specifically, it elucidates a social conceptualization of environmental stimuli through an investigation into the interplay between commentary presentation and commentary content. Additionally, it underscores the role of dominance in predicting approach-avoidance behavior in marketing context. The dominance dimension is a part of the original M-R model, but is often omitted in recent studies. Nevertheless, the sense of dominance is instrumental in influencing users' avoidance

behavior in the marketing context whereby users' power and freedom to decide whether to approach or avoid commercial messages are vital.

In essence, we take an important step toward understanding the cognitive and affective benefits of distracting website features and the contingent conditions in which the benefits would be more salient. It demonstrates that distractions, if strategically designed, are capable of gaining cognitive and affective benefits. The thesis has made critical contributions to the literature on information systems and a few reference disciplines.

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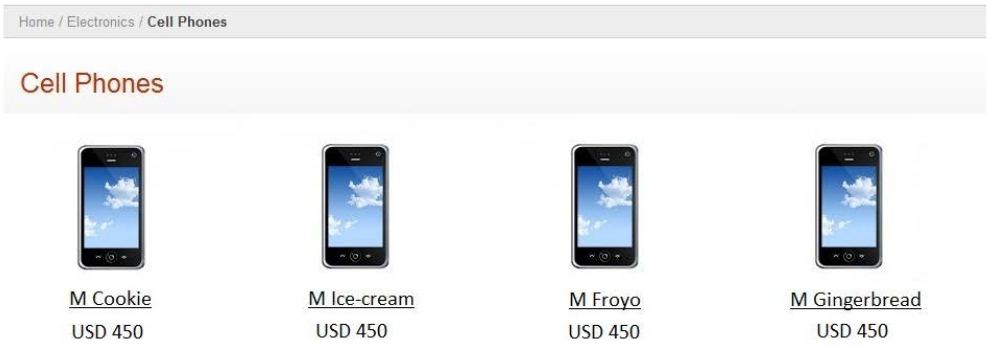
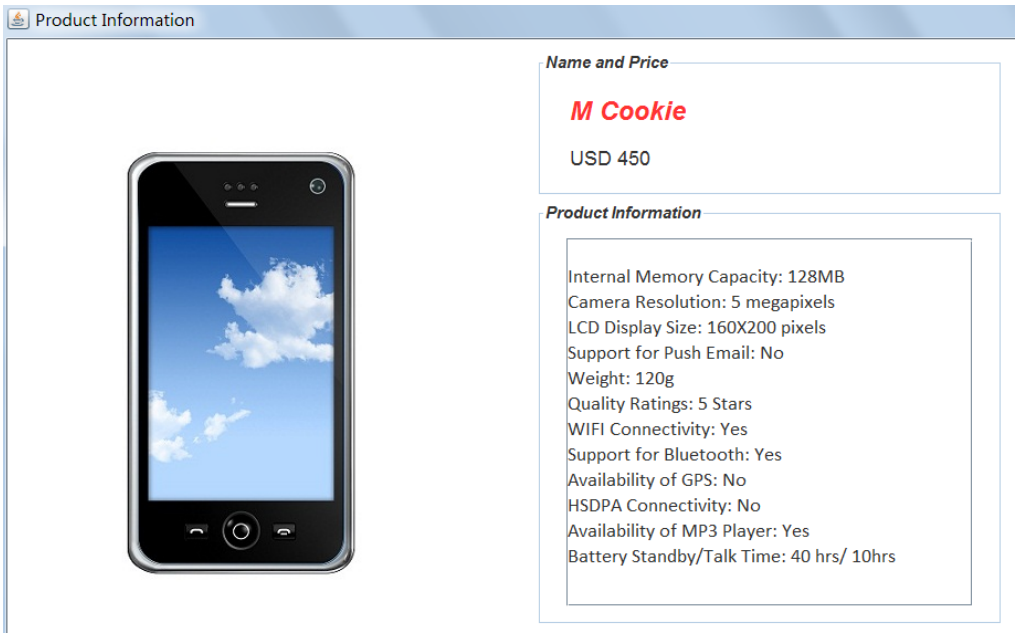
APPENDICES

Appendix A: Screenshots of Experimental Website of Study One

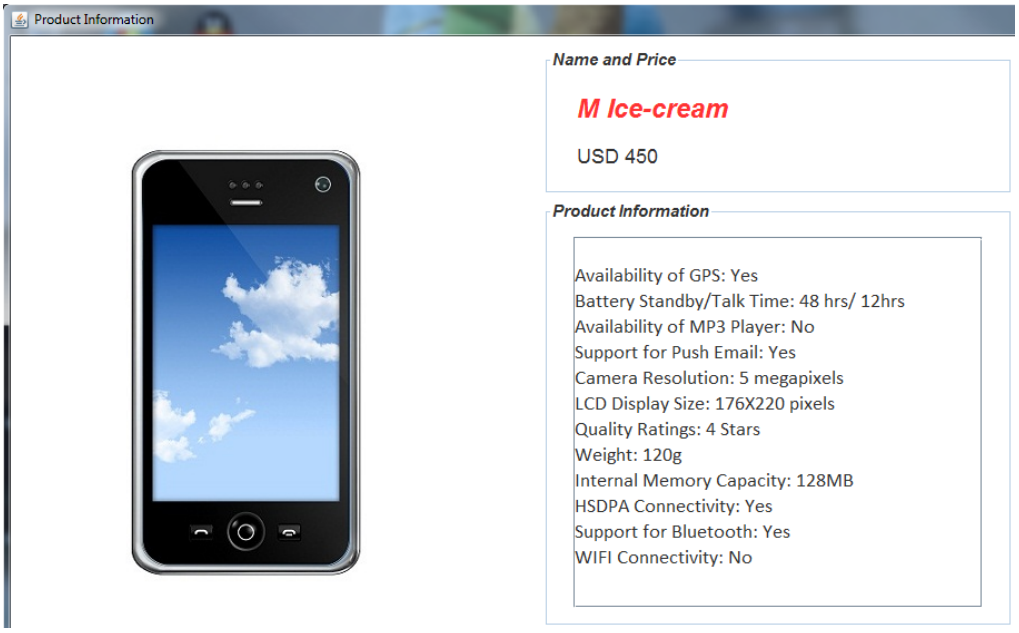
Screenshot of Product Overview



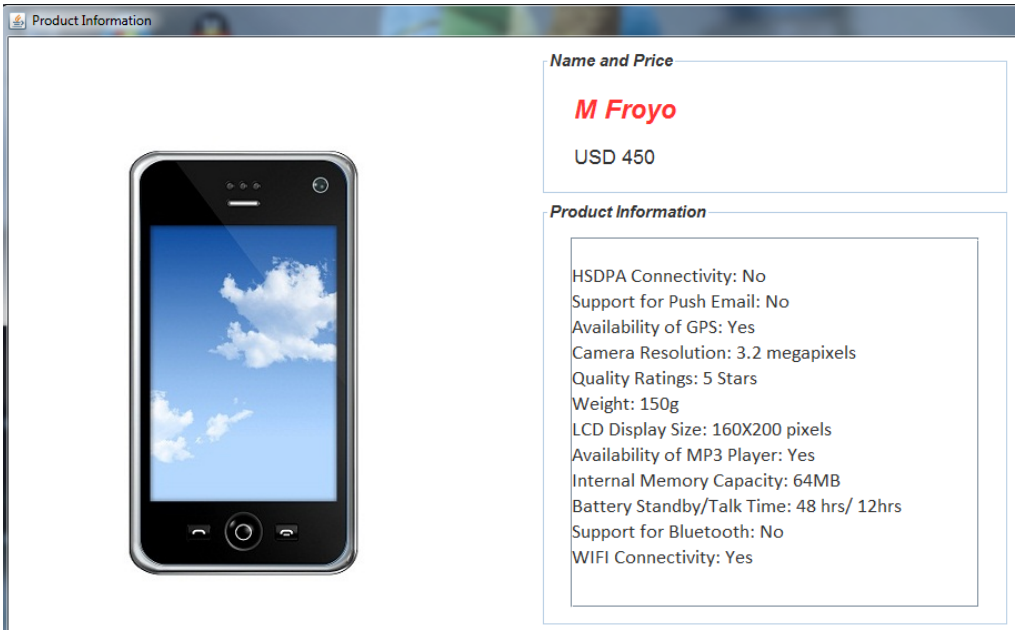
Screenshot of Product Information Page: M Cookie



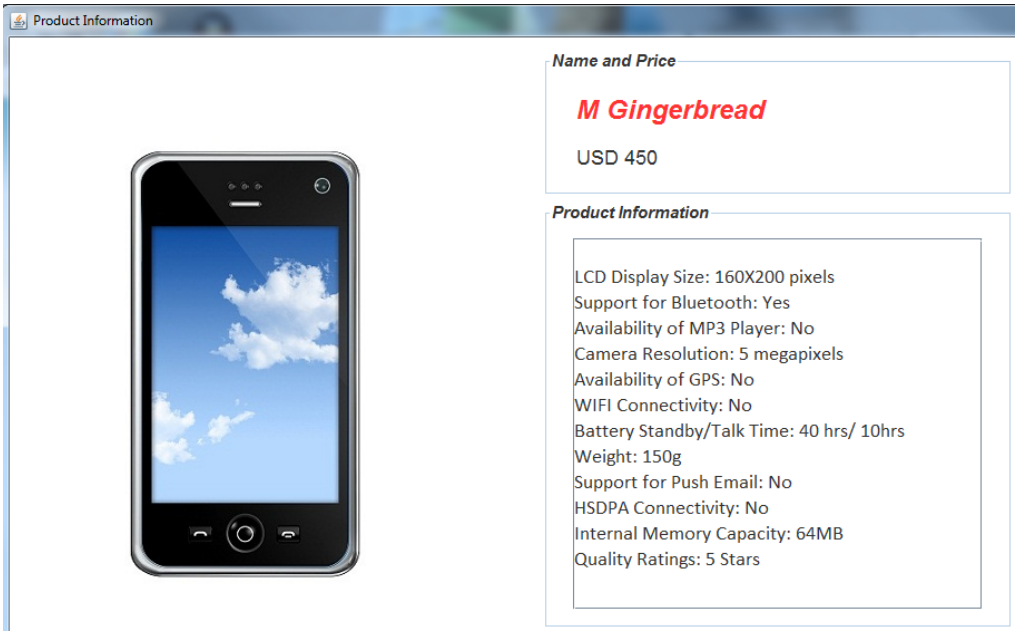
Screenshot of Product Information Page: M Ice-cream



Screenshot of Product Information Page: M Froyo

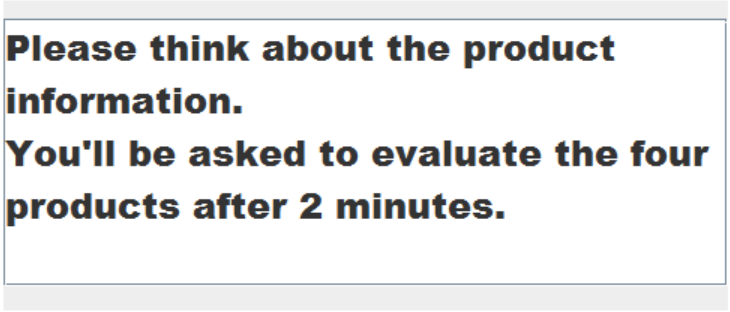


Screenshot of Product Information Page: M Gingerbread

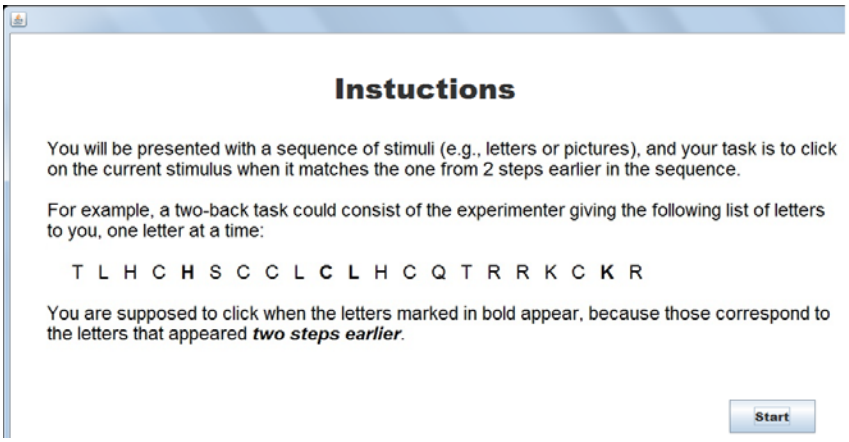


Appendix B: Screenshot of Distraction Pop-up of Study One

Screenshot of Deliberation Window (Conscious Thought Condition)



Screenshot of Distraction Pop-up (Unconscious Thought Condition)



Appendix C: Product Design of Study One

Product Attributes Design

Among the four products, there was one best product with 75% desirable attributes, two mediocre products with 60% and 40% desirable attributes respectively, and one poor product with 25% desirable attributes.

Detailed Product Information

Alternative 1 – M Cookie (USD 450)

	Attribute Value	Positive (+) / Negative (–)[7]
LCD Display Size	160×200 Pixels	(–)
HSDPA Connectivity	No	(–)
Camera Resolution	5 Megapixels	(+)
Quality Ratings	5 Stars	(+)
Battery Standby/Talk Time	40hrs / 10hrs	(–)
Weight	120g	(+)
WIFI Connectivity	Yes	(+)
Internal Memory Capacity	128 MB	(+)
Support for Push Email	No	(–)
Support for Bluetooth	Yes	(+)
Availability of GPS	No	(–)
Availability of MP3 Player	Yes	(+)
	Percentage of Positive Attributes	58.3%

Alternative 2 – M Ice-cream (USD 450)

	Attribute Value	Positive (+) / Negative (–)
LCD Display Size	176×220 Pixels	(+)
HSDPA Connectivity	Yes	(+)
Camera Resolution	5 Megapixels	(+)
Quality Ratings	4 Stars	(–)
Battery Standby/Talk Time	48hrs / 12hrs	(+)
Weight	120g	(+)
WIFI Connectivity	No	(–)
Internal Memory Capacity	128 MB	(+)
Support for Push Email	Yes	(+)
Support for Bluetooth	Yes	(+)
Availability of GPS	Yes	(+)
Availability of MP3 Player	No	(–)
	Percentage of Positive Attributes	75% (Best)

[7] An attribute value that is more desired and better than that of alternatives is marked as positive. An attribute value that is less desired or worse than that of alternatives is marked as negative. For example, because smartphones with larger LCD display size is better, 176×220 Pixels is positive while 160×200 Pixels is negative.

Alternative 3 – M Froyo (USD 450)

	Attribute Value	Positive (+) / Negative (–)
LCD Display Size	3.2 Megapixels	(–)
HSDPA Connectivity	No	(–)
Camera Resolution	160×200 Pixels	(–)
Quality Ratings	5 Stars	(+)
Battery Standby/Talk Time	48hrs / 12hrs	(+)
Weight	150g	(–)
WIFI Connectivity	Yes	(+)
Internal Memory Capacity	64 MB	(–)
Support for Push Email	No	(–)
Support for Bluetooth	No	(–)
Availability of GPS	Yes	(+)
Availability of MP3 Player	Yes	(+)
	Percentage of Positive Attributes	41.7%

Alternative 4 – M Gingerbread (USD 450)

	Attribute Value	Positive (+) / Negative (–)
LCD Display Size	160×200 Pixels	(–)
HSDPA Connectivity	No	(–)
Camera Resolution	5 Megapixels	(+)
Quality Ratings	5 Stars	(+)
Battery Standby/Talk Time	40hrs / 10hrs	(–)
Weight	150g	(–)
WIFI Connectivity	No	(–)
Internal Memory Capacity	64 MB	(–)
Support for Push Email	No	(–)
Support for Bluetooth	Yes	(+)
Availability of GPS	No	(–)
Availability of MP3 Player	No	(–)
	Percentage of Positive Attributes	25%

Appendix D: Instructions for Participants of Study One

Instructions for Participants

1. During the experiment, you will be asked to evaluate and compare four M-Series smartphones from an online auction website. Hence, you may want to decide fast before others bid for the same product or before the auction closes.
2. Please note that every step in this experiment is guided. So please pay attention and follow our instructions closely.
3. You will be given detailed attribute information about each product. You have to differentiate the four products in terms of their overall quality, and choose the best product before the auction closes. To help you make product judgment, we will be teaching you how to evaluate the product based on the attribute vales. The following criteria should be used when evaluating the products:

Product Attribute	Criteria for Choice
Quality ratings	More "stars" awarded
Battery standby/talk time	Longer battery standby / talk time
Weight	Lighter weight
LCD display size	Larger display
HSDPA connectivity	HSDPA connectivity available
Camera resolution	Higher camera resolution
Availability of GPS	GPS available
Availability of MP3 player	MP3 player available
Support for push email	Push email supported
Support for Bluetooth	Bluetooth supported
WIFI connectivity	WIFI connectivity available
Internal memory capacity	Larger internal memory

4. Please make judgment based on the criteria above, ***NOT*** your personal preference.
5. Each product attribute is ***equally important*** to you. Please consider every product attribute in your product evaluation. In other words, the more better-ranking attributes the product possesses the better the product is.

6. (For UD condition only) As you are making your purchase decision, a pop-up window will appear. Please do NOT close the window. You will be redirected back to the main auction window automatically.
7. You will have to choose the product that you deem the best. At the end of the experiment, you will be paid according to the following scheme:

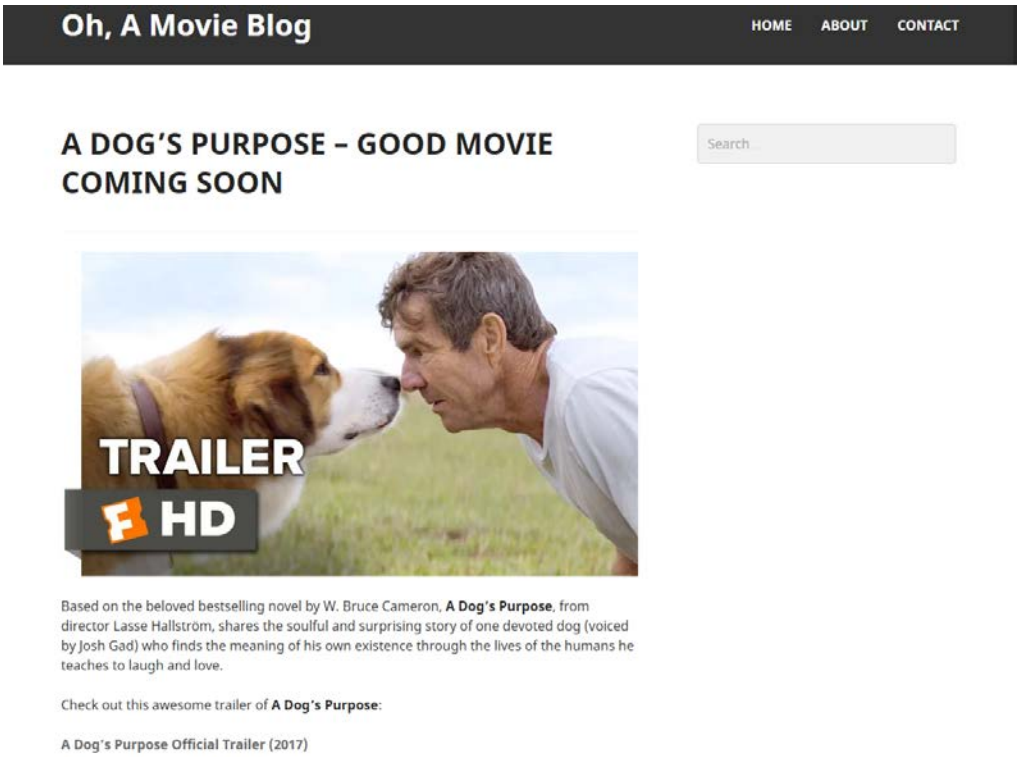
Product Selected	**Bonus Awarded**
Best	$6
Average	$4
Worst / No choice	$2

Appendix E: Experimental Stimuli (Movie Trailers) of Study Two

Movie	Genre	Link
A Dog's Purpose (A)	Comedy	http://www.bilibili.com/video/av6069229/
Audrie & Daisy (B)	Documentary	http://www.bilibili.com/video/av6066090/
A United Kingdom (C)	Biography, Romance	http://www.bilibili.com/video/av6041741/
Collateral Beauty (D)	Drama	http://www.bilibili.com/video/av6213504/

Appendix F: Screenshot of Experimental Website of Study Two

Movie Blog Introducing the Trailer



Danmaku Commentary Presentation

Appendix G: Measurement Items for Study Two

Construct	Survey Items	Source
Predictors		
Informational Content (INF)	I find the user-generated comments/reviews on this video sharing website to be valuable. The user-generated comments/reviews on this video sharing website are resourceful to me. The user-generated comments/reviews on this video sharing website are useful to me. I think of user-generated comments/reviews on this video sharing website as an information source.	Mathwick et al. (2008)
Humorous Content (HUM)	The user-generated comments/reviews on this video sharing website are fun to read. I find the user-generated comments/reviews on this video sharing website to be humorous. The user-generated comments/reviews on this video sharing website have a good sense of humor.	Duncan et al. (1984)
Mediators: Affective States		
Pleasure (PLE)	I felt satisfied watching this movie trailer. I felt contented watching this movie trailer. I felt happy watching this movie trailer.	Mehrabian and Russell (1974)
Arousal (ARO)	I felt excited watching this movie trailer. I felt stimulated watching this movie trailer. I felt wide-awake watching this movie trailer.	Mehrabian and Russell (1974)
Dominance (DOM)	I felt that I had a lot of control over my visiting experiences at this video sharing website. While surfing the web, my actions decided the kind of experiences I got on this video sharing website. While I was on this video sharing website, I controlled what happened in my video watching experience.	Mehrabian and Russell (1974); Mazaheri et al. (2011)
Dependent Variables		
Movie Watching Intention (MWI)	It is likely that I will watch the movie. I will watch this movie soon. Suppose a friend calls me to get my advice in his/her search for a movie, I would recommend him/her to watch this movie. I intend to watch this movie after it is released.	Jiang and Benbasat (2007b); Verhagen et al. (2014)
Positive Rating Intention (PRI)	I intend to give positive feedback on this movie trailer and share it to my social networking sites. It is likely that I will give positive rating to this movie trailer.	Bock et al. (2005)
Negative Rating Intention (NRI)	It is likely that I will give negative rating to this movie trailer. I intend to give negative feedback on this movie trailer and share it to my social networking sites.	Bock et al. (2005)
Controls		
Trailer Familiarity (TF)	I am familiar with the movie trailer. I am familiar with the director(s) of the movie. I am familiar with the writer(s) of the movie.	Jiang and Benbasat (2007a)

	I am familiar with the cast of the movie. I am familiar with the storyline of the movie.	
General Attitude toward Movies (GAM)	I think the movies are fairly interesting. The movies are the most vital form of art today. Movies are good entertainment. I have a great interest in movies.	Perera (2000)
Need to Evaluate (NES)	I pay a lot of attention to whether things are good or bad. I like to decide whether new things are really good or really bad. I want to know exactly what is good and bad about everything.	Jarvis and Petty (1996)
Manipulation Checks		
Order (ORD)	My interaction with this website was clear and understandable. The content on this video sharing website was easy to read. The content on this video sharing website was clear.	Brunner-Sperdin et al. (2014)
Complexity (CMP)	The video sharing website is complex. The video sharing website is overwhelming. The video sharing website is crowded.	Nadkarni and Gupta (2007); Wang et al. (2014)
Confounding Checks		
Technology Novelty (TN)	I find the experience I had watching the movie trailer to be a novel experience. The interaction process I had watching the movie trailer is new and refreshing. The interaction I had watching the movie trailer represents a novel way of evaluating movies.	Wells et al. (2010)
Information Amount (IA)	From the video sharing website, I learned a great deal about the movie. The video sharing website I visited was very informative to me. The video sharing website I visited was very resourceful to me.	Kim and Lennon (2010); Mazaheri et al. (2011)