BEYOND USABILITY — AFFECT IN WEB BROWSING

A Dissertation

by

LIQIONG DENG

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2006

Major Subject: Information and Operations Management

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Approved by:

Chair of Committee,	Marshall Scott Poole
Committee Members,	Evan Anderson
	Joobin Choobineh
	Richard Street
Head of Department,	Dean Wichern

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ABSTRACT

Beyond Usability — Affect in Web Browsing. (August 2006)

Liqiong Deng, B.A., Fudan University, China;

M.A., Fudan University, China

Chair of Advisory Committee: Dr. Marshall Scott Poole

This research concentrates on the visual aesthetics of a website, investigating the web user's affective/emotional reactions to different designs of web homepage aesthetics and their influence on subsequent behaviors of web users. Drawing on the existing theories and empirical findings in environmental psychology, human-computer interaction, aesthetics, and marketing research literature, a research model is developed to explore the relationships between the visual aesthetic qualities of a website homepage – webpage visual complexity and order, induced emotional states in users, and users' approach behaviors toward the website. The model predicts that the visual aesthetics of a web homepage elicit specific emotional responses by provoking intrinsic feelings of pleasantness / unpleasantness, arousal, as well as motivational pleasantness / unpleasantness in web users. These elicited emotional responses, which mediate the effect of homepage aesthetic features, in turn affect web users' subsequent behaviors toward the website, such as further approaching/exploring or avoiding the website.

A set of pilot studies and a main laboratory experiment were conducted to test the model and its associated hypotheses. Based on the results of pilot studies, 12 versions of a Gift website's homepage, which varied at four levels of complexity and

three levels of order, were selected the stimuli materials for the main experiment. A total of 467 undergraduate students participated in the main study. During the main study, we instructed the participants to browse the homepage stimuli for a goal-oriented web search activity or an excitement/enjoyment-seeking web browsing activity, measured how they felt about the homepage and their degree of approach/avoidance tendencies toward the entire website. The results of the study generally confirmed the belief that a web user's initial emotional responses (i.e., pleasantness and arousal) evoked by the aesthetic qualities of a website's homepage he/she first encounters will have carry-over effects on his/her subsequent approach behaviors toward the website.

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CHAPTER I

INTRODUCTION

1.1 Motivation and Problem Statement

During the past twenty years, designing for usability has been one of the primary foci of human-computer interaction (HCI) research, which informs website design and provides guidelines for developing usable websites. Traditionally, task performance regarding the effectiveness and efficiency of the systems in supporting user tasks has been considered central to the design of websites. Norman and Draper (1986), for example, argue that websites should be carefully designed to meet criteria that can lead to improved user performance.

An explosion of usability research has examined the cognitive processes of users in explaining and predicting users' responses to media stimuli and user performance while they are interacting with computer system (Eveland and Dunwoody 2001; Ahuja and Webster 2001; Nielsen 2000). While this stream of research has produced numerous guidelines, tools, and methods for developing useful and easy-to-use website to web activities, however, relatively less attention has been directed to the nature of users' affective responses to website features, or to the interplay between users' cognitive and affective responses when they interact with websites.

This dissertation follows the style of MIS Quarterly.

Only recently have researchers begun to pay closer attention to the affective aspects of user interface design (Norman 2003; Dillon 2001). In contrast to the traditional approach to website design, which places emphasis on measurable criteria of user performance, the new perspective on user interface design closely relates the assessment of a website to the subjective experience of specific users with the interface in a specific context of use. It has become increasingly evident that the user's evaluation and perception of a website is intrinsically subjective and is based on the user's personal interpretation of the system and his/her interaction with it (Agarwal and Venkatesh 2002).

The emphasis on user experience requires us to look beyond the objective assessment of user performance to the subjective states that form the context for perception, thought and action. Affective or emotional reactions constitute a critical component of subjective experiences. A human being's affective system is judgmental, assigning positive or negative valence to the environment rapidly and efficiently (Norman 2002). Affect is therefore closely linked to attitudes, cognitions and motivations. It influences and mediates specific aspects of interaction with a user interface.

Affective computing has emerged as an area of computing relating to, arising from, and deliberately influencing human emotion (Picard 1997). It enables a form of human-computer interaction in which a computing device has the ability to detect, evaluate, and appropriately respond to its user's emotions and other stimuli. Through affective computing, a computing device could gather cues to user emotion from a user's

posture, gestures, words, and facial expressions, evaluate the user's psychological state, and respond in an emotionally-aware way to the user. For example, in e-learning situations, the computer could detect from available emotional cues when the user is having difficulty and then offer expanded explanations or additional information to the user.

While affective computing emphasizes a computer system's capability of sensing and responding to different human emotions, there is another important aspect of system design that needs to be addressed – giving system the ability to evoke specific emotions in users so as to facilitate certain psychological states and behaviors. This research recognizes the importance of user's emotional responses for web interface design and focuses on the potentials of different design features of a website to elicit certain emotional responses in users, which in turn influence the way users manipulate and explore the website. On the Internet, as customers are presented with a proliferation of choices of different websites, they can move from one website to another effortlessly. Bucy (2000) argues that emotional responses may determine which interfaces (e.g. Websites) people choose to use, as they seek pleasure or enjoyment beyond just task efficiency. The recent shift from usability to "user experience" places emphasis on the aesthetics of interface design, and stresses the need for interfaces that promote engagement, fun, and delight rather than just functionality or ease-of-use (Marcus 2002; Wright, McCarthy and Marsh 2001).

1.2 Purpose of the Dissertation

Given the important role that human affect plays in the interpretation, exploration and appraisal of a user interface, it is important to understand how web design features influence human affect and shape users' perceptions of the website. Giving prominent attention to the way users feel about the website interface is important to predicting the user's thought and action, as well as to enhancing user experience. While numerous usability studies have investigated users' cognitive processes during their interaction with computer interfaces, very few are devoted to examining users' affective experiences (Norman 2002). In response to this need, this dissertation attempts to identify the web design features influencing a user's subjective experience and perception of a website by focusing on the user's affective/emotional experiences during their initial encounter with a website interface.

While a web user's emotional responses can be influenced by all aspects of a website, such as the content and design of a website, this research focuses on the visual aesthetic qualities of webpage, with special attention to how different webpage layout designs make a difference in the web users' aesthetic perceptions of the webpage and their emotional responses and subsequent approach behaviors toward the website. Some recent human computer interaction studies (Lindgaard et al. 2005) show that, in the blink of an eye, web users make nearly instantaneous judgments of the "visual appeal" of a website, which then influence the rest of their experience with the website. It has been well documented that visual aesthetics play an important role in our everyday life. People are affected by the aesthetics of nature and of architecture (Nasar 1988; Porteous

1996). For instance, a person's physical attractiveness may influence people's assumptions about his or her personality traits. With a focus on webpage visual aesthetics, this dissertation sets out to investigate web users' emotional reactions to different designs of web homepage aesthetics during the users' initial encounters with the websites and predict that the users' affective responses influence their subsequent approach-avoidance behaviors toward the websites, such as staying within a particular website and exploring the site deeper, or leaving the site and moving on to other sites.

It has been shown that web users' approach tendency is highly related to the success of a website and leads to more time spent browsing, more varied products explored, a higher response to promotional incentives, and enhanced probability of purchasing (Menon and Barbara 2002; Tai and Fung 1997). By relating webpage aesthetic features to web users' approach-avoidance behaviors through the mediating effects of users' affective responses, this research provides a new perspective for website design theory and practice and emphasizes the importance of affective design for a website's success. Considering the important role of aesthetic design in determining which website web users may prefer (Schenkman and Jonsson 2000) and in affecting users' perceptions of other qualities of website (van der Heijden, 2003), this research is expected to contribute to our knowledge of web aesthetics by identifying determinants of web visual aesthetics and studying their effects on web user's emotional, psychological and behavioral responses. This research will also be of interest to managers and web designers by providing guidelines for website presentation and customization to enhance user experience. Possible future extensions of this research may include examining the

effect of web content as a determinant of user emotional responses and integrating it with the effect of web layout design for a complete understanding of affective web design.

This dissertation will be organized as follows. Chapter II will review related literature on emotions, aesthetics, and human-computer interaction (HCI). Chapter III will propose a research model of how the aesthetic qualities of a webpage elicit users' emotions and influence their subsequent behaviors toward the webpage. Chapter IV will discuss research methodology, including sampling strategy, experimental procedure, and measurement. Data analysis and results will be discussed in chapter V. Chapter VI will be devoted to the discussion of the key findings of this study. In Chapter VII, the research model will be revisited based on the results. Some implications for webpage design and suggestions for IS-emotion research will be addressed along with future research.

CHAPTER II

THEORETICAL BACKGROUND

2.1 Affect, Feeling, and Emotion

Affect, feeling, emotion are closely related terms and are often used interchangeably in the same context. According to Tomkins (1991), when people are affected by something, they experience an emotion as a result. He identifies nine distinct affects – six negative affects, two positive affects, and one neutral affect – to describe the expression of emotion in all human beings. Most of these affects are defined by pairs of words that represent both the least and the most intense expressions of a particular type of affect. The six negative affects include anger-rage, fear-terror, distress-anguish, shame-humiliation, disgust, and dissmell. The two positive affects are interest-excitement and enjoyment-joy, and surprise-startle is the neutral affect. Tomkins (1991) also distinguishes among affect, feeling, and emotion. He suggests that affect is the innate physiological response pattern to a given set of external and internal stimuli. Affect becomes a feeling when the individual is consciously aware of it and able to appreciate and comprehend it. Emotion is created when the individual associates his/her prior experience with the feeling and amplifies the awareness of feeling.

While it is difficult to accurately define emotion due to the complex nature of emotion, Tomkins' theory, together with other theories of emotion, suggests several key components to emotion. Firstly, emotion is stimulated by a pattern of physiological change. James (1884) argues that emotion results from bodily changes/reactions to emotion-provoking stimuli. Secondly, emotion involves cognitive processing that

interprets or appraises the situation. Schachter and Singer (1962) suggest cognitive labeling/interpretation of the arousal is necessary to experience a strong emotion. Lazarus (1982) argues that positive or negative appraisal of the situation triggers physiological arousal and the feeling of an emotion. Thirdly, the emotion experience is constituted by facial expressions and non-verbal behaviors. Buck (1980) suggests that emotion is the experience of changes in our facial muscles, which send messages to the brain that both identify the emotion we are feeling and intensify it. Finally, emotion is experiential as it is elicited by the awareness of feeling or affect (Tomkins 1991).

2.2 Determinants of Emotions

When it comes to the question of what determines affect/emotion, there has never been a shortage of ideas. This topic has been under heated debate for over a thousand years. The focus of the debate has been on the occurrence, order of, and interaction among the components of emotion. Different theories provide different accounts of which component comes first and must be present in the emotional experience. The James-Lange theory of emotion (1894) argues that an emotion-provoking event first brings about physiological arousal in the individual and then he/she notices and interprets this arousal. The emotion is experienced only after the interpretation of the arousal. If the arousal is not noticed or interpreted, then no emotion is experienced based on this event. The Cannon-Bard theory (1927) criticizes the James-Lange theory on the basis that the physiological changes, such as bodily changes, were too slow to initiate an emotional response and not sufficiently differentiated to distinguish one emotion from another. They argue that people experience physiological arousal and

emotion at the same time, and that arousal and emotion do not cause each other. When a person perceives a stimulus, the thalamus simultaneously sends impulses to the cortex of the brain and the sympathetic nervous system so that he/she will feel the physiological arousal and subjective feeling at the same time. According to Schachter-Singer theory (1962), physiological arousal and cognitive labeling of the arousal based on the situation are the two necessary components for emotional experience. They suggest that an event causes physiological arousal first. Then the individual must identify a reason for this arousal and label it in terms of a specific emotion based on the current situation. In Buck's facial feedback theory (1980), emotion is a function of the experience of changes in people's facial muscles. So, it is the changes in people's facial muscles that cue their brains and provide the basis of their emotions. Lazarus' (1982) cognitive appraisal theory states that a cognitive process must come before any physiological arousal. In the absence of physiological arousal, people first perform a "cognitive appraisal" of their situation before they can experience an emotion. Lazarus (1982) suggests that emotional stimuli are appraised using the following sequence: 1) primary appraisal - the situation is evaluated as positive, negative, or neutral based on how it may affect individual's personal well-being; 2) secondary appraisal - the individual then considers his/her resources for coping with the situation. 3) re-appraisal - the situation and the coping strategies are monitored and re-evaluated for the duration of the situation.

All of these theories have received some level of support from empirical studies. However, among them, the cognitive appraisal theories represent the dominant class of emotion theories (Frijda 1986). A variety of notions have been developed on the basic

theme of cognitive appraisal theories and the primacy of cognition (Lazarus 1982; Ortony et al. 1988; Frijda 1986; Ellsworth 1988; Mandler 1984; Scherer 1988). The cognitive appraisal theorists view emotion as "valenced reactions to events, agents, or objects, with their particular nature being determined by the way in which the eliciting situation is construed," (Ortony et al. 1988, p. 13). The underlying premise is that emotional responses represent undifferentiated physiological states, and hence cognition is necessary to provide interpretation, which enables conscious experience of a particular emotion and initiates or alters a particular expression or behavior. According to this view, emotion can occur in the following sequence of events: A stimulus is detected, causing a state of bodily arousal, which in turn is interpreted by the cognition to generate an appraisal, on the basis of the individual's goals, motives, and beliefs (Frijda 1986).

The cognitive appraisal theories of emotion seem to be the most promising perspective to explain user's emotional responses to website interfaces. Assuming that appraisal of the emotion-evoking stimulus is a necessary step to bring about different emotions; the cognitive appraisal perspective can identify different emotion-specific patterns of appraisal conditions (Scherer 1993b; Smith and Ellsworth 1985). Positive emotions such as pleasure are elicited by stimuli that are appraised as beneficial or pleasant and negative emotions such as disgust are elicited by stimuli appraised as harmful or unpleasant. Therefore, extending the cognitive appraisal theories of emotion to the website context, we suggest that a user's cognitive appraisals of a website as pleasant or unpleasant will evoke positive or negative emotions in the user.

2.3 Antecedent Appraisal and Emotions

Many cognitive appraisal theorists assume that cognitive appraisal does not necessarily occur at the conscious level of controlled information processing, and that it may also occur at an unconscious, automatic level of processing (Frijda 1993; Lazarus 1991; Scherer 1993a). This assumption leads them to distinguish between two types of appraisal – the appraisal as the antecedent of emotion (e.g., pleasantness and goal-congruence or motive-consistency) and the appraisal as the cognitive elaboration/labeling of the emotion-eliciting stimuli or events (e.g., perceived uncertainty of the event, attribution of agency for the event, and anticipated effort to cope with the event) that may occur as emotion is elicited and thus constitutes an aspect of the emotional experience.

It is generally believed that the first appraisal, the antecedent appraisal, which is similar to Lazarus' (1982) primary appraisal, is automatic in nature and involves only elementary cognitive activity; whereas the second appraisal, analogous to Lazarus' (1982) secondary appraisal, functions to differentiate between more discrete emotions and relies on deliberate, conscious cognitive process. This research focuses on the antecedent appraisal because it determines the valence of emotion, an individual's immediate, automatic response to stimuli. Valence is a fundamental characteristic of emotional experience, which distinguishes between the positive and negative emotional responses and accounts for the largest portion of variance in emotions (Ellsworth 1994). Therefore in the context of website browsing, valence is critical in determining user's initial response to the website, e.g., willingness to further explore or avoid the website.

There are two antecedent appraisal components that have been proposed to distinguish positive emotional stimuli from negative emotional stimuli – the processing of intrinsic stimulus valence (e.g., the intrinsic pleasantness/unpleasantness) (Scherer 1988) and the processing of motivational stimulus valence (e.g., the appraisal of motivational congruence or incongruence) (Lazarus 1991; Scherer 1988). Motivational stimulus valence is also termed as goal-related valence (Scherer 1988), determined by the stimulus' relation to the goals or concerns of the individual. When the stimulus is assessed as helping to reach the individual's goals, motivational stimulus valence is positive; however, negative motivational stimulus valence is perceived when the stimulus is evaluated as hindering the attainment of his/her goals. An intrinsic stimulus valence is defined as the hedonic valence of a stimulus that affects the individual in its own right, independent of the motivational context. Scherer (1988) suggests that intrinsic stimulus valence is a characteristic of the stimulus rather than of its relation to the individual's current goals. A stimulus can be innately pleasant or unpleasant or can acquire the power to evoke pleasure or displeasure through the conditioning or other learning processes (Scherer 1988). De Houwer and Hermans (1994) conceptualize intrinsic stimulus valence as a tag associated with the representation of a stimulus in a semantic memory network, which will become activated on presentation of the stimulus.

Scherer (1988) notes the importance of differentiating between intrinsic stimulus valence and motivational stimulus valence, and further proposes four different emotional states based on the interaction between intrinsic stimulus valence and motivational stimulus valence (See Table 1). An individual will have an "agreeable feeling of

satisfaction" when the stimulus is both intrinsically pleasant and helps reach his/her goals; an individual will feel "regretful" when the stimulus is intrinsically pleasant but hinders him/her from reaching his/her goals; an individual will have "uneasy feelings of satisfaction" when the stimulus is unpleasant and helps the individual to achieve his/her goals; an individual will feel "sullen frustration" when the stimulus is unpleasant and hinders goal attainment.

Table 1. Intrinsic Pleasantness and Goal-Related Valence (Scherer 1988)

	Intrinsically pleasant	Intrinsically unpleasant
Helps reach goals (beneficial, good)	Agreeable feeling of satisfaction	Uneasy feeling of satisfaction
Hinders reaching goals (harmful, bad)	Regret	Sullen frustration

2.4 Dynamics among Dimensions of Emotions

As mentioned before, in the emotion literature, it has been generally agreed that arousal and cognitive appraisal are the two key components of emotion, but neither can be really said to precede or follow the other. Arousal has been defined in a variety of ways in the literature. It has been referred to as the non-specific component of emotion that reflects the intensity rather than the evaluative quality of affect (Whissel et al. 1986). Thayer (1978; 1986) describes arousal as being wide awake, alert, vigorous, excited, and full of pep, while unaroused state is described as being sleepy, sluggish, tired, and relaxed. Arousal is also referred to as an elevated state of bodily function,

representing a nonspecific increment in physiological activity (Eysenck 1976). Berlyne (1960) defines arousal to be a response to increases in task complexity, causing desynchronization of the electroencephalogram (EEG). The common theme emerging from these definitions is the activation of the organism.

While arousal is a non-directional component of emotion, many theories have been offered to relate arousal to the valence of emotions, such as optimal arousal theory, which posits that a moderate level of arousal is pleasant. Among them, reversal theory provides an alternative approach to understanding the dynamics of emotions and the effects of arousal on motivational stimulus valence. It proposes that there are two different meta-motivational states – telic versus paratelic states, in which changes in felt arousal are interpreted and experienced in opposite ways, and that people involuntarily reverse between these two states (Apter 1982). Unlike Hebb's (1955) optimal arousal theory that posits a single optimal arousal level, reversal theory holds that both low and high levels of arousal can be pleasant depending upon which metamotivational state is operative. Reversal theory's telic/paratelic metamotivational states can be represented by two separate curves, each suggesting an opposite way of interpreting arousal. The anxiety-avoiding curve is considered to represent the telic state. The telic (from the Greek "*telos,*" meaning goal) state is characterized as goal-oriented in which the ultimate goal of any ongoing activity is perceived as essential for the individual, and the activity itself is peripheral. In the telic state, a high level of felt arousal is experienced as unpleasant because it is perceived as interfering with the achievement of the goal, and is hence associated with anxiety. Alternatively, low levels of felt arousal in this state are

experienced as pleasant and described as relaxation. Therefore, individuals in the telic state are depicted as serious-minded, future-oriented, and arousal-avoidant (Apter 2001; Kerr 1997).

In contrast to anxiety-avoiding telic state, the paratelic state (from the Greek "*para,*" meaning beside) is directed to excitement-seeking. This state is characterized as activity-oriented since the goal of the activity is not important compared to the ongoing activity, which is engaged in for its own sake, i.e. for the immediate enjoyment which it can provide. Unlike the telic state, a high level of felt arousal in a paratelic state is experienced as pleasant because it is associated with excitement, whereas low levels of felt arousal are experienced in this state as unpleasant and are described as boredom. Thus, individuals in a paratelic state are also characterized as playful, present-oriented, and arousal-seekers (Apter 2001; Kerr 1997). The notion of reversal theory is consistent with that of the cognitive appraisal theory of emotion, which explains why the same stimuli may elicit different emotions in different users.

2.5 Functions of Emotions

Previous research has provided empirical support for the influence of emotions on cognitive processes such as social judgment (Keltner et al. 1993), risk perception (Lerner and Keltner 2000; 2001), and attribution (Lerner et al. 1998). Those findings are consistent with the notion of "feelings as information" (Schwarz 1986), which posits that emotions serve informative functions when individuals make evaluative judgments in a context lacking in relevant information or imposing high constraints of time. Schwarz (1986) also suggests that different emotions are related to different psychological

situations of individuals. For instance, positive emotional states inform individuals that the world is a safe place, one characterized by presence of positive outcomes or lack of threats to current goals. However, negative emotions tell the person that the current situation is problematic, characterized by a lack of positive outcomes or a threat of negative outcomes.

To the extent that individuals are motivated to obtain positive outcomes and avoid negative outcomes, negative emotions cause avoidance behaviors, such as physical movement away from the stimuli; while positive emotions induce approach actions, such as physical movement toward, staying with, and exploring the environment. As a result, advocates of the "feeling-as-information" notion believe that emotions provide people with an adaptive advantage by triggering a set of responses such as physiological changes and overt behavior, which enable the individual to deal quickly with changes in his/her surrounding environment (Frijda 1986; Oatley and Johnson-Laird 1996). According to Niedenthal et al. (1999), the primary purpose of emotional response categories is "to motivate appropriate action". Emotions therefore can be described as states of action readiness, that is, motivational states that engender a specific form of action (Frijda et al. 1986). Frijda et al. (1986) differentiate emotional experiences on the basis of different felt action urges, for example, "I wanted to approach, to make contact", "I wanted to oppose, to assault; hurt or insult", "I wanted to move, be exuberant, sing, jump, undertake things", or "I wanted to protect myself from someone or something". In general, events or stimuli that provoke negative emotions need to be terminated quickly, while those that elicit positive emotion should be continued.

The abovementioned approaches to emotions, along with the cognitive appraisal theory of emotions assuming that emotions are essentially a person's reactions to the stimuli or event in the environment (Ortony et al. 1988), all have converged upon a functional perspective of emotions. The environmental psychology model proposed by Mehrabian and Russell (1974) (the M-R model) not only subsumes the functional, coping view of emotions but also provides a platform to understand how people's responses (e.g., perception and behavior) toward a certain environment are affected by the emotional states induced by the environment. The M-R model (1974) suggests that the emotions function to mediate the effects of certain environmental stimuli or features on human behaviors. Mehrabian and Russell (1974) assume that people's emotions determine what they do and how they do it, and that people respond with different sets of emotions to different environments which, in turn, induces individuals to approach or avoid these environments. The M-R model also specifies the details of approach to/avoidance of the environment as 1) physical movement towards/staying, 2) attention to and exploration, 3) favorable attitude, 4) successful execution of a task, and 5) affiliation (social interaction). Approach-avoidance behavior is considered important for this research, because a web user's approach-avoidance tendency toward the website not only reflects the user's perception of the quality of the website, but it also strongly predicts desired user behaviors pertaining to the measurement of the success of a website, such as customer satisfaction, total number of website hits, user's return rate or future patronage, etc. It has been found that web user's approach tendencies, such as willingness to stay with or explore more about the website, will lead to more time spent

browsing, more varied products explored, a higher response to promotional incentives, and enhanced probability of purchasing (Menon and Barbara 2002; Tai and Fung 1997).

Regarding the specific relationships between emotional states and approach-avoidance behaviors, the M-R model posits that the valence of emotion – pleasantness/unpleasantness would be significantly correlated with overall approach-avoidance behavioral measures and that arousal would interact with pleasantness in determining approach-avoidance behavior. In pleasant environments, an increase in arousal is argued to increase approach behaviors, whereas, in unpleasant environments, an increase in arousal is suggested to motivate avoidance behaviors. This notion is similar to Thayer's (1986) two-dimensional theory of activation/arousal. Thayer differentiates energetic arousal described in terms of energy, activity and readiness from tense arousal that is associated with feelings of fear and anxiety. While energetic arousal prepares the body for movement and approach behavior, the tense arousal prepares the organism for avoidance and inhibition. Thayer found that energetic arousal and positive affect are positively related, whereas tense arousal is strongly correlated with negative affect. .

2.6 Aesthetics and Emotions

While the above literature review of emotions and environmental psychology research provides an integrated overview of the generation mechanisms and functions of human emotions, the question still remains as to what are the implications of emotional responses for the design of website interface. Since it has been generally established that emotions are associated with readiness to respond to (e.g., approach or avoid) emotion-

eliciting events or stimuli in the environment, it is important for us to first identify the web design features that have potentials to evoke user emotions.

Aesthetics has been advocated as an important dimension that can trigger individuals' immediate automatic emotional response to stimuli (Rafaeli and Vilnai-Yavetz 2004). Research and practice in spacial and environmental design (Lang 1988; Nasar 1997) and environmental psychology (Nasar 1994) suggest that aesthetics is related to affect. Aesthetics involves sensory-perceptual information capable of directly provoking primitive emotional responses with no cognitive mediation (Rafaeli and Vilnai-Yavetz 2004). Analogous to the automatic process eliciting emotional valence (Scherer, 1988), the appraisal of aesthetics is brief, automatic and pre-attentive (Zajonc 1968; Kunst-Wilson and Zajonc 1980).

In recent years HCI research has paid close attention to aesthetics due to its important role in eliciting the user's positive affective response and improving overall usability of product (Marcus 2002; Wright et al. 2000). Attractive things are considered to work better, to be easier to learn, and to produce a more harmonious result (Norman 2002). In addition to promoting usability, aesthetics also matters for its own sake. The aesthetic experience that an artifact elicits has been found to produce an emotional reaction of pleasantness (Rafaeli and Vilnai-Yavetz 2004). Lavie and Tractinsky (2004) also suggest that website aesthetics is an important factor that determines visitors' pleasure and satisfaction with the website. The emphasis on aesthetics and the affective responses it elicits has shifted the design focus from usability to user experience and the

evaluation of an artifact from “How does the interface perform?” to “How does the interface feel?”

2.7 Aesthetic Qualities – Order and Complexity

Aesthetics is a complex concept that has not been clearly defined in the literature. The term “aesthetic” is derived from the Greek work “aesthesis”, which means “sense perception.” Studies of website aesthetics deal with the sensory information provided by the website environment and how it influence web users, e.g., their attitudes, preferences, and satisfaction. While a multitude of sensory information from different senses (i.e., vision, hearing, touch, smell, etc.) informs aesthetic experiences, this research will be limited to visual aesthetics due to the fundamental role that vision plays in website apprehension.

In the literature, there have been debates between the objective and subjective views of aesthetics. The objective perspective views aesthetics as an objective property of things. It focuses on the attributes that make things beautiful and pleasing. The subjective view posits that aesthetics is subjective, residing in the subject’s individual experience and judgment, instead of in the object’s properties. This research adopts the subjective view because it is concerned with the individual’s perception or judgment of aesthetics and emphasizes the connection between aesthetics and emotion. In this research, we attempt to investigate dimensions of webpage design that influence a user’s evaluation of webpage aesthetics, which then affects the user’s emotions and subjective experience.

While aesthetics has been the topic of numerous studies, the environmental and architecture studies, which deal with aesthetic evaluation of built environment and how it affects human emotion, cognition and behavior, provide both theoretical and empirical grounds for studying the dimensions of aesthetic appraisal of a specific website. This research stream on environmental aesthetics emphasizes the affective qualities of environments and suggests that environments can be viewed as aesthetic stimuli capable of eliciting affect (Kaplan 1988; Nasar 1984). Order and complexity have emerged from the field of environmental and architectural aesthetics as two central factors of aesthetics (Arnheim 1966). The early history of ideas of order and complexity in aesthetics (Berlyne 1960; Gilbert and Kuhn 1953) can be traced back to Birkhoff's (1933) mathematical formula of aesthetic value M = O/C, which suggests that aesthetic value (M) of an image was inversely proportional to its complexity C (amount of information content, e.g., diversity or numerosity) on which attention and tension depended, and straightly proportional to its order (degree of spatial arrangement, e.g., in unity and symmetry) upon which resolution of the tension depended. However, later attempts to test this theory (Eysenck 1941; Davis 1936) found that a judgment of maximum aesthetic value was associated with the intermediate values of Birkhoff's aesthetic value (M). While there are other important aesthetic properties, such as balance, symmetry, proportion, etc., however, it seems that they are all subsumed by the order and complexity properties. Ngo and Byrne (2001) develop an aesthetics measurement model for user interface design written as a measure of screen layout order/complexity, which is a function of an aggregate of all the other aesthetic characteristics, e.g., symmetry,

sequence, cohesion, regularity, homogeneity, rhythm, balance, equilibrium, unity, proportion, simplicity, density, and economy.

Order and complexity are defined differently in research. Some treat complexity/order as a single dimension stretching between order and complexity (Ngo and Byrne 2001), others differentiate complexity from order and consider their respective effects on aesthetic perceptions as well as their interactive effects (Nasar 1994). In this research, we consider both order and complexity being two important qualities of aesthetics, and suggest that good design of webpage should strive to balance the degrees of order and complexity given the context. Arnheim (1966) defines order "as the degree and kind of lawfulness governing the relations among the parts of an entity…. Complexity is the multiplicity of the relationships among the parts of an entity." (Arnheim 1966, p. 123). Corresponding to the clarity/orderliness factor identified by Nasar (1984) and Oostendorp and Berlyne (1978), the order of an environment is related to the organization variables of environment, such as the extent of coherence, fittingness, congruity, legibility and clarity (Nasar 2000). Coherence, fittingness, and congruity are related to how the elements hang together, which can enhance harmony. The legibility of an environment characterizes "the ease with which its parts can be recognized and can be organized into a coherent pattern" (Lynch 1960). Legibility suggests the ease with which a person could gain knowledge regarding how to navigate the environment and later apply that knowledge to search for and reach a destination. Clarity reflects the identifiability of different elements of an environment, which is closely related to the recognition process. Environmental complexity, analogous to the

richness/diversity/ornateness factor (Nasar 1984; Oostendorp and Berlyne 1978), is related to visual richness, ornamentation, diversity and variety of information in an environment (Nasar 2000). Visual richness and ornamentation are related to the amount and refinement of details and the application of decorative elements in an environment. Diversity and variety of information can be measured by the number of elements and features in an environment. Complexity increases when there is more richness and greater diversity in an environment and when it does not maintain a coherent pattern and manifests large variance (Nasar 1994).

It is generally believed that order and complexity are interrelated. On the one hand, order and complexity are antagonistic in that order tends to reduce complexity while complexity tends to reduce order (Arnheim 1966); and on the other hand, order and complexity cannot exist without each other (Arnheim 1966). Nasar (2000) suggests that environmental complexity and order are combined in such ways that complexity provides visual richness while order structures diversity and helps to reduce uncertainty and provide understanding. Order is needed to for individuals to deal with high complexity as "complexity without order produces confusion" (Arnheim 1966, p. 124); and some level of complexity is necessary to bring interest to high order "as order without complexity causes boredom" (Arnheim 1966, p. 124).

The evolutionary perspective of environmental aesthetics, one of the major approaches to aesthetic experience (Sinha 1995), also identify order and complexity as major factors influencing human preference for the environment. The evolutionary perspective assumes that aesthetic judgment is a manifestation of a psychological

adaptation (Thornhill 2003), which is engineered to process environmental information and to guide feelings, emotions, learning and behavior towards the maximum likelihood of survival and reproductive success. Usually such adaptation includes increased preferences for the environment that is perceived affordable to the species (Gibson 1979). Moreover, these instinctual preferences usually manifest themselves trough affective responses of valence (positive or negative). Having its ground in natural selection and instinct-based behaviors, the evolutionary perspective is believed to provide the sources of universal preference for the environment, which can explain most of human's aesthetic preferences. The important work of Kaplan and Kaplan (1983), extending the Gibson's notion of environmental affordance (1979) that people perceive the physical elements of environment in terms of what they afford, suggests that there is a natural tendency in humans to prefer the environment that are most favorable for understanding (i.e., having coherence and legibility) and exploration (i.e., having complexity and mystery). These qualities that influence preference for the environment are described as preference framework (Kaplan and Kaplan 1983). Kaplan and Kaplan's (1983) preference framework is based on the assumption that human being is information-seeking and survival is dependent on obtaining information from and about the environment. They propose two general cognitive processes important to evolving human – making sense and involvement. Making sense refers to the process of structuring the environment so that one can find his/her way and predict what is likely to happen in a given setting. And involvement refers to the process of engaging and maintaining one's interest in an environment. Since both processes are crucial to

survival, environments that permit both to function successfully are highly preferred. Therefore, Kaplan and Kaplan (1983) argue that environmental features that provide understanding and help viewers make sense of the environments, such as coherence and legibility, and features that foster the viewer's involvement with the environment, such as complexity and mystery, are important qualities that influence preference for the environment. Coherence refers to the degree of order or unity present in the immediate environment; legibility is concerned with how easy it is to gain knowledge of how to get around; complexity pertains to the amount of information or the number of elements present in the immediate environment; and mystery is associated with the extent of promised opportunity for further information.

In HCI research, Lavie and Tractinsky (2004) found that users' perceptions of website aesthetics consisted of two main dimensions, which they termed "classical aesthetics" and "expressive aesthetics". The classical aesthetics dimension, similar to the order quality of environmental aesthetics, emphasizes orderly, clear, clean, and symmetrical design and is closely related to traditional usability metrics. The expressive aesthetics dimension, reflecting the complexity quality of environmental aesthetics, is characterized by creativity, using special effects, originality, sophistication and fascination. This is highly related to visual richness, diversity and complexity of the website.

While the extant HCI research and studies have examined the role of aesthetics in user interface design and stimulated thinking about the implications of emotional responses for improving user's experience with interface, few have focused on how

people respond to the specific aesthetic features of particular user interfaces. Chapter III will develop a research model of how the aesthetic features of a website's homepage – webpage complexity and order elicit different emotional reactions and subsequent action readiness in the users toward the website.

CHAPTER III

CONCEPTUAL FRAMEWORK AND KEY HYPOTHESES

Synthesizing and applying the findings and theories from emotion literature, environmental aesthetics studies, environmental psychology research, and psychological theories of motivation, we formulate a research model (Figure 1) to explore the relationships between the visual aesthetic qualities of a website's homepage, induced emotional states in users, and users' approach-avoidance behaviors toward the entire website. The proposed model mainly draws on M-R model (Mehrabian and Russell 1974), which is widely used in marketing research to relate features of the environment to human behaviors through the mediating effects of induced emotional states within the environment. As mentioned before, the M-R model is based on the Stimulus-Organism-Response paradigm and provides an integrated framework to understand how environmental features shape human emotions and subsequent behaviors. It proposes that the sensory variables in the environment, such as the information rate of the environment that reflects the level of overall uncertainty in the environment, influence individuals' approach-avoidance behaviors within the environment, mediated by their emotional states (e.g., pleasantness and arousal) aroused by the environment. The rest of this chapter discusses the proposed model, describing the variables of a web homepage aesthetics (Stimulus), arousal and valence of emotions (Organism), and approach-avoidance behaviors (Response) toward the website, as well as how these variables are related to each other.

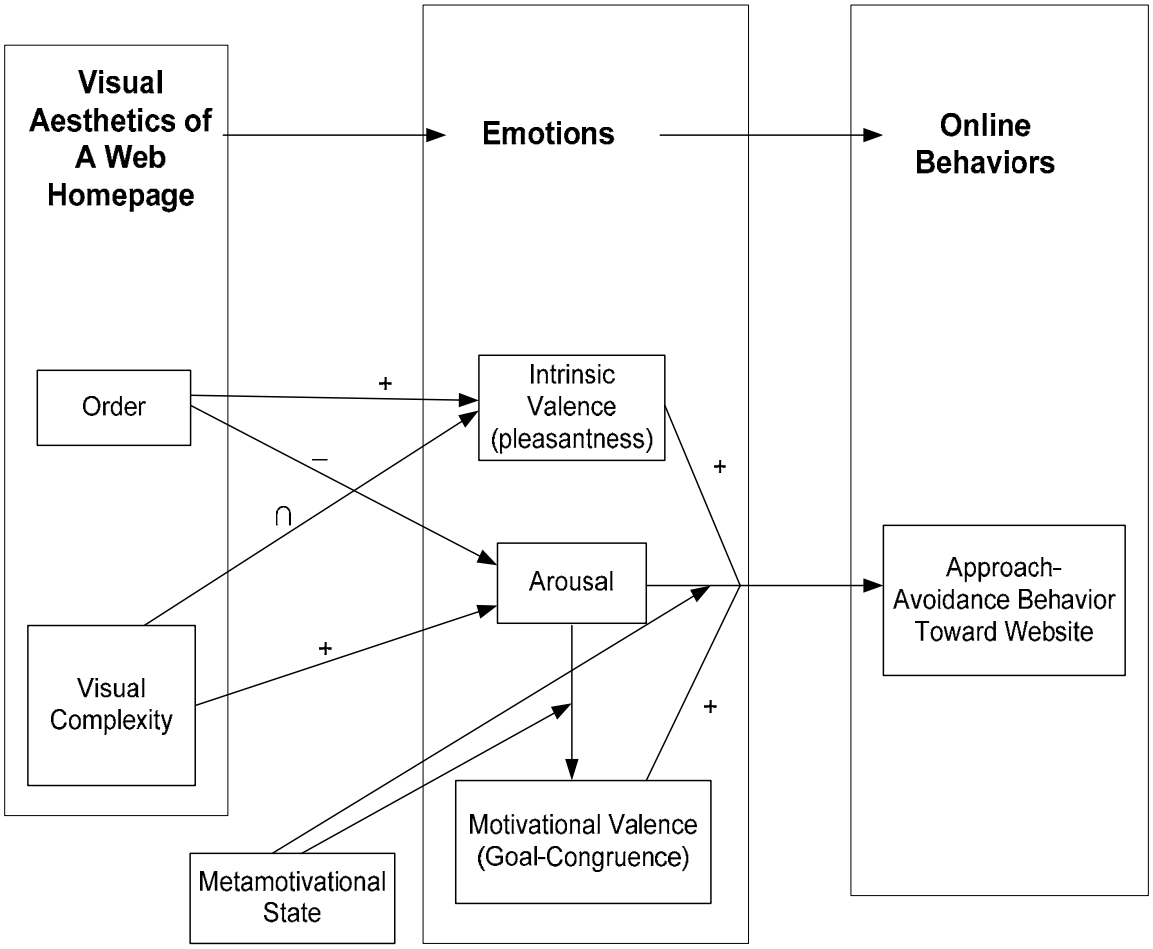

Figure 1. Research Model of Website Aesthetics, Emotional States, and Approach Avoidance Behavior

3.1 Visual Aesthetics of Webpage

Given the ample evidence and theories in experimental aesthetics (Birkhoff 1933), evolutionary aesthetics (Kaplan and Kaplan 1983), environmental aesthetics (Arnheim 1966; Nasar 2000) and HCI research (Lavie and Tractinsky 2004) about complexity and order being the central factors in aesthetic perception, we propose webpage order and visual complexity as two important dimensions of webpage visual aesthetics. Extending the aesthetic concepts of environmental complexity to the website

context, we define webpage visual complexity as composed of two dimensions – visual richness referring the details of information present in a webpage measured by the amount of text, number of graphics and links and layout of a page (e.g., number of columns of information), and visual diversity measured by different types of elements present in the webpage. These are consistent with the web homepage design elements suggested by Geissler et al. (2001) that influence user's perceived webpage complexity – the number of links, number of graphics, and homepage length on the page. Similarly, using Arnheim's (1966) definition of environmental order, we define webpage order as the extent of lawfulness governing the relationships among different elements of a webpage. The definition of environmental order suggests that webpage order is related to the logical organization, clarity, and coherence of webpage content and information. Logical organization of webpage is associated with the intuitiveness and understandability of the webpage organization. Webpage coherence can be achieved through creating congruity or harmony among elements of a webpage, e.g., grouping or aligning similar elements, while clarity can be enhanced by differentiating a webpage elements, e.g., contrasting between different elements.

3.2 Arousal and Valence of Emotions

Arousal and cognitive appraisal, being the two underlying components of any human emotional responses to any environmental stimuli or events, are employed to examine web user's emotional responses elicited by the visual aesthetic qualities of a web homepage. For the purpose of this study, we conceptualize arousal as providing the organism with energy for psychological and motor activity (Werner 1979). High and low

levels of arousal distinguish between feelings of stimulated, excited, or frenzied and aroused and relaxed, bored or sleepy. Cognitive appraisal, the other important component of emotion, determines the valence of emotion as positive (pleasant), negative (unpleasant), or neutral by evaluating the situation's intrinsic pleasantness and congruence with individual's motivations. Scherer (1988) distinguishes between intrinsic stimulus valence and motivational stimulus valence, which are independent of each other and combine to form four differentiated emotions (See Table 1). Using Scherer's definitions of intrinsic stimulus valence, we can define intrinsic stimulus valence as the intrinsic pleasantness or unpleasantness of the webpage aesthetic qualities as a result of an appraisal based on an individual's innate feature detector or learned associations. In contrast to intrinsic stimulus valence, which is independent of a person's goals or needs, motivational stimulus valence is closely related to a person's motivations and goals. Motivational stimulus valence, then, can be defined as the goal congruence of webpage aesthetic qualities, which pertains to whether the webpage aesthetic features are conducive or obstructive to reaching a user's goals or satisfying the relevant needs.

Applying the reversal theory and Scherer's cognitive appraisal model of emotion to studying user's emotional responses toward a webpage, we suggest that meta-motivational states of a web user moderate the relationship between the arousal levels elicited by website stimuli and motivational stimulus valence in the user. For web users who are in a telic state and engaged in a purposeful activity (e.g., search for information or a product), a high level of arousal will be interpreted as unpleasant while a low level of arousal will be perceived as pleasant and relaxing. For users who are in a paratelic

state seeking enjoyment or entertainment, a low level of arousal will be experienced as boredom and uninteresting whereas a high level of arousal will be evaluated as exciting and fun.

3.3 Relating Webpage Aesthetic Qualities to Emotional Responses

Studies of environmental aesthetics have investigated how the two aesthetic qualities of the built environment – complexity and order – influence emotional responses such as pleasantness and arousal. It has been found that order has a positive relationship with pleasantness (Nasar 1997; Nasar 1987; Nasar and Hong 1999). However, an inverted U-shaped relationship is found between complexity and pleasantness, with moderate levels of complexity being the most pleasant (Nasar 2000; Nasar 1997) and extremely low or high levels of complexity associated with the least pleasant situations. Psychological research and studies of aesthetic experience provide explanation for the abovementioned relationships between dimensions of aesthetic judgment (order and complexity) and aesthetic pleasure – the emotional response resulting from aesthetic experience. Reber et al. (2004), based on a review of experimental aesthetics and cognitive psychology, posits that the felt intrinsic pleasantness from an aesthetic judgment is a function of the perceiver's processing dynamics, that is, the more fluently perceivers can process an object, the more positive their aesthetic responses. Therefore, features like high levels of order and moderate levels of complexity (complex stimulus usually has higher redundancy and thus can be recognized faster and easier than simple stimulus) that facilitate easy and fluent processing of the stimulus can elicit positive affect because they promote successful

recognition of the stimulus, error-free processing, and the availability of appropriate knowledge structures to interpret the stimulus (Reber et al. 2004). Reber et al.'s (2004) notion that stimuli with high processing fluency are experienced as positive resulting in pleasant feeling and favorable judgment is consistent with Kaplan and Kaplan's (1983) preference framework of environmental qualities, which suggests that environmental features aiding in information seeking (e.g., understanding and involvement) are preferred. Furthermore, the notion has also gained support from the findings of psychophysiological studies (Winkielman and Cacioppo 2001). So, extending these findings about how order and complexity influence intrinsic pleasantness resulting from aesthetic appreciation, we suggest that webpage order is positively associated with web user's feeling of intrinsic pleasantness while webpage visual complexity has an inverse curvilinear relationship with user's intrinsic pleasantness. Therefore, the following two hypotheses can be proposed:

Hypothesis 1a: The order of a web homepage positively influences the website user's feelings of intrinsic valence.

Hypothesis 1b: The complexity of a web homepage has an inverted U-shaped relationship with the user's feelings of intrinsic valence.

Regarding the relationships between complexity and arousal, complexity has been shown to be positively related to interest (Berlyne 1971) and arousal (Nasar 1987; 1997; Heath et al. 2000). By providing diverse and numerous information as a source of stimulation that call for attentions, increased levels of complexity in the built environment will lead to greater levels of interest in the environment and higher levels of

arousal in individuals. This finding is in line with Kaplan and Kaplan's (1983) proposition that the complexity present in the environment aids in the involvement process by eliciting and maintaining viewer's interest in the environment. For the order property of aesthetics, it has been found that order bears a negative relationship with arousal (Nasar 1997; Nasar 1987; Nasar and Hong 1999). As the extent of order grows in a built environment, it brings unity, coherence, and clarity to and reduces stimulation in the environment, and hence the level of arousal will decrease in individuals. As a result of these findings, we suggest that webpage visual complexity is positively associated with the web users' felt arousal levels while webpage order is negatively related to the elicited arousal levels in the users. Therefore, we propose the following two hypotheses:

Hypothesis 2a: The order of a web homepage negatively influences the user's arousal levels.

Hypothesis 2b: The complexity of a web homepage positively influences the website user's arousal levels.

Moreover, there have also been important findings that relate complexity and order to individual's motivational valence through the moderating effect of arousal. Nasar (1997) argues aesthetic preference is different from individual to individual as each of them may seek different levels of arousal from the environment. Employing the collative motivation model (Whitfield 1995), which assumes that preference is influenced by arousal level or interest, Nasar (1997) further posits that for the person who seeks high arousal, complex stimuli tend to receive high preference, whereas

individuals seeking lower arousal level may prefer less complex environments and popular stimuli. Based on an extensive review of research on building exteriors, Nasar (1994) found that high order, moderate complexity, and element of popular styles enhance feelings of pleasantness; high complexity, atypicality, and low order provoke excitement; and high order and naturalness produce calmness in the individual. These propositions and findings suggest that in a web browsing context, webpage visual complexity is positively related to the felt motivational pleasantness when web users are arousal-seeking (e.g., in a paratelic state) and negative related to the users' motivational pleasantness when they are arousal-avoidant (e.g., in a telic state); while webpage order is negatively related to the felt motivational pleasantness of the web users who are arousal-seeking and positively related to their feeling of motivational pleasantness when users seeks low arousal. Therefore, we posit the following hypotheses:

Hypothesis 3: A web user's metamotivational states moderate the direction of the relationship between a user's felt arousal and motivational valence.

Hypothesis 4a: The order of a web homepage positively influences a user's felt motivational valence when the user is in a telic state.

Hypothesis 4b: The order of a web homepage order negatively influences a user's felt motivational valence when the user is in a paratelic state.

Hypothesis 5a: The complexity of a web homepage negatively influences a user's felt motivational valence when the user is in a telic state.

Hypothesis 5b: The complexity of a web homepage positively influences a user's felt motivational valence when the user is in a paratelic state.

Being two dimensions of aesthetics, order and complexity are interrelated and interact with each other to influence individual's aesthetic judgment and emotional responses. Studies have suggested the interaction effect of complexity and order on emotional responses. Berlyne's (1971) study suggests that order has an effect above and beyond that of complexity. It indicated that adding order to a set of stimuli with low levels of complexity will decrease the interest level in the environment. In contrast, the effects on interest levels will be positive when order is added to stimuli with high complexity. Kaplan and Kaplan (1995) also suggest that the preferred environment tend to be high in at least one of the qualities from preference framework. However, a high level of one quality without another cannot cause high preference. For example, a very complex scene lacking coherence receives low preference; and an environment that rates too high on coherence or legibility but low on complexity or diversity may be uninteresting and decrease preference. Therefore, they argue that a highly preferred environment can be high in both complexity and coherence at the same time (Kaplan and Kaplan 1983).

In sum, on the one hand, order and complexity affect emotional responses independently; and on the other hand, they also interact with each other to provoke different emotional responses. Moreover, the same stimuli may elicit different emotional responses under different situations, which suggest that a balance between degrees of order and complexity that provoke the most pleasure differs is governed by the situation. It is generally established that greatest intrinsic pleasantness can be found in the stimuli that combine high order with moderate complexity. Arousal increases with increasing

complexity and decreases with increasing order. Due to the different roles of order and complexity in cognition, that is order aids in making sense/understanding process while complexity promotes involvement process by producing and maintaining interest (Kaplan and Kaplan 1983), their effects on motivational valence differ under different situations. For example, when an individual is in a telic state, in which low arousal is preferred and the process of making sense and understanding is important, high order is most preferred and felt as most pleasant. Due to the interaction effects between order and complexity, high order when combined with moderate complexity will produce most pleasure in a telic state because moderate complexity is most intrinsically pleasant and high order can reduce complexity and alleviate the arousal caused by complexity. However, in a paratelic state when high arousal is desirable and the process of involvement is important, people will prefer high complexity, which is experienced as most pleasant. As moderate order can provide understanding without decreasing the interest level when combined with high complexity, a combination of moderate order and high complexity will elicit most pleasure in a paratelic state. The above analysis leads us to propose the following hypotheses:

Hypothesis 6a: A website user in a telic state will feel the most pleasure when visiting a web homepage with high levels of order and moderate levels of complexity.

Hypothesis 6b: A website user in a paratelic state will feel the most pleasure when visiting a web homepage with moderate levels of order and high levels of complexity.

3.4 Approach and Avoidance Behaviors

According to the functional perspective of emotions, the purpose of emotion is to motivate certain types of actions. It has been consistently shown that emotional valence is a significant predictor of approach-approach behaviors, with positive emotions (e.g., pleasantness) motivating approach tendency while negative emotions (e.g., unpleasantness) promoting avoidance behavior. Regarding the relationship between the felt arousal and approach-avoidance behaviors, both the M-R model and two-dimensional activation/arousal theory suggest that arousal will stimulate approach behaviors when it is experienced as pleasure but will inhibit approach or motivate avoidance tendencies when felt as unpleasant. According to reversal theory, the meta-motivational states of an individual may determine the valence or pleasantness of felt arousal, which, in turn, influences his/her approach-avoidance tendencies. For example, high levels of arousal will prompt approach behaviors for those who are in paratelic states, but the same high levels of arousal will inhibit approach tendencies for those in telic states. On the other hand, low levels of arousal will motivate approach behaviors when individuals are in telic states and induce avoidance tendencies for individuals when in paratelic states. Scherer's classification of emotional valance suggests that this kind of pleasantness/unpleasantness is associated with motivational valence due to its dependence on a person's situation instead of the innate nature of a stimuli or event. Therefore, the following hypotheses can be suggested:

Hypothesis 7: A web user's motivational valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website.

Hypothesis 8: A web user's intrinsic valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website.

Hypothesis 9: A web user's metamotivational states moderate the direction of relationship between a user's felt arousal level and the user's approach tendency toward the website.

While meta-motivational states moderate the effect of arousal levels on motivational valence, which in turn influence approach-avoidance tendencies, they also moderate the influence of intrinsic valence on approach-avoidance behaviors. For an individual in a telic state, online activities serve as the means to the end, geared toward achieving specific goals. Being very goal oriented, the individual focuses on task completion rather than enjoyment. As a result, for a person who is in a telic state, his/her behaviors will be subject to the effect of motivational valence associated with the stimuli's goal congruence rather than that of intrinsic valence concerned with the stimuli's innate pleasantness/unpleasantness. In contrast, a person in a paratelic state would engage in the activity as an end in itself. He/she is motivated toward obtaining pleasure, arousal and enjoyment. Therefore, both intrinsic valence and motivational valence of the stimuli are important in determining his/her approach-avoidance behaviors. The above analysis leads us to propose the following hypothesis:

Hypothesis 10: A web user's metamotivational states moderate the strength of the relationship between the intrinsic valence elicited by a web homepage in a user and the user's approach tendency toward the website: the effect of the user's felt intrinsic

valence on the user's approach tendency toward the website is stronger when the user is in a paratelic state than when the user is a telic state.

As the M-R model posits the approach-approach behavior as a function of any emotional-eliciting quality of the environment, we therefore expect significant linkages between the webpage complexity and order and the approach-avoidance behaviors through the mediating effect of elicited emotional responses. As discussed before, when in a telic condition, a high level of arousal will be interpreted as unpleasant and cause avoidance behavior, while a low level of arousal will be experienced as pleasant and motivate approach tendency. Since there is a negative relationship between the webpage order and felt arousal and a positive relationship between the webpage complexity and arousal, the webpage order can be expected to be positively related to the approach tendency and the webpage complexity however should be negatively related to the approach tendency. Conversely, for the web users in a paratelic state, a low level of arousal is perceived unpleasant and will cause avoidance behavior whereas a high level of arousal is considered pleasant thus inducing approach tendency. As a result, in the paratelic condition, the webpage complexity will be positively related to the approach tendency; whilst the webpage order will have a U-shaped curvilinear relationship with the approach tendency toward the website since a high level of webpage order is associated with motivational unpleasantness and a low level of webpage order is related to intrinsic unpleasantness.

According to the above discussion, we can suggest the following hypotheses relating qualities of website aesthetics – webpage complexity and order to website users'

approach-avoidance behaviors, mediated by their emotional responses to those aesthetic features:

Hypothesis 11a: When a website user is in a telic state, the order of a web homepage positively influences the user's approach tendency toward the website.

Hypothesis 11b: When a website user is in a paratelic state, the order of a web homepage bears a curvilinear relationship to the user's approach tendency toward the website with the moderate levels of order associated with the greatest approach tendency.

Hypothesis 12a: When a website user is in a telic state, the complexity of a web homepage negatively influences the user's approach tendency toward the website.

Hypothesis 12b: When a website user is in a paratelic state, the complexity of a web homepage positively influences a user's approach tendency toward the website.

Hypothesis 13a: When a website user is in a telic state, the abovementioned effects of the order and complexity of a web homepage on the user's approach tendency toward the website are mediated by the user's emotional responses toward the homepage.

Hypothesis 13b: When a website user is in a paratelic state, the abovementioned effects of the order and complexity of a web homepage on the user's approach tendency toward the website are mediated by the user's emotional responses toward the homepage.

CHAPTER IV

RESEARCH METHOD

To test the proposed research model and its associated hypotheses, this research consists of four pilot studies and a main laboratory experiment. We manipulated web homepage aesthetics by varying the levels of order and complexity of the WebPages and measured subjects' emotional responses and approach-avoidance tendencies in response to the manipulations of webpage aesthetics under telic and paratelic metamotivational states.

The purpose of Pilot Study 1 was to select an appropriate website category for the experimental stimuli (See Appendix A). Pilot Study 2 aimed to identify appropriate webpage contents for the experimental stimuli (See Appendix A). The purpose of Pilot Study 3 was to check the effectiveness of each of hypothetical scenarios in inducing an appropriate metamotivational state (telic or paratelic) in subjects, and to examine how a person's metamotivational dominance (being telic or paratelic dominant) may influence the likelihood and ease of that person being brought into a metamotivational state different from his/her metamotivational dominance (See Appendix A). Pilot Study 4 examined how webpage design elements affected webpage complexity and order and the manipulation levels of these elements influenced the subjects' perceptions of webpage aesthetics (See Appendix A). The results of Pilot Study 4 were used to guide the design of webpage stimuli for the main experiment.

The main experiment investigated the influence of webpage aesthetic qualities on web users' emotions and approach-avoidance behaviors with a 4 (complexity) x 3

(order) x 2 (metamotivational state) between-subject design. The research methodology and design of the main experiment are discussed as follows.

4.1 Experimental Design and Procedure

In the main study, the laboratory experiment, a sample of subjects who had not participated in the pilot studies was recruited. Based on the results of Pilot Study 1, Pilot Study 2 and Pilot Study 4, 24 versions of a Gift website's homepage were designed, among which 12 versions were selected as the stimuli materials for the experiment. This led to a 4 (complexity) x 3 (order) x 2 (metamotivational state) between-subject design producing a total of 24 treatments. Table 2 shows the research design and the manipulated variables in the experiment. The subjects were randomly assigned to each treatment. Before being exposed to the stimuli materials, the subjects were instructed to read a hypothetical scenario (See Appendix B) designed to induce either a telic or paratelic metamotivational state. In the telic condition, the subjects were assigned to perform a task of purchasing a gift; while in the paratelic condition, the subjects were told to surf freely as they pleased. Then, subjects were asked to review the webpage on their computer screens. Each subject was allowed to examine a homepage stimulus for an equal amount of time (20 seconds). To determine the appropriate time duration for subjects to look at the homepage stimuli, we experimented with three different time durations by allowing the subjects to look at the stimuli for 10 seconds, 15 seconds, and 20 seconds. Finally, 20 seconds was selected for the main experiment because it was rated as of appropriate duration, not too long or too short for the subjects to view the stimuli. When examining the stimuli, the subjects were told not to click on the links on

the homepage. After 20 seconds, the webpage stimulus disappeared from the computer screen automatically, and on-screen instructions led the subjects to complete a questionnaire which asked them about the emotions they felt about the homepage and their degree of approach tendencies toward the entire website. Finally, at the end of the experiment, the subjects' web experience (e.g., length and frequency of web usage) and knowledge of website design were captured as covariate variables to control for their influence on subjects' perceptions of the experimental stimuli, which in turn might affect subjects' emotions and approach-avoidance tendencies toward the stimuli.

4.2 Stimulus Materials

To investigate how webpage aesthetic qualities defined in terms of complexity and order influenced user emotions and behaviors under telic and paratelic metamotivational states, the experimental stimuli needed 1) to vary only in terms of levels of webpage complexity and order, 2) to have content and characteristics that evoke neutral affect in users, and 3) to allow subjects to engage in either goal-oriented tasks or excitement/enjoyment-seeking activities. The first criterion stems from the need to minimize differences among the stimuli that were not relevant to the interest of this research and to isolate the effects of webpage complexity and order as independent variables. The second criterion is necessary to minimize any pre-existing response bias resulting from the confounding effects of website characteristics and content on the subjects' emotions and behaviors. The third criterion is related to the need to engage subjects in a telic or paratelic metamotivational state, which is examined as a moderator in this research.

Table 2. Experimental Design and Manipulation Levels

Complexity	Order	Metamotivational State
High	High	Telic State
		Paratelic State
	Moderate	Telic State
		Paratelic State
	Low	Telic State
		Paratelic State
Moderate-High	High	Telic State
		Paratelic State
	Moderate	Telic State
		Paratelic State
	Low	Telic State
		Paratelic State
Moderate-Low	High	Telic State
		Paratelic State
	Moderate	Telic State
		Paratelic State
	Low	Telic State
		Paratelic State
Low	High	Telic State
		Paratelic State
	Moderate	Telic State
		Paratelic State
	Low	Telic State
		Paratelic State

Following the abovementioned criteria, in Pilot Study 1, we selected a website category that subjects are unfamiliar with but have some interest in browsing and whose content subjects neither liked nor disliked. We chose a website category that subjects were not familiar with because familiarity with a category of website may influence

perceived complexity of and liking for the webpage stimuli. There has been consistent evidence for a positive relationship between familiarity and liking (Bornstein 1989; Zajonc 2000), and a negative relationship between familiarity and perceived complexity (Radocy and Boyle 1988). Web content that subjects showed neither liking nor disliking for was required to elicit an initial neutral affective response so that the manipulations could be assumed to be the major influence on their reported affective states. To have some degree of interest in browsing the website is necessary for subjects to engage in paratelic activities with the webpage stimuli. Based on the results of Pilot Study 1 (See Appendix A), we selected the Gifts website as the context for the experimental stimuli. Then, using the same criteria for selecting webpage content, Pilot Study 2 was conducted to identify specific gift items to be included in the webpage stimuli for the experiment (See Appendix A).

Utilizing Geissler et al.'s (2001) findings regarding the influence of amount of text, number of links and number of graphics on user's perceived complexity of webpage, we designed six levels of Complexity (Complexity increases from Level-1 to Level-6) into the experimental stimuli by manipulating the number of links, number of graphics, and amount of text (See Table 3). While we couldn't exhaust all levels of webpage complexity — which varies on a continuum and may be influenced by different combinations of links, graphics and text in the webpage — we deliberately made the stimuli resemble the real-world ecommerce website homepages, which are featured in co-presence of links, graphics, and text.

Table 3. Manipulation of Web Homepage Complexity

	Level-1 Complexity	Level-2 Complexity	Level-3 Complexity	Level-4 Complexity	Level-5 Complexity	Level-6 Complexity
Number of Links	Twelve	Sixteen	Twenty-six	Thirty-three	Forty-three	Fifty-four
Number of Graphics	Two	Four	Six	Eight	Ten	Fourteen
Number of Text	Thirty-three	Forty	Forty-seven	Fifty-seven	Ninety-six	One hundred Eighteen

We manipulated webpage Order at 4 levels (Order increases from Level-1 to Level-4) by arranging the layout of webpage elements. According to our definition of order, webpage order is related to the logical organization, coherence, and clarity of webpage content. Among the three dimensions of order, logical organization is the most fundamental component that coherence and clarity are built upon. It pertains to the understandability and intuitiveness of organization of webpage elements. In other words, to obtain logical organization, webpage elements ought to be arranged in an intuitive way so that they are obviously identifiable or easily recognizable in the web space. This can be achieved by matching the placement of webpage elements in the web space with user's cognitive map or mental picture of webpage, an generalized mental representation of webpage that user applies as a reference when navigating websites. Since the user's mental picture of webpage is obtained through his/her memory of past experience with websites, we operationalized logical organization by conforming to the general guidelines for arranging the positions of different webpage elements in relation to each

other in the web space. For instance, to comply with the habit of browsing a webpage from top to bottom and left to right, we 1) placed the company name in the most prominent webpage location, the top left corner, 2) put the primary navigation bar on the top of webpage just to the right of company name, 3) positioned the content navigation menu on the left of webpage below the company name, and 4) placed the content area in the center of webpage to the right of content navigation menu and below the primary navigation bar. Due to the primary role of logical organization for establishing webpage order, we used it as a starting point for our design of homepage stimuli at lower and higher levels of order. Four levels of webpage order were operationalized and designed into the homepage stimuli through the following steps: 1) We identified the webpage elements to be included in the homepage stimuli that are designed at a certain level of complexity; 2) We determined the logical position of each webpage element in the web space in order to make them easily identifiable by users. The homepage stimuli designed at this stage were labeled as Level-2 Order, which served as basis for the design of other three levels of order – Level-1 Order, Level-3 Order, and Level-4 Order; 3) We designed Level-1 Order by using free-form layout of webpage elements each of which was displaced from its logical position so as to attain a low level of order without any sense of logical organization; 4) Level-3 Order was built on the level-2 Order by applying the alignment and grouping design tools to associate similar or related elements and differentiate unrelated elements; 5) Level-3 Order was then enhanced to Level-4 Order by using color contrast design to further visually differentiate between elements that belong to different sections.

Pilot study 4 was conducted to test the influence of our manipulations of webpage complexity and order levels on the subjects' perceptions of complexity and order, as well as webpage aesthetic qualities. Two independent samples were recruited. The first sample of subjects was assigned to arrange the 24 color-printed images of homepage stimuli on the tabletop according to their similarities. This elicited their perceptions of the similarities and differences among the stimuli without cueing them to the dimensions of complexity and order, thus enabling us to ascertain whether (as expected) complexity and order underlay their perception of the webpages. The second sample was instructed to rate each homepage on its degree of complexity and order as well as their preference for it under two different scenarios (telic versus paratelic). This elicited ratings on dimensions that could be related to the analysis of the first set of similarity ratings. The similarity data collected from the first sample were analyzed using the multidimensional scaling (MDS) technique, which revealed a well-defined two-dimensional perceptual structure for the homepage stimuli. By regressing the complexity and order rating data collected from the second sample onto the MDS solution, we found a good fit of the ratings of perceived complexity and perceived order with the two-dimensional MDS solution (See Appendix A for details). This result demonstrated the effectiveness of our manipulation of webpage complexity and order, which were shown to underlie the perceived similarity/dissimilarity between homepage stimuli. It also helped in the selection of stimuli for the experiment. Based on further analysis of the rating data of complexity and order, 12 homepage stimuli with level-1, level-2, level-4 and leve-6 complexity and the level-1, level-2 and level-3 order

treatments were selected as the stimulus materials for the main experiment (See Appendix A). Please note that, since only four manipulation levels of complexity were included in the main experiment, the level-4 and level-6 complexity treatments will be relabeled and referred to as the level-3 and level-4 complexity respectively in the remaining chapters of the dissertation. The 12 homepage stimuli used for the main experiment are presented in Appendix E.

4.3 Sample

The sample of subjects for the main study included undergraduate students from a large middle southern university in the USA. They voluntarily participate in this study in exchange for extra course credit. We employ student subjects for three reasons. First, given the large sample size required for this study, students provide an accessible sample. Second, since students represent a large population of web users, their perceptions of, affective responses and approach-avoidance behaviors toward webpage aesthetic qualities will provide valuable insight into the research questions of this study. Third, there is little reason to believe that student emotional response mechanisms will differ from those of other groups of people, since human emotions are generally regarded as basic physiological and mental states that result from collecting sensory information and transmitting it to cognitive and behavioral systems (Panksepp 1992). 467 students participated in the study, and 445 data points were useable; 22 data points were discarded due to missing data or failure to follow instructions.

The sample consists of 255 females (57.30%) and 190 males (42.70%). The majority of the subjects were between 20 and 21 years old (83.82%). Approximately

Sixty-five percent (288) were majoring in Business disciplines (i.e., Accounting, Marketing, Finance, MIS, Management, OM), while thirty-five percent (157) were from non-Business majors (i.e., Liberal Arts, Agriculture, Engineering). A total of 359 subjects or about eighty percent of the sample had basic knowledge of website design. Sixty-seven percent of the subjects (301) spent one-to-five hours daily online. Seventy-seven percent of the subjects (345) had six-to-ten years of experience in using the Internet. The profile and characteristics of the sample are shown in Table 4.

4.4 Measurement

The model we tested in this study has 7 constructs that are operationalized with seven-point rating scales (scale values ranging from strongly disagree to strongly agree) or seven-point semantic differential scales. In addition, we assessed two web usage variables to specify when the respondent started using the web, and how much time per day the respondent spent using the web. These two variables were used as covariates in the data analysis. Our survey instrument was developed by incorporating and adapting existing valid and reliable scales where appropriate. All instrumental scales are shown in Appendix C.

Table 4. Demographics of the Sample

Item	Frequency	Proportion of Sample (%)
Gender		
Female	255	57.30%
Male	190	42.70%
Age		
19 and under	42	9.44%
20 – 21	373	83.82%
22 – 23	21	4.72%
24 – 25	3	0.67%
26 and over	6	1.35%
Major		
Business	288	64.72%
Non-Business	157	35.28%
Knowledge of Web Design		
None	54	12.13%
Basic	359	80.67%
Advanced	32	7.19%
Hours Spent Online (Daily)		
1 Hour and less	85	19.10%
1 – 3 Hours	237	53.26%
3 – 5 Hours	64	14.38%
6 – 10 Hours	41	9.21%
10 Hours and More	18	4.04%
Years of Internet Use		
5 Years and less	17	3.82%
6 – 10 Years	345	77.53%
10 Years and more	83	18.65%

Note: N = 445

Manipulation Checks

The effectiveness of webpage order and complexity manipulation was measured by having the subjects rate the levels of order and complexity of the website they viewed on the seven-point scales (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree). We adopted

Geissler et al.'s (2001) measure of perceived webpage complexity (See Appendix C). Cronbach's alpha reliability for this measure was 0.81. We omitted 6 items from the original complexity measures – familiarity, surprising, patterned, interactive, common, frustrating, and navigable – due to their lack of relevance to this study and their potential confounding effects with measurements of webpage order and emotion measurements. The measure of webpage order was developed based on a number of website usability studies (Shneiderman 1998; Palmer 2002; Agarwal and Venkatesh 2002) (See Appendix C).

We also checked whether the metamotivational state manipulation was effective by using measures derived from OConnell and Calhoun's telic/paratelic state instrument (2001) whose Cronbach's coefficient alpha was 0.93 (See Appendix C). Similarly, the subjects were asked to rate their metamotivational states on the seven-point scales (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree).

Measures of Emotional Responses

Mehrabian and Russel (1974) developed measures of pleasantness (reliability score of 0.89) and arousal (reliability score of 0.83), which have been widely used to measure affect. We adopted their measures and adapted them to measure motivational valence and arousal in this study. For intrinsic valence, Fisher's (1974) environmental quality scale (reliability score of 0.92) is adapted to measure the subjects' evaluation of the webpage's aesthetic quality. As shown in Appendix C, the subjects were asked to report their feelings of intrinsic valence, arousal, and motivational valence based upon

the seven-point semantic differential scales that have two bi-polar/opposing adjectives at each end (-3 = significantly, -2 = quite, -1 = slightly, 0 = neither, 1 = slightly, 2 = quite, 3 = significantly).

Measure of Dependent Variable

The measures of approach-avoidance behaviors are derived from Donovan and Rossiter's (1982) scales of approach/avoidance tendencies and adapted to the website context (See Appendix C). The original measure contains 8 items with a reliability score of 0.78. During the experiment, the subjects reported their approach/avoidance behaviors on a seven-point scale (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree).

A copy of the actual questionnaire appears in Appendix D.

4.5 Methods of Data Analysis

Four types of statistical methods were used to analyze the data gathered from the main experiment. MANOVA test was used to test the effects of the independent variables – manipulations of webpage complexity and webpage order on the three emotional response variables – intrinsic valence, arousal and motivational valence, and the dependent variable of approach tendency. The moderating effects of metamotivational state variable were also tested using MANOVA.

Planned contrasts were conducted to compare the scores of emotional responses and approach tendency across different manipulation levels of webpage complexity and webpage order. Trend analyses were performed using polynomial contrast tests to determine whether the effects of webpage complexity and order on subjects' emotional

responses and approach behavior are linear, quadratic or cubic. A series of multiple regressions were also performed to test the mediation effects of emotional responses on the influence of webpage complexity and order on approach behavior.

In addition, structural equation modeling (SEM) was also performed to test the validity of the whole research model and evaluate how well the data can be explained by the proposed model. We employed LISREL program to implement the SEM analysis using the maximum likelihood method. We drew on multiple fit indices to assess the goodness-of-fit between the data and the model. One index of fit is the ratio of the chi-square value to its degrees of freedom (χ^2/df), which needs to be less than 3:1 for an acceptable fit (Kline 1998). We also used the Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI), which are the measures of the relative amount of variance/covariance in the data accounted for by the model. GFI and AGFI are classified as the absolute indices of fit, because they basically compare the hypothesized model with no model at all (Hu and Bentler 1995). They usually vary between 0 and 1 and a value of 0.90 or above indicates a good model fit. Another set of fit indices include the normed-fit index (NFI), non-normed-fit index (NNFI), and comparative fit index (CFI), which are derived from the comparison of a restricted model (i.e., one in which structure is imposed on the data) with an independence or null model (i.e., one in which all correlations among variables are zero). The NFI, NNFI, and CFI values that are greater than 0.90 indicate an acceptable fit of the model to the data. In addition, the Root Mean Square Error of Approximation (RMSEA) was also estimated, which measures the discrepancy in fit between the model and the data. A RMSEA value of 0.05 or less

indicates a good fit, while the value of about .08 or less indicates an adequate model fit (Browne and Cudeck 1993).

CHAPTER V

DATA ANALYSIS AND RESULTS

This chapter reports the results of the statistical analyses of the experimental data.

5.1 Manipulation Checks

Manipulation of Webpage Order

A manipulation check was performed on perceived webpage order to confirm that the subjects exposed to the homepage stimuli with higher levels of order perceived them to be of higher levels of order and the subjects who browsed the lower-order homepage stimuli perceived them to be of lower levels of order. An ANOVA with perceived webpage order as the dependent variable and manipulation of webpage order as the independent variable showed that the manipulation of webpage order had a significant effect on the ratings of webpage order ($F_{2, 442} = 145.59$, $p < 0.001$).

A plot of the mean ratings of webpage order by manipulation levels of webpage order (Figure 2) showed a continuous increase in the mean ratings of webpage order as the levels of order manipulation increased from level-1 to level-3 (Mean-of-Order $_{\text{level-1OR}} = 3.32 <$ Mean-of-Order $_{\text{level-2OR}} = 5.14 <$ Mean-of-Order $_{\text{level-3OR}} = 5.44$). The repeated contrasts compared consecutive pairs of levels of webpage order manipulation, which yielded significant differences on the mean ratings of webpage order between level-1 and level-2 ($p<0.001$) and between level-2 and level-3 ($p=0.028$) order manipulation. The above analyses demonstrated the effectiveness of the manipulation of webpage order in the experiment.

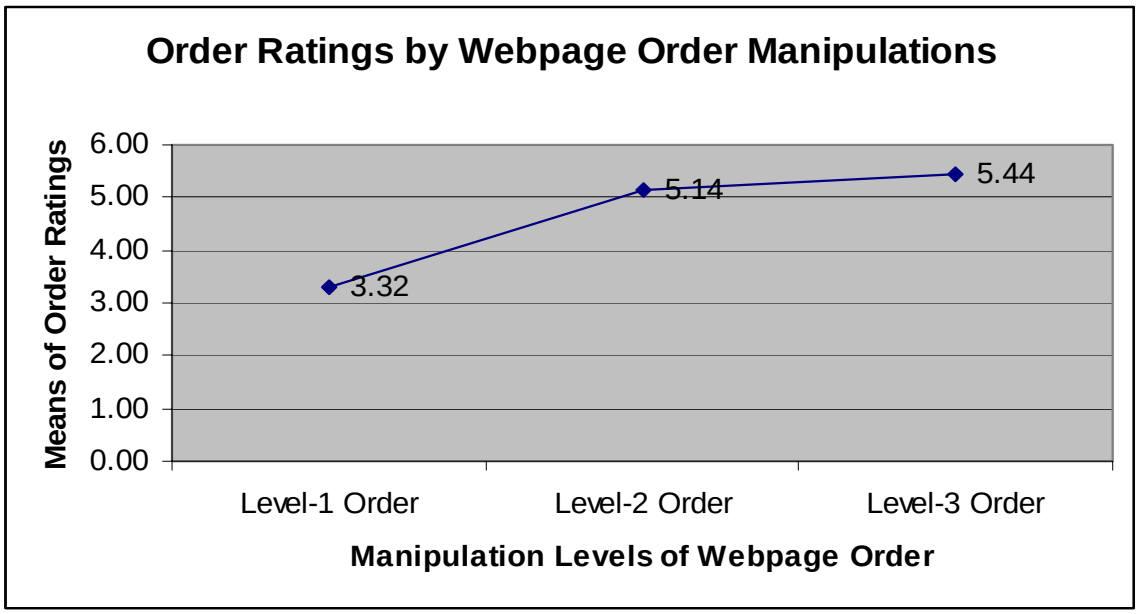

Figure 2. Relationship between Order Ratings and Webpage Order Manipulation

Manipulation of Webpage Complexity

To examine the effectiveness of the manipulation of webpage complexity, an ANOVA was performed using perceived webpage complexity as the dependent variable and manipulation of webpage complexity as the independent variable. The manipulation of webpage complexity was found to have a significant effect on the ratings of webpage complexity ($F_{3, 441} = 80.879$, $p < 0.001$).

A plot of the mean rating of webpage complexity by manipulation levels of webpage complexity (Figure 3) shows there was a continuous increase in the ratings of webpage complexity as the levels of complexity manipulation increased from level-1 to level-4 ($\text{Mean-of-Cmplx}_{\text{level-1CM}} = 2.70 < \text{Mean-of-Cmplx}_{\text{level-2CM}} = 3.29 < \text{Mean-of-Cmplx}_{\text{level-3CM}} = 3.83 < \text{Mean-of-Cmplx}_{\text{level-4CM}} = 4.47$). The repeated contrasts yielded

significant differences on the mean ratings of webpage complexity between level-1 and level-2 ($p<0.001$), between level-2 and level-3 ($p<0.001$), and between level-3 and level-4 ($p<0.001$) complexity manipulation. These results suggested the effectiveness of our manipulation of webpage complexity.

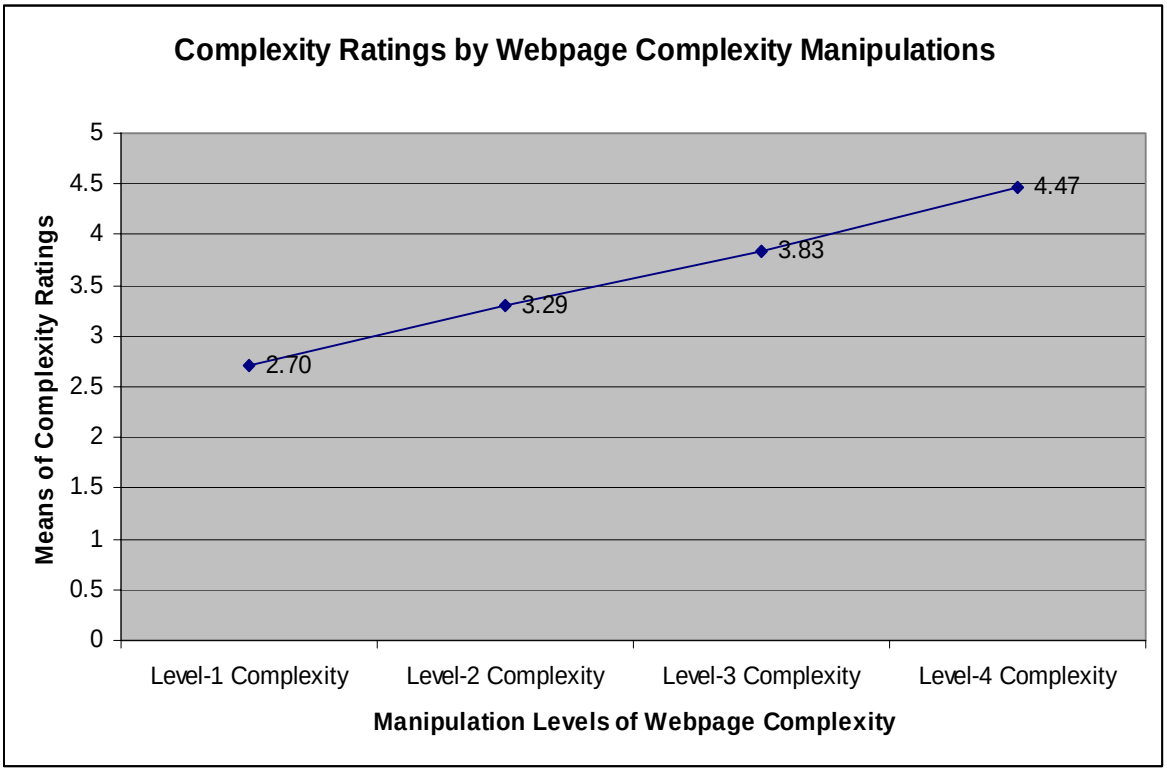

Figure 3. Relationship between Complexity Ratings and Webpage Complexity Manipulation

Manipulation of Subjects' Metamotivational States

A manipulation check was then performed on the subjects' metamotivational states to test whether the subjects were successfully induced into the respective metamotivational states (telic state or paratelic) that the hypothetical scenarios were

intended for. The independent sample t-test showed that the subjects reading the scenario used to facilitate a telic state had a significantly higher mean score on the TPS measure ($t = 22.576$, $p < 0.001$, $Mean_{telic} = 4.38$ vs. $Mean_{paratelic} = 3.05$) than those who read the scenario intended for a paratelic state. A higher TPS score indicates a greater inclination toward a telic state while a lower TPS score shows a greater tendency toward a paratelic state. Therefore, as expected, the telic scenario facilitated the subjects into a telic state while the paratelic scenario induced a paratelic state in the subjects. This demonstrated the effectiveness of our manipulation of subjects' metamotivational states.

Two ANOVA tests were conducted to test whether the subjects' metamotivational state influenced their perceptions of webpage order and complexity. No significant effect of the manipulation of metamotivational states was found on the subjects' ratings of webpage order ($F_{1, 421} = 1.286$, $P = 0.257$) and complexity ($F_{1, 421} = 0.123$, $P = 0.726$). Nor was there any significant interaction effect of the manipulation of metamotivational state with the webpage order and complexity manipulation.

5.2 Construct Validity and Reliability

A confirmatory factor analysis was performed using maximum likelihood estimation in order to assess the validity of the factor structure of the 26 items used to measure the mediating and dependent variables of intrinsic valence, arousal, motivational valence, and approach/avoidance behavior. The total 26 items yielded a four-factor model. Multiple fit indices were used for evaluating the model. The goodness-of-fit index (GFI) was 0.85 and the adjusted goodness-of-fit index (AGFI) was 0.82. The data of the present study yielded a comparative fit index (CFI) of 0.948, a

normed fit index (NFI) of 0.927, a non-normed-fit index (NNFI) of 0.942, a root mean square residual (RMR) of 0.0687 and a root mean square error of approximation of 0.0727. The χ^2/df ratio was 3.34. In general, values of 0.8 or above for the GFI and AGFI, higher than 0.9 for the NFI, CFI and NNFI, less than or equal to 0.08 for RMSEA are considered a good fit (Kelloway, 1998; Kline, 1998). All factor loadings were significant and ranged from 0.63 to 0.95 ($p < 0.001$). The Cronbach's Alpha of each factor ranged from 0.89 to 0.98. As a result, the four-factor measurement model fits the data well. Table 5 and Table 6 present the indices of model fit, factor loadings and Item reliability. The items of each factor were summed and averaged into a single score for the analysis.

Table 5. Fit Indices for CFA

χ^2	df	χ^2/df	GFI	AGFI	NFI	NNFI	CFI	RMR	RMSEA
980	293	3.34	0.85	0.82	0.927	0.942	0.948	0.0687	0.0727

Table 6. Factor Loadings and Item Reliability

Constructs and Their Indicators	Factor Loading	T Value	SE	Cronbach's Alpha
Intrinsic Valence				0.925
Invl1	0.8854	23.66	0.047	
Invl2	0.9191	25.22	0.053	
Invl3	0.9111	24.84	0.051	
Invl4	0.8905	23.89	0.048	
Invl5	0.6363	14.74	0.060	
Arousal				0.895
Arsl1	0.7427	17.66	0.053	
Arsl2	0.7969	19.54	0.050	
Arsl3	0.8273	20.67	0.044	
Arsl4	0.7459	17.76	0.052	
Arsl5	0.8109	20.06	0.047	
Arsl6	0.6846	15.80	0.050	
Motivational Valence				0.909
Mtvl1	0.7226	17.38	0.046	
Mtvl2	0.8782	23.28	0.048	
Mtvl3	0.8317	21.33	0.050	
Mtvl4	0.7769	19.25	0.046	
Mtvl5	0.8212	20.92	0.048	
Mtvl6	0.7194	17.66	0.051	
Approach/Avoidance Behavior				0.982
Apb1	0.9521	27.09	0.059	
Apb2	0.9236	25.65	0.060	
Apb3	0.9396	26.45	0.059	
Apb4	0.9409	26.51	0.059	
Apb5	0.9147	25.22	0.060	
Apb6	0.9292	25.92	0.061	
Apb7	0.8532	22.47	0.061	
Apb8	0.9550	27.24	0.060	
Apb9	0.9445	26.69	0.060	

5.3 Tests of the Hypotheses

This section discusses the results of the analysis of the effects of the experimental factors in the study.

Descriptive Statistics and Correlation Matrices

Table 7 shows the means and standard deviations of the variables of emotional response and approach tendency by the factor levels of each independent variable in the experiment. The correlations among the response variables – ratings of webpage complexity, webpage order, intrinsic valence, arousal, motivational valence, and approach tendencies are presented in Table 8.

Table 7. Descriptive Statistics for the Variables by Factor Levels

Factor Levels		Intrinsic Valence		Arousal		Motivational valence		Approach Tendency	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Webpage Complexity	Level -1	-0.22	1.17	-0.83	0.82	-0.12	1.04	2.53	1.36
	Level -2	0.44	0.95	-0.15	0.75	0.31	0.70	3.23	1.18
	Level -3	0.90	1.04	0.18	0.93	0.57	1.02	3.90	1.64
	Level -4	0.15	1.30	0.64	0.69	0.38	1.09	3.43	1.73
Webpage Order	Level -1	-0.64	1.12	0.58	0.88	-0.22	0.91	2.22	1.17
	Level -2	0.61	0.93	-0.23	0.85	0.54	0.94	3.77	1.48
	Level -3	1.02	0.77	-0.51	0.80	0.54	0.97	3.85	1.46
Meta-motivational State	Telic	0.21	1.18	-0.08	1.00	0.33	1.05	3.33	1.67
	Paratelic	0.41	1.19	-0.01	0.92	0.24	0.95	3.20	1.45

Table 8. Correlation Matrix of the Variables

	Complexity	Order	Intrinsic Valence	Arousal	Moti-vational Valence	Approach Tendency
Complexity	1	-	-	-	-	-
Order	-0.483*	1	-	-	-	-
Intrinsic Valence	-0.125**	0.562**	1	-	-	-
Arousal	0.578**	-0.320**	-0.173**	1	-	-
Moti-vational Valence	0.007	0.339**	0.627**	-0.071	1	-
Approach Tendency	-0.023	0.482**	0.810**	-0.097*	0.887**	1

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

All the correlations were significant expect for the correlations of the ratings of webpage complexity with the subjects' motivational valence and approach tendency, and the correlation between the subjects' felt arousal and motivational valence. While the correlation between the subjects' felt arousal and approach tendency is significant at the level of 0.05, however, its value is close to zero (-0.097). As predicted, the subjects' metamotivational state serves as a moderator in the research model. Therefore, as shown in Table 9, we obtained the correlation matrices of the response variables respectively from the subject group that read the telic scenario and the group reading the paratelic

scenario. Different from what was found in the correlation matrix obtained from the data across the telic and paratelic groups (Table 8), the ratings of webpage complexity were significantly correlated with the subjects' motivational valence and with their approach tendency for both the telic and paratelic groups (Table 9). While these correlations were significant, their directions were different, positive for the paratelic group and negative for the telic group (Table 9). Therefore, when the subjects were in a paratelic state, the ratings of webpage complexity were positively related to the subjects' motivational valence and their approach tendency, however, when the subjects were in a telic state, the relationships of the ratings of webpage complexity with the subjects' motivational valence and their approach tendency became negative (Table 9).

These finding provided support for Hypotheses 5a, 5b, 11a, and 11b. Similarly, contrary to the findings obtained from the across-group data (Table 8), the relationships of the subjects' felt arousal to their motivational valence and approach tendency were also significant for both groups, but their directions varied between the telic and paratelic group (Table 9). The subjects' felt arousal levels and their motivatitonal valence and approach tendency were negatively related when the subjects were in a telic state; however, the relationships became positive when the subjects were in a paratelic state (Table 9). This provided support for Hypotheses 3 and 10.

Table 9. Correlation Matrices of the Response Variables under the Telic and Paratelic Scenarios

	Complexity		Order		Intrinsic Valence		Arousal		Motivational Valence		Approach Tendency	
	Telic	Para-telic	Telic	Para-telic	Telic	Para-telic	Telic	Para-telic	Telic	Para-telic	Telic	Para-telic
Complexity	1	1	-	-	-	-	-	-	-	-	-	-
Order	-.505***	-.457***	1	1	-	-	-	-	-	-	-	-
Intrinsic Valence	-.195**	-.050	.566***	.556***	1	1	-	-	-	-	-	-
Arousal	.540***	.625***	-.323***	-.323***	-.349***	.012	1	1	-	-	-	-
Moti-vational Valence	-.333***	.400***	.521***	.120	.786***	.465***	-.619***	.602***	1	1	-	-
Approach Tendency	-.244***	.241***	.566***	.380***	.879***	.748***	-.462***	.371***	.910***	.858***	1	1

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

Table 10. Multivariate Effects of the Independent Variables, the Two-Way Interaction Terms, and the Three-Way Interaction Terms

Source	Wilks' Lambda	$DF_{numerator}$	$DF_{denominator}$	F Value
Webpage Complexity (CM)	0.433	12	1106.216	34.293***
Webpage Order (OR)	0.390	8	836	62.941***
Metamotivational State (MT)	0.922	4	418	7.027***
CM x OR	0.683	24	1459.438	7.027***
CM x MT	0.761	12	1106.216	10.043***
OR x MT	0.720	8	836	18.677***
CM x OR x MT	0.844	24	1459.438	3.027***

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

While most of the correlations were significant for both telic and paratelic groups, however, the correlations were not significant between the ratings of webpage complexity and subjects' intrinsic valence, between the webpage order ratings and subjects' motivational valence, and between the subjects' intrinsic valence and felt arousal when the subjects were in a paratelic state. The implications of the findings regarding the correlations between the response variables will be discussed in further detail for each of the hypotheses in the following sections.

MANOVA Test

An MANOVA was conducted with the variables of the subjects' emotional responses and approach tendency as the dependent variables and the manipulations of

webpage complexity, webpage order, and the subjects' metamotivational state as the independent variables. As shown in Table 10, the MANOVA results showed significant multivariate effects for all the three independent variables – webpage complexity, webpage order and subjects' metamotivational state, two-way interaction terms, and the three-way interaction term. While the interaction effect of webpage complexity and order manipulations was significant, however, its magnitude ($F_{24,\ 1459.438} = 7.027$) was much less than the magnitudes of the main effects of webpage complexity manipulation ($F_{12,\ 1106.216} = 34.293$) and webpage order manipulation ($F_{8,\ 836} = 62.941$). Therefore, for the current analysis, we mainly focus on the main effects of the manipulations of webpage complexity and webpage order instead of their interaction effect. The manipulation of subjects' metamotivational state was found to have significant interaction effects with the manipulation of webpage complexity ($F_{12,\ 1106.216} = 10.043$) and webpage order ($F_{8,\ 836} = 18.677$). Both of these interaction effects have larger magnitudes than the magnitude of the main effect of the manipulation of subjects' metamotivational state ($F_{4,\ 418} = 7.027$). The non-negligible interaction effects of the manipulation of metamotivational state of the subjects with the webpage complexity and webpage order manipulations indicate that the subjects' metamotivational state moderates the effects of webpage complexity and webpage order. The three-way interaction effect of the manipulations of webpage complexity, webpage order and subjects' metamotivational state, while significant at the level of 0.001, has a much smaller magnitude ($F_{24,\ 1459.438} = 3.027$) than any of the main effects and two-way interaction effects of the independent variable. This allows us to focus on the main

effects and the two-way interaction effects rather than the three-way inaction effect of the independent variables.

The F statistics of the main and interaction effects of the independent variables for each dependent variable are presented in Table 11. The first and second rows of Table 11 indicate that the main effects of both webpage complexity and webpage order were significant ($P < 0.001$) on all the dependent variables – the three emotional responses and approach behavior. As shown in the third row of Table 11, there was a significant main effect of metamotivational state on intrinsic valence ($P = 0.019$). However, no significant main effects of metamotivational state on arousal, metamotivational state and approach behavior were found. The fourth row indicates that the two-way interaction effects between webpage complexity and order were significant on all the dependent variables – intrinsic valence ($p < 0.001$), arousal ($P = 0.01$), motivational valence ($P < 0.001$), and approach behavior ($P = 0.008$), while not significant on approach/avoidance behavior. As indicated in the fifth and sixth row, the two-way interaction effects between webpage complexity and metamotivational state and between webpage order and metamotivational state were all significant on motivational valence ($P < 0.001$) and approach behavior ($P < 0.001$), however, not significant on intrinsic valence and arousal. The three-way interaction effects among complexity, order and metamotivational states were only significant on the motivational valence ($P = 0.048$). In addition, to understand how the webpage order and complexity influence the subjects' motivational valence and approach tendency differently when the subjects are in different metamotivational states, we also ran separate ANOVAs on the

scores of motivational valence and approach tendency respectively for the telic and paratelic groups. We will report the F statistics in more detail where appropriate in the discussion of each hypothesis below.

Table 11. Effects of the Manipulations of Webpage Complexity, Webpage Order, and Metamotivational State on the Subjects' Emotional Responses and Approach Tendency

Source	$DF_{numerator}$	$DF_{denominator}$	F Values of the Dependent Variables			
			Intrinsic Valence	Arousal	Moti-vational Valence	Approach Tendency
Webpage Complexity (CM)	3	421	32.604***	110.428***	18.209***	25.312***
Webpage Order (OR)	2	421	154.823***	129.938***	54.103***	93.103***
Meta-motivational State (MT)	1	421	5.568*	2.155	2.464	2.100
CM x OR	6	421	4.916***	3.766**	9.488***	2.943**
CM x MT	3	421	2.144	0.630	31.219***	15.923***
OR x MT	2	421	2.340	1.177	58.519***	28.366***
CM x OR x MT	6	421	1.499	0.956	2.135*	2.098

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

Planned Contrasts

Along with the MANOVA test, a series of repeated planned contrasts were performed comparing the scores on each dependent variable (intrinsic valence, arousal, motivational valence and approach tendency) between each consecutive pair of the treatment conditions of webpage complexity and webpage order. The purpose was to provide information about both the significance levels and the natures of the main effects of the manipulation levels of webpage complexity and order. Table 12 shows the results of the repeated contrasts of the manipulation levels of webpage order on the scores of intrinsic valence, arousal, motivational valence, and approach behavior. There were significant differences in the scores of intrinsic valence and arousal between each consecutive pair of levels of the order manipulation (Level-1 webpage order vs. Level-2 webpage order, and Level-2 webpage order vs. Level3 webpage order). The scores of motivational valence and approach behavior were significantly different between the level-1 and level-2 webpage order manipulation. However, no significant difference was found in motivational valence and approach behavior between the level-3 and level-4 webpage order conditions. Table 13 presents the results of the repeated contrasts of the manipulation levels of webpage complexity. Significant differences were found among the scores of all the dependent variables (three emotional responses and approach behavior) between each consecutive pair of manipulation levels of complexity. In addition, repeated contrasts were also performed on the scores of motivational valence and approach tendency respectively for the telic and paratelic groups in order to examine the moderating effects of the subjects' metamotivational state. Furthermore, in order to

verify which combinations of webpage complexity and order elicit the most pleasure and the greatest approach tendencies in the subjects under telic and paratelic states, four planned contrasts were also conducted on the subjects' overall pleasure scores and their approach tendency. The overall pleasure scores were obtained by summing up the scores of intrinsic and motivational valence for each subject. The results of the planned contrasts will be reported in detail in the discussion of each hypothesis below.

Table 12. Results of Repeated Contrasts of Webpage Order Manipulation Levels

Repeated Contrasts of Webpage Order Manipulations	Statistics	Dependent Variable			
		Intrinsic Valence	Arousal	Moti-vational Valence	Approach Tendency
Level-1 Order vs. Level-2 Order	Contrast Estimate	-1.232	0.831	-0.753	-1.534
	Std. Error	0.097	0.073	0.083	0.133
	Sig.	0.000	0.000	0.000	0.000
Level-2 Order vs. Level-3 Order	Contrast Estimate	-0.416	0.311	0.009	-0.076
	Std. Error	0.098	0.074	0.084	0.135
	Sig.	0.000	0.000	0.911	0.573

Table 13. Results of Repeated Contrasts of Webpage Complexity Manipulation Levels

Repeated Contrast of Webpage Complexity Manipulations	Statistics	Dependent Variable			
		Intrinsic Valence	Arousal	Moti-vational Valence	Approach Tendency
Level-1 Complexity vs. Level 2 Complexity	Contrast Estimate	-0.613	-0.692	-0.442	-0.671
	Std. Error	0.112	0.084	0.096	0.153
	Sig.	0.000	0.000	0.000	0.000
Level-2 Complexity vs. Level-3 Complexity	Contrast Estimate	-0.458	-0.322	-0.248	-0.665
	Std. Error	0.113	0.085	0.097	0.155
	Sig.	0.000	0.000	0.011	0.000
Level-3 Complexity vs. Level-4 Complexity	Contrast Estimate	0.774	-0.482	0.192	0.493
	Std. Error	0.114	0.086	0.098	0.156
	Sig.	0.000	0.000	0.050	0.002

Polynomial Trend Analysis

We conducted polynomial contrast tests to further investigate the nature of the relationships of the manipulations of webpage complexity and order with the subjects' emotional responses and approach behaviors. Polynomial contrasts allowed us to perform trend analyses of the linear, quadratic, and cubic effects of webpage complexity and order on emotional responses and approach tendency. Due to the interaction effects of metamotivational state with webpage complexity and order on motivational valence and approach tendency, we also conducted polynomial contrasts with motivational valence and approach tendency as the dependent variables respectively for the telic and paratelic groups. The results of polynomial contrasts will be reported below where appropriate in discussion of each hypothesis.

Multiple Regressions

In order to perform multiple regressions to investigate the mediation effects of emotional responses on the relationships between webpage order and complexity and approach tendency, orthogonal polynomial coding was used to transform the variable of webpage complexity manipulation into the three variables that respectively represent the linear (CM^1), quadratic (CM^2) and cubic effects (CM^3) of webpage complexity. Similarly, the variable of webpage order manipulation was transform into the two variables respectively representing the linear (OR^1) and quadratic effects (OR^2) of webpage order. Two sets of multiple regressions were conducted respectively for the telic and paratelic groups of subjects according to Baron and Kenny's (1986) four criteria for establishing mediation relationship. The results of multiple regressions will

be reported with respective to their implications for Hypothesis 13a and Hypotheses 13b as follows.

How do the aesthetic qualities of a web homepage influence the subjects' emotional responses?

Hypotheses 1a and 1b were proposed to examine the influences of the aesthetic qualities of a web homepage on the subjects' felt intrinsic valence. Hypothesis 1a predicted that a web homepage's order level has a positive relationship with the subjects' feelings of intrinsic valence. As shown in Table 8, the subjects' ratings of webpage order were significantly positively correlated with the subjects' felt intrinsic valence (Correlation = 0.562, $P < 0.01$). Likewise, the F statistic for the effect of webpage order manipulation on the subjects' felt intrinsic valence was significant ($F_{2, 421} = 154.823$, $P < 0.001$), as shown in Table 11. A repeated contrast also revealed a positive effect of the manipulation levels of webpage order on the subjects' felt intrinsic valence (Table 12): the subjects experienced the web homepages with higher levels of order as more intrinsically pleasant than the homepages with lower levels of order ((MeanDiff (OR-L1 vs. OR-L2) = -1.232, $P < 0.001$; MeanDiff (OR-L2 vs. OR-L3) = -0.416 , $P < 0.001$). The polynomial contrast tests yielded, as shown in Table 14, a significant positive linear effect ($F_{1, 147} = 300.23$, $P < 0.001$) and a significant negative quadratic effect ($F_{1, 147} = 24.35$, $P < 0.001$) of webpage order on the subjects' felt intrinsic valence. While both were significant, the positive linear effect ($\eta^2 = 0.50$) was considerably larger in terms of effect size than the negative quadratic effect ($\eta^2 = 0.04$) of webpage order, which indicates the dominance of linear term in the relationship between webpage order and

intrinsic valence. The presence of the weak negative quadratic trend indicates the linear effect of webpage order became smaller as the levels of webpage order increase (See Figure 4). All these results established an overall positive linear relationship between webpage order and the subjects' felt intrinsic valence. Therefore, hypothesis 1a was supported that the order levels of a web homepage positively influence the subjects' feelings of intrinsic pleasantness.

Table 14. Results of Polynomial Contrasts for the Effects of Webpage Order on the Subjects' Intrinsic Valence and Arousal

Dependent Variable	Order	Contrast Estimate	df	F Value	Eta Square
Intrinsic Valence	Linear	1.17	1/147	300.23***	0.50
	Quadratic	-0.33	1/147	24.35***	0.04
Arousal	Linear	-0.81	1/147	104.61***	0.27
	Quadratic	0.21	1/147	15.04***	0.03

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

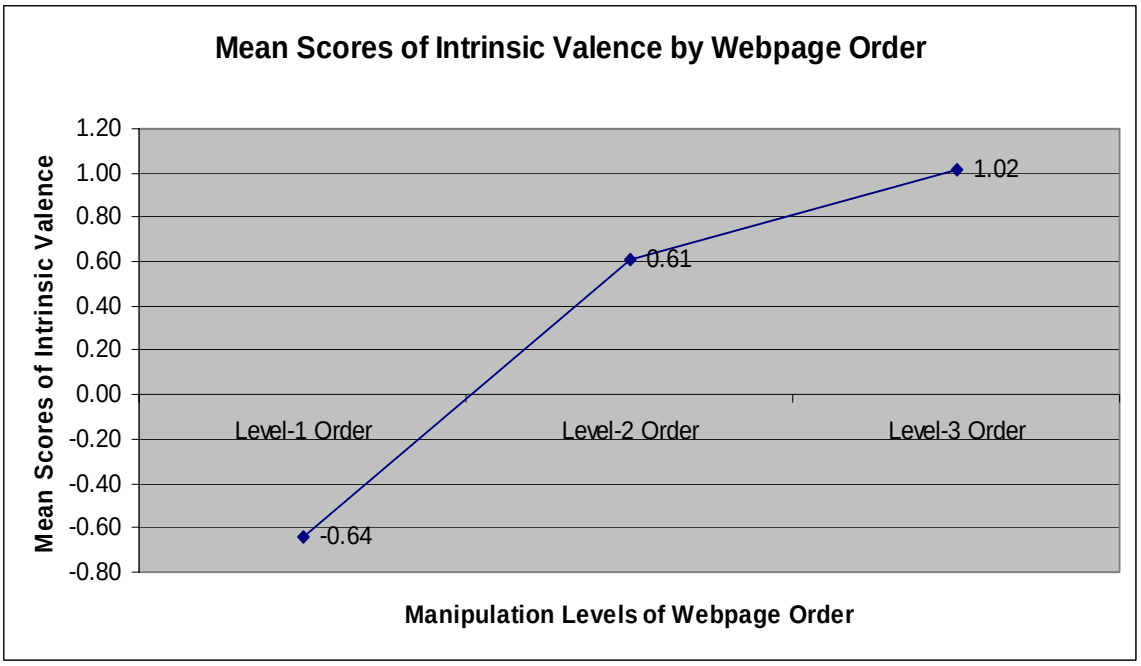

Figure 4. Relationship between Intrinsic Valence and Webpage Order

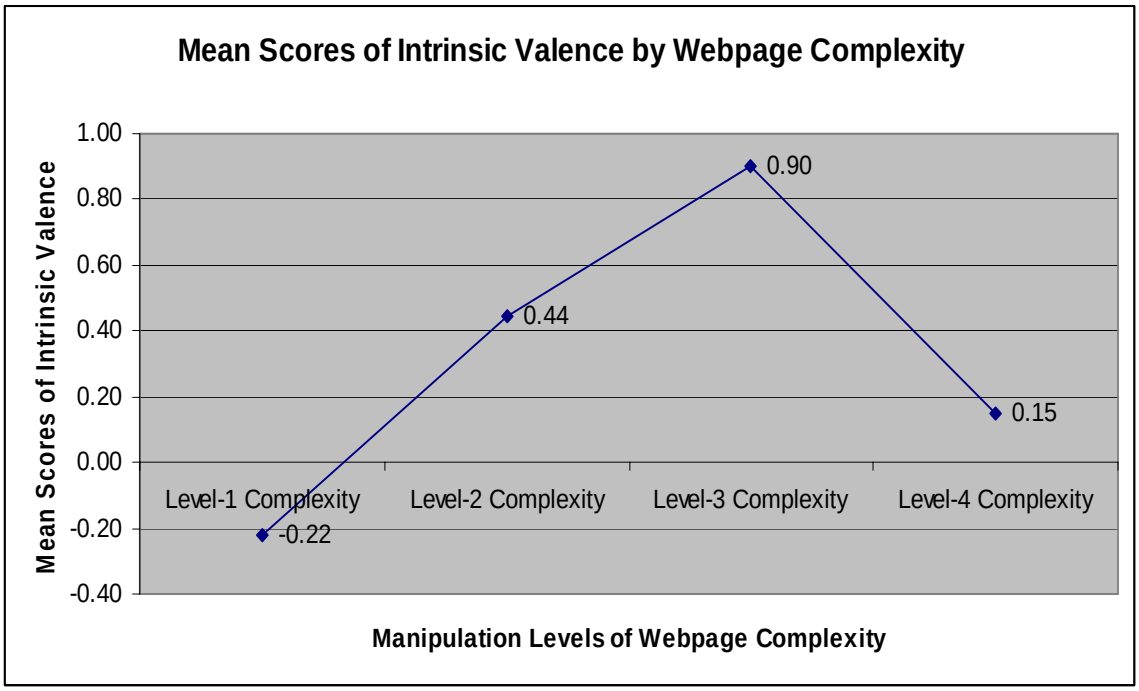

Figure 5. Relationship between Intrinsic Valence and Webpage Complexity

Hypothesis 1b argues that a web homepage's complexity level has an inverted U-shaped relationship with the subjects' feelings of intrinsic valence. As shown in Table 11, the F statistic for the effect of webpage complexity manipulation on the subjects' felt intrinsic valence was significant ($F_{3, 421} = 32.604$, $P < 0.001$). A repeated contrast yielded (Table 13) an increase in the mean scores of intrinsic valence with increasing manipulation levels of webpage complexity until the level-3 complexity was reached (MeanDiff (CM-L1 vs. CM-L2) = -0.613, $P < 0.001$; MeanDiff (CM-L2 vs. CM-L3) = -0.458, $P < 0.001$). From that point, the increase in webpage complexity was associated with a decrease in the mean scores of intrinsic valence (MeanDiff (CM-L3 vs. CM-L4) = 0.774, $P < 0.001$). This finding revealed an inverted U-shaped curvilinear relationship between the manipulation levels of webpage complexity and the subjects' felt intrinsic valence (Figure 5). The polynomial contrasts showed that the manipulation levels of webpage complexity had a significant positive linear effect ($F_{1, 106} = 14.13$, $P < 0.001$), a significant negative quadratic effect ($F_{1, 106} = 71.27$, $P < 0.001$), and a significant negative cubic effect ($F_{1, 106} = 15.78$, $P < 0.001$) on the subjects' felt intrinsic valence. The results of polynomial contrast were shown in table 15. The existence of a significant negative quadratic effect of webpage complexity, which was much greater in magnitude ($\eta^2 = 0.18$) than the linear ($\eta^2 = 0.04$) and cubic trend ($\eta^2 = 0.02$) of complexity suggests that the subjects' intrinsic valence toward the webpage was a curvilinear inverted U function of the webpage complexity levels. These findings were supportive of hypothesis 1b, which proposes that the complexity of a web homepage bears an inverted U-shaped relationship with the subjects' feelings of intrinsic pleasantness.

Hypotheses 2a and 2b dealt with the effects of a web homepage's aesthetic qualities on the subjects' felt arousal levels. Hypothesis 2a suggests the order level of a web homepage has a negative relationship with the subjects' felt arousal levels. Table 9 shows a significant negative correlation between the subjects' ratings of webpage order and their felt arousal levels (Correlation = -0.320, $P < 0.01$). As shown in Table 11, the manipulation of webpage order was also shown to have a significant univariate effect on the subjects' felt arousals ($F_{2, 421} = 129.938$, $P < 0.001$). A repeated contrast revealed a significant negative effect of the manipulations levels of webpage order on the subjects' felt arousal levels (Table 12 and Figure 6): the subjects exposed to the web homepages with lower levels of order reported greater levels of felt arousal than those who browsed the homepages with higher levels of order (MeanDiff (OR-L1 vs. OR-L2) = 0.831, $P < 0.001$; MeanDiff (OR-L2 vs. OR-L3) = 0.311, $P < 0.001$). The results of the polynomial contrasts, which are shown in Table 14, indicated a significant negative linear effect ($F_{1, 147} = 104.61$, $P < 0.001$) and a significant positive quadratic trend ($F_{1, 147} = 15.04$, $P < 0.001$) of the webpage order manipulation on subjects' felt arousal. Although both the negative linear and positive quadratic effects were significant, the linear effect ($\eta^2 = 0.27$) had a larger effect size than the quadratic effect ($\eta^2 = 0.03$). This implies that the negative effect of webpage order on the subjects' felt arousals became smaller as the manipulation levels of webpage order increased. Overall, these results suggest that webpage order had a negative linear effect on the subjects' felt arousal. Therefore, hypothesis 2a was supported, which proposes that the order level of a web homepage negatively influences the subjects' felt arousal levels.

Table 15. Results of Polynomial Contrasts for the Effects of Webpage Complexity on the Subjects' Intrinsic Valence and Arousal

Dependent Variable	Complexity	Contrast Estimate	Df	F Valule	Eta Square
Intrinsic Valence	Linear	0.30	1/106	14.13***	0.04
	Quadratic	-0.69	1/106	71.27***	0.18
	Cubic	-0.24	1/106	15.78***	0.02
Arousal	Linear	1.08	1/106	125.93***	0.34
	Quadratic	-0.11	1/106	2.90	0.01
	Cubic	0.12	1/106	4.17*	0.01

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

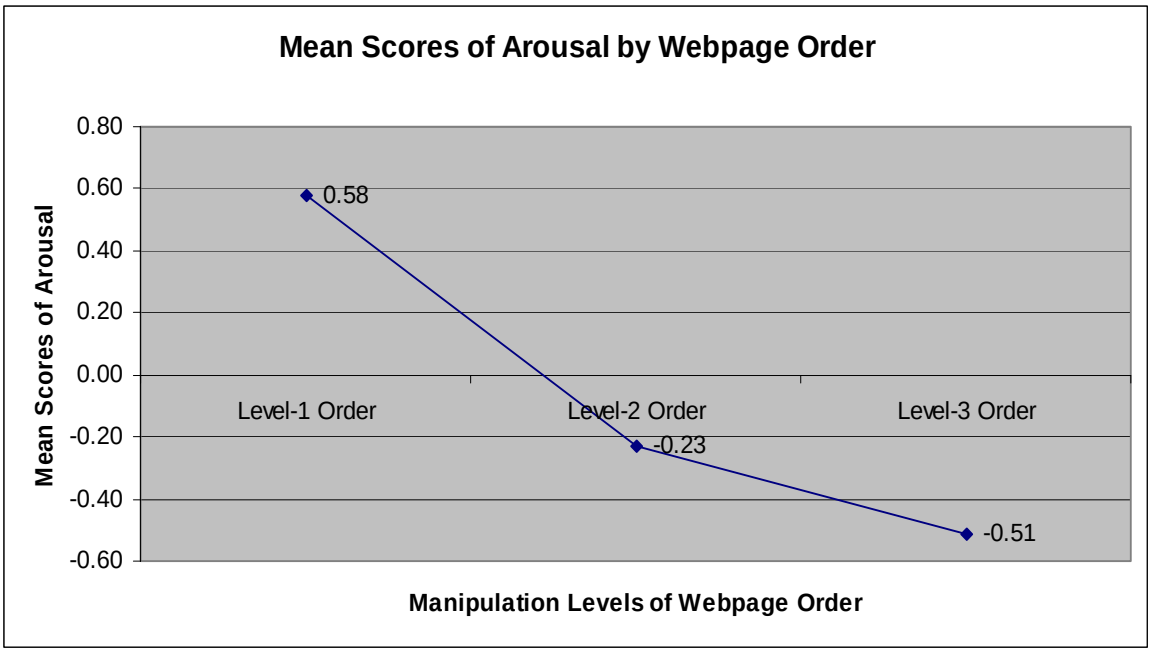

Figure 6. Relationship between Arousal and Webpage Order

Hypothesis 2b proposed that the complexity level of a web homepage has a positive relationship with the subjects' felt arousal levels. As shown in Table 8, the subjects' ratings of webpage complexity were positively correlated with their arousal levels (Correlation = 0.578, $P < 0.01$). The F statistics of the effect of the manipulation of webpage complexity on the subjects' felt arousals was significant ($F_{3, 421} = 110.428$, $P < 0.001$), as presented in Table 11. A repeated contrast also showed the positive effect of the webpage complexity manipulation on subjects' felt arousal levels (Table 13 and Figure 7): the subjects reported the web homepages with higher levels of complexity as more arousing and stimulating than the homepages with lower levels of complexity (MeanDiff (CM-L1 vs. CM-L2) = -0.692, $P < 0.001$; MeanDiff (CM-L2 vs. CM-L3) = -0.322, $P < 0.001$; MeanDiff (CM-L3 vs. CM-L4) = -0.482, $P < 0.001$). As shown in Table 15, the polynomial contrasts revealed a significant positive linear effect ($F_{1, 106} = 125.93$, $P < 0.001$) and a significant positive cubic effect ($F_{1, 106} = 4.17$, $P < 0.05$) of webpage complexity on felt arousal. No significant quadratic effect of webpage complexity was found. While both linear and cubic effects were significant, however, the positive linear effect ($\eta^2 = 0.34$) had a considerably larger effect size than the positive cubic effect ($\eta^2 = 0.01$). Hence, a positive linear trend dominated the relationship between webpage complexity and felt arousal. Therefore, all the above results were consistent with hypothesis 2b, which suggests that the complexity level of a web homepage positively influences the subjects' felt arousal levels.

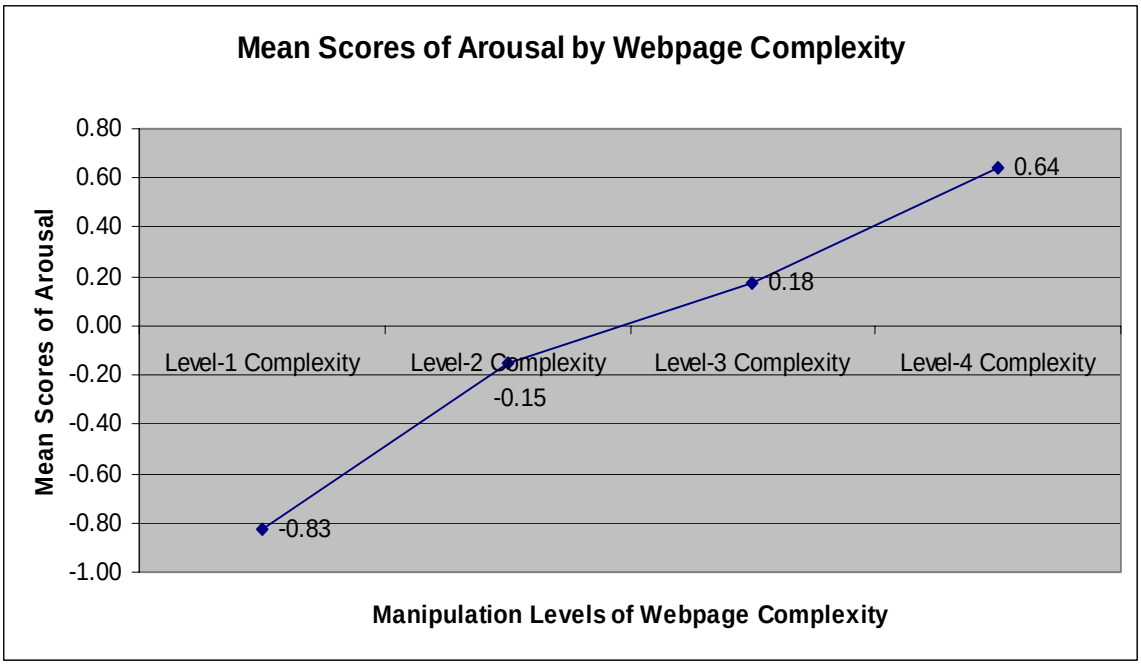

Figure 7. Relationship between Arousal and Webpage Complexity

Hypothesis 3 proposed that a web user's metamotivational states moderate the direction of the relationship between a user's felt arousal and motivational valence. In other words, the web user's felt arousal can positively or negatively influence his/her felt motivational valence, depending on which metamotivational state is operative. As mentioned earlier and shown in Table 9, Hypothesis 3 was supported by the findings that when the subjects were in a telic state, their felt arousal levels were significantly negatively correlated with their felt motivational valence (Correlation = -0.619, $P < 0.001$); however, when they were in a paratelic state, their arousal levels were positively related to the motivational valence (Correlation = 0.602, $P < 0.001$). In addition, we also assessed the moderation effect of the subjects' metamotivational state by testing the equality of regression coefficients on arousal between the subject group in a telic state

and the group in a paratlic state. Before we ran the test, we first created a dummy variable called *telic* that was coded 1 for the telic condition and 0 for the paratelic condition, and a variable *tlasl* (the interaction term of metamotivational state and arousal) that was the product of the value of *telic* variable and the score of felt *arousal*. We then used the variables of *telic*, *arousal* and *tlasl* as predictors in a regression equation. Since the variable *telic* was coded as such that the paratelic group is the omitted group, the estimated slope for variable *tlasl* is equal to the slope for telic group minus the slope for paratelic group. Hence, the value of the regression coefficient (slope) of the variable *tlasl* and its significance level were used to test the null hypothesis that regression coefficients are equal between the telic and paratelic groups. The multiple regression conducted with *telic*, *arousal* and *tlasl* predicting *motivational valence* yielded a significant, non-zero regression coefficient for *tlasl* (B = -1.268, SE = 0.079, t = -16.12, $P < 0.001$), which suggested the regression coefficient of motivational valence on arousal for the telic group is significantly different from the regression coefficient for the paratelic group. Therefore, the moderation effect of the subjects' metamotivational state on the relationship between the subjects' felt arousal levels and their motivational valence was confirmed. Hypothesis 3 was supported.

Hypotheses 4a and 4b predicted how the order levels of a web homepage influence the subjects' felt motivational valence differently when the subjects are in different metamotivational states. The multivariate interaction effect of the webpage order manipulation and the subjects' metamotivational state was found significant ($F_{8, 836} = 18.677$, $P < 0.001$), as shown in Table 10. The results presented in Table 11 also

indicate a significant univariate interaction effect of the manipulation of webpage order and the subjects' metamotivational state on the subjects' felt motivational valence ($F_{2, 421}$ = 58.519, P < 0.001). Both findings suggest the moderating effect of the subjects' metamotivational state, which determines how the webpage order may affect the subjects' felt motivational valence.

Hypothesis 4a proposed that the order of a web page positively influences a user's felt motivational valence when the user is in a telic state. As shown in Table 9, when the subjects were in a telic state, the subjects' ratings of webpage order were significantly positively correlated with their feelings of motivational valence (Correlation = 0.521, P < 0.001). An ANOVA performed on the data of the telic group yielded a significant univariate effect of the webpage order manipulation on the subjects' felt motivational valence ($F_{2, 213}$ = 116.426, P < 0.001), as presented in Table 16. While the interaction effect of webpage complexity and order manipulations were also significant ($F_{2, 213}$ = 6.176, P < 0.001), the magnitude of the interaction effect is much smaller than that of the main effect of webpage order (Table 16). The interaction effect of webpage complexity and order is depicted graphically in Figure 8, which shows the simple effect of webpage order on the subjects' motivational valence for each manipulation level of webpage complexity. It seems that the simple positive effects of the webpage order manipulation existed for all the manipulation levels of webpage complexity (Figure 8).

Table 16. Effects of the Manipulations of Webpage Complexity and Webpage Order on the Subjects' Felt Motivational Valence and Approach Tendency in a Telic Condition

Source	$DF_{numerator}$	$DF_{denominator}$	F Values of the Dependent Variables	
			Motivational Valence	Approach Tendency
Webpage Complexity (CM)	3	213	6.375***	8.517***
Webpage Order (OR)	2	213	116.426***	109.760***
CM x OR	6	213	6.176***	2.394*

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

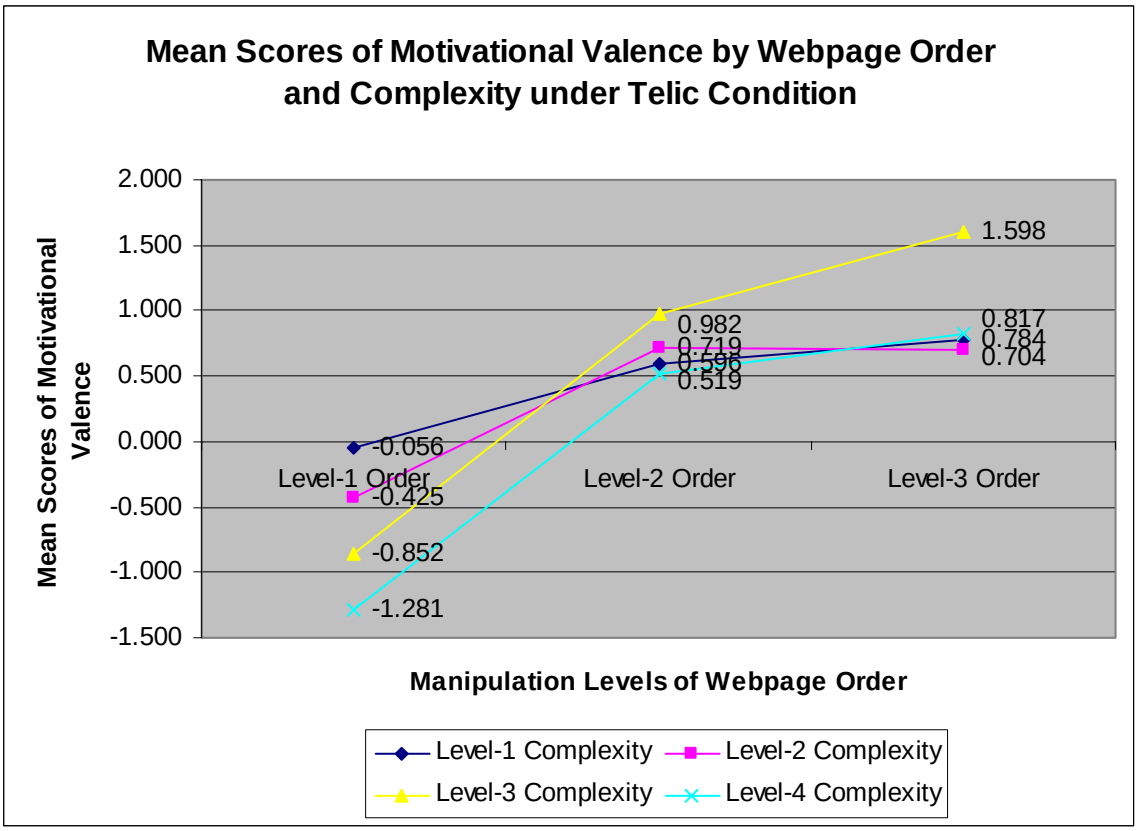

Figure 8. Relationship between Motivational Valence and Webpage Order and Complexity under Telic Condition

A repeated contrasts conducted using the data of the telic group showed a positive effect of the webpage order manipulation levels on the subjects' felt motivational valence when the subjects were in a telic state (Table 17): The subjects felt higher levels of motivational valence toward the web homepages with higher levels of order than was the case for the homepages with lower levels of order (MeanDiff (OR-L1 vs. OR-L2) = -1.357, $P < 0.001$; MeanDiff (OR-L2 vs. OR-L3) = -0.271, $P = 0.021$). The polynomial contrasts performed on the telic group data revealed a significant positive linear effect ($F_{1, 71} = 9584.34$, $P < 0.001$) and a significant negative quadratic effect ($F_{1,}$

$_{71}$ = 708.97, P < 0.001) of the webpage order manipulation on the subjects' motivational valence, which is shown in Table 18. Although both were significant, the positive linear effect (η^2 = 0.87) was considerably larger in magnitude than the negative quadratic effect (η^2 = 0.12). As represented by the blue line in Figure 9, this result suggests that when the subjects were in a telic state, their felt motivational valence toward the web homepage increased as the order level of webpage increased, however, the magnitude of the increase in the scores of motivational valence were smaller at a higher level of webpage order than a lower level of order. Therefore, all the results supported hypothesis 4a, which suggested that when the subjects are in a telic state, the order of a web homepage positively influences the subjects' feelings of motivational valence.

Table 17. Results of Repeated Contrasts of Webpage Order Manipulation Levels on the Scores of Motivational Valence and Approach Tendency under Telic and Paratelic Conditions

Repeated Contrasts of Webpage Order Manipulations	Statistics	Dependent Variable			
		Motivational Valence		Approach Tendency	
		Telic	Paratelic	Telic	Paratelic
Level-1 Order vs. Level-2 Order	Contrast Estimate	-1.357	-0.149	-2.101	-0.967
	Std. Error	0.114	0.120	0.186	0.189
	Sig.	0.000	0.216	0.000	0.000
Level-2 Order vs. Level-3 Order	Contrast Estimate	-0.271	0.290	-0.517	0.365
	Std. Error	0.116	0.122	0.190	0.191
	Sig.	0.021	0.018	0.007	0.057

Table 18. The Results of the Polynomial Contrasts for the Effects of Webpage Order on the Subjects' Motivational Valence and Approach Tendency in the Telic and Paratelic Conditions

Dependent Variable	Order	Meta-motivational State	Contrast Estimate	df	F Value	Eta Square
Moti-vational Valence	Linear	Telic	1.15	1/71	9584.34***	0.87
		Paratelic	-0.10	1/70	0.83	0.01
	Quadratic	Telic	-0.44	1/71	708.97***	0.12
		Paratelic	-0.18	1/70	15.15***	0.08
Approach Tendency	Linear	Telic	1.85	1/71	460.61***	0.75
		Paratelic	0.43	1/70	106.98***	0.30
	Quadratic	Telic	-0.65	1/71	98.94***	0.08
		Paratelic	-0.54	1/70	61.52***	0.23

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

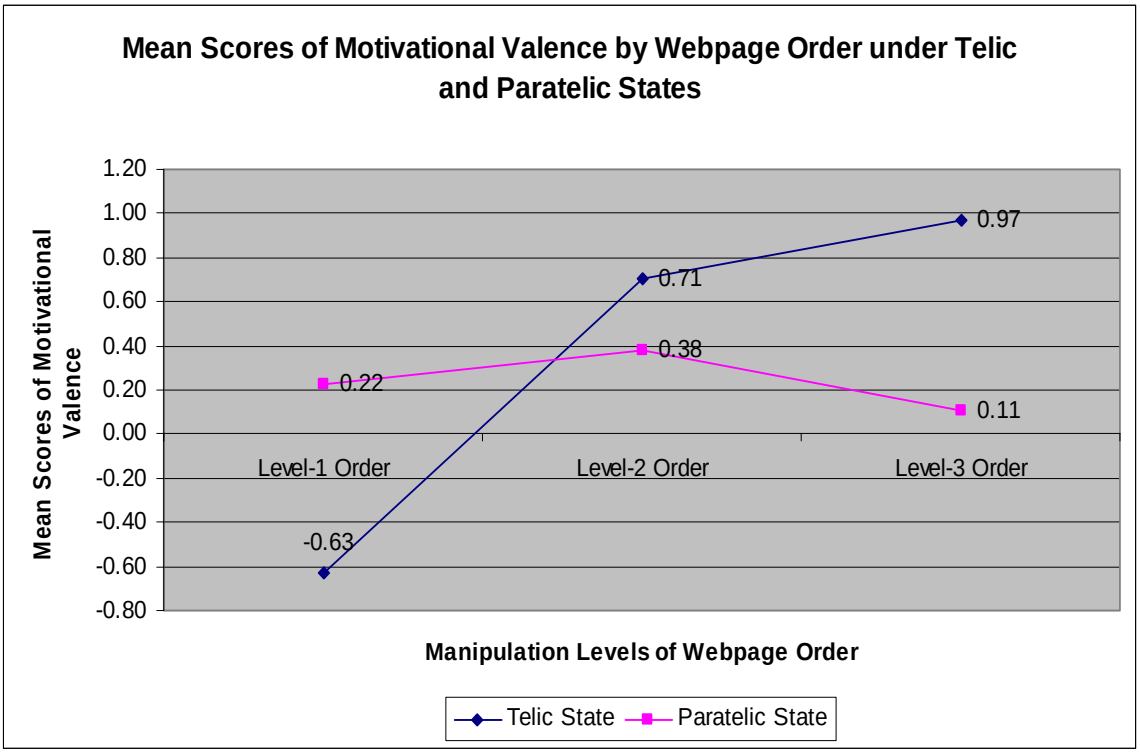

Figure 9. Relationship between Motivational Valence and Webpage Order under Telic and Paratelic Conditions

Hypothesis 4b predicted that the order of a web homepage negatively influences a user's felt motivational valence when the user is in a paratelic state. However, no significant correlation was found between the subjects' ratings of webpage order and their felt motivational valence when the subjects were in a paratelic state, as shown in Table 9. Similarly, the F statistic of the effect of webpage order manipulation on the subjects' felt motivational valence was not significant ($F_{2, 208} = 2.852$, $P = 0.06$) in the paratelic condition, which is presented in Table 19. As shown in Table 18, the polynomial contrasts conducted using the paratelic group data did not yield a significant result for the linear effect, but revealed a significant negative quadratic effect of

webpage order ($F_{1, 70}$ = 15.15, P < 0.001) on the subjects' felt motivational valence. Therefore, hypothesis 4b was rejected.

Table 19. Effects of the Manipulations of Webpage Complexity and Webpage Order on the Subjects' Felt Motivational Valence and Approach Tendency in a Paratelic Condition

Source	$DF_{numerator}$	$DF_{denominator}$	F Values of the Dependent Variables	
			Motivational Valence	Approach Tendency
Webpage Complexity (CM)	3	208	41.225***	32.507***
Webpage Order (OR)	2	208	2.852	13.386***
CM x OR	6	208	5.409***	2.568*

* p < 0.05
** p<0.01
*** p<0.001

The presence of a significant quadratic effect of webpage order suggests a curvilinear relationship between webpage order and motivational valence. This result was also supported by the results of repeated contrast tests, which are shown in Table 17. As depicted by the red line in Figure 9, while not significant, the scores of motivational valence increased as the webpage order increased from level-1 to level-2 (MeanDiff (OR-L1 vs. OR-L2) = -0.149, P = 0.216). Then, as the webpage order continued to increase from level-2 to level-3, a significant drop occurred in the scores of motivational

valence (MeanDiff (OR-L2 vs. OR-L3) = 0.290, P = 0.018). However, the quadratic effect of webpage order only accounted for 8% (η^2 = 0.08) of the total variance in motivational valence.

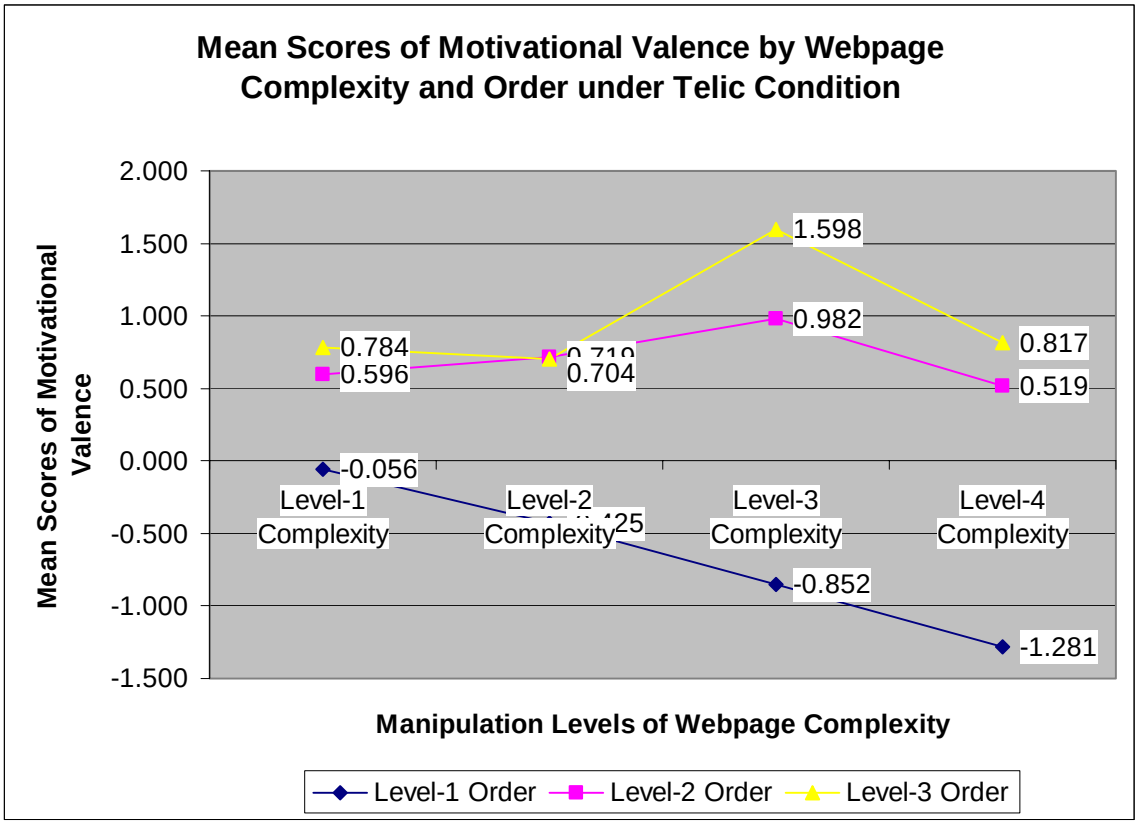

Figure 10. Relationship between Motivational Valence and Webpage Complexity and Order under Telic Condition

Hypotheses 5a and 5b suggested that the complexity levels of a web homepage influence a web user's motivational valence differently depending on the user's metamotivational state. Hypothesis 5a predicted that the complexity of a web homepage negatively influences a user's felt motivational valence when the user is in a telic state.

As shown in Table 9, the subjects' ratings of webpage complexity were significantly negatively correlated with the scores of motivational valence (Correlation = -0.333, $P < 0.001$). While the F statistic of the main effect of the webpage complexity manipulation on the subjects' felt motivational valence when the subjects were in telic state was significant ($F_{3, 213} = 6.375$, $P < 0.001$), as presented in Table 16, however, the presence of an interaction effect ($F_{3, 213} = 6.176$, $P < 0.001$) means that the main effect was not representative of the simple effects of webpage complexity. Figure 10 presents the interaction effect and suggests that the effect of webpage complexity manipulation was different for the three manipulation levels of webpage order, being negative at the level-1 webpage order and curvilinear at the level-2 and level-3 webpage orders. The repeated contrasts shown in Table 20 revealed a curvilinear instead of a negative linear trend of the effect of webpage complexity manipulation on the subjects' felt motivational valence in the telic condition. As represented by the blue line in Figure 11, the mean score of motivational valence decreased insignificantly as the webpage complexity increased from level-1 to level-2, then the mean score increased nonsignificantly when the webpage complexity increased to level-3, and finally when the webpage complexity increased from level-3 to level-4 the mean score of motivational valence dropped again significantly (MeanDiff (CM-L1 vs. CM-L2) = 0.109, $P = 0.41$; MeanDiff (CM-L2 vs. CM-L3) = -0.244, $P = 0.070$; MeanDiff (CM-L3 vs. CM-L4) = 0.558, $P < 0.001$).

Table 20. Results of Repeated Contrasts of Webpage Complexity Manipulation Levels on the Scores of Motivational Valence and Approach Tendency under Telic and Paratelic Conditions

Repeated Contrast of Webpage Complexity Manipulations	Statistics	Dependent Variable			
		Motivational Valence		Approach Tendency	
		Telic	Paratelic	Telic	Paratelic
Level-1 Complexity vs. Level 2 Complexity	Contrast Estimate	0.109	-0.993	-0.047	-1.294
	Std. Error	0.132	0.138	0.216	0.217
	Sig.	0.410	0.000	0.826	0.000
Level-2 Complexity vs. Level-3 Complexity	Contrast Estimate	-0.244	-0.253	-0.776	-0.554
	Std. Error	0.134	0.140	0.219	0.220
	Sig.	0.070	0.072	0.000	0.012
Level-3 Complexity vs. Level-4 Complexity	Contrast Estimate	0.558	-0.175	1.039	-0.052
	Std. Error	0.134	0.142	0.219	0.223
	Sig.	0.000	0.220	0.000	0.815

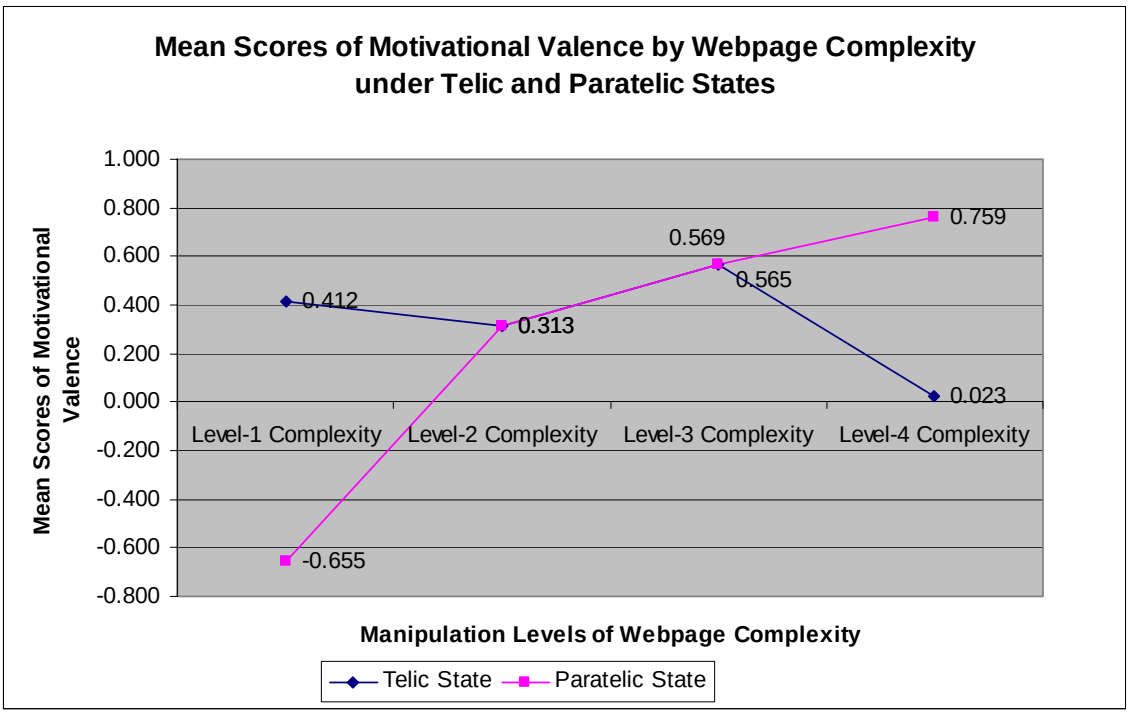

Figure 11. Relationship between Motivational Valence and Webpage Complexity under Telic and Paratelic Conditions

The polynomial contrasts performed on the telic group data yielded a significant negative linear effect ($F_{1, 53} = 19.30$, $P < 0.001$), a significant negative quadratic effect ($F_{1, 53} = 80.23$, $P < 0.001$), and a significant negative cubic effect ($F_{1, 53} = 81.51$, $P < 0.001$) of webpage complexity on the subjects' motivational valence, as shown in Table 21. While all the negative linear, quadratic, and cubic effects of webpage order were significant, the quadratic ($\eta^2 = 0.14$) and cubic effects ($\eta^2 = 0.24$) had a considerably larger effect size than the linear effect ($\eta^2 = 0.10$), which suggests a dominant curvilinear relationship between webpage complexity and felt motivational valence when the subjects were in a telic state.

Table 21. The Results of Polynomial Contrasts for the Effects of Webpage Complexity on the Subjects' Motivational Valence and Approach Tendency in the Telic and Paratelic Conditions

Dependent Variable	Complexity	Meta-motivational State	Contrast Estimate	df	F Value	Eta Square
Moti-vational Valence	Linear	Telic	-0.23	1/53	19.30***	0.10
		Paratelic	1.01	1/52	3970.62***	0.70
	Quadratic	Telic	-0.22	1/53	80.23***	0.14
		Paratelic	-0.41	1/52	50.07***	0.11
	Cubic	Telic	-0.26	1/53	81.51***	0.24
		Paratelic	0.15	1/52	9.23**	0.01
Approach Tendency	Linear	Telic	0.03	1/53	1.28	0.00
		Paratelic	1.40	1/52	107.69***	0.54
	Quadratic	Telic	-0.54	1/53	74.76***	0.22
		Paratelic	-0.62	1/52	93.30***	0.10
	Cubic	Telic	-0.57	1/53	90.49***	0.28
		Paratelic	0.053	1/52	0.02	0.00

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

To summarize the above results, although we found a significant negative correlation between complexity ratings and felt motivational valence as well as a significant negative linear effect of webpage complexity manipulation, however, the

presence of a dominant curvilinear effect overrode the negative linear relationship. Therefore, hypothesis 5a was rejected.

Hypothesis 5b proposed that the complexity of a web homepage positively influences a user's felt motivational valence when the user is in a paratelic state. As shown in Table 9, when in a paratelic state, the subjects' ratings of webpage complexity were significantly positively related to the subjects' felt motivational valence (Corrrelation = 0.40, $P < 0.001$). An ANOVA conducted using the paratelic group data yielded a significant main effect of webpage complexity manipulation ($F_{3, 208} = 41.225$, $P < 0.001$) and a significant interaction effect of webpage complexity and order ($F_{6, 208} = 5.409$, $P < 0.001$), as presented in Table 19. As the magnitude of the interaction effect was much smaller than that of the main effect of webpage complexity, there seemed to be a dominant simple effect of webpage complexity manipulation for all the manipulation levels of webpage order. Figure 12 graphically describes the simple effects of webpage complexity on the subjects' felt motivational valence for each level of webpage order in the paratelic condition. While there seemed to be a positive effect of webpage complexity for the level-2 and level-3 webpage order, however, at the level-1 webpage order, there appeared to be a positive effect of webpage complexity until the webpage complexity reached level-3, where the positive effect diminished and turned into a negative one as the webpage complexity increased from level-3 to level-4. The red line in Figure 11 represents the main effect of webpage complexity manipulation levels across all manipulations levels of webpage order. While the mean scores of motivational valence changed in the hypothesized direction (increased) as the webpage complexity

increased from level-1 to level-4, however, the repeated contrast in the paratelic condition shown in Table 20 yielded only one significant result for the mean differences of motivational valence, which is between the level-1 to level-2 webpage complexity (MeanDiff (CM-L1 vs. CM-L2) = -0.993, $P < 0.001$; MeanDiff (CM-L2 vs. CM-L3) = -0.253, $P = 0.072$; MeanDiff (CM-L3 vs CM-L4) = -0.175, $P = 0.220$). As shown in Table 21, the polynomial contrasts conducted using the paratelic group data revealed a significant positive linear effect ($F_{1, 52} = 3970.62$, $P < 0.001$), a significant negative quadratic ($F_{1, 52} = 50.07$, $P < 0.001$), and a significant positive cubic effect ($F_{1, 52} = 9.23$, $P < 0.01$) of webpage complexity on the subjects' motivational valence. The positive linear effect ($\eta^2 = 0.70$) was considerably larger in magnitude than the quadratic ($\eta^2 = 0.11$) and cubic effects ($\eta^2 = 0.01$). It dominated the relationship between webpage complexity and the subjects' motivational valence, and became smaller at higher levels of complexity than at lower levels of complexity. Based on the above results, while the interaction effect of webpage complexity and order rendered a negative effect of webpage complexity when a very high level of complexity (level-4 complexity) is combined with a very low level of order (level-1 order), there still appeared to be an overall positive effect of webpage complexity on the subjects' felt motivational valence in the paratelic condition. Therefore, hypothesis 5b was partially supported, that when a website user is in a paratelic state, the complexity of the webpage positively influences motivational valence.

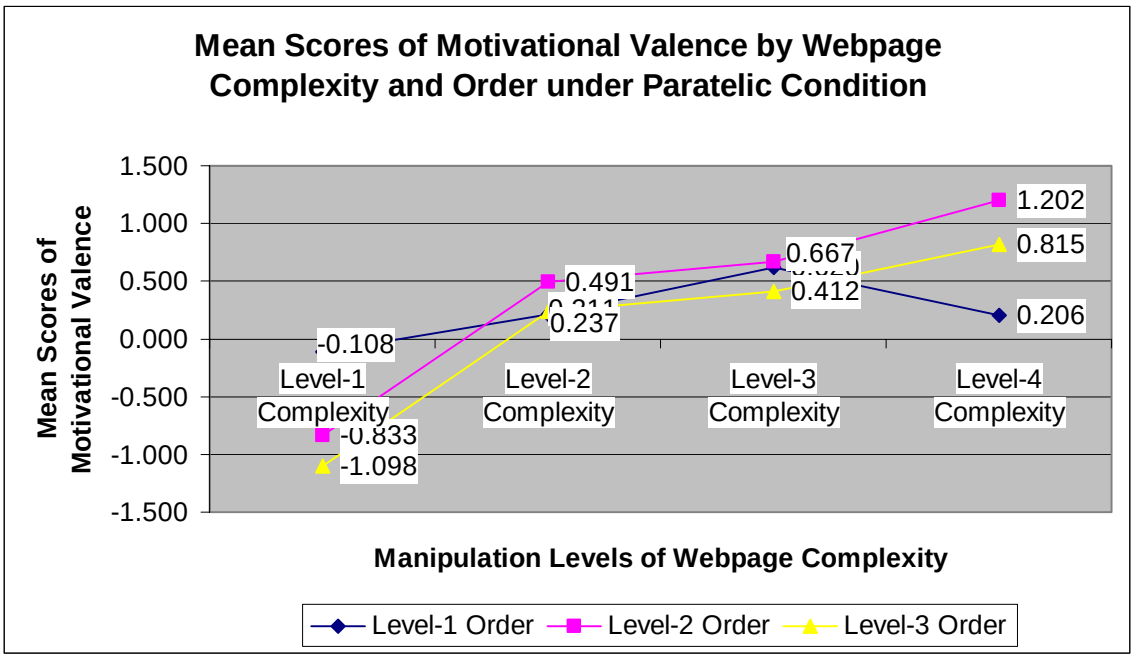

Figure 12. Relationship between Motivational Valence and Webpage Complexity and Order under Paratelic Condition

Hypotheses 6a and 6b were proposed to examine how to balance the design of complexity and order in a web homepage so as to elicit the most pleasure in the subjects in a telic or paratelic state. Hypothesis 6a predicts that a website user in a telic state will feel the most pleasure when visiting a web homepage with high levels of order and moderate levels of complexity. As shown in Table 22, in the telic condition the webpage stimulus with the level-3 complexity and level-3 order (C3O3) score highest on overall pleasure (Mean = 3.257), whose score was obtained by summing up the scores of intrinsic valence and motivational valence for each subject. A planned contrast was conducted on the telic group data comparing the scores of overall pleasure between the subject group who browsed the webpage stimulus with level-3 complexity and level-3 order (C3O3) and the subject groups exposed to the other 11 webpage stimuli. Table 24

presents the coefficients and results for the contrast. The result suggested that when the subjects were in a telic state, the scores of overall pleasure elicited by the webpage with the level-3 complexity and level-3 order were significantly higher than those evoked by all the other webpage stimuli ($T = 8.449$, $df = 213$, $P < 0.001$). In other words, the subjects in a telic state experienced the web homepage with the level-3 complexity and level-3 order as the most pleasant among all the webpage stimuli. Therefore, Hypothesis 6a was supported.

Table 22. Descriptive Statistics of the Overall Pleasure Score for Each Webpage Stimulus in the Telic Condition

Manipulation Levels of Webpage Complexity	Manipulation Levels of Webpage Order	Webpage Stimuli	Number of Subjects	Means of Overall Pleasure	Std Deviation of Overall Pleasure
Level-1	Level-1	C1O1	21	-1.170	1.068
	Level-2	C1O2	19	0.765	1.740
	Level-3	C1O3	17	1.467	1.126
Level-2	Level-1	C2O1	20	-0.995	1.890
	Level-2	C2O2	19	1.267	1.170
	Level-3	C2O3	18	1.526	1.323
Level-3	Level-1	C3O1	18	-1.030	1.541
	Level-2	C3O2	19	1.940	1.574
	Level-3	C3O3	17	3.257	0.723
Level-4	Level-1	C4O1	19	-2.754	0.916
	Level-2	C4O2	18	1.007	1.349
	Level-3	C4O3	20	1.737	1.435

Table 23. Descriptive Statistics of the Overall Pleasure Score for Each Webpage Stimulus in the Paratelic Condition

Manipulation Levels of Webpage Complexity	Manipulation Levels of Webpage Order	Webpage Stimuli	Number of Subjects	Mean of Overall Pleasure	Std Deviation of Overall Pleasure
Level-1	Level-1	C1O1	20	-1.658	0.744
	Level-2	C1O2	19	-0.760	1.869
	Level-3	C1O3	17	-0.310	1.522
Level-2	Level-1	C2O1	19	0.516	1.534
	Level-2	C2O2	19	1.354	0.427
	Level-3	C2O3	19	0.995	0.648
Level-3	Level-1	C3O1	18	0.987	1.686
	Level-2	C3O2	18	1.689	1.591
	Level-3	C3O3	17	2.059	1.245
Level-4	Level-1	C4O1	17	-0.571	1.889
	Level-2	C4O2	19	1.949	2.026
	Level-3	C4O3	18	1.737	1.132

Hypothesis 6b proposed that a website user in a paratelic state will feel the most pleasure when visiting a web homepage with moderate levels of order and high levels of complexity. As shown in Table 23, in the paratelic condition, the web homepage stimulus with the level-3 complexity and level-3 order (C3O3) scored highest (Mean = 2.059) and the webpage with the level-4 complexity and level-2 order (C4O2) scored second highest (Mean = 1.949) on the overall pleasure. Using the paratelic group data, a planned contrast of the score of overall pleasure between the treatment condition of webpage stimulus with level-4 complexity and level-2 order (C4O2) and the other 11

treatment conditions of webpage stimuli yielded a significant result ($t = 4.045$, $df = 208$, $P < 0.001$), as presented in the Table 24.

Table 24. Planned Contrasts of the Scores of Overall Pleasure between Treatments of Webpage Stimuli in the Telic and Paratelic Conditions

Contrast		Telic Condition	Paratelic Condition
Coefficients			
	Webpage Treatments		
	C1O1	-1	-1
	C1O2	-1	-1
	C1O3	-1	-1
	C2O1	-1	-1
	C2O2	-1	-1
	C2O3	-1	-1
	C3O1	-1	-1
	C3O2	-1	-1
	C3O3	11	-1
	C4O1	-1	-1
	C4O2	-1	11
	C4O3	-1	-1
DF		213	208
t Value		8.449***	4.045***

*** p<0.001

These findings partially supported Hypothesis 6b that when a web user is in a paratelic state, the web homepage with a high level of complexity and a moderate level of order elicits the most pleasure in the user.

What's the consequence of the web user's emotional responses elicited by the aesthetic qualities of a web homepage?

Hypothesis 7 argued that the motivational valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website. As shown in Table 8, the subjects' felt motivational valence toward the web homepage was significantly positively correlated with the subjects' approach tendency toward the website (Correlation = 0.887, $P < 0.001$). This finding provided support for Hypothesis 7.

Hypothesis 8 predicted that the intrinsic valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website. As shown in Table 8, the subjects' felt intrinsic valence toward the web homepage was found to be significantly positively correlated with the subjects' approach tendency toward the website (Correlation = 0.810, $P < 0.001$). Thus, Hypothesis 8 was supported.

Hypotheses 9 and 10 pertained to the moderating role of the web user's metamotivational state on the effects of user's arousal and felt intrinsic valence on the user's approach tendency toward the website. Hypothesis 9 proposed that a web user's metamotivational states moderate the direction of relationship between a user's felt arousal level and the user's approach tendency toward the website. As shown in Table 9, when in the telic condition, the subjects' felt arousal elicited by the web homepage was

significantly negatively correlated with their approach tendency toward the website (Correlation = -0.462, P < 0.001); however, in the paratelic condition, the felt arousal was found to be significantly positively correlated with the approach tendency (Correlation = 0.371, P < 0.001). This finding provided support for hypothesis 9. Using the same statistical method adopted for Hypothesis 3, we performed a multiple regression using *telic*, *arousal* and *tlasl* as the independent variables and *approach tendency* as the dependent variable. The regression model yielded a significant non-zero regression coefficient (B = -1.358, SE = 0.141, t = -9.638, P < 0.001) for *tlasl*, which indicated the inequality of the regression coefficients between the telic and paratelic conditions. This result confirmed the existence of a moderation effect of the subjects' metamotivational state on the relationship between the subjects' felt arousal and their approach tendency toward the website. Therefore, Hypothesis 9 was supported.

Hypothesis 10 predicted that the effect of a web user's felt intrinsic valence on the user's approach tendency toward the website is stronger when the user is in a paratelic state than when the user is a telic state. As shown in Table 9, the subjects' felt intrinsic valence toward the web homepage was highly correlated with their approach tendency toward the website in both telic (Correlation = 0.879, p < 0.001) and paratelic conditions (Correlation = 0.748, p < 0.001). Contrary to Hypothesis 10, the magnitude of the correlation coefficient was larger in a telic condition than in a paratelic condition, which suggested a stronger positive effect of intrinsic valence on approach tendency in the telic condition than in the paratelic condition. Therefore, hypothesis 10 was rejected.

How do the aesthetic qualities of a web homepage influence the web user's approach tendency toward the website, as mediated by the user's emotional responses toward the web homepage?

Hypotheses 11a and 11b address the effect of the order of a web homepage on the web user's approach tendency toward the website. Hypothesis 11a proposed that when a website user is in a telic state, the order of a web homepage positively influences the user's approach tendency toward the website. As shown in Table 9, in the telic condition, the subjects' ratings of webpage order were significantly positively correlated with their approach tendency toward the website (Correlation = 0.566, $P < 0.001$). An ANOVA performed on the telic group data presented in Table 16 revealed a significant main effect of webpage order ($F_{2, 213} = 109.760$, $P < 0.001$) and a significant interaction effect of webpage complexity and order ($F_{6, 213} = 2.394$, $P < 0.029$) on the subjects' approach tendency toward the website. Despite the significant interaction effect, there appeared to be a positive simple effect of webpage order manipulation on approach tendency for each manipulation level of webpage complexity, as depicted in Figure 13. The repeated contrasts of the scores of approach tendency in the telic condition between the consecutive pairs of the webpage order manipulation levels, whose results are presented in Table 17, yielded a positive effect of webpage order manipulation on the subjects' approach tendency toward the website: the subjects who browsed the web homepages with higher levels of order exhibited greater approach tendency toward the website than those given the homepages with the lower levels of order (MeanDiff (OR-

L1 vs. OR-L2) = -2.101, P < 0.001; MeanDiff (OR-L2 vs. OR-L3) = -0.517, P = 0.007). This result is graphically depicted by the blue line in Figure 14.

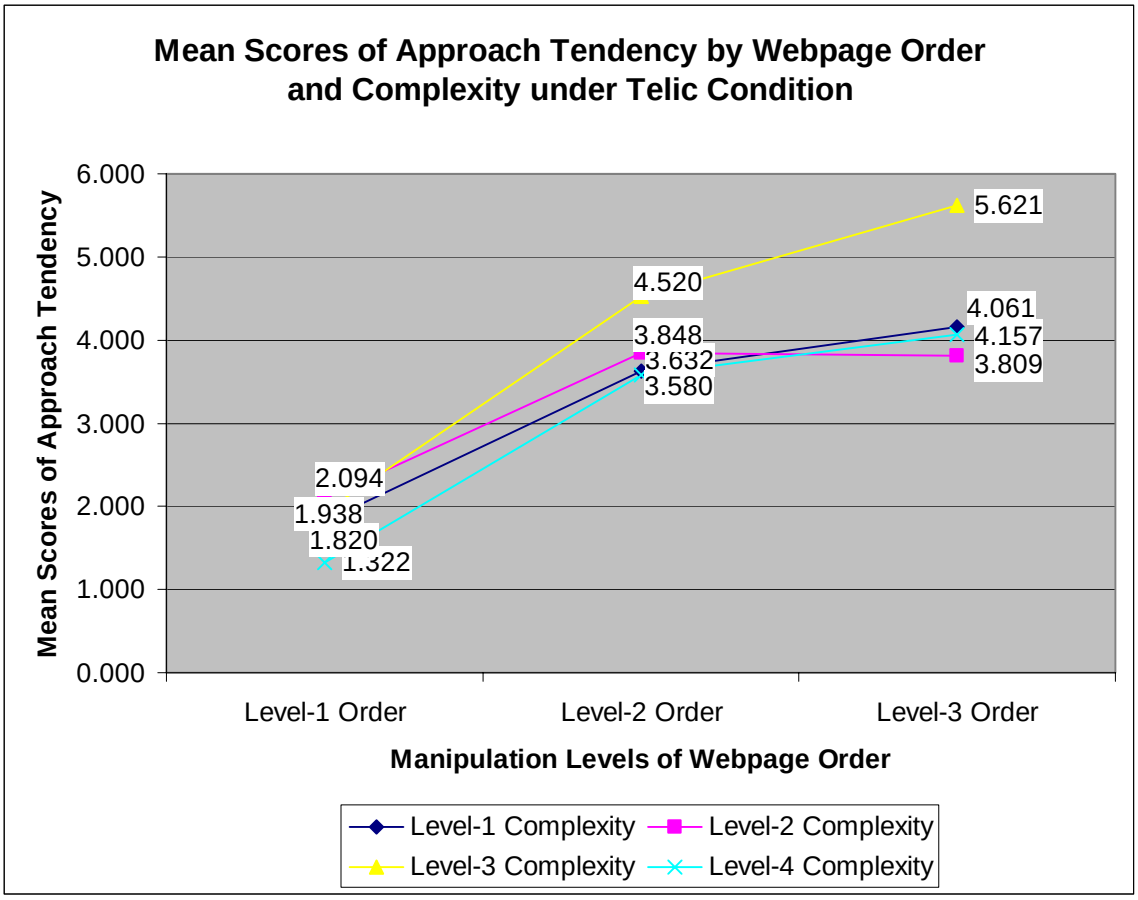

Figure 13. Relationship between Approach Tendency and Webpage Order and Complexity under Telic Condition

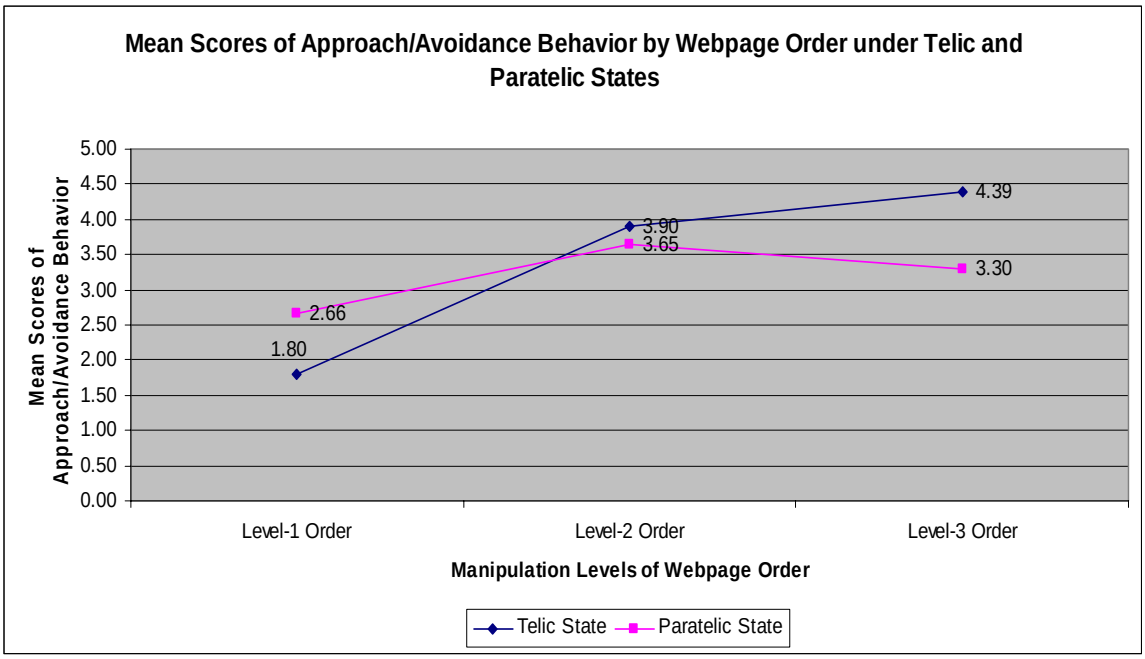

Figure 14. Relationship between Approach Tendency and Webpage Order under Telic and Paratelic States

The polynomial contrasts performed using the telic group data revealed a strong significant positive linear effect ($F_{1,\ 71} = 460.61$, $P < 0.001$, $\eta^2 = 0.75$) and a weak significant negative quadratic effect ($F_{1,\ 71} = 98.94$, $P < 0.001$, $\eta^2 = 0.08$) of webpage order, as shown in Table 18. The presence of a positive linear trend ($\eta^2 = 0.75$) that was stronger and greater than the negative quadratic trend ($\eta^2 = 0.08$) in magnitude suggested that there was an overall positive linear effect of webpage order on the subjects' approach tendency toward the website and that the linear effect of webpage order decreased as the order levels increased. In summary, these results provided support for Hypothesis 11a.

Hypothesis 11b predicted that when a website user is in a paratelic state, the order of a web homepage bears a curvilinear relationship to the user's approach tendency toward the website with the moderate levels of order associated with the greatest approach tendency. As shown in Table 9, in the paratelic condition, the subjects' ratings of webpage order were significantly positively correlated with the subjects' approach tendency toward the website (Correlation = 0.380, $P < 0.001$). An ANOVA performed using the paratelic group data, as presented in Table 19, revealed a significant main effect ($F_{2, 208} = 13.386$, $P < 0.001$) of webpage order manipulation and a significant interaction effect ($F_{6, 208} = 2.568$, $P < 0.020$) of webpage order and complexity manipulation on the subjects' approach tendency toward the website. Figure 15 graphically depicts the simple effects of webpage order manipulation levels on the subjects' approach tendency for each manipulation level of webpage complexity in the paratelic condition. Webpage order seemed to bear a curvilinear inverted U-shaped relationship with the subjects' approach tendency toward the website for all levels of webpage complexity. The repeated contrasts of the scores of approach tendency between the consecutive pairs of webpage order levels in the paratelic condition, as shown in Table 17, also suggested a change in the mean score of approach tendency in hypothesized direction along the increasing levels of webpage order: there was first a significant increase in the score of subjects' approach tendency (MeanDiff (OR-L1 vs. OR-L2) = -0.967, $P < 0.001$), and then a decrease in their approach tendency although not significant (MeanDiff (OR-L2 vs. OR-L3) = 0.365, $P = 0.057$). This result is also

graphically depicted by the red line in Figure 14. The level-2 webpage order was shown to motivate the greatest approach tendency toward the website in the paratelic condition.

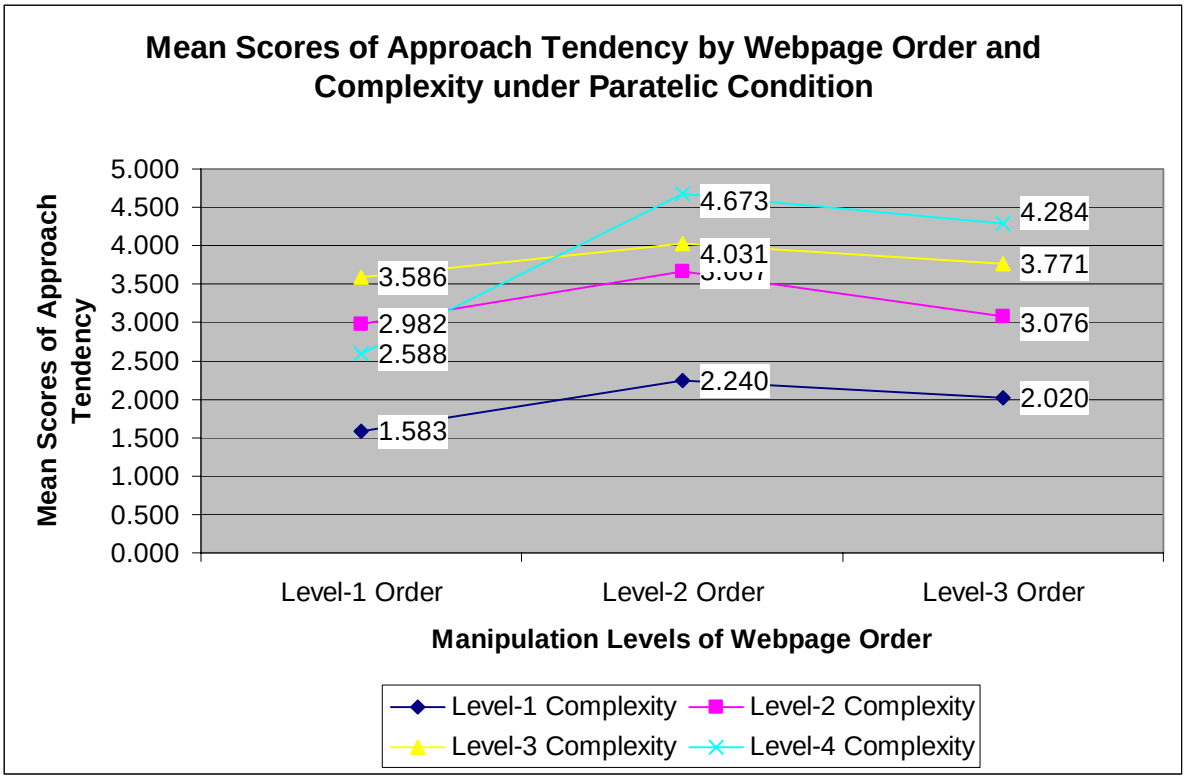

Figure 15. Relationship between Approach Tendency and Webpage Order and Complexity under Paratelic Condition

The polynomial contrasts conducted using the paratelic group data, as shown in Table 18, revealed a significant positive linear effect ($F_{1, 70} = 106.98$, $P < 0.001$) and a significant negative quadratic effect ($F_{1, 70} = 61.52$, $P < 0.001$) of webpage order on the subjects' approach tendency. Since the linear effect ($\eta^2 = 0.30$) and quadratic effect ($\eta^2 = 0.23$) were comparable in size, this result indicated both a positive linear term and a

negative quadratic term dominating the relationship between webpage order and approach tendency. As Hypothesis 11b suggests that the order of a web homepage has an inverted U-shaped relationship to the user's approach tendency toward the webpage with the moderate levels of order associated with the greatest approach tendency, a mere dominant negative quadratic effect of webpage order on approach tendency is necessary for acceptance of the hypothesis. However, due to the co-presence of dominant linear and quadratic effects of webpage order, as suggested by the polynomial contrast, Hypothesis 11b was rejected.

Hypotheses 12a and 12b deal with the effect of the complexity of a web homepage on the web user's approach tendency toward the website. Hypothesis 12a predicted that when a website user is in a telic state, the complexity of a web homepage negatively influences the user's approach tendency toward the website. As shown in Table 9, in the telic condition, the subjects' ratings of webpage complexity was significantly negatively correlated with their approach tendency toward the website (Correlation = -0.244, $P < 0.001$). According to the results of the ANOVA using the telic group data shown in Table 16, a significant main effect ($F_{3, 213} = 8.517$, $P < 0.001$) of webpage complexity manipulation and a significant interaction effect ($F_{6, 213} = 2.394$, $P < 0.029$) of webpage complexity and order were found on the subjects' approach tendency toward the website. A plot of the interaction effect, as presented in Figure 16, suggested a curvilinear effect of webpage complexity manipulation levels on the scores of approach tendency for each level of webpage order. At the level-1 webpage order, the effect of webpage complexity exhibited a quadratic trend of inverted U shape with the

level-2 webpage complexity associated with the greatest approach tendency; at the level-2 webpage order, a more obvious inverted U-shaped quadratic effect of webpage complexity was suggested with the level-3 webpage complexity related with the greatest approach tendency; and finally at the level-3 webpage order, webpage complexity was found to have a cubic effect on the subjects' approach tendency.

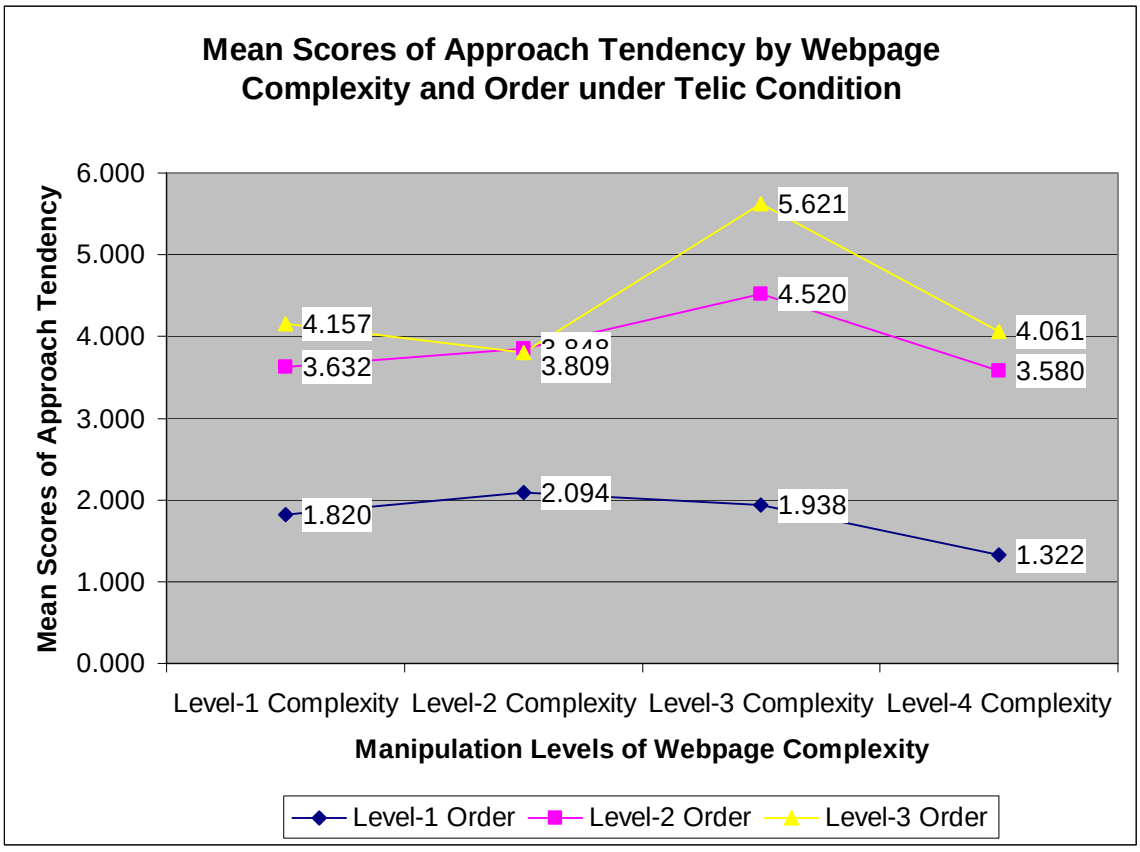

Figure 16. Relationship between Approach Tendency and Webpage Complexity and Order under Telic Condition

Likewise, the repeated contrasts of the scores of approach tendency between the consecutive pairs of webpage complexity manipulation levels in the telic condition, as shown in Table 20 and graphically represented by the blue line in Figure 17, also suggested a curvilinear effect of webpage complexity on the scores of approach tendency: as the manipulation level of webpage complexity increased, there was first an insignificant small increase in the mean score of approach tendency (MeanDiff (CM-L1 vs. CM-L2) = -0.047, P = 0.826), then a significant increase in mean approach tendency (MeanDiff (CM-L2 vs. CM-L3) = -0.776, P < 0.001), and finally a significant decrease (MeanDiff (CM-L3 vs. CM-L4) = 1.039, P < 0.001). The polynomial contrasts performed on the telic group data yielded a significant negative quadratic effect ($F_{1, 53}$ = 74.76, P < 0.01, η^2 = 0.22) and a significant negative cubic effect ($F_{1, 53}$ = 90.49, P < 0.01, η^2 = 0.28) of webpage complexity on approach tendency. However, the linear effect of webpage complexity was not significant ($F_{1, 53}$ = 1.28). The results of polynomial contrasts are shown in Table 21. In sum, in the telic condition, while the ratings of webpage complexity was found to be negatively related to the subjects' approach tendency, the results of ANOVA, repeated contrasts, and polynomial contrast consistently indicated the presence of a curvilinear instead of a linear effect of webpage complexity on the subjects' approach tendency. Therefore, Hypothesis 12a was rejected.

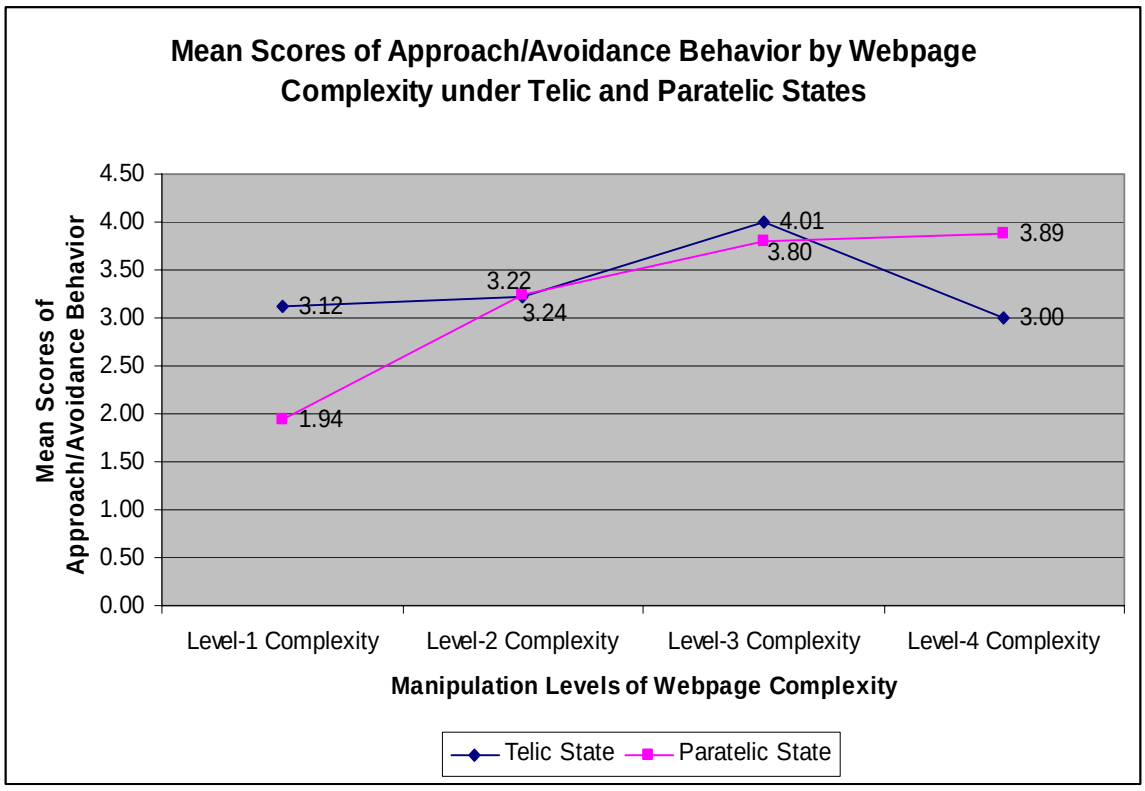

Figure 17. Relationship between Approach Tendency and Webpage Complexity under Telic and Paratelic States

Hypothesis 12b proposes that when a website user is in a paratelic state, the complexity of a web homepage positively influences a user's approach tendency toward the website. As shown in Table 9 (Correlation = 0.241, $P < 0.001$), in the paratelic condition, the subjects' ratings of webpage complexity were found to be significantly positively correlated with the scores of approach tendency toward the website. The ANOVA conducted using the paratelic group data, whose results are presented in Table 19, yielded a significant main effect ($F_{2, 208} = 32.507$, $P < 0.001$) of webpage complexity and a significant interaction effect ($F_{6, 208} = 2.568$, $P < 0.020$) of webpage complexity

and order on the subjects' approach tendency toward the website. The interaction effect graphs, shown in Figure 18, suggested a consistent positive simple effect of webpage complexity on the subjects' approach tendency for both level-2 and level-3 webpage order. However, at the level-1 webpage order, webpage complexity appeared to have an inverted U-shaped quadratic effect: the score of approach tendency increased as the webpage complexity increased from level-1 to level-3, where the positive effect turned into a negative one and the score of approach tendency dropped when the webpage complexity continued to increase to level-4.

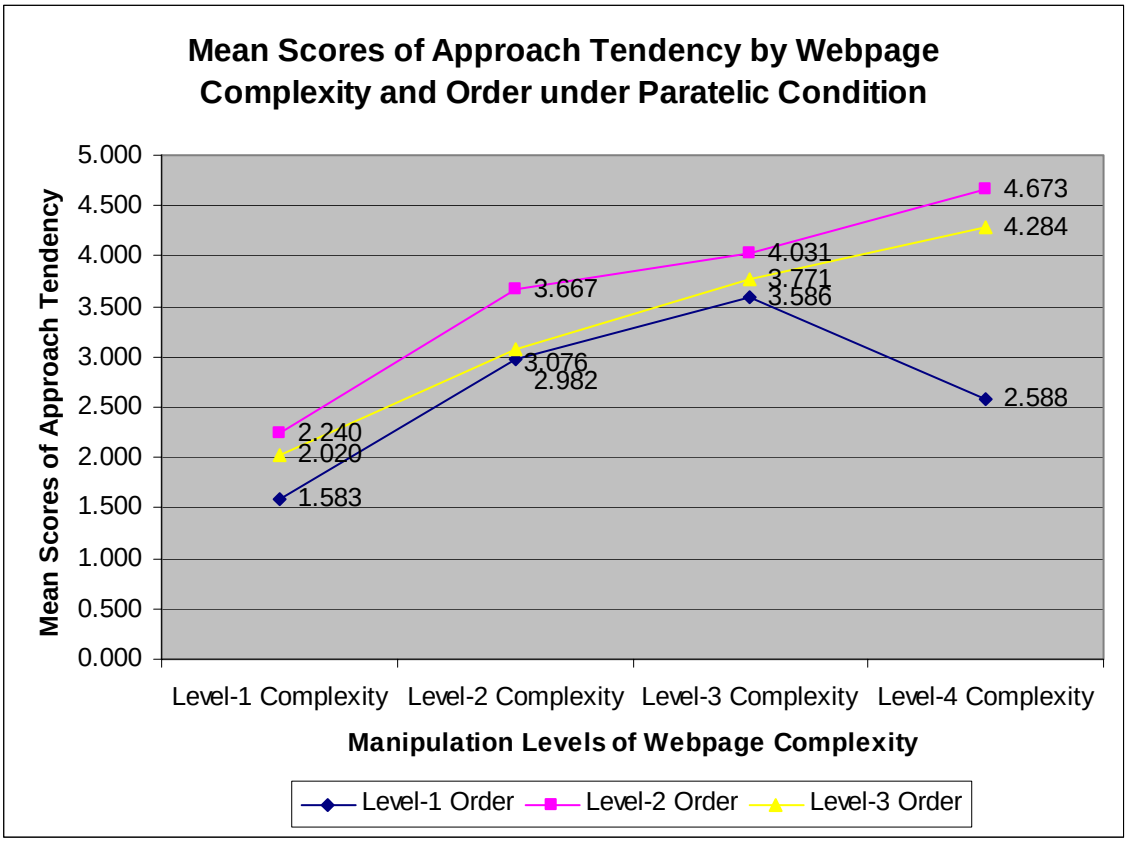

Figure 18. Relationship between Approach Tendency and Webpage Complexity and Order under Paratelic Condition

The repeated contrasts of the scores of approach tendency between the consecutive pairs of webpage complexity manipulation levels across all levels of webpage order in the paratelic condition, as shown in Table 20, indicated a mean score change of the approach tendency in the hypothesized direction along the increasing levels of webpage complexity: when in the paratelic condition, while no significant difference was found between the subject group which browsed the homepages with the level-3 complexity and the group given the homepages with the level-4 complexity on their approach tendency toward website (MeanDiff (CM-L3 vs. CM-L4) = -0.052, P = 0.815), in general the subjects showed greater approach tendency toward a website whose homepage has a higher level of complexity (MeanDiff (CM-L1 vs. CM-L2) = -1.294, P < 0.001; MeanDiff (CM-L2 vs. CM-L3) = -0.554, P < 0.001). This result is also represented by the red line in Figure 17. The polynomial contrasts run on the paratelic group data, as shown in Table 21, revealed a significant positive moderate-sized linear effect ($F_{1, 52}$ = 107.69, P < 0.001, η^2 = 0.54), and a significant negative small-sized quadratic effect ($F_{1, 52}$ = 93.30, P < 0.001, η^2 = 0.10) of webpage complexity manipulation on the subjects' approach tendency. The cubic effect of webpage complexity ($F_{1, 52}$ = 0.02) was not significant. Therefore, as shown by the red line in Figure 17, webpage complexity had a positive linear relationship with subjects' approach tendency toward the website when the subjects were in a paratelic state. Meanwhile, the linear effect on approach tendencies was smaller at higher complexity levels than those lower levels. To summarize these results, while the interaction effect of webpage complexity and order caused a negative effect of webpage complexity on the

subjects' approach tendency when a very high level of complexity (level-4 complexity) was designed into a webpage with a very low level of order (level-1 order), there still appeared to be an overall positive effect of webpage complexity on the subjects' approach tendency toward the website in the paratelic condition. Therefore, Hypothesis 12b was partially supported by the above statistical results.

Hypotheses 13a and 13b were proposed to examine the mediating effect of the elicited user's emotional responses on the influences of a web homepage's aesthetic qualities on the web user's approach tendency toward the website. Hypothesis 13a suggested that when a web user is in a telic state, the effects of the order and complexity of a web homepage on the user's approach tendency toward the website are mediated by the user's emotional responses toward the homepage. We tested this mediation relationship using the four criteria proposed by Baron and Kenny (1986). First, the relationship between the independent variables – webpage order (OR^1 and OR^2) and complexity (CM^1, CM^2 and CM^3) and the dependent variable – approach tendency (AP) should be significant. Second, the relationship between the independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3) and mediating variables – intrinsic valence (IV), arousal (AS) and motivational valence (MV) should be significant. Third, the relationship between the mediating variables (IV, AS and MV) and the dependent variable (AP) should be significant. Finally, the significant relationship between the independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3) and dependent variable (AP) would become non-significant or weaker after controlling for the mediator.

Table 25. The Results of the Multiple Regression Models for the Mediating Effects of Emotional Responses in the Telic Condition

Multiple Regression		1	2	3	4	5	6
Beta							
Dependent Variables		AP	IV	AS	MV	AP	AP
Independent Variables	OR[1]	0.637***	0.641***	-0.501***	0.629***	-	0.040
	OR[2]	-0.223***	-0.176***	0.144***	-0.239***	-	-0.018
	CM[1]	0.005	0.069	0.580***	-0.121*	-	-
	CM[2]	-0.163***	-0.252***	-0.034	-0.101*	-	0.000
	CM[3]	-0.165***	-0.145**	0.069	-0.121*	-	-0.040
	IV	-	-	-	-	0.403***	0.379***
	ASL	-	-	-	-	0.074**	0.085**
	MV	-	-	-	-	0.639***	0.631***
F Value		46.648***	51.288***	64.962***	42.937***	678.384***	292.406***
DF		5/219	5/219	5/219	5/219	3/221	7/217
R Square		0.516	0.539	0.597	0.495	0.902	0.904

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

To test for the mediating effects of the subjects' felt intrinsic valence, arousal, and motivational valence in the telic condition, we estimated the following regression equations using the telic group data: (1) the dependent variable (AP) predicted by the

independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3), (2) the mediator (IV) predicted by the independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3), (3) the mediator (AS) predicted by the independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3), (4) the mediator (MV) predicted by the independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3), (5) the dependent variable (AP) predicted by the mediating variables (IV, AS and MV), and (6) the dependent variable (AP) predicted by the mediators (INV, ASL, AP) and independent variables (OR^1, OR^2, CM^1, CM^2 and CM^3). The results of the regression models are presented in Table 25.

The regression model (1) was significant ($F_{5, 219} = 46.648$, $P < 0.001$, $R^2 = 0.516$). While the effect of CM^1 (Beta(CM^1) = 0.005, P = 0.913) was not significant, the predictors – OR^1 (Beta(OR^1) = 0.637, $P < 0.001$), OR^2 (Beta(OR^2) = -0.223, $P < 0.001$), CM^2 (Beta(CM^2) = -0.163, P = 0.001), and CM^3 (Beta(CM^3) = -0.165, P = 0.001) were all found to have significant effects on the dependent variable of AP. This result satisfied Baron and Kenny's (1986) first criterion for establishing mediation effect.

The regression model (2) was also significant ($F_{5, 219} = 51.288$, $P < 0.001$, $R^2 = 0.539$). Similar to the results of regression model (1), OR^1 (Beta(OR^1) = 0.641, $P < 0.001$), OR^2 (Beta(OR^2) = -0.176, $P < 0.001$), CM^2 (Beta(CM^2) = -0.252, $P < 0.001$), and CM^3 (Beta(CM^3) = -0.145, P = 0.002) were found to be significant predictors of the mediator of IV. Again, the effect of CM^1 (Beta(CM^1) = 0.069, P = 0.134) was not significant.

The regression model (3) was significant ($F_{5, 219} = 64.962$, $P < 0.001$, $R^2 = 0.597$). Despite the insignificant effects of CM^2 (Beta(CM^2) = -0.034, P = 0.428) and CM^3

(Beta(CM^3) = 0.069, P = 0.112), the effects of OR^1 (Beta(OR^1) = -0.501, P < 0.001), OR^2 (Beta(OR^2) = 0.144, P = 0.001), and CM^1 (Beta(CM^1) = 0.580, P < 0.001) were significant on the mediator of AS.

The regression model (4) ($F_{5, 219}$ = 42.937, P < 0.001, R^2 = 0.495) was significant and yielded significant results for all the predictors – OR^1 (Beta(OR^1) = 0.629, P < 0.001), OR^2 (Beta(OR^2) = -0.239, P < 0.001), CM^1 (Beta(CM^1) = -0.121, P = 0.013), CM^2 (Beta(CM^2) = -0.101, P = 0.036), and CM^3 (Beta(CM^3) = -0.121, P = 0.012). Thus, according to the results of regression models (2), (3), and (4), Baron and Kenny's (1986) second criterion that there should be significant relationship between the independent variables and mediator variables was satisfied

The regression model (5) was significant ($F_{3, 221}$ = 678.384, P < 0.001, R^2 = 0.902). All the mediators – IV (Beta(IV) = 0.403, P < 0.001), AS (Beta(AS) = 0.074, P = 0.009), and MV (Beta(MV) = 0.639, P < 0.001) were found to be significant predictors of the dependent variable of AP. This satisfies Baron and Kenny's (1986) third criterion that the relationship between the mediators and the dependent variable should be significant. From the above regression models, the independent variables – OR^1, OR^2, CM^2, and CM^3, and the mediators – IV, AS, and MV were shown to be significant predictors of the dependent variable of AP. Therefore, the regression model (6) was estimated using these variables predicting the dependent variable of AP. The model was significant ($F_{7, 217}$ = 292.406, P < 0.001, R^2 = 0.904) and yielded only three significant predictors of the dependent variable of AP – the three mediators of IV (Beta(IV) = 0.379, P < 0.001), AS (Beta(AS) = 0.085, P = 0.004), and MV (Beta(MV) = 0.631, P <

0.001). The effects of all the other predictors – the independent variables of OR^1 (Beta(OR^1) = 0.040, P = 0.206), OR^2 (Beta(OR^2) = -0.018, P = 0.429), CM^2 (Beta(CM^2) = 0.000, P = 0.995), and CM^3 (Beta(CM^3) = -0.040, P = 0.066) were found insignificant. Therefore, Baron and Kenny's (1986) fourth criterion was satisfied by the finding that the significant effects of the independent variables of OR^1, OR^2, CM^2 and CM^3 on the dependent variable of AP in regression model (1) became insignificant in regression model (6). In sum, the results of the above regression models provided support for Hypothesis 13a that in the telic condition the subjects' elicited emotional responses mediate the relationship between the complexity and order of a web homepage and the subjects' approach tendency toward the website.

As suggested by Hypothesis 13b, it was also predicted that the web user's elicited emotional responses mediate the effects of the complexity and order of a web homepage on the user's approach tendency toward the website when he/she is in a paratelic condition. To test Hypothesis 13b, the same regression models used to examine hypothesis 13a were estimated using the paratelic group data. The results of these regression models are shown in Table 26.

In the paratelic condition, regression model (1) was significant ($F_{5, 214}$ = 24.302, P < 0.001, R^2 = 0.362). Despite the insignificant effect of CM^3 (Beta(CM^3) = 0.019, P = 0.722), the effects of the other independent variables – OR^1 (Beta(OR^1) = 0.163, P = 0.003), OR^2 (Beta(OR^2) = -0.216, P < 0.001), CM^1 (Beta(CM^1) = 0.486, P < 0.001), and CM^2 (Beta(CM^2) = -0.210, P < 0.001) were all significant on the dependent variable of

AP. Therefore, Baron and Kenny's (1986) first criterion that the relationship between the independent variables and the dependent variable should be significant was satisfied.

Table 26. The Results of the Multiple Regression Models for the Mediating Effects of Emotional Responses in the Paratelic Condition

Multiple Regression		1	2	3	4	5	6
Beta							
Dependent Variables		AP	IV	AS	MV	AP	AP
Independent Variables	OR^1	0.163**	0.489***	-0.460***	-0.067	-	-0.033
	OR^2	-0.216***	-0.152**	0.112*	-0.104	-	-0.080***
	CM^1	0.486***	0.193***	0.553***	0.531***	-	0.075**
	CM^2	-0.210***	-0.337***	-0.085	-0.206***	-	0.076***
	CM^3	0.019	-0.052	0.052	0.078	-	-
	IV	-	-	-	-	0.429***	0.483***
	ASL	-	-	-	-	-0.047	-
	MV	-	-	-	-	0.687***	0.599***
F Value		24.302***	31.333***	47.488***	22.618***	597.832***	350.566***
DF		5/214	5/214	5/214	5/214	3/216	6/213
R Square		0.362	0.423	0.526	0.346	0.893	0.908

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

The regression model (2) estimated using the paratelic group data was also significant ($F_{5, 214} = 31.333$, $P < 0.001$, $R^2 = 0.423$). Similar to the results of regression model (1), while the effect of CM^3 (Beta(CM^3) = -0.052, P = 0.323) was not significant, the other independent variables – OR^1 (Beta(OR^1) = 0.489, $P < 0.001$), OR^2 (Beta(OR^2) = -0.152, P = 0.004), CM^1 (Beta(CM^1) = 0.193, $P < 0.001$), and CM^2 (Beta(CM^2) = -0.337, $P < 0.001$) were all found to have significant effects on the mediator of IV.

Being estimated using the paratelic group data, the regression model (3) was found significant ($F_{5, 214} = 47.488$, $P < 0.001$, $R^2 = 0.526$). It yielded significant effects of OR^1 (Beta(OR^1) = -0.460, $P < 0.001$), OR^2 (Beta(OR^2) = 0.112, P = 0.018), and CM^1 (Beta(CM^1) = 0.553, $P < 0.001$) on the mediator of AS. No significant results were found for the independent variables of CM^2 (Beta(CM^2) = -0.085, P = 0.073) and CM^3 (Beta(CM^3) = 0.052, P = 0.269).

In the paratelic condition, the regression model (4) was also found significant ($F_{5, 214} = 22.618$, $P < 0.001$, $R^2 = 0.346$). The independent variables – CM^1 (Beta(CM^1) = 0.531, $P < 0.001$), and CM^2 (Beta(CM^2) = -0.206, $P < 0.001$) were found to be significant predictors of the mediator of MV. The effects of OR^1 (Beta(OR^1) = -0.067, P =0.226), OR^2 (Beta(OR^2) = -0.104, P = 0.063), and CM^3 (Beta(CM^3) = 0.078, P = 0.162) were not significant. Overall, the results of regression models (2), (3) and (4) satisfied Baron and Kenny's (1986) second criterion that there should be significant relationships between the independent variables and the mediators.

The regression model (5) estimated using the paratelic group data was significant ($F_{3, 216} = 597.832$, $P < 0.001$, $R^2 = 0.893$). The results suggested that the mediators of IV

(Beta(IV) = 0.429, P < 0.001), and MV (Beta(MV) = 0.687, P < 0.001) were significant predictors of the dependent variable of AP. However, no significant effects was found for AS (Beta(AS) = -0.047, P = 0.118). Therefore, AS was excluded from the analysis as it didn't meet with Baron and Kenny's (1986) third criterion that the relationship between the mediators and the dependent variable should be significant.

Finally, the regression model (6) was estimated using the paratelic group data and regressing the dependent variable of AP on the independent variables of OR^1, OR^2, CM^1 and CM^2, and the mediators of IV and MV. These predictors were chosen because they were shown to be significant predictors of the dependent variable with the previous regression models. The regression model (6) was significant ($F_{6, 213} = 350.566$, $P < 0.001$, $R^2 = 0.908$). All the predictors – IV (Beta(IV) = 0.483, P < 0.001), MV (Beta(MV) = 0.599, P < 0.001), OR^2 (Beta(OR^2) = -0.080, P < 0.001), CM^1 (Beta(CM^1) = 0.075, P = 0.003), and CM^2 (Beta(CM^2) = 0.076, P = 0.001), except OR^1 (Beta(OR^1) = -0.033, P = 0.209), were found to have significant effects on the dependent variable. Contrary to our expectation, the results of the regression model (6) showed that the effects of independent variables – OR^2, CM^1, and CM^2 on the dependent variable were still significant even after controlling for the effects of the mediators. Please note that while still significant, however, the absolute values of beta coefficients for each of the independent variable became smaller and close to zero. And the effect of OR^1 became insignificant. This result combined with the failure to meet Baron and Kenny's (1986) fourth criterion led us to infer a partial rather than a full mediation effect of the subjects' emotional responses. As a result, in the paratelic condition, the subjects' felt intrinsic

valence and motivational valence were only shown to partially mediate the relationship between the complexity and order of a web homepage and the subjects' approach tendency toward the website. Therefore, Hypothesis 13b was rejected.

The results of the all research hypotheses are shown in Table 27.

Table 27. A Summary of the Results of Research Hypotheses

No.	Hypothesis	Result
1a	The order of a web homepage positively influences the website user's feelings of intrinsic valence.	Supported
1b	The complexity of a web homepage has an inverted U-shaped relationship with the user's feelings of intrinsic valence.	Supported
2a	The order of a web homepage negatively influences the user's arousal levels.	Supported
2b	The complexity of a web homepage positively influences the website user's arousal levels.	Supported
3	A web user's metamotivational states moderate the direction of the relationship between a user's felt arousal and motivational valence.	Supported
4a	The order of a web homepage positively influences a user's felt motivational valence when the user is in a telic state.	Supported
4b	The order of a web homepage negatively influences a user's felt motivational valence when the user is in a paratelic state.	Rejected
5a	The complexity of a web homepage negatively influences a user's felt motivational valence when the user is in a telic state.	Rejected
5b	The complexity of a web homepage positively influences a user's felt motivational valence when the user is in a paratelic state.	Partially Supported

Table 27. Continued

No.	Hypothesis	Result
6a	A website user in a telic state will feel the most pleasure when visiting a web homepage with high levels of order and moderate levels of complexity.	Supported
6b	A website user in a paratelic state will feel the most pleasure when visiting a web homepage with moderate levels of order and high levels of complexity.	Partially Supported
7	A web user's motivational valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website.	Supported
8	A web user's intrinsic valence elicited by a web homepage's aesthetic qualities positively influences the user's approach tendency toward the website.	Supported
9	A web user's metamotivational states moderate the direction of relationship between a user's felt arousal level and the user's approach tendency toward the website.	Supported
10	A web user's metamotivational states moderate the strength of the relationship between the intrinsic valence elicited by a web homepage in a user and the user's approach tendency toward the website	Rejected
11a	When a website user is in a telic state, the order of a web homepage positively influences the user's approach tendency toward the website.	Supported
11b	When a website user is in a paratelic state, the order of a web homepage bears a curvilinear relationship to the user's approach tendency toward the website with the moderate levels of order associated with the greatest approach tendency.	Rejected
12a	When a website user is in a telic state, the complexity of a web homepage negatively influences the user's approach tendency toward the website.	Rejected
12b	When a website user is in a paratelic state, the complexity of a web homepage positively influences a user's approach tendency toward the website.	Partially Supported

Table 27. Continued

No.	Hypothesis	Result
13a	When a website user is in a telic state, the abovementioned effects of the order and complexity of a web homepage on the user's approach tendency toward the website are mediated by the user's emotional responses toward the homepage.	Supported
13b	When a website user is in a paratelic state, the abovementioned effects of the order and complexity of a web homepage on the user's approach tendency toward the website are mediated by the user's emotional responses toward the homepage.	Rejected

5.4 Validity Assessment of Research Model

In order to test the validity of the whole research model and evaluate how well the data can be explained the proposed model, we also conducted structural equation modeling (SEM) on the data. Due to the categorical and ordinal nature of the raw data, the original data was first preprocessed by the PRELIS program (that comes with the LISREL program), which produced an asymptotic covariance matrix to be used as data input for the SEM analysis.

Because of the existence of a moderation effect of metamotivational state in the model, the original research model was fitted to the data of telic group and paratelic group separately using LISREL. Figure 19 presents the SEM solution for the telic group with the standardized path coefficients, factor loadings and correlations, which were all significant except for the correlation between the webpage complexity and order treatment conditions and the regression coefficient of the path from webpage complexity to intrinsic valence. These non-significant parameters are highlighted in red. The non-

significant path coefficient from complexity to intrinsic valence could be a result of the presence of a significant curvilinear relationship and lack of linear relationship between webpage complexity and intrinsic valence in the telic condition.

The fit statistics of the estimated SEM model in Figure 19 are reported in Table 28. The model had a GFI of 0.82, AGFI of 0.80, CFI of 0.98, NNFI of 0.98, NFI of 0.97, RMSEA of 0.068, χ^2/df ratio of 2.03. As a result, the original theoretical model fit the data for telic group well, which yielded a GFI higher than 0.8, an NFI higher than 0.9, a CFI closer to 1.0, a RMSEA less than 0.08, and a χ^2/df ratio lower than 3 (Kelloway 1998; Kline 1998).

The SEM analysis performed on the paratelic group data yielded a model estimation presented in Figure 20. Table 29 reports its fit indices. The path coefficients and factor loadings were significant. Only the correlation between webpage complexity and order manipulations were not significant. Comparing the estimated SEM parameters for the paratelic group with those for the telic group, we found that the relationship between arousal and motivational valence varied considerably between the two groups. For the telic group, the standardized path coefficient from arousal to motivational valence was -0.60, indicating a negative relationship between arousal and motivational valence; while for the paratelic group, positive relationship between arousal and motivational valence was established with a standardized path coefficient of 0.59. This finding is consistent with the results from MANOVA and multiple regressions. The data for the paratelic group yielded a GFI of 0.70, AGFI of 0.65, CFI of 0.93, NNFI of 0.92, NFI of 0.92, RMSEA of 0.11, χ2/df ratio of 3.84.

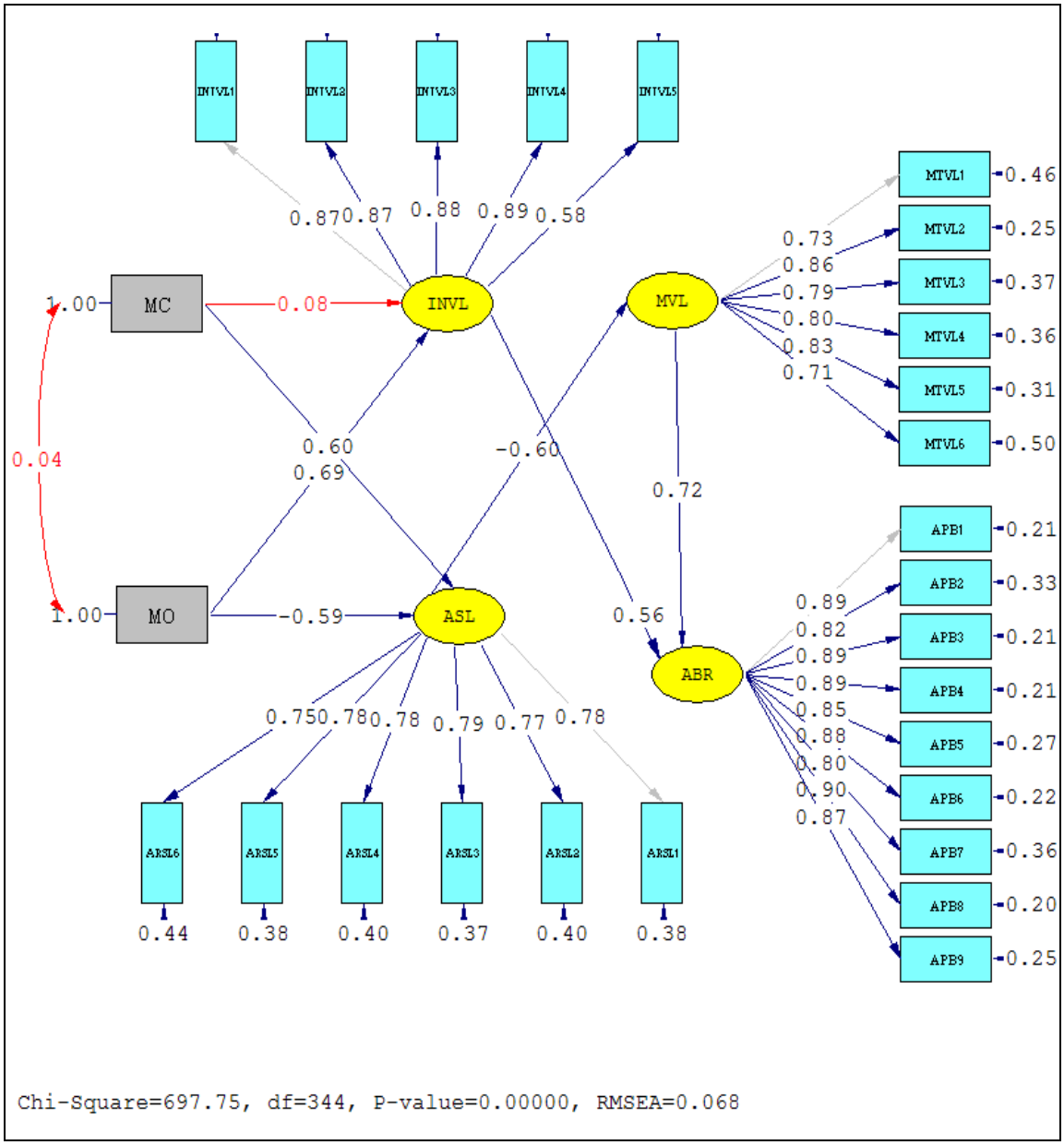

Figure 19. Standardized SEM Solution for the Telic Group

Table 28. Fit Indices of the SEM Solution for the Telic Group

χ^2	Df	χ^2/df	GFI	AGFI	NFI	NNFI	CFI	RMSEA
697.75	344	2.03	0.82	0.80	0.97	0.98	0.98	0.068

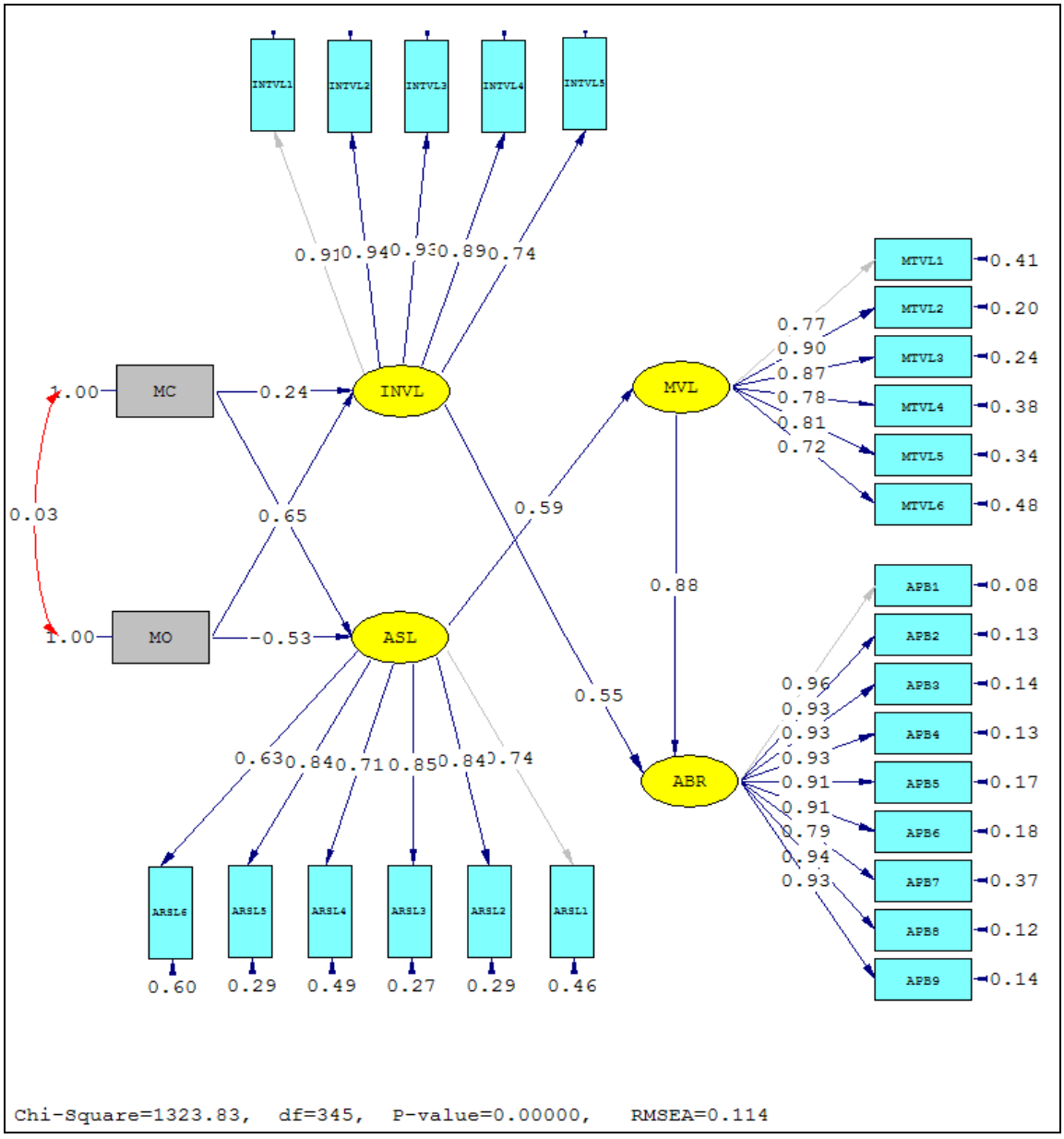

Figure 20. Standardized SEM Solution for the Paratelic Group

Table 29. Fit Indices of the SEM Solution for the Paratelic Group

χ^2	Df	χ^2/df	GFI	AGFI	NFI	NNFI	CFI	RMSEA
1323.83	345	3.84	0.70	0.65	0. 92	0.92	0.93	0.11

CHAPTER VI

DISCUSSION AND SUMMARY

This study has investigated the relationships between two aesthetic qualities of a web homepage – webpage complexity and order--and web users' emotional responses to the homepage and their subsequent approach behaviors toward the website under both telic and paratelic conditions. Using a simulated Internet environment for goal-oriented web search activities and excitement/enjoyment-seeking web browsing activities, we manipulated the complexity and order of a Gift website's homepage that our subjects encountered, and measured their elicited emotional responses and approach tendency toward the website. The results of the experiment generally confirmed the belief that a web user's initial emotional responses (i.e., pleasantness and arousal) evoked by the aesthetic qualities of a website's homepage he/she first encounters will have carry-over effects on his/her subsequent approach behaviors toward the website. The major findings of this study can be summarized as follows:

6.1 Aesthetic Design of Webpage

The results provided support for the validity of using complexity and order as the web design features related to a webpage's aesthetic qualities. In Pilot Study 4, the MDS (Multidimensional Scaling) solution derived from the dissimilarity perception data of webpage stimuli with the ratings of perceived complexity and order regressed into the two-dimension solution space revealed perceived webpage complexity and order as two important dimensions used by participants for judging webpage similarity/dissimilarity.

As a result, a map of the perceptual structure for the webpage stimuli was developed which indicates the webpage complexity and order underlie web users' perceptions of aesthetics and preferences for the webpage. This is consistent with the prior findings regarding complexity and order as the two environmental characteristics that capture the distinctions among visual preferences for different external environments (Arnheim 1966; Berlyne 1960). Furthermore, the main experiment provided support for webpage complexity and order as the web design features grasping the main influences of web interface on the web user's emotional responses and approach tendency.

Regarding the visual design of WebPages in terms of complexity and order, this study suggested the following findings about the perceived complexity and order of certain web design features: 1) A webpage perceived as of high complexity is characterized by more than fifty links, ten graphics, and one hundred texts; 2) A webpage of moderate complexity features twenty to thirty links, five to eight graphics, and forty to fifty texts; 3) A webpage of low complexity is characterized by fewer than ten links, two graphics, and thirty texts; 4) A webpage experienced as of high order is characterized by logical arrangement of webpage elements and application of layout design tools to both visually differentiate elements and associate similar elements; 5) A webpage of moderate order is characterized of logical arrangement of webpage elements without extensive use of layout design tools; 6) A webpage of low order is featured with free-form layout of webpage elements without conforming to a logical configuration. And the elements are arranged in a webpage space with no application of layout design tools.

6.2 Effects of Webpage Aesthetic Qualities

This study applied and largely supported the hypotheses drawn from prior research on environmental aesthetics to the study of aesthetic design of webpage. In line with Berlyne's (1971) theory regarding the effects of environmental order and complexity on pleasantness and arousal, the confirmation of Hypothesis 1a, 1b, 2a and 2b suggested that the webpage order has a positive relationship with the web user's intrinsic pleasantness and a negative relationship with the user's felt arousal, while the webpage complexity bears an inverted U-shaped curvilinear relationship with the user's intrinsic pleasantness and a positive relationship with the user's felt arousal.

The results for Hypotheses 4a and 5b confirmed a positive relationship between webpage order and the web user's motivational valence in the telic condition and a positive relationship between the webpage complexity and the user's motivational valence in the paratelic condition.

The findings of this study not only revealed the individual effects but also the interaction effect of webpage complexity and order on the users' emotional responses. The significant interaction effects of webpage complexity and order on motivational valence were revealed in both telic and paratelic conditions. In the telic condition, as shown in Figure 10, there was a curvilinear effect of webpage complexity on the motivational valence at the moderate (level-2 order) and high levels of webpage order (level-3 order), however, at the low level of webpage order (level-1 order), the effect became merely negative, with the increased levels of webpage complexity associated with the decreased feelings of motivational valence. In the paratelic condition, as shown

in Figure 12, while there was an overall positive effect of webpage complexity on motivational valence, however, designing a very high level of complexity (level-4 complexity) into a webpage with a very low of webpage order (level-1 order) will decrease rather than increase the feelings of motivational valence. These interaction effects suggested that some levels of both order and complexity are needed to design a webpage capable of eliciting pleasant feelings in the users. This also largely confirmed the theory and findings of environmental aesthetics that a preferred environment needs to have both order and complexity at the same (Arnheim 1966; Nasar 2000; Kaplan and Kaplan 1983).

The results for Hypotheses 6a and 6b further provided suggestions about how to best balance the levels of order and complexity in the design of webpage to elicit the highest pleasure in the user. Hypothesis 6a was confirmed, which suggested that a webpage with a moderate complexity level (level-3 complexity) and a high order level (level-3 order) is experienced as the most pleasant when the web user is in a telic condition. The same webpage stimulus also received the highest rating of overall pleasure in the paratelic condition. Hypothesis 6b was not fully supported because the webpage with a high level of complexity (level-4 complexity) and a moderate level of order (level-2 order) was ranked the second highest on the score of overall pleasure, although only 0.11 point below that of the webpage with the level-3 complexity and level-3 order. While the webpage with the level-3 complexity and level-3 order were reported to elicit the most overall pleasure in both telic and paratelic conditions, its mean score of overall pleasure decreased from 3.257 in the telic condition to 2.059 in the

paratelic condition by 1.198 points (See Table 22 and Table 23). In contrast, the score of overall pleasure for the webpage with the level-4 complexity and level-2 order increased by 0.942 point from 1.007 in the telic condition to 1.949 in the paratelic condition (See Table 22 and Table 23). This indicated that web users experience the webpage with a high-level of complexity and a moderate-level of order as more pleasant in the paratelic condition than the telic condition, but that the webpage with the moderate-level of complexity and high-level of order is evaluated as less pleasant in the paratelic condition than the telic condition. In addition, the significant result of the planned contrast of the scores of overall pleasure between the webpage with level-4 complexity and level-2 order and the other webpage stimuli in the paratelic condition, as shown in Table 24, also supported the idea that the webpage with a high level of complexity (level-4 complexity) and a moderate level of order (level-2 order) is experienced as the most pleasant by the web user who is in a paratelic state.

The confirmation of Hypotheses 7, 8, and 9 provided support for the carry-over effects of the emotional responses elicited by the web homepage on the approach tendency toward the website. The felt intrinsic valence and motivational valence were shown to have positive effects on the approach behavior. As a result of its effects on motivational valence, felt arousal was found to bear a positive or a negative relationship with the approach tendency depending on the web user's metamotivational state.

The rejection of hypothesis 10 indicated that instead of only motivating the approach/avoidance behaviors of the web users who are in a paratelic state, the felt intrinsic valence played an equally important role in determining the web users'

approach/avoidance tendency when they were in a telic state. This is partly due to the immediate and automatic nature of intrinsic valence, which occurs quickly when the users encounter the web homepage, but will have significant effect on the users' subsequent feelings (motivational valence) about the homepage and prime the users' actions toward the website when either metamotivational state is operative in the web user.

The results regarding Hypotheses 13a and 13b were concerned with the mediating effect of emotional responses. Along with the confirmation of Hypothesis 13a, the mediating effect of elicited emotional responses on the relationship between a web homepage's aesthetic qualities and the user's approach tendency toward the website was supported in the telic condition. This result also supported the mediating role of the emotions predicted by Mehrabian and Russell's (1974) environmental psychology model. However, the rejection of Hypothesis 13b implied only a partial instead of a full mediation effect of the emotional responses in the paratelic condition. It seemed that, in the paratelic condition, the felt intrinsic valence and motivational valence only fully mediated the linear effect of webpage order (OR^1) on the approach tendency, but partially mediated the quadratic effect of webpage order (OR^2), and the linear (CM^1) and quadratic effects (CM^2) of webpage complexity. Nevertheless, as shown by the results of the regression model (6) in Table 26, we can see that after controlling for the effects of intrinsic valence and motivational valence, while the beta weights for OR^2, CM^1 and CM^2 were still significant, their absolute values decreased considerably to be near zero. This result suggests that the effects of webpage order and complexity diminished

noticeably with the addition of intrinsic valence and motivational valence in the regression equation, hence providing support for the presence of significant mediation effects of emotional responses in the paratelic condition. This also led us to conclude that the significant beta weights for OR^2, CM^1 and CM^2 are largely due to the large sample size we have.

6.3 Role of Web User's Metamotivational State

Another significant finding of this study is the presence of significant interaction effects between the users' metamotivational states and their felt arousal levels on their motivational valence and subsequent approach tendency toward the website.

In the experiment, those subjects who were induced into a paratelic metamotivational state felt more motivational pleasantness and exhibited greater approach tendency in response to the web homepage stimuli eliciting higher levels of arousal than to the web homepages that evoked lower-levels of arousal. Conversely, those subjects who were brought into a telic metamotivational state experienced more motivational unpleasantness and exhibited higher avoidance tendency in response to the high-arousal homepage stimuli than the low-arousal homepages.

Another interesting finding related to this is the identification of the most salient or important aesthetic design feature of a web homepage in determining the web users' emotional responses and motivating their approach/avoidance behaviors toward the website. The results for Hypotheses 4a, 4b, 5a, 5b, 11a, 11b, 12a, and 12b suggested that a web user's metamotivational state may determine the importance/salience of webpage complexity and order to his/her emotional responses and approach tendency. Along with

the confirmation of Hypothesis 4a and rejection of Hypothesis 4b, a significant relationship between webpage order and subjects' motivational valence was only found in the telic condition but not in the paratelic condition. In contrast, according to the results for Hypotheses 5a and 5b, webpage complexity was only found to have a significant effect on the felt motivational valence of the subjects who were in a paratelic state, but not on that of the subjects in a telic state. While the results for Hypotheses 11b suggested both dominant linear and quadratic effects of webpage order on the approach tendency in a paratelic condition, however, webpage order had very little explanatory power (ANOVA $\eta^2 = 0.077$) in the paratelic condition, only accounting for 8% of the variance in the approach tendency of the subjects in a paratelic state; conversely, for the subjects in a telic state, webpage order was proven to bear a positive linear relationship with approach tendency and had a substantial explanatory power (ANOVA $\eta^2 = 0.465$) of 46% of the total variation in their approach tendency. In contrast to the effects of the webpage order, according to the results for Hypotheses 12a and 12b, webpage complexity was found to have a modest explanatory power (ANOVA $\eta^2 = 0.28$) in the paratelic condition, accounting for 28% of the variation in the approach tendency of the subjects; however, the explanatory power of the webpage complexity became very trivial in the telic condition (ANOVA $\eta^2 = 0.054$), explaining only 5% of the variation in the approach tendency of the subjects who were in a telic state. All these results suggest that the salience/importance of the webpage order and webpage complexity to the web users' motivational valence and approach tendency is largely dependent on the web users' metamotivational states. For the web users in a telic state, who are usually

motivated by a clearly defined goal and place great emphasis on the process of comprehending the website, the order of a webpage is considered a salient web aesthetic feature driving the users' motivational valence and motivating their approach tendency, because of its critical role in aiding in understanding and making sense of the website content. However, the complexity of a webpage is perceived as less important/salient because it promotes involvement and interest rather than understanding. Conversely, when in a paratelic state, the web users seem to consider webpage complexity a more important aesthetic feature than webpage order in evoking their motivational pleasantness and promoting their approach tendency for the important role of complexity in satisfying their needs for stimulation and arousal.

CHAPTER VII

CONTRIBUTIONS AND FUTURE RESEARCH

This chapter concludes the dissertation with contributions of the research, limitations of the study, and recommendations for future research.

7.1 Theoretical and Practical Contributions

The contribution of the research is two fold, theoretical and practical. The major theoretical contribution of this study is the development of a research model of how a web homepage's aesthetic qualities can influence the web users' emotional responses and their subsequent behaviors toward the website. Having its roots in a synthesis of existing literature on emotions, environmental aesthetics, environmental psychology and web design, the research model advances knowledge of the role of a user's initial emotional experience with a website's homepage in shaping his/her subsequent online behaviors toward the website.

Second, in this model, we identify two important web aesthetic qualities – webpage complexity and order — and explore how they influence users' emotions and behaviors differently when users are under different metamotivational states. This not only provides valuable insights regarding users' aesthetic perceptions of webpage design features, but also contributes to the development of objective and subjective measures for webpage aesthetics.

Finally, the current study suggests a new perspective on website design, which transcends and complements the traditional focus on design for usability. It shows that

webpage complexity and order, and probably other web design features, can be applied to guide the website interface design to evoke positive emotional responses and promote desirable user behaviors. It also provides support for the relationships between certain web design features and the web users' approach tendencies mediated by their elicited emotions, further confirming their importance to website design.

As for practical contribution, the outcome of this research will be of interest to managers and web designers. A better understanding of the relationship between the design features of a website interface and the users' emotions can help the managers to create web pages that elicit desired emotions and therefore desired behaviors in the users. A web user's initial experience with a website's homepage can influence his/her emotions and determine whether he/she will stay within a particular website and explore the site deeper, or leave the site and move on to other sites.

Thus, this research provides significant implications for website presentation and customization and helps the managers to understand the importance of the emotional impact of a user's initial encounter with a website and how it can affect his/her subsequent behavior. The results of this study can also assist managers in their decisions to customize their website designs based on the metamotivational states of their online visitors. Managers can infer their customers' metamotivational state by their offerings of product or service, records of customers' web browsing behaviors, and time of the day (morning vs. evening), day of the week (weekdays versus weekends) and time of the year (holiday vs. non-holiday seasons). For example, a website that offers online tax return service would expect its customers to have a telic motive while a website

providing online games is often visited by customers who are in a paratelic state. Customers may have at different in the paratelic state. Customers' metamotiovational state may also vary from time to time. Customers may be more telic motivated on weekdays and more paratelic oriented on weekends and holidays. Even within the same day, customers may be more telic oriented in morning than in the evening. The company can also determine a particular customer's metamotivational dominance, whether he/she tends to be telic or paratelic motivated, by analyzing the clickstream data collected on the mouse-clicks and paths he/she made through the website. After determining which metamotivational state customers are likely to be in, companies can customize their website homepage each customer sees by incorporating the design features consistent with the customer's metamotivational state, for instance, high complexity and moderate order for telic-motivated customers, and high order and moderate complexity for partelic-motivated customers.

Finally, the findings concerning the users' perceptions of the webpage aesthetic qualities will also provide implications and guidelines for web designers to design aesthetically pleasant and inviting website.

7.2 Research Limitations

One of the major limitations of this research is the methodology chosen for this study. We used a laboratory experiment, which is strong in establishing internal validity but weaker in terms of external validity. Despite our efforts to minimize the limitation, external validity may suffer from the artificiality of a laboratory setting and data collection procedures.

Second, the data were collected from a sample of students, which may restrict the applicability of the results to other populations. As mentioned before, students are e-commerce web users, and our webpage stimuli and hypothetical scenarios were designed to induce the subjects into the experience of the browsing the stimuli presented to them. However future research using a broader sample of actual web users should confirm the generalization of our findings to other samples.

Third, the single web site category introduced some limitations for the study. We only used one web site category (Gifts website), which may or may not meet the expectations or requirements of all the subjects for an Internet environment. While restricting data collection to only one type of website category can increase the accuracy of results, however, using only one website category for the experiment may also limit the generalizability of the results to other website categories.

Fourth, we adopted the static webpage instead of dynamic webpage stimuli for the study. Not allowing the subjects to click on any links on the homepages as they would do in a natural Internet environment, on the one hand, may adversely influence the subjects' emotional responses and approach tendency; and on the other hand, could contaminate the measures of approach/avoidance behaviors by capturing the subjects' behavioral intentions rather than their actual behaviors.

Finally, drawing on the existing literature (Geissler 2001), we identified webpage design factors – number of links, number of graphics, and amount of text that may influence webpage complexity and did extensive pilot testing to verify the effectiveness of our treatment of webpage complexity through manipulating different levels of the

these factors. Our treatment however was not exhaustive of all the factors influencing webpage complexity, nor did it include all possible combinations of different levels of the manipulated factors. Other design factors that may influence webpage complexity were not included in the study, such as use of animation, length of webpage (Geissler 2001). With the manipulated factors, we tested six possible combinations of links, text, and graphics producing six levels of complexity that fell into three general categories of complexity levels – high complexity, moderate complexity, and low complex. Since our study is to investigate the influences of webpage complexity on user's aesthetic perception and emotional responses, our manipulation of webpage complexity, although not exhaustive of all complexity levels, yielded significant effects on the subjects' perceptions of webpage complexity and hence is considered sufficient for the purpose of this study. While there are numerous possible combinations of web design factors to produce moderate complexity that telic-motivated web users prefer most and to attain high complexity that is most desired by web users with a paratelic motive, our study provides examples of web homepages at different complexity levels and provides general framework that companies can draw on to test their homepages to ensure they fit within an appropriate range of complexity, either high complexity or moderate complexity.

7.3 Directions for Future Research

This research opens a variety of avenues for future research. Most of the abovementioned research limitations can be addressed in future studies, which will extend the current study by including non-student subjects who are actual website users,

and adopting the dynamic multi-webpage stimuli for a variety of product/industry categories.

While the current study mainly draws on self-report measurements, future research can employ observational techniques to measure the subjects' emotional and behavior responses. The measures of galvanic skin responses and eye tracking measures are promising for examining the dynamics between the specific web design features and the web user's physiological arousal. Camtasia recorder used to capture all the movements (such as mouse clicks) of a web user on a website offers promise to measure the subjects' actual online behavior.

Future research could use our treatment of webpage complexity as a starting point for developing metrics of webpage complexity. More extensive studies are need to test the effects of different combinations of text, links, graphics and additional design factors on perceptions of webpage complexity.

Since this research only focuses on web users' initial emotional experiences with web homepage design features, we assumed the subjects' induced metamotivational state kept unchanged during their initial 20-seond encounter with the experiment stimuli. However, in reality, web users may change from one metamotivational state to the other in the course of same web activities. As noted by Lafreniere et al. (1988), people switch between the telic and paratelic states over time, even when the environment is not changing. For example, a student in searching for a textbook on Amazon.com might get carried away by a special promotion of stylish sports shoes, forgetting the original purpose and instead enjoying the pleasure of browsing contemporary sports fashion. An

promising area of future research is the personalization of user's interaction with website by detecting changes in a web user's metamotivational states through eye-tracking and/or mouse-clicking measures, and changing the design of web pages he/she sees accordingly to fit with his/her current metamotivational state. In addition, while this research mainly deals with how to adapt web design features to satisfy users' needs arising from their psychological motives, another interesting area of future research could be on how to make use of different web design features to manipulate users' metamotivational states so as to match user's psychology state and needs with the company's goals. For example, an ecommerce website would prefer its customers to be in a paratelic state because paratelic-motivated customers would spend more time browsing more varied products than those who are telic motivated. It has been well supported that novel stimulus captures attention and creates intensified emotions of interest and fascination in perceivers (Scherer 1988; 1993b; Fischer and Connell 2003). People are stimulated by novelty, which may divert people from a constrained, goal-oriented state of mind and bring out their propensity to seek out new experiences and behaviors, which can be paratelic in nature. While there is a lack of theoretical conceptualization and empirical scrutiny of how to apply novelty in website design practice to induce a paratelic motive in web users, it however provides a promising avenue for future study.

Other important directions for future research would include: 1) investigating the effects of other aspects of website interface design (e.g., interactivity, personalization, etc.) on web users' emotional responses; and 2) examining other carry-over effects of

users' emotional responses toward websites (e.g., persuasion, customer loyalty, trust, purchase intention, etc.).

In conclusion, this research is the beginning of a rich stream of research based on investigating the effects of IS user interface design features on users' emotional responses. As computers and information systems become increasingly distributed and pervasive in all aspects of human life, this stream of research is urgently needed.

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APPENDIX A

RESULTS OF PILOT STUDIES

A.1 Pilot Study 1

Pilot study 1 is a questionnaire survey study. Its purpose is to determine the type of webpages used as the experimental stimuli for this research. In order to minimize the potential confounding effects of website characteristics and content on subjects' affective responses, we will select a website that subjects are not familiar with but have some interests in browsing and whose contents elicit neutral affect in the subjects. The rationale of such a selection is discussed in the Stimulus Material section of Research Method. A total of 55 student subjects (24 males and 31 females) from MIS courses at a large middle south university in USA participated. They were all experienced Internet users (at least 4 years experience of using the Internet). The subjects were presented with a list of 26 web categories drawn from an e-commerce website search engine and instructed to rate their degrees of familiarity with each website category, levels of interests in browsing each website category, and degrees of liking or disliking for the products or contents of each website category.

Table 30. Results of T-Test of the Familiarity with, Interests in, and Liking/Disliking for the Five Website Categories

Website Category	Familiarity *			Interest *			Like/Dislike *		
	Mean	Std.	t-test value	Mean	Std.	t-test value	Mean	Std.	t-test value
Antiques & Collectibles	1.59	1.079	2	2.04	1.541	2	0.16	1.247	0
Garden & Lawn	1.69	1.103	2	2.12	1.379	2	0.20	1.247	0
Gifts	2.10	1.544	2	2.88	1.576	3	0.90	1.195	1
Food & Wine	2.08	1.631	2	2.78	1.863	3	0.63	1.395	1
Tools & Hardware	1.92	1.351	2	2.14	1.472	2	0.12	1.628	0

* Degree of familiarity with the websites is rated on a 7 point scale from 7 = extremely familiar to 1= not familiar at all.
* Degree of interest in browsing the websites on a 7 point scale from 7 = extremely interested to 1= not interested at all.
* Levels of liking/disliking for the product or content of the websites is rated on a 7 point scale from 3 = strongly like to -3 = strongly dislike.

Among the 55 questionnaires collected from Pilot Study 1, 49 are useable. After computing the descriptive statistics and t-tests on the useable data, we identified five categories of websites that score lowest on familiarity and medium on like/dislike variables -- Antiques & Collectibles, Garden & Lawn, Gifts, Food & Wine, and Tools & Hardware. The results also show that the three variables – familiarity, interest, and preference are highly correlated with each other. Then it seems impossible to find a website that scores low on familiarity, medium on disliking/liking, but high on interest. However, low familiarity score and medium disliking/liking score are necessary to

ensure the selected website characteristics and content will not induce subjects' emotional bias, which is critical for controlling for the potential factors besides the manipulation of stimuli complexity and order that might affect subjects' emotional responses and subsequent behaviors toward the webpage stimuli. Therefore, we decide to choose one website from those five website categories. We select the Gifts website as the context for the experimental stimuli because it has the highest mean score on interest variable among these five websites, and we believe that Gifts website is more relevant to the college students than the other four website categories. Therefore, it will be realistic to engage college students in telic or paratelic activities with the Gifts website.

Table 30 shows the descriptive statistics and t-tests results of subjects' familiarity with, interests in, and liking/disliking for the five website categories.

A.2 Pilot Study 2

Based on the results of pilot study 1, pilot study 2 is conducted to identify the appropriate gift items to be included the webpage stimuli. The selected gift items will only elicit neutral affect in the subjects and should be of some level of interests to the subjects for browsing or purchasing them. Student subjects are recruited from MIS courses at a large middle south university in USA. During the study, the subjects are given a list of gift items and instructed to rate their reactions to these gifts on following scales: their liking/disliking for the listed gifts (from 3 = strongly like to -3 = strongly dislike), perceived suitability of the listed items as gifts for female friends of their age (from 7= extremely suitable to 1=not suitable at all), perceived suitability of the listed items as gifts for male friends of their age (from 7= extremely suitable to 1=not suitable

at all), and desirability of the listed items as gifts to themselves (from 7= extremely desirable to 1= not desirable at all). To ensure the selected gift items are of some interest to and produce neutral affect in the subjects, gift items with medium scores on liking/disliking (score between -1 and 1) and on desirability (score between 2 and 4), and high scores on suitability for either female or male friends (score higher than 3) are selected. Moreover, to minimize the response bias resulting from gender difference, we also make sure that there is no significant difference between male and female subjects on the scores of desirability and liking/disliking for the selected gift items. Therefore, 13 gift items satisfying the above criteria are selected, which include: college beads, sports scarf, model college mascot, holiday ornament, personalized door mat, college hot sauce, glass lamp, personalized can & bottle huggies, coffee mug or cup, personalized door mat, college ornament, tailgate party to go package, and pen & case set.

A.3 Pilot Study 3

The purpose of pilot study 3 was to check the effectiveness of the hypothetical scenarios in inducing the subjects into metamotivational states that they are intended for and examine whether an individual with a certain metamotivational dominance (being telic or paratelic dominant) can be brought into a metamotivational state that is different from his/her metamotivational dominance. During the study, each subject was randomly assigned to read one of the hypothetical scenarios (See Appendix B), which respectively facilitate paratelic or telic metamotivational states by describing a fictional situation where an individual similar to the subjects go visit a gift website for a birthday gift (telic state) or for enjoyment and fun (paratelic state). Before the subjects were instructed to

read the scenario, they were asked to fill out a questionnaire that measures their metamotivational dominance. After that, the subjects completed a questionnaire, which measures their current metamotivational state.

49 business school undergraduate students participated in the study. 42 data were useable. Based on the participants' scores on paratelic dominance scale (PDS), they were categorized into three groups. Participants with a score of 16 to 30 were considered to be paratelic-dominant (n = 8, 19%); those with scores of 0 to 7 were considered to be telic-dominant (n = 11, 26%); and those with a score of 8 to 15 were considered to be nondominant (n = 23, 55%).

The two-way ANOVA analysis using the measure of telic/paratelic state as dependent variable revealed a significant main effect for the hypothetical scenarios ($F=43.55$, $df=1$, $p<0.001$) that are intended to facilitate certain metamotivational states. As expected, the participants who read the telic scenarios (4.58) scored significantly higher on the telic state measure than those who read paratelic scenarios (2.86). The effect of participants' telic/paratelic dominance was not significant. There was no significant interaction effect between the hypothetical scenarios and participants' metamotivational dominance. This result demonstrated the effectiveness of the hypothetical scenarios in eliciting respective metamotivational states in the subjects.

A.4 Pilot Study 4

Pilot study 4 aims to test the influence of the design elements considered important for webpage complexity and order and the manipulation levels of these elements on subjects' perceptions of complexity and order.

The stimuli for this study include 24 homepages varying at 6 levels of complexity and 4 levels of order, which were designed according to the guidelines discussed in Section 3 of Chapter IV. Two independent samples of 47 and 22 undergraduate students participated in the study. The first sample of 47 subjects was shown the 24 homepages. Their task was to compare each homepage image with every other homepage image, judge their perceived similarity, and rank order the homepages according to their paired similarities. Their responses were used to obtain the pairwise dissimilarity values of stimuli for the MDS (Multidimensional Scaling) analysis. The second sample of 22 participants was given the same 24 homepages and asked to rate their reactions to each of these homepages on four scales: levels of perceived order of each homepage, levels of perceived complexity of each homepage, levels of preference for each homepage under two different scenarios (telic versus paratelic). The order in which the stimuli were presented was counter balanced between participants. This provided additional perceptual data about the homepage stimuli.

With the distance data collected from the first sample of 47 participants, I created a pooled matrix of dissimilarity values by averaging the distance values across subjects. The data matrix was submitted to MDS analysis using the SPSS procedure PROXSCAL. The purpose of MDS is to help us to discover the participants' mental representation of stimuli that explains how the participants made similarity judgments.

We used a scree plot to decide the number of dimensions for the scaling solution. In the scree plot that is shown in Figure 21, Normalized Raw Stress (the lack of fit measure) is plotted against the dimensionality. Correct dimensionality is indicated by an

"elbow" in the plot, after which the Stress is not reduced substantially by increasing the dimensionality. You can see from the scree plot that increasing the dimensionality from 1 to 2 provides the most significant improvements in the Stress. After 2, the improvements are rather small. Moreover, the value of stress for the two-dimensional solution is quite low, well below accepted standards for good fit for MDS solutions. Therefore, the two-dimensional solution space was selected.

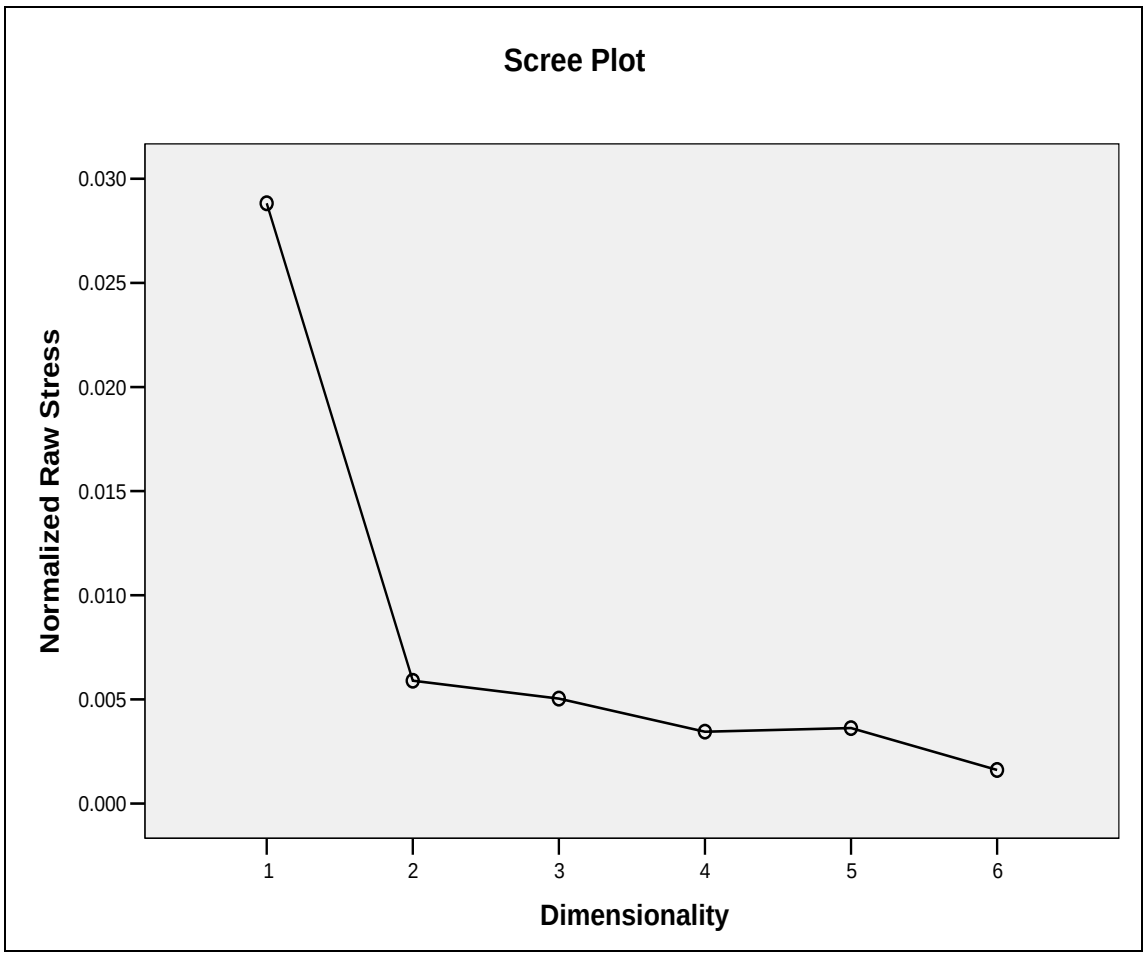


Figure 21. Scree Plot of Stress and Dimensionality

To facilitate the dimensionality interpretation, the ratings of perceived complexity and perceived order of homepage images, collected from the second sample, were regressed onto the two-dimensional solution. This was performed by using two multiple regression analyses with levels of perceived complexity and perceived order as dependent variables and the coordinates of stimuli points in the two-dimensional solution space as the independent variables. The results show that the multiple correlations for both perceived complexity and perceived order are significant and high (See Table 31), which indicated that the ratings of perceived complexity and perceived order can be well fitted by the two-dimensional solution space. Figure 22 shows the interpretation of the two-dimensional solution, which is represented by a scatter plot of stimuli's coordinate values obtained from the MDS output. Dimension 1' (DIM. 1'), represented by the red line going from the lower left to the upper right, delineated changes in levels of perceived order of stimuli, ranging from low order on one end of the line to high order on the other end. This dimension also roughly differentiated the manipulated levels of order, which range from level 1 (the lowest level of order) to level 4 (the highest level of order). Similarly, Dimension 2' (DIM. 2'), indicated by the blue line going from the upper left to the lower right, distinguished between stimuli whose levels of perceived complexity changed from low to high. It also seemed to roughly show the differences between the manipulated levels of complexity, which range from level 1 (the lowest level of complexity) to level 6 (the highest level of complexity). Therefore, it seems reasonable for us to interpret Dimension 1' as "Perceived Order of Stimuli" and Dimension 2' as "Perceived Complexity of Stimuli". This analysis, as we

have expected, revealed perceived complexity and perceived order of stimuli as two perceptual dimensions that can meaningfully describe the perceived similarity/dissimilarity between stimuli. It also demonstrates the effectiveness of complexity and order manipulation in the stimuli. The deviation of perceived complexity and order from the manipulated complexity and order may be due to the interaction effect between order and complexity on participants' perceptions of stimuli.

Table 31. Regression of the Ratings of Perceived Complexity and Perceived Order into the Two-Dimensional Solution Space

Multiple Regression		1	2
	F Value	88.248	52.150
	R Square	0.894**	0.832**
Beta			
Dependent Variables		Perceived Complexity	Perceived Order
Independent Variables	Dimension 1 Coordinates	-0.933**	0.311*
	Dimension 2 Coordinates	-0.332**	0.903**

* P value < 0.05
** P value < 0.001

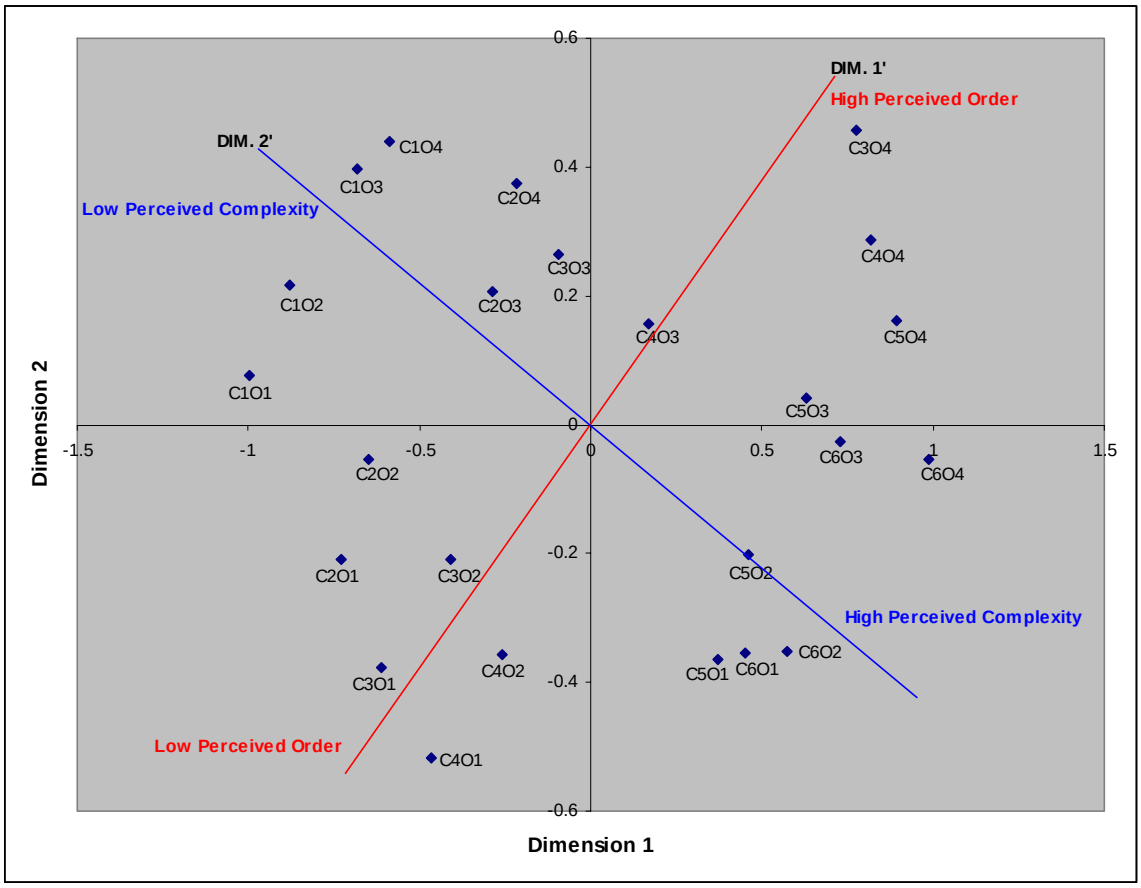


Figure 22. Stimuli* Coordinates in the Two-Dimensional Solution Space and Subjective Interpretation of the Dimensions

* Each stimulus is denoted by a 4-character label, which indicates its manipulation levels of complexity and order. The labels starts with a "C" (complexity) followed by a number ranging from 1 to 6 to indicate the manipulation level of complexity with 1 representing the lowest complexity level and 6 being the highest complexity level. After that, the third character in the label is an "O" (Order) followed by a number ranging from 1 to 4 to indicate the manipulation level of order with 1 representing the lowest order level and 4 representing the highest order level. For example, C1O1 represents the stimulus with level-1 (lowest) complexity and level-1(lowest) order.

To further examine the effects of manipulation of stimuli's complexity and order levels on perceived complexity and order of as well as participants' affective response to the stimuli (i.e., liking/disliking), a repeated measures analysis of variance was conducted on the data gathered from the second sample, with the manipulation of stimuli's complexity levels and the manipulation of stimuli's order levels as the two within-factors, and perceived webpage order, perceived webpage complexity, and levels of liking/disliking for each homepage under telic and paratelic scenarios as the dependent variables. The multivariate test of the main effects of the two within-factors – the manipulation of stimuli's complexity levels and the manipulation of stimuli's order levels was significant beyond the 0.001 level (See Table 32). The multivariate complexity by order interaction effect was also found significant beyond the 0.001 level (See Table 32), which is consistent with the findings of MDS solution.

Table 32. Main Effects and Interaction Effects of Manipulation of Stimuli's Complexity and Order Levels

Source	Wilks' Lambda	$DF_{numerator}$	$DF_{denominator}$	F Value
Webpage Complexity (CM)	0.156	20	322.662	12.122***
Webpage Order (OR)	0.139	12	151.099	13.969***
CM x OR	0.514	60	1161.567	3.604***

* $p < 0.05$
** $p<0.01$
*** $p<0.001$

The univariate test shows that the manipulation of complexity had significant effects on perceived complexity of stimuli ($p<0.001$) and participants' liking/disliking of stimuli when they are in a paratelic state ($p<0.001$) (See Table 33). The manipulation of order was shown to have significant effect on perceived complexity of stimuli ($p=0.024$), perceived order of stimuli ($p<0.001$), participants' liking/disliking of stimuli when they are in either a paratelic state ($p<0.001$) or a telic state ($p<0.001$) (See Table 33). And the univariate interaction effects were all significant for the four dependent variables (See Table 33).

These findings further demonstrate the effectiveness of our manipulations of webpage complexity and order as factors influencing the webpage stimuli's perceived complexity and perceived order and participants' preference for the stimuli. In selecting the appropriate levels of complexity and order manipulation for the webpage stimuli of the major experiment, a series of within-subject contrasts between different levels of complexity and order manipulation are performed on the perceptual variables of complexity and order.

The goal was to select the complexity manipulation levels that score significantly differently on perceived complexity from every other manipulation level of complexity, and that can be considered as either high complexity, moderate complexity, or low complexity. Similarly, we would select the order manipulation levels whose scores on perceived order are significantly different from every other manipulations level of order, and which can be perceived as either high order, moderate order, or low order.

Table 33. Univariate Test of Main Effects and Interaction Effects of Manipulation of Stimuli's Complexity and Order Levels

Source of Within-Subject Effects	Dependent Variables	F Value	DF*	Sig.
Manipulation of Complexity	Perceived Complexity	78.405	2.381	.000
	Perceived Order	2.776	1.832	.080
	Liking/Disliking when being Paratelic	12.886	2.340	.000
	Liking/Disliking when being Telic	3.074	1.791	.064
Manipulation of Order	Perceived Complexity	5.372	1.204	.024
	Perceived Order	89.461	1.663	.000
	Liking/Disliking when being Paratelic	44.030	1.895	.000
	Liking/Disliking when being Telic	75.274	1.835	.000
Complexity x Order	Perceived Complexity	2.825	6.520	.011
	Perceived Order	7.182	8.145	.000
	Liking/Disliking when being Paratelic	3.472	6.983	.002
	Liking/Disliking when being Telic	5.905	8.262	.000

* Greenhouse-Geisser adjusted degrees of freedom

For the purpose of the major experiment, we need stimuli characterized of high level, moderate level, and low level of complexity, as well as high level, moderate level, and low level of order. In this pilot study, participants were asked to rate perceived complexity and perceived order on a 7-point scale, where 7 = extremely, 6 = very high, 5

= quite a bit, 4 = moderately, 3 = a little, 2 = very slightly, 1 = not at all. Therefore, for high complexity and high order stimuli, we need to choose the manipulation levels that have values greater than 5; for moderate complexity and moderate order stimuli, we ought to choose the levels that have values between 3 and 5; and for low complexity and low order stimuli, we need to select the manipulation levels whose values are less than 3. The mean statistics for manipulated complexity (See Figure 23) show that the manipulated complexity at level-5 (mean of perceived complexity = 5.08) and level-6 (mean of perceived complexity = 5.38) can be considered as high complexity, the level-4 (mean of perceived complexity = 4.38), level-3 (mean of perceived complexity = 3. 83), and level-2 (mean of perceived complexity = 3.20) complexity can be regarded as moderate complexity, and level-1 complexity (mean of perceived complexity = 1.85) can be rated as low complexity. As shown in Figure 24, the level-4 (mean of perceived order = 5.92) and level-3 (mean of perceived order = 5.57) order can be regarded as high order; level-2 order can considered as moderate order (mean of perceived order = 3.66); and level-1 order can be rated as low order (mean of perceived order = 2.86). As the results showed that all the contrasts are significant, which indicates each manipulation level of complexity and order differ significantly from every other manipulation level on score of perceived complexity and order, we drew on the findings from the MDS analysis to decide which manipulation levels of complexity and order will be selected.

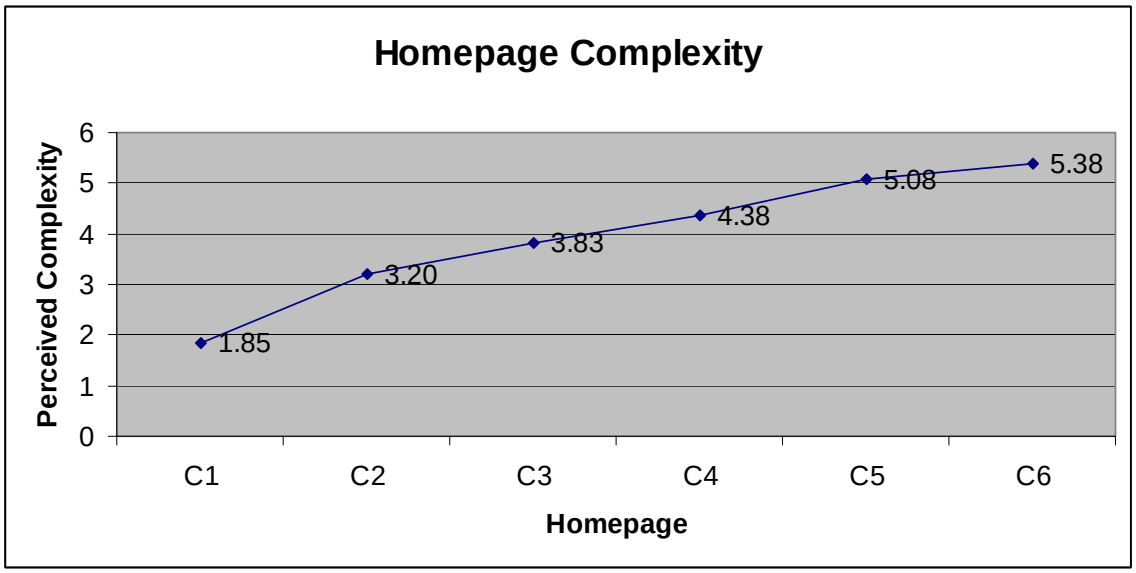


Figure 23. Means of Perceived Complexity for Stimuli at Each Manipulated Level of Complexity

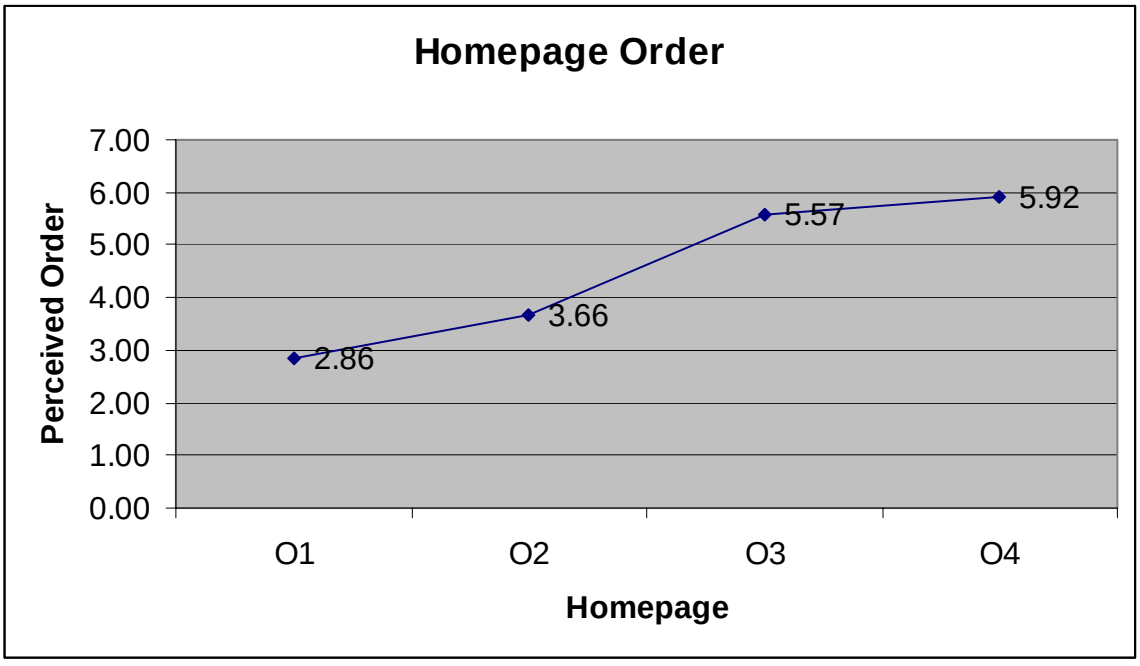


Figure 24. Means of Perceived Order for Stimuli at Each Manipulated Level of Order

As mentioned before, the complexity manipulations at level-5 and level-6 are perceived quite similar in the two-dimensional solution space. Given that they are both considered as high complexity and are perceptually similar and that level-6 scored higher than level-5 on perceived complexity, we chose the manipulated complexity at level-6 for the stimuli of the major experiment. Since level-3 complexity and level-4 complexity are also perceived quite similar, we chose level-4 complexity as the moderate level of complexity for the major experiment, because level-4 complexity, which score between 4 = moderately complex and 5 = quite a bit complex, was considered more representative of moderate complexity than level-3 complexity whose score on perceived complexity was below 4. As level-1 complexity is the only one considered as low complexity and is not perceived similar to any of the other manipulated complexity levels, it is selected as the low complexity manipulation for the major experiment. We also chose to keep level-2 complexity manipulation for the major experiment because it was not perceived similar to any other manipulated levels of complexity and could serve as an intermediate level between the vastly disparate complexity manipulations at level-1 and level-4 (difference between the perceived complexity means of level-1 and level-4 complexity = 2.58) in the major experiment. For the manipulated levels of webpage order, level-1 and level-2 order are selected because they are the only ones that are considered as low order and moderate order, and they are not perceptually similar to any other manipulated order levels. When choosing between the level-3 and level-4 order, both of which had high order ratings, we finally decided to keep the level-3 order rather than level-4 order treatment for the major

experiment. Since the level-4 order treatment is designed to further differentiate the webpage elements beyond the level-3 order through building color contrast between the elements, it has a different color scheme from the other three treatments of webpage order. Therefore, using the level-4 order treatment may introduce additional unintended effects of color on the perceptions of webpage aesthetics, emotional responses, and approach tendency. In summary, based on the above discussions, we selected the level-1, level-2, level-4, and level-6 treatments of webpage complexity and the level-1, level-2, and level-3 treatments of webpage order for the stimuli of the major experiment. Since there will be only four levels of webpage complexity treatment for the main experiment, we relabeled the level-4 complexity as the level-3 complexity and the level-6 complexity as the level-4 complexity. Therefore, the level-3 and level-4 complexity will be used in place of the level-4 and level-6 complexity in the discussion of the results of the main experiment.

APPENDIX B

SCENARIOS

B.1 Telic Metamotivational State

One of your friends' birthday is just around the corner. You want to buy a gift for him/her, but you don't have a lot of time to shop around. You plan to spend 10-20 minutes. So, you think of going to a gift website on the internet to buy a birthday gift for your friend.

In order to quickly find a gift for your friend online, you turn on the computer, open Internet Explorer, and go to the Google search engine. You search for the gift websites by typing in "gifts" in the keywords space. You click on the first website link in the resulting list. As the website homepage loads on your computer screen, you start looking through the webpage. …

B.2 Paratelic Metamotivational State

It is shortly after noon on a Saturday. You're surfing on the Internet at home. You're not looking for anything specific online. Instead, you're taking your time browsing various Websites and checking out some fun stuff. All you want to do is to spend several enjoyable hours online by yourself.

As you're browsing the Internet looking for fun and enjoyment, a banner advertisement for a gift website attracts your attention. You want to visit the website and see if you can find some interesting stuff for your friends. You click on the banner,

which opens another IE window. As the website homepage loads on your computer screen, you start browsing through the webpage. …

APPENDIX C

INSTRUMENTS USED IN THE EXPERIMENT

Order Measures (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree)

- The information is clearly labeled and well organized.
- The structure of information is logical.
- The webpage has high clarity of organization.
- The webpage is easy to navigate.
- The webpage is well laid-out.

Complexity Measures (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree)

- The webpage is crowded.
- The webpage is complex.
- The webpage is overwhelming.
- The presentation of webpage is rich.
- The webpage content has much variety.
- The webpage content is dense.

Telic metamotivational state (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree)

- I’m feeling serious-minded
- I’m being purposeful.

- I want to get things done.
- I want to be efficient.
- I'm feeling serious.
- I want to be task-focused.
- I want to be serious.
- I want to feel calm.
- I'm not feeling adventurous.
- I'm trying to get things done.

Paratelic metamotivational state (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree)

- I'm feeling playful.
- I'm just having fun.
- I want to be playful.
- I want to just have fun.
- I want to be amused.
- I want to have enjoyment
- I'm living for the moment.
- I want to feel leisurely.
- I want adventure.
- I want to feel excitement.
- I want to feel more stimulated.

Intrinsic valence (-3 = significantly, -2 = quite, -1 = slightly, 0 = neither, 1 = slightly, 2 = quite, 3 = significantly)

- The webpage is disagreeable/enjoyable.
- The webpage is visually unappealing/appealing to me.
- The webpage is visually unattractive/attractive.
- The webpage is visually unpleasant/pleasant.
- The webpage is interesting/uninteresting (R).

Arousal (-3 = significantly, -2 = quite, -1 = slightly, 0 = neither, 1 = slightly, 2 = quite, 3 = significantly)

- The webpage makes me feel stimulated/relaxed (R).
- The webpage makes me feel calm/excited.
- The webpage makes me feel frenzied/sluggish (R).
- The webpage makes me feel unaroused/aroused.
- The webpage makes me feel jittery/dull (R).
- The webpage makes me feel wide-awake/sleepy.

Motivational valence (-3 = significantly, -2 = quite, -1 = slightly, 0 = neither, 1 = slightly, 2 = quite, 3 = significantly)

- The webpage makes me feel happy/unhappy (R).
- The webpage makes me feel annoyed/pleased.
- The webpage makes me feel satisfied/unsatisfied (R).
- The webpage makes me feel melancholic/contented.
- The webpage makes me feel hopeful/despairing(R).

- The webpage makes me feel uncomfortable/comfortable.

Approach-Avoidance behaviors (7 = strongly agree, 6 = agree, 5 = somewhat agree, 4 = neutral, 3 = somewhat disagree, 2 = disagree, 1 = strongly disagree):

- I would enjoy visiting this website.
- I like to spend much time browsing this website.
- I would try to leave this website as soon as possible (reversed).
- I would avoid getting back to this website after I have left it (reversed).
- I want to avoid exploring or investigating this website (reversed).
- I like this website.
- I would avoid any unplanned activity in this website.
- I would be satisfied with this website.
- I would have a positive attitude toward this website.

APPENDIX D

QUESTIONNAIRE USED IN THE EXPERIMENT

Introduction

This experiment will guide you through a number of steps. Please read the instructions carefully and follow the steps as you proceed. In order to ensure accuracy of your responses, we need you to complete the experiment individually.

During the experiment, you will view a website homepage. You can scroll up and down the webpage when browsing the webpage. But for the purpose of this study, please **DO NOT** click on any links in the webpage.

You will also be asked to fill out questionnaires. We would appreciate your honest answers to our questions. Please follow the following instructions for completing the questionnaire:

1) Please complete the questions in the order presented. This is necessary for data to be properly recorded.

2) Use your initial "gut" response to each question. Don't spend too much time on each question. This will help us get an accurate assessment of people's responses.

3) Complete the questionnaire individually.

Please click on the "Begin" button to begin the experiment if you agree to follow these instructions.

Please read the following scenario and **VIVIDLY IMAGINE** that you're the person in the scenario.

One of your friends' birthday is just around the corner. You want to buy a gift for him/her, but you don't have a lot of time to shop around. You plan to spend 10-20 minutes. So, you think of going to a gift website on the internet to buy a birthday gift for your friend.

To Be Continued …

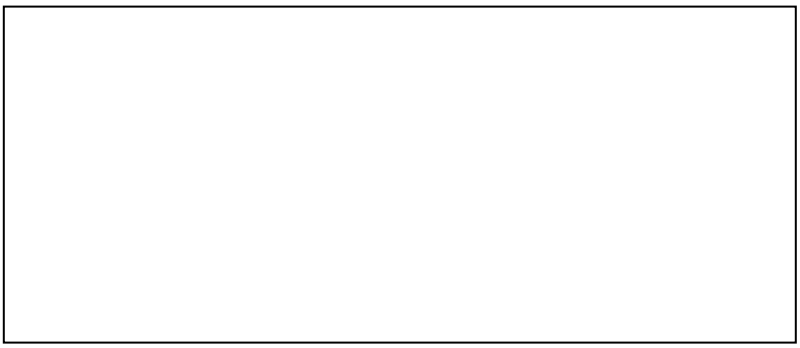
Or

It is shortly after noon on a Saturday. You're surfing on the Internet at home. You're not looking for anything specific online. Instead, you're taking your time browsing various Websites and checking out some fun stuff. All you want to do is to spend several enjoyable hours online by yourself.

To Be Continued …

Click on the "Next" button to continue

Now put yourself in the scenario you just read, and please describe what is occurring, what you are doing, and what your surroundings are like in the space below.



Click on the “Next” button to continue

Imagine that you're the person who is experiencing the situation described in the scenario. Please indicate **the degree to which you disagree or agree with the following statements about your current motivational state**.

(1 = Strongly disagree, 2 = Quite disagree, 3 = Slightly disagree, 4 = Neither disagree nor agree,

5 = Slightly agree, 6 = Quite agree, 7 = Strongly agree)

<u>Select</u> the number that represents your answer.

1. I'm feeling serious-minded.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

2. I'm just having fun.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

3. I want to accomplish something.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

4. I’m feeling playful.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

5. I’m being purposeful.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

6. I want to be playful.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

7. I’m feeling serious

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

8. I want to just have fun.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

9. I'm trying to accomplish something

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

10. I want to be amused.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

11. I want to be efficient.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

12. I want to have enjoyment.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

13. I want to focus on the task at hand.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

14. I'm living for the moment.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

15. I want to be serious.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

16. I want to feel leisurely.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

17. I'm not feeling adventurous.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

18. I want adventure.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

19. I want peace and quiet.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

20. I want to feel excitement

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

21. I want to feel calm.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

22. I want to feel more stimulated.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

Click on the “Next” button to continue

Imagine that you're the person who is experiencing the situation described in the scenario. Please indicate **the degree to which you have the following feelings**.

(1 = Not at all, 2 = Very slightly, 3 = A little, 4 = Moderately, 5 = Quite a bit, 6 = Very high, 7 = Extremely)

<u>Select</u> the number that represents your answer.

Pleased

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Sluggish

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Surprised

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Sad

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Delighted

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Inactive

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Gloomy

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Tranquil

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Lively

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Nervous

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Enthused

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Active

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Content

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Attentive

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Bored

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Elated

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Calm

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Alert

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Interested

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Distressed

|____1____|_____2____|_____3____|____4_____|____5_____|_____6____|____7____|

Not at all very slightly a little moderately quite a bit very high extremely

Click on the "Next" button to continue

Please read the continuation of the scenario as follows and **VIVIDLY IMAGINE** you're experiencing what is described in the scenario.

Continued

In order to quickly find a gift for your friend online, you turn on the computer, open Internet Explorer, and go to the Google search engine. You search for gift websites by typing in "gifts" in the keywords space. You click on the first website link in the resulting list. As the website homepage loads on your computer screen, you start looking through the webpage. …

Or

Continued

As you're browsing the Internet looking for fun and enjoyment, a banner advertisement for a gift website attracts your attention. You want to visit the website and see if you can find some interesting stuff for your friends. You click on the banner, which opens another IE window. As the website homepage loads on your computer screen, you start browsing through the webpage. …

Click on the "Next" button to continue

(Show the experiment stimulus, which will disappear and lead to Screen Eight after 20 seconds)

The following questions relate to the web homepage that you just visited.

Please indicate **the degree to which you have the following feelings about the webpage**.

(-3 = significantly, -2 = quite, -1 = slightly, 0 = neither, 1 = slightly, 2 = quite, 3 = significantly)

<u>Select</u> the number that represents your answer.

1. The webpage is disagreeable/enjoyable.

Disgreeable Enjoyable

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

2. The webpage is visually unappealing/appealing to me.

Unappealing Appealing

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

3. The webpage is visually unattractive/attractive.

Unattractive Attractive

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

4. The webpage is visually unpleasant/pleasant.

Unpleasant Pleasant

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

5. The webpage is interesting/uninteresting.

Uninteresting Interesting

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

7. The webpage makes me feel calm/excited.

Calm Excited

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

8. The webpage makes me feel frenzied/sluggish.

Frenzied Sluggish

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

9. The webpage makes me feel unaroused/aroused.

Unaroused Aroused

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

10. The webpage makes me feel jittery/dull.

Jittery Dull

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

11. The webpage makes me feel wide-awake/sleepy.

Wide-awake Sleepy

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

12. The webpage makes me feel happy/unhappy.

Happy Unhappy

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

13. The webpage makes me feel annoyed/pleased.

Annoyed Pleased

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

14. The webpage makes me feel satisfied/unsatisfied.

Satisfied Unsatisfied

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

15. The webpage makes me feel melancholy/contented.

Melancholy Contented

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

16. The webpage makes me feel hopeful/despairing.

Hopeful Desparing

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

17. The webpage makes me feel uncomfortable/comfortable.

Uncomfortable Comfortable

|_____-3___|____-2___|___-1____|____0____|____1____|_____2___|_____3___|

Significantly quite slightly neither slightly quite Significantly

Click on the “Next” button to continue

Imagine that you can click on any links on the homepage to get to the other related web pages of the website, please indicate **the degree to which you disagree or agree with the following statements about your current behavioral intentions toward the entire website**.

(1 = Strongly disagree, 2 = Quite disagree, 3 = Slightly disagree, 4 = Neither disagree nor agree,

5 = Slightly agree, 6 = Quite agree, 7 = Strongly agree)

<u>Select</u> the number that represents your answer.

18. I would enjoy visiting this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

19. I like to spend much time browsing this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

20. I would try to leave this website as soon as possible.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

21. I would avoid getting back to this website after I have left it.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

22. I want to avoid exploring or investigating this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

23. I like this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

24. I would avoid any unplanned activity in this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

25. I would feel like purchasing from this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

26. This is a website where I might end up spending more money than I originally set out to spend.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

27. I would recommend this website to my friends.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

28. I would consider the choice of visiting this website a good one.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

29. I would be satisfied with this website.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

Click on the “Next” button to continue

Please indicate **the degree to which you disagree or agree with the following statements about the webpage's design features**.

(1 = Strongly Disagree, 2 = Quite Disagree, 3 = Slightly Disagree, 4 = Neither Disagree Nor Agree,

5 = Slightly Agree, 6 = Quite Agree, 7 = Strongly Agree)

<u>Select</u> the number that represents your answer.

1. The information is clearly labeled and well organized.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

2. The structure of information is logical.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

3. The webpage has high clarity of organization.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

4. The webpage is easy to navigate.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

5. The webpage is well laid-out.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

6. The webpage is crowded.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

7. The webpage is complex.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

8. The webpage is overwhelming.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

9. The presentation of webpage is rich.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

10. The webpage content has much variety.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

11. The webpage content is dense.

Disagree Agree

|_____1___|_____2___|____3____|____4____|____5____|_____6___|_____7___|

strongly quite slightly neither slightly quite strongly

Click on the "Next" button to continue

Please provide the following information about yourself:

1. Age: _____
2. Gender: _____
3. Major: _____
4. Country of Origin: _____
5. When did you start using the Internet? _____
6. How much time do you spend per day using the Internet? _____
7. Please rate your knowledge level of website design _____

   (1 = none, 2 = basic knowledge, 3 = advanced knowledge)

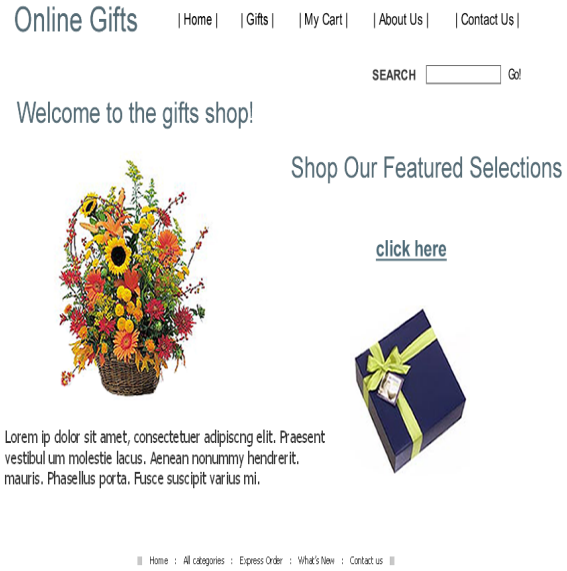
THANK YOU VERY MUCH FOR PARTICIPATING. IF YOU HAVE ANY QUESTIONS ABOUT THE STUDY, I WOULD BE GLAD TO ANSWER THEM.

APPENDIX E

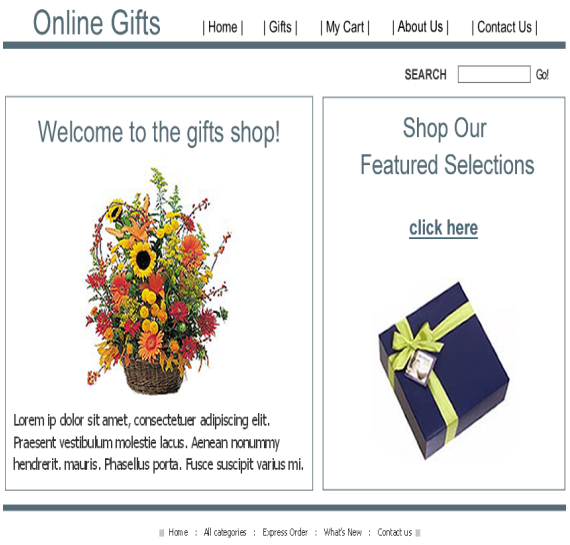
EXPERIMENTAL STIMULI

Stimulus C1O1

Stimulus C1O2



Stimulus C1O3



Stimulus C2O1

Stimulus C2O2

Stimulus C2O3

Stimulus C3O1

Stimulus C3O2

Stimulus C3O3

Stimulus C4O1

Stimulus C4O2

Stimulus C4O3

VITA

Liqiong Deng

4217 TAMU, Texas A&M University, College Station, TX 77840,

jdeng@mays.tamu.edu

Education

2006	Doctor of Philosophy in Management Information Systems
	Texas A & M University, College Station, TX, USA
2000	M. A. in Economics
	Fudan University, Shanghai, P. R. China
1997	B. A. in Economics
	Fudan University, Shanghai, P. R. China