

**WEB PERSONALIZATION – A TYPOLOGY, INSTRUMENT AND
TEST OF A PREDICATIVE MODEL**

A Dissertation

by

HAIYAN FAN

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

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Major Subject: Management Information Systems

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ABSTRACT

Web Personalization – A Typology, Instrument, and a Test of a Predictive Model.

(August 2007)

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In E-Commerce and mobile commerce, personalization has been recognized as an important element in customer relationship and Web strategies. However, there are wide differences in how this concept is defined, characterized, and measured in the literature. The extant personalization research is also limited by the lack of proper measurement instruments. While personalization has been recognized as a multi-dimensional construct, identifying those dimensions and operationalizing them in measurable terms has been a persistent and important research issue in MIS research. Furthermore, existing knowledge about user's preference of different personalization features is sparse. In responding to these three limitations, this study aims to advance existing understanding in these three areas: First, the Web Personalization Measurement Instrument (WPMI) was developed based on the analysis of ideal types of personalization that are defined in terms of the motivation they supply for personalization and the goals and means of personalization. Reliability and construct validity of the instrument were established in this study. External validity and predictive validity issues were investigated by applying WPMI to a wide range of commercial websites. Second, this research examined the effect of Web personalization on positive user experience and its associated motivational states. Using commercial websites as stimuli for three different types of personalization strategies, this research conducted two independent studies and found supportive evidence for the positive influence of web personalization on user experience. In addition, we also identified distinct user motivational states salient to specific personalization strategies that are conducive to positive user experience. Third, this research examined the moderating effect of user values on the relationship between Web personalization and the

user experience and its associated motivational states. The analysis identified important values that are salient to certain Web personalization strategies in eliciting positive user experience and its associated motivational states.

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TABLE OF CONTENTS

	Page
ABSTRACT	iii
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
LIST OF FIGURES	xi
CHAPTER I	1
INTRODUCTION	1
1. Motivation and Problem Statement	1
2. Purpose of the Dissertation	3
3. Overview of Experimental Design and Methodology	7
CHAPTER II	11
THEORETICAL BACKGROUND	11
1. Web Personalization Strategies	11
1.1 Instrumental Personalization	13
1.2 Architectural Personalization	14
1.3 Social Personalization	15
2. Enjoyment: Positive User Experience	16
3. User Motivational States: Work and Play	18
4. User Value	19
CHAPTER III	21
STUDY ONE: DEVELOPMENT AND VALIDATION OF THE WPMI	21
1. Study One: Experimental Design and Procedure	21

	Page
2. Experiment Websites and Measurement.....	22
3. Data Analysis and Results	26
CHAPTER IV	30
STUDY TWO: A STUDY OF PERSONALIZATION AND	30
POSITIVE USER EXPERIENCE	30
1. Relating Personalization to Enjoyment.....	30
2. Relating Personalization to Motivational States	33
3. Experimental Design and Procedure.....	34
4. Experimental Websites and Measurement.....	35
5. Data Analysis and Results	37
5.1 Construct Validity and Reliability	37
5.2 Test of the Hypotheses.....	39
CHAPTER V	44
STUDY THREE: BUILDING WEB PERSONALIZATION	44
PROFILES USING WPMI.....	44
1. External Validity of the WPMI.....	44
1.1 Methodology	44
1.2 Experimental Design and Websites	45
1.3 Data Analysis and Results	48
2. Predictive Validity of WPMI	53
2.1 Predicting Perceived Enjoyment.....	53
2.2 Relating Web Personalization Profiles to User Motivational States	56

	Page
CHAPTER VI	61
WEB PERSONALIZATION AND USER VALUES	61
1. User Values Salient to the Three Personalization Strategies	61
2. A Contingency Approach to Integrating User Values into Web Personalization.	62
3. Experimental Design and Measurement	64
4. Data Analysis and Results	65
4.1 Validity and Reliability of the Value Measurement	65
4.2 MANOVA Test.....	66
4.3 Planned Contrasts.....	70
CHAPTER VII.....	86
DISCUSSION AND SUMMARY	86
1. Measurement of Web Personalization	87
2. Effects of Web Personalization on User Experience	88
3. Effects of User Values on the User Experience with Web Personalization	93
CHAPTER VIII	94
CONTRIBUTION AND FUTURE RESEARCH	94
1. Theoretical and Practical Contributions.....	94
2. Limitations	96
3. Directions for Future Research.....	97
REFERENCES	99
APPENDIX INSTRUMENT USED IN THE STUDIES	105
VITA.....	108

LIST OF TABLES

	Page
Table 1 Summary of the Three Studies in this Dissertation Research.....	9
Table 2 Personalization Ideal Types	12
Table 3 Experiment Websites Used in Study One.....	24
Table 4 Web Personalization Measurement Instrument (WPMI).....	25
Table 5 Construct Loading for WPMI from Exploratory Factor Analysis.....	27
Table 6 Factor Correlation and AVE for the Three Sub-Scales of WPMI	28
Table 7 Fit Indices for CFA from Study One	29
Table 8 Experimental Websites Used in Study Two	36
Table 9 Fit Indices for CFA from Study Two.....	37
Table 10 Factor Loading and Item Reliability from Study Two	38
Table 11 Results of Multiple Regressions in Study One and Study Two.....	41
Table 12 Experiment Websites Used in Study Three	46
Table 13 Descriptive Statistics of 18 Websites.....	49
Table 14 Cluster Characteristics and Correlations with Enjoyment within Clusters.....	51
Table 15 Post-Hoc Comparison of Perceived Enjoyment by Clusters	55
Table 16 Results of Planned Contrasts of User Motivational States on Perceived Enjoyment and Three personalization Strategies.....	58
Table 17 Fit Indices of CFA for User Value Constructs	65
Table 18 Factor Loading and Inter-Item Reliability	66
Table 19 Multivariate Effects of Personalization Strategies.....	68
Table 20 Effects of Personalization Strategy, User Value on the Subjects' Perceived Enjoyment and Motivational States	69
Table 21 Coding Scheme for the Dummy Variable in the Planned Contrast Tests.....	71
Table 22 Results of Planned Contrast of Low-High Achievement Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Architectural Personalization.....	73

	Page
Table 23 Results of Planned Contrast of Low-High Achievement Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Social Personalization.....	73
Table 24 Results of Planned Contrast of Low-High Achievement Value on the Score of Telic State between Instrumental Personalization versus Architectural Personalization.....	74
Table 25 Results of Planned Contrast of Low-High Achievement Value on the Score of Telic State between Instrumental Personalization versus Social Personalization.....	74
Table 26 Results of Planned Contrast of Low-High Stimulation Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Architectural Personalization.....	78
Table 27 Results of Planned Contrast of Low-High Stimulation Value on the Score of Paratelic State between Instrumental Personalization versus Architectural Personalization.....	78
Table 28 Results of Planned Contrast of Low-High Stimulation Value on the Score of Telic State between Instrumental Personalization versus Architectural Personalization.....	79
Table 29 Results of Planned Contrast of Low-High Benevolence Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Social Personalization.....	82
Table 30 Results of Planned Contrast of Low-High Benevolence Value on the Score of the Paratelic State between Instrumental Personalization versus Social Personalization.....	83
Table 31 Results of Planned Contrast of Low-High Benevolence Value on the Score of the Telic State between Instrumental Personalization versus Social Personalization.....	83
Table 32 A Summary of the Results of Research Hypotheses	89

LIST OF FIGURES

	Page
Figure 1 Mean Score of Perceived Enjoyment by Clusters	55
Figure 2 Instrumental Personalization Scores by User States	58
Figure 3 Architectural Personalization Scores by User States.....	59
Figure 4 Social Personalization Scores by User States.....	59
Figure 5 Enjoyment Scores by User States.....	60
Figure 6 Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Achievement Value.....	75
Figure 7 Mean Scores of Telic State by Web Personalization Types and Low-High User Achievement Value	75
Figure 8 Mean Scores of Paratelic State by Web Personalization Types and Low-High User Achievement Value	76
Figure 9 Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Stimulation Value	79
Figure 10 Mean Scores of Paratelic State by Web Personalization Types and Low-High User Stimulation Value	80
Figure 11 Mean Scores of Telic State by Web Personalization Types and Low-High User Stimulation Value	80
Figure 12 Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Benevolence Value	84
Figure 13 Mean Scores of Paratelic State by Web Personalization Types and Low-High User Benevolence Value	84
Figure 14 Mean Scores of Telic State by Web Personalization Types and Low-High User Benevolence Value	85

CHAPTER I

INTRODUCTION

1. Motivation and Problem Statement

The impulse to personalize environments, tools, and products to fit the unique concerns of the individual is as old as human society. In the present era of technological innovations, the internet, and new media, personalization is possible on a broader scale and can be done more quickly and effectively than ever before. As an important social phenomenon that carries great economic value (Davenport et al. 2001; Pine et al. 1999), personalization has drawn increasing research attention from both academia and industry. Personalization has been studied in such academic fields as economics, management, marketing, information systems, and computer science. In industry, corporate spending on content personalization is estimated at \$6 billion by 2004 (Ledford et al. 2002) and personalization technology providers have mushroomed (e.g. Net Perceptions, BroadVision, Documentum).

However, there is little consensus on how best to characterize the personalization construct. There is considerable diversity in thinking about the concept across the various disciplines and researchers who have studied personalization. Such diversity is advantageous because it offers multiple creative viewpoints on an important phenomenon. However, the wide range of viewpoints has tended to hinder accumulation of a foundational body of research on personalization. Most current research on this topic is centered on the technical level, where the conceptualization of personalization systems depends on the developer or researcher's particular view of personalization. This has resulted in studies and systems that are difficult to relate to one another. Furthermore, empirical studies that compare and contrast the effectiveness of different personalization strategies are rare. The current practice of focusing on "how to do personalization," rather than "how can personalization be done well" suggests that the field is still in its infancy.

This dissertation follows the style of *MIS Quarterly*.

On the measurement side, while the extant literature recognizes that personalization is a multi-dimensional construct, identifying those dimensions and operationalizing them in measurable terms has been a pressing concern for IS research for some time. There are wide differences in how this construct is defined, operationalized and measured in the literature, with unvalidated personalization measures widely used both in industry and in academia. Without meaningful information on the dimensions underlying personalization, tracing the effect of personalization on outcomes will be difficult.

Because of the multi-dimensional nature of the personalization construct, it would not be sufficient to use one single yardstick to measure the effectiveness of personalization strategies. Existing literature in e-commerce and marketing tend to adopt a monolithic approach (Kramer et al. 2000; Riecken 2000) by focusing on business-oriented measures such as return-on-investment, click-to-buy rate, etc, therefore personalization dimensions evaluated in those studies might not have captured personalization values that users/customers have (Bender 2002; Chen et al. 2002). In the context of the use of Web personalization, the study of subjective user experience is particularly relevant because whether or not to use a specific personalization feature on a website is ultimately a personal choice. Companies may invest handsome sums in personalization technologies, without knowing how these personalization technologies will be perceived by end users. This puts the effectiveness of Web personalization strategies in question. Sophisticated Web analytics matrix such as browsing history, click-to-buy rate only serve as indirect measures of user experience. This one-sidedness in our opinion is not conducive to the healthy growth of the industry because it ignores the interest of the target audience of personalization, i.e. the end users themselves.

Traditional usability measurement that focuses primarily on performance-based objective criteria also falls short of the task of measuring positive user experience, a key element of Web personalization. It has been widely recognized that the user's evaluation and perception of a website is intrinsically subjective, and user's positive subjective experience on a website is closely linked to positive attitudes, intrinsic motivations and

the subsequent approaching and exploring behavior (Agarwal et al. 2000; Finneran et al. 2003; Ghani et al. 1994; Hoffman et al. 1996). This research recognizes the diversity of Web personalization strategies, and investigates the potentials of Web personalization strategies as source of enjoyment for Web users, and the capacity of different Web personalization strategies for eliciting different motivational states.

A third limitation in the extant personalization literature is the lack of understanding of impact of individual differences in the perception of Web personalization. To a great extent, the effectiveness of any website strategy is contingent upon the user's receptivity to it. Due to individual differences, different users' subjective experiences with Web personalization are likely to differ. Coming from the prevailing technological-centric design paradigm, current practice of Web personalization design assumes that technological products would be uniformly perceived and used by end users according to the designer's intent, ignoring the richness and complexities of the impact of individual differences, as well as the interactive nature of human-computer interaction. This research recognizes the dynamics of user experience as structured by users' individual values, and investigates the interactions between user values and different Web personalization strategies.

2. Purpose of the Dissertation

This dissertation research consists of four main modules that are designed to answer four different research questions. They are organized into four main chapters. Hence we discuss the purpose of this dissertation in terms of the four main modules.

First, given the multi-dimensional nature of Web personalization, an important theoretical undertaking in personalization research involves 1) identifying and operationalizing the multi-dimensional constructs that comprise the domain; and 2) constructing a measurement scale that corresponds to each dimension of the construct. In the extant literature, personalization and its sister construct 'customization' are usually measured as indicator variables that lead to some higher-order construct such as

interactivity (McKinney et al. 2002; Novak et al. 2000; Palmer 2002), made-for-medium (Microsoft Usability Guidelines), and relationship service (Chen et al. 2002). However, empirical studies have often failed to support the hypothesized association between personalization and its purported positive outcome (Chen et al. 2002; Novak et al. 2000). Some researchers have attributed the inability to demonstrate significant linkage to the inadequacy of measures that “may not capture all dimensions of personalization that consumers actually value” (Chen et al. 2002). Research has been constrained by the shortage of high-quality measures for the personalization construct.

In responding to this need, this research attempts to develop a measurement scale of Web personalization strategies. Developing such a measure has a two-fold advantage. First, the process of developing the measures can in itself provide insights into how users perceive different Web personalization strategies. Secondly, developing reliable and valid measures would provide a valuable tool for evaluating the implementation of Web personalization, as well as for comparing the effectiveness of different personalization strategies.

The first part of the task, i.e. identifying and operationalizing the personalization construct is completed and summarized in Fan & Poole (Fan et al. 2006). In that article, we developed a conceptual framework that consists of four distinct perspectives on the nature of personalization distilled from the literature of several intellectual disciplines. These perspectives are ideal types and are discussed in terms of the motivation they supply for personalization, the goals and means of personalization, and the ways in which they conceptualize and model users. A gist of this framework is summarized in Table-2. From that conceptual framework of ideal types, we further identified three distinct design strategies¹ for developing personalization systems, i.e. instrumental personalization, architectural personalization, and social personalization. In this dissertation, the second part of the task, i.e. constructing a measurement scale that corresponds to each

¹ Here the term “dimension”, “ideal types” and “strategy” refer to the same logic structure, with slightly different use context. We use “dimension” in the context of the theoretical personalization construct, “ideal type” is used in the context of development of distinct personalization approaches using the ideal type methodology, whereas “strategy” is often used in the context of website personalization applications. Therefore, we do not semantically distinguish these terms strictly, but use them interchangeably.

personalization strategy is carried out. Although the dimensions underlying the personalization construct is universal as we initially conceptualized it, when developing the measurement scales, we focus on Web personalization as the relevant application domain. A series of studies having subjects interacting with commercial websites that employs personalization are undertaken to develop the Web Personalization Measurement Instrument (WPMI thereafter). Its psychometric properties will be discussed.

Secondly, once the measurement scales have been constructed, the next step of the dissertation is to investigate the impact of the three distinct Web personalization strategies on user's experience on the website, and the distinct motivational states associated with such positive experience. A number of IS and marketing theories have established the important role of positive experience in human-computer interaction. For example, TAM posits that perceived enjoyment is a kind of intrinsic motivation that that leads to intention to use/accept technology (Davis 1989; Davis et al. 1992). Flow theory advances the idea that a "flow" state leads to sustained interest and exploratory behavior (Csikszentmihalyi 1990). Cognitive engagement theory explains the cognitive process of engaging activities that are characterized as prolonged duration and time disorientation (Agarwal et al. 2000). However, few studies have investigated the underlying motivations for engaging in various kinds of computer and Web activities. Is the enjoyment of shopping on the Amazon website using personalized account of "one-click checkout" feature the same as the enjoyment felt when trying different outfits on the virtual model the on Land's End website? Are there different "shades of joy" when it comes to Web personalization? We believe by examining the motivations behind using Web personalization, we will be able to uncover different sources of enjoyment of using such interactive technologies, hence better inform the design and development of Web personalization.

This investigation will be carried out by testing a set of hypotheses on the effect of Web personalization strategies on user experience and its associated motivational states. We first test whether Web personalization contributes to positive user experience,

and then we examine the nature of this affect by associating distinct personalization strategies with different user motivational states.

Thirdly, identifying distinct personalization strategies is one step towards establishing a common theoretical basis for the study of personalization. The next logical task is to use such a common frame of reference to evaluate current practice of personalization. The WPMI gives us an analytical tool for comparing the extent to which a concrete example of practice is similar to or different from the defined ideal. The third part of the dissertation applies the WPMI to a handful of real commercial websites that employ a variety of personalization strategies. Such an exercise serves two purposes: 1) testing the external validity of the measurement instrument; and 2) evaluating personalization strategies used by real websites.

In practice, however, it is not uncommon that websites employ a combination of such strategies in designing particular personalization applications. For example, the popular online role playing game Everquest® seems to combine the architectural and relational perspectives to enable users to create shared worlds that to many users seem more real and more desirable than “real life”. Can consistent patterns of combinational use of personalization strategies be discerned from studying actual websites? If so, we can possibly build personalization profiles based on the strategies employed, and compare their effects on user experience. Such practical questions relate to the predictive validity of the measurement instrument under the development, and will be explored in the third part of the dissertation.

Finally, are all personalization strategies equally desirable to every individual user? Due to individual differences, different users’ subjective experiences with Web personalization are likely to differ. Several individual characteristics have been studied in the context personalization systems in recent years. In a study of personalized recommendation of ring-tone websites, Tam and Ho found that individual’s cognitive characteristics played a critical role in assessing the persuasiveness of the personalization strategy (Tam et al. 2005) . Lam and Lim (2004) found that individual values can be a

reliable predictor in assessing one's emotional needs as a way to personalize web features (Lam et al. 2004).

Because individual's needs and motivation for personalization differ, targeting personalization strategy to deliver the intended effect on user experience is critical. The key issue is to identify salient individual values to reliably predict such positive experience so as to enhance the effectiveness of the target strategy. In the last part of the dissertation, we take a contingency view and investigate the interaction effect between Web personalization strategy and the corresponding salient user values. By identifying user values salient to specific Web personalization strategy, this research provides a new perspective for personalization design theory and practice.

3. Overview of Experimental Design and Methodology

In this dissertation research, three studies were conducted to answer the research questions outlined above. Details about the experimental design, procedures, materials and measurement will be discussed later in the following individual chapters that are devoted to answering each of the specific research questions. In this section, we give an overview of all three studies so readers will gain a better understanding of the purpose of each study, as well as how each study relates to one another.

Study One was conducted to develop and validate the WPMI. Exploratory Factor Analysis (EFA) was used on data collected from Study One to examine construct validity of reliability of the proposed instrument, to be discussed in Chapter III. The data from Study One were used to test a set of hypotheses regarding the effects of personalization strategies on positive user experience and its associated user motivational states. The methodology for data analysis was multiple regression, and specifics will be discussed in Chapter IV.

Study Two was conducted to serve several purposes. First, data from Study Two were used to conduct Confirmatory Factor Analysis (CFA) to cross validate construct

validity and reliability of WPMI, to be discussed in Chapter III. Second, the data were also used to test a set of hypotheses regarding the effects of personalization strategies on positive user experience and its associated user motivational states, to be discussed in Chapter IV. In other words, this set of hypotheses in Chapter IV were tested with data from both Study One and Study Two using multiple regressions. Third, data from Study Two was used to test a set of hypothesis relating user motivational states to personalization strategies using ANOVA with planned contrasts. Finally, the data from Study Two was used to test a set of hypotheses investigating the moderating effect of user values on the relationship between personalization strategies and positive user experience and its associated motivational states, using MANOVA with planned contrasts, to be discussed in Chapter VI.

Study Three was conducted to apply WPMI to 18 commercial websites to examine its external validity. Cluster analysis was conducted on the data from Study Three to identify homogeneous subgroups among the 18 websites. The data from Study Three were used to test a set of hypotheses predicting the mean perceived enjoyment by the cluster membership identified. ANOVA with post-hoc testing will be discussed in Chapter V. From the 18 websites, 7 that had achieved positive Z-score of perceived enjoyment were selected to be used as experiment websites in Study Two². Table-1 summarizes each study.

² Although Study Three took place before Study Two chronologically, for the purpose of logical arrangement of the analyses, we report Study Two before Study Three in the organization of the dissertation

Table 1 - Summary of the Three Studies in this Dissertation Research

Study	Purposes	Methodology	Chapters
Study One	1. To develop and validate WPMI	Exploratory Factor Analysis	Chapter III
	2. To test a set of hypotheses regarding the effects of personalization strategies on positive user experience and its associated user motivational states	Multiple Regression	Chapter IV
Study Two	1. To cross-validate the WPMI	Confirmatory Factor Analysis	Chapter III
	2. To cross-test a set of hypotheses regarding the effects of personalization strategies on positive user experience and its associated user motivational states	Multiple Regression	Chapter IV
	3. To test a set of hypothesis relating user motivational states to personalization strategies.	ANOVA with planned contrast	Chapter V
	4. To test a set of hypotheses investigating the interaction effect between user values and personalization strategies	MANOVA with planned contrasts	Chapter VI
Study Three	1. To examine the external validity Of WPMI	Cluster Analysis	Chapter V
	2. To test a set of hypotheses predicting the mean perceived enjoyment by the cluster membership identified.	ANOVA with post-hoc test	Chapter V

This dissertation will be organized as follows. Chapter II reviews related literature on Web personalization, user experience and motivational states, and human value systems. Chapter III is devoted to developing and validating the WPMI. Research methodology for scale development and analysis of the psychometric properties of the instrument will be discussed. Chapter IV proposes a research model of how different personalization strategies elicit positive user experience through different mechanisms of motivational states. Research methodology and result of this structural model, cross-validated by two separate experiments will be discussed. In Chapter V, we will take an exploratory approach by applying the WPMI to 18 commercial websites that employ Web personalization in attempt to 1) test whether the WPMI can differentiate Web personalization strategies within a given a website and between websites; 2) build personalization profiles for each site based on the personalization strategies used, and relate the profiles to positive user experience and its associated user motivational states. In Chapter VI, we will propose a set of hypotheses testing the interaction effect between salient user values and Web personalization strategies. Research methodology and results will be discussed. Chapter VII will be devoted to the discussion of the key findings of this dissertation. In Chapter VIII, research questions will be further explored based on the results. Some implications for Web personalization design and suggestions for HCI research will be addressed along with future research.

CHAPTER II

THEORETICAL BACKGROUND

In this session, we first review three distinctive approaches of personalization, which provides the conceptual foundation for the measurement instrument that we are purported to develop in the next chapter. Next we review literatures on positive user experience and its associated motivational states. This sets up the stage for our empirical investigation of the impact of Web personalization strategies on user's experience on the website. Finally, we review user value theory, and specifically some relevant value types that may play a role in influencing user's perception of Web personalization.

1. Web Personalization Strategies

Different schools of thought can be discerned within the diverse personalization literature. To capture the characteristic features of these logically consistent approaches to thinking about personalization, we distilled three ideal types from the literature on personalization. We used Weber's ideal type theory as a model for the content analysis. Weber argued that social, economic and historical research can never be fully inductive or descriptive, as one always approaches it with a conceptual apparatus. This conceptual apparatus Weber defined as the ideal type, which is an abstraction of essential features of a particular social or economic phenomenon (Sgouros et al. 1997).

From our literature review we distilled three ideal types of personalization, as shown in Table-2: instrumental, architectural, and social. Each type represents a different philosophy concerning the motivation behind for personalization and what personalization tries to accomplish (its goal). Each type implies a different strategy for personalization, different methods for carrying out this strategy, and different user modeling techniques. Finally, each type implies different criteria for evaluating personalization systems.

Table 2 - Personalization Ideal Types

<i>Architectural</i>
<p><i>Motive:</i> To fulfill a human being's needs for expressing himself/herself through the design of the built environment</p> <p><i>Goals:</i> To create a functional and delightful web environment that is compatible with a sense of personal style</p> <p><i>Strategy:</i> Individualization</p> <p><i>Means:</i> Building a delightful web environment and immersive web experience</p> <p><i>User model:</i> Cognitive, affective and social-cultural aspects of the user</p>
<i>Instrumental</i>
<p><i>Motive:</i> To fulfill a human being's needs for efficiency and productivity</p> <p><i>Goals:</i> To increase efficiency and productivity of using the system</p> <p><i>Strategy:</i> Utilization</p> <p><i>Means:</i> Designing, enabling and utilizing useful, usable, user-friendly tools</p> <p><i>User model:</i> Situated needs of the user</p>
<i>Social</i>
<p><i>Motive:</i> To fulfill a human being's needs for socialization and a sense of belonging</p> <p><i>Goals:</i> To create a common, convenient platform for social interaction that is compatible with the individual's desired level of privacy</p> <p><i>Strategy:</i> Mediation</p> <p><i>Means:</i> Building social interactions and interpersonal relationships</p> <p><i>User model:</i> Social context and relational aspects of the user</p>

1.1 Instrumental Personalization

Instrumental personalization refers to the utilization of information systems to enhance efficiency and personal productivity by providing, enabling and delivering useful, usable, user-friendly tools that meet individual's unique needs in a way that meet the user's situated needs. Instrumental personalization focuses on the functionality of the system. The assumption in this case is that users will find systems that are designed and tailored to their particular requirements more relevant. Regardless of the type or sophistication of the technology, the purpose for instrumental personalization nevertheless is singular—to support users in accomplishing their goals. Instrumental personalization emphasizes functionality and usability and treats aesthetics as a secondary consideration to be addressed once instrumental standards are met.

There are three aspects of instrumental personalization: providing tools, designing tools, and utilizing tools. Each aspect takes a different perspective on the personalization issue and entails different research interests. Providing tools is concerned with creating devices for personalized use that can be delivered through the appropriate channels. Channels for provision of services include the wired and wireless webs, personal digital assistants, interactive TV, and voice portals, among others. Devices deployed in wired or wireless applications offer personalized functions ranging from Hallmark's interactive calendar that sends reminders of important dates to personal agents capable of conducting business transactions (Andre et al. 2002; Maes et al. 1999). Designing tools is concerned with making tools and machines usable, useful and user friendly, the traditional domain of software engineers. Utilizing tools is concerned with choosing the appropriate channels and devices to deliver relevant content effectively. The challenge lies in identifying the proper vehicle to carry out the service through multiple channels. For example, ubiquity, localization and convenience have been often cited as key mobile value propositions (Sadeh 2002). Mobile wireless agents equipped with Global Positioning Systems are suitable for personal tourist guides that can dynamically adjust to users' interests and changes in environment (e.g. indicating when museums are open during times convenient for the user) (Cheverst et al. 2002). Web-based shopping agents are capable of performing complicated price, utility and functionality comparison among

brands (Ardissono et al. 2002). The challenge lies in identifying the proper vehicle to carry out the service through the “multi-channel zigzag” (Rose 2001). An important task for instrumental personalization is the integration of different computing devices across platforms. Truly personal control over the flow of information across the boundaries of networks, platforms and devices can be realized through the creation of personalized communication networks such as 3GPP’s *Personal Service Environment* and *Virtual Home Environment (3GPP)* (3GPP) .

1.2 Architectural Personalization

Architectural personalization is most generally associated with the fields of architecture, environmental psychology and urban planning. Architectural personalization can be defined as *the construction of the digital environment to create a pleasant user space and a unique experience for the user through arrangement and design of digital artifacts in a way that meet the user’s aesthetic needs and reflect his or her style and taste*. Because architectural personalization is concerned with building digital environments, it relates particularly to the interface aspect of the system.

The motive of architectural personalization is to fulfill the user’s needs and to enable him or her to express himself/herself through design of the online environment. The goals for personalization in this view are two-fold: (1) to create a functional and delightful web environment that provides aesthetic value and reflects the user’s personal style; and (2) to help the user cultivate a sense of personal and social identity within the space (Becker 1977). The general strategy of architectural personalization is *individualization*. Research in architecture has shown that personalized design that incorporates the needs and requirements of users has significantly improved the quality and function of the built environment (Altman 1975; Bonnes et al. 1995; Canter 1974; Holahan 1978). Most current research explores principles for constructing digital spaces that afford easy navigation, intelligent presentation and aesthetic delight. A good example of architectural personalization would be the L’OREAL web site. The site is designed with a different look-and-feel for different countries. The Japanese site is presented with the fresh pure look of oriental lotus, the Brazilian site is imbued with passionate dashes of

red, and the French site is enlivened by an avant-garde looking model. The variety brings in intrigue, mood, and added-value to a site.

1.3 Social Personalization

Another way to personalize one's world is to create a unique web of social relationships. This approach is most closely associated with the disciplines of sociology, communication and anthropology. Positive social relationships give individuals a sense of well being by creating support and a sense that they are not alone and are valued. In a very real sense, they lend an aura of the personal to one's world.

Relational personalization can be defined as *the mediation of interpersonal relationships and utilization of relational resources to facilitate social interactions by providing a convenient platform for people to interact with others in a way that is tailored to the individual's desired level of communality and privacy and their specific preferences for interacting with others*. The motivation behind relational personalization is to fulfill the user's particular needs for socialization and a sense of belonging. The goal of relational personalization is two-fold. (1) to enhance the effectiveness of interpersonal interactions, and (2) to help generate "social capital" (Wellman 2002) by providing new opportunities for strengthening social relationships and maintaining social networks. Relational personalization takes a myriad of forms, ranging from personalized gifts to computer-mediated interpersonal communication (MIT Media Lab).

Personalization systems designed according to the relational perspective focus on a strategy of *mediation*. They seek to provide a common, convenient platform for interpersonal communication and community building that emphasizes design on the basis of what Preece (Preece 2000) terms "sociability". Once a social network has emerged, the designer can use this critical mass to further enlist users and increase the relational potential of the network. Applications amenable to relational personalization vary greatly in size and complexity. They can be as simple as providing an "email to a friend" button to notify others of one's flight schedule after booking tickets online or as

complicated as a conglomeration of online information portal and activity center in a “Digital City” that engages residents or visitors (Toru 2002).

The divergence of personalization technology has provided infinite possibilities for Web application and design. Yet how does personalization influence the bottom line of user experience? Specifically how does personalization contribute to the positive user experience – a topic that we are about to review.

2. Enjoyment: Positive User Experience

In many respects the field of computer systems design is a late-comer to the study of enjoyment. Traditionally, computer design has been concerned with work and work systems. However, as information and communication technology penetrates all aspects of daily life, enjoyment has become a major research issue in human-computer interaction design (Blythe et al. 2003; Hassenzahl 2001a; Hassenzahl 2001b). Clearly efficiency, productivity and effectiveness are essential attributes for technology to support activities, but increasingly it is acknowledged that “enjoy the work” is as equally important as simply “get it done” (Norman 2004).

Major theories in IS and CHI such as TAM and flow theory have established the important role of positive user experience by gathering evidence that enjoyment of technology leads to technology appreciation, acceptance, exploration, experimentation and sustained usage (Agarwal et al. 2000; Bennett 2001; Ghani 1995; Mccarthy et al. 2003; Monk et al. 2002; Novak et al. 2003). Traditional human-computer interaction literature, coming from the expectation-confirmation paradigm, views enjoyment as positive emotion about the confirmation of the prospects of a desirable event. IS flow theory and self-efficacy theory emphasize the role of individual’s competency in ensuring one’s level of enjoyment during the course of technology use. However, our knowledge about what motivates enjoyment and what are the sources of enjoyment in the context of technology use is still limited.

In the field of Psychology, there exists the distinction between “satisfying homeostatic needs” such as food and bodily comfort and “breaking through the limits of homeostasis” (Seligman et al. 2000). This distinction reflects two divergent notions of happiness in Greek philosophy. For Plato happiness is the absence of pain. For Aristotle happiness is caused by the stimulation of the senses through action, e.g. novelty keeps mind stimulated and active. These two distinct schools of philosophy have shed light on our quest into what motivates enjoyment and the sources of enjoyment. One emphasizes the removal of usability problems, whereas the other emphasizes the provision of delight and enchantment of technology.

First, if we view human needs as the primary motivator for human action, then action is impregnated with a purpose, a target, a goal and meaning in itself. With needs and goals come expectations. In the context of human computer interaction, the expectation lies in whether the technology can bring about the desired performance with effectiveness and efficiency – that is “getting the work done”. Enjoyment is linked to the success in using a technology to achieve particular desirable behavioral goals (Hassenzahl 2003).

Yet “getting the work done” is not the only source of enjoyment. There are also moments of “enjoying the work”, in which the absence of usability problems gives away to the experience of novelty; the mundane use of technology that is oppressive and alienating gives away to continuous interactivity with technology and communication mediated by technology. At the receiving end of the human-computer interaction, users are “caught up in wonder at the object and carried away by senses” (Bennett 2001). Senses stimulated, imaginations sparked, users at this stage can be likened to an *open* system that is receptive to new stimuli, to the idea of the world of openness and unfinalized experience (Bakhtin 1993). There are many examples of such experience with technology, for instance, leafing through the online idea book as if turning an actual book, or personalizing merchandise using a 3-D interactive tool.

In order to better understand the two sources of enjoyment, we will first consider Michael Apter's Reversal Theory (RT), a theory that expounds on the motivational states behind positive human experience.

3. *User Motivational States: Work and Play*

One significant contribution of RT is its introduction of the concept of motivational states in the study of experience. According to Apter, motivational state is conceptualized as two distinctive states of mind in which one experiences arousal in "diametrically opposite ways" (Apter 1989). The two mental states are mutually exclusive as one can not be in both states simultaneously, no matter how short one state lasts. In systems theory terminology, they are two independent systems operating at alternate times and driving the organism in opposing directions.

Telic – after the ancient Greek word *telos*, meaning "an end" or "a goal"—is the mode in which the organism is goal-oriented. These goals are usually externally-imposed and unavoidable. *Paratelic* – in which *para* means "alongside"—is the mode in which the organism is process-oriented. Note that there is still the 'telic' word root in the word 'paratelic'. Hence it does not mean that there is no goal in this mode, but simply that the goal is not externally imposed but is self-defined and usually avoidable. In the telic mode, pleasure comes primarily from the feeling of movement towards the goal and making progress. In the paratelic mode, pleasure is derived from the activity itself, i.e. immediate sensual gratification, deep involvement in skilled performance, kinesthetic sensations, stimulation of intellectual engagement, and evocation of emotions and memories.

According to RT, the telic mode is characterized as serious-minded, future-oriented, as the goal preoccupies the organism, resulting in planning and monitoring behavior to ensure current activities are in fact leading towards the goal. Because of these characteristics, the telic mode is also called the work mode. On the contrary, the paratelic mode is characterized as playful, light-hearted, fun-loving, spontaneous, and present-oriented, resulting in exploring behavior. The paratelic mode is hence called the play

mode. In this research, RT serves as the theoretical foundation for our investigation into the effect of Web personalization on positive user experience. Particularly, RT supplies a theoretical argument for our hypotheses on the potential of Web personalization strategies in eliciting different motivational states.

4. User Value

Because individual's needs and motivation for personalization differ, targeting personalization strategy to deliver the intended effect on user experience is critical. The key issue is to identify salient individual values to reliably predict such positive experience so as to enhance the effectiveness of the target strategy. For that purpose, we now review value theory.

As advanced by Schwartz, a value is defined as a *desirable goal, varying in importance, that serves as a guiding principle in people's lives* (Schwartz 1992). The following attributes of values, as summarized by Schwartz and Bilsky (Schwartz et al. 1987; Schwartz et al. 1990), form the basis of our theoretical rationale of relating values to personalization types. Values (1) are concepts or beliefs, that (2) transcend specific situations, (3) guide selection or evaluation of behavior and events, and (4) are ordered in terms of relative importance. Schwartz's value typology consists of two elements. The *content* aspect defines the value in terms of primary goals, underlying needs and motivational concerns. The *structure* aspect specifies the dynamic relations among value types, i.e. compatibilities and conflicts among value types. The typology defines a total of 10 universal values (self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, universalism), which in turn form four higher-order value types (openness to change, conservation, self-enhancement, self-transcendence).

We postulate that one's subjective experience using Web personalization can be inferred by his/her personal values because both typologies are motivation-based. Each value item is defined by its underlying needs, conscious goals and motivational concern

(Schwartz 1992). On the other hand, personalization strategies are defined in terms of the motivation they supply for personalization and the goals and means of personalization. Therefore, exploring human values as a factor of individual difference in users' subjective experience with Web personalization will be a fruitful stream of research.

From this review, we conclude that personalization is a multi-dimensional construct. On one hand, there is considerable diversity in thinking about the concept across the various disciplines, on the other hand, there also exist patterns of consistency underpinning the way personalization technologies applied to website design. From the literature, we distilled three main personalization strategies, namely, the instrumental, the architectural and the social personalization. Based on this conceptual framework, we will develop a measurement instrument – the Web Personalization Measurement Instrument – test its reliability and convergent and discriminant validity will be dealt in the next chapter. In Chapter V, this instrument will be applied to a wide range of commercial websites to test its external validity, and to discover consistent patterns of combinationary use of Web personalization strategies. Because of the multi-dimensional nature of the personalization construct, it would not be sufficient to use one single yardstick to measure the effectiveness of personalization strategies. Existing literature in e-commerce and marketing tend to adopt a monolithic business-oriented measures, usability research tend to focus on the objective side of user responses neglecting the user's personal experience – the holy grail of personalization. In Chapter IV, we first test whether Web personalization contributes to positive user experience, and then we examine the nature of this affect by associating distinct personalization strategies with different user motivational states. The literature review also shows that individual values can be a reliable predictor in assessing one's receptivity of Web personalization. In Chapter VI, we will investigate the influence of salient user value types on user's receptivity of Web personalization.

CHAPTER III

STUDY ONE: DEVELOPMENT AND VALIDATION OF THE WPMI

1. Study One: Experimental Design and Procedure

The goal of this study is to develop and validate measures corresponding to the three Web personalization strategies. We used a lab experiment to test the validity and reliability of the proposed measurement model of personalization. We used the personalization features of actual commercial web sites as the experimental stimuli. Since most websites tend to employ a combination of different personalization strategies, the lab experiment allows us to assess participants' responses to only one personalization feature at a time. This helps to minimize the variations among participants' responses due to exposure to mixed personalization features.

A total of 308 undergraduate students (165 male, 143 female) enrolled in an introductory IS course at a major research university in the U.S. were recruited to participate in the study for the benefit of extra course credit. Because this course is designed for non-IS majors, the sampling frame represents a wider range of disciplinary backgrounds than IS or business courses. Majors of the subjects included chemistry, agriculture, liberal arts, and life sciences. This type of heterogeneity is advantageous in testing the reliability and generalizability of the measurement instrument (Shadish et al. 2001).

During the experiment, we showed movie clips of someone using the personalization features of websites to the participants rather than having them actually visit the site. We did this for two reasons. First, having the participants view the movie clips ensures that they are only exposed to the personalization features that they are assigned to. Second, this approach reduces or eliminates the differences in participants' responses resulting from irrelevant factors such as different browsing paths participants traversed, thus giving us the maximum experimental control.

To approximate actual web browsing in the movie as closely as possible, we used Camtasia software to capture the entire course of web interactions, dubbed with synchronized human voice to explain each mouse movement. To prime participants, we created a use scenario for each website describing the context and purpose of using the personalization features. To ensure the best audio quality, we tested several volunteers and chose one with the most pleasant voice in speaking standard American English. A total of 7 AVI files were generated including instructions for the participants, and one for each sites. The resolution of the movie clip on screen was 1080x720.

To optimize the effect of movie viewing, we conducted the experiment in a state-of-the-art instructional lab, in which participants viewed the movie on a personal computer via a 19-inch flat screen LCD monitor using a headphone. Each participant was randomly assigned to view only one of the six website stimuli. Online user questionnaires were developed using HTML and ASP code to facilitate data collection and to ensure data quality. All 308 data points collected were useable.

2. *Experiment Websites and Measurement*

In determining the web personalization stimuli for the experiment, we chose to use actual websites rather than creating our own because actual ones are representative of the tradeoffs designers will have in creating them to meet actual business needs and therefore will enhance generalizability of the experimental results to other commercial website settings. We identified five prominent Web sites whose personalization strategies have addressed personal needs of a wide base of web users and been advocated as exemplars of web personalization in the literature (Amazon's book recommendation system and convenient browsing history feature, Land's End's 3-D virtual model tool, MyMSN information portal, Yahoo!Group and Kodak Gallery). Then we made an interpretive analysis of those personalization strategies to match them with the three personalization strategies (see Table-3).

The interpretive analysis began with an examination of those personalization strategies in relation to the various personal needs of web users they are intended to fulfill. Making explicit the relations between personalization strategies and types of user needs allowed us to trace back to the motivations underlying these personalization strategies and identify a match between each personalization strategy and personalization ideal type. In this way, the personalization ideal types were respectively operationalized through the selected web personalization stimuli. Amazon's book recommendation system and convenient browsing history feature were used to operationalize instrumental personalization. The virtual model tool on Land's End website and MyMSN information portal were used to represent architectural personalization. Yahoo!Group and Kodak Gallery were used to represent social personalization.

The three personalization archetypes suggest the multidimensional nature of personalization. A step-by-step process was used to develop multi-item measurement scales for personalization with acceptable reliability and validity. We first distilled the three personalization archetypes stated above from an extensive literature review of five general areas in which personalization has been studied: marketing/e-commerce, computer science/cognitive science, architecture/ environmental psychology, information science, and social sciences including sociology, anthropology and communication. Next, we generated 20 candidate measurement items for all three archetypes of personalization for a pilot study.

The pilot study took the form of a group-and-sort game using paper strips. Thirty participants were given 20 randomly mixed paper strips, each with a personalization scale item written on it. The task was to group those statements by semantic content and then rank-order them within each semantic category. With no pre-specified number of categories, the pilot study result converged on three categories. After removing low ranking items and removing ambiguous items, 15 items, corresponding to the three personalization strategies remained for the succeeding study.

Items of the WPMI are listed in Table-4. The measurements were operationalized with seven-point rating scales (scale values ranging from “strongly disagree” to “strongly agree”) or seven-point semantic differential scales.

Table 3 - Experiment Websites Used in Study One

Personalization Ideal Type	Operationalization		
	Sample Web Site	Personalization Strategy	Personalization Motivation
Architectural personalization	MyMSN information portal	Allowing users to customize Web content by 1) selecting desired information to display; 2) changing the layout of the webpage by moving modularized content block to desired position; and 3) designing Web aesthetics by choosing desired theme and color palate.	Fulfilling user’s need for a personalized web space that meets his/her information need and reflects his/her aesthetic taste and style.
	Land’s End My virtual model TM	Allowing users to 1) build a customizable 3-D virtual model configured in one’s own body parameters; 2) determine how well the clothes fit by trying clothes on the model; and 3) view clothes from different angles.	Fulfilling user’s need for visualizing the effect of an outfit before purchasing. The visual tool makes online shopping tangible and fun.
Social Personalization	Yahoo!Group	Allowing users to 1) create and maintain newsgroups; 2) communicate through chat room and message board; and 3) share working space of files and documents.	Fulfilling user’s need for social interactions in ways compatible with his/her desired level of communality and privacy.
	Kodak Gallery	Allowing users to 1) upload pictures onto online album; 2) annotate pictures and create personal stories and slide shows; 3) share albums with friends and family; 4) having visitors sign on and make comments on guest books	Fulfilling users’ need for sharing fun and memory, and staying in touch with friends and family

Table3 continued

Personalization Ideal Type	Operationalization		
	Sample Web Site	Personalization Strategy	Personalization Motivation
Instrumental personalization	Amazon browsing history	Dynamically creating a browsing history displayed on the left column of the page consisting of hyper links that the user has just visited.	Fulfilling user's need for convenient access to pages that were just visited before, saving user's time to trace back page by page.
	Amazon book recommendation system	Recommending books to customers based on collaborative filtering algorithm, and customer past purchase history	Fulfilling user's need for identifying the relevant information/product in an efficient manner

Table 4 - Web Personalization Measurement Instrument (WPMI)

Construct	Code	Questionnaire Item
Architectural	ARCH1	This personalization feature enables me to tailor the color and feel of the site to my own personal taste and style.
	ARCH2	This personalization feature enables me to customize the online space to reflect my own style.
	ARCH3	This personalization feature allows me to create a web environment that is aesthetically pleasing to me.
	ARCH4	This personalization feature allows me create a web environment that is visually appealing to me.
	ARCH5	Personalizing the site makes it a greater visual impact on me.

Table 4 continued

Construct	Code	Questionnaire Item
Instrumental	INSTR1	This personalization feature makes the web interaction more productive for me.
	INSTR2	This personalization feature helps me to obtain my goal more efficiently.
	INSTR3	This personalization feature makes it more convenient for me to interact with the site in the long run.
	INSTR4	This personalization feature makes the site more functional for me.
	INSTR5	Personalizing the site helps me locating the right information/product/service I need.
Social	SOCIA1	Personalizing the site helps to fulfill my needs for socialization and communication with others.
	SOCIA2	This personalization feature facilitates my interaction with others.
	SOCIA3	This personalization feature creates a congenial social environment for me.
	SOCIA4	This personalization feature bridges me to communities that are potentially interesting to me.
	SOCIA5	Personalizing the site helps me to stay in touch with people that are important to me.

3. *Data Analysis and Results*

Factor analyses were conducted to assess the reliability, and discriminant and convergent validity of the instrument. We first performed exploratory factor analysis (EFA) on the 15 personalization measurement items, and derived three dimensions of personalization, which were consistent with our proposed conceptual model. Next, confirmatory factor analysis (CFA) was conducted using the 15 personalization measurement items.

As our theory predicted, three components had eigenvalues greater than 1. The three columns in the middle of Table-5 present the factor loadings for the three sub-constructs of personalization from the EFA analysis using maximum likelihood extraction method and oblimin rotation method. All 15 items converge well on their corresponding sub-construct, with high loadings on the sub-construct they are intended to measure and low loadings on others (Factor loadings that are less than .5 are not shown in the table). The result shows good evidence for convergent validity. All Cronbach's Alpha are larger than .85, showing good evidence for inter-item reliability.

Table 5 - Construct Loading for WPMI from Exploratory Factor Analysis

Scale Items	Latent Construct Loading			Reliability Coefficient
	Instrumental	Social	Architectural	
INSTR1	.815			.873
INSTR2	.827			
INSTR3	.722			
INSTR4	.783			
INSTR5	.62			
SOCIA1		.886		.903
SOCIA2		.899		
SOCIA3		.873		
SOCIA4		.624		
SOCIA5		.747		
ARCH1			.799	
ARCH2			.823	.902
ARCH3			.852	
ARCH4			.881	
ARCH5			.644	
Eigenvalues	2.17	3.25	5.23	

Table-6 presents the factor correlations and average variances extracted (AVE) for the three personalization sub-constructs from the EFA analysis. The diagonal elements in Table-6 are the square root of AVE, and the off-diagonal elements are factor correlations. The four diagonal values are all larger than .5 and also larger than the correlation coefficients of their corresponding factors with other factors, which suggests that the measures have appropriate discriminant validity across all six experiment sites (Gefen et al. 2000). The low factor correlations between pair-wise sub-scales of personalization also indicate the distinctive dimensionality of the three theoretical ideal types within the personalization construct.

Table 6 - Factor Correlation and AVE for the Three Sub-Scales of WPMI

	Instrumental	Social	Architectural
Instrumental	.75		
Social	.272	.81	
Architectural	.352	.105	.80

A confirmatory factor analysis was performed using maximum likelihood estimation in order to assess the validity of the WPMI. The 15 items yielded a three-factor model. Multiple fit indices were used for evaluating the model. The goodness-of-fit (GFI) was .9 and the adjusted goodness-of-fit (AGFI) was .87. The data of the present study yielded a comparative fit index (CFI) of .95, a normed fit index (NFI) of .92 and a non-normed-fit index (NNFI) of .93, and a root mean square error of approximation (RMSEA) of .0761. The χ^2/df ratio was 2.78, as shown in Table-7. In general, values of .8 or above for GFI and AGFI, higher than .9 for the NFI < CFI, NNFI, less than or equal to .08 for RMSEA are considered a good fit (Kelloway 1998; Kline 1998). As a result, the three-factor measurement model fits the data well.

Table 7 - Fit Indices for CFA from Study One

χ^2	df	χ^2/df	GFI	AGFI	NFI	NNFI	CFI	RMSEA
241.485	87	2.78	0.9036	0.867	0.918	0.934	0.9456	0.0761

The purpose of Study One was to develop and validate measurement scales for personalization by identifying three distinctive personalization archetypes. This effort yielded promising results in several respects. The WPMI for measuring personalization strategies were developed based on the definitions of personalization archetypes. The WPMI exhibited adequate psychometric properties in terms of reliability, convergent and discriminant validity. The study empirically supported our theoretical model of the structure of personalization construct, which consists of three distinct dimensions: architectural, instrumental, and social. Once the reliability and validity of the measurement instrument was established, the next step is to use the WPMI to investigate the relationship between Web personalization strategies, user experience and the corresponding user motivational states.

CHAPTER IV

STUDY TWO: A STUDY OF PERSONALIZATION AND POSITIVE USER EXPERIENCE

Synthesizing and applying findings and theories from personalization literature, user experience literature and psychological theories of motivation, we propose a set of hypotheses to investigate the relationship between Web personalization strategies, positive user experience and the corresponding user motivational states. The rest of this chapter develops the set of hypotheses, describing the variables of Web personalization strategy (instrumental, architectural, social), positive user experience (perceived enjoyment), and motivational states (telic state and paratelic state), as well as how these variables are related to each other.

1. Relating Personalization to Enjoyment

By definition personalization systems are designed to allow themselves to be tailored to individual needs and hence to be more relevant to individual users. Compared to mass produced goods and standardized services, personalized products, services and information of high relevance to users yields a satisfying user experience by an emphasis on one-to-one contact (Peppers et al. 1993). Regardless of the types of personalization strategy employed, if carried out properly, the result of such effort is expected to be happier users and more loyal customers. In this section, we analyze how each distinct Web personalization strategy contributes to positive user experience.

In Marxist philosophy, a human being is defined as the creature capable of creating and using tools. Human history is a history of creation and use of increasingly powerful tools and machines. Instrumental personalization attempts to fulfill such human needs by providing, enabling and delivering useful, usable, user-friendly tools. The goal of instrumental personalization correlates with that of traditional systems design, i.e. to increase the effective and efficiency of the system, hence to increase usefulness and ease

of use to the users, the two critical elements that contribute to positive user experience, according to the theory of technology of acceptance (Davis et al. 1992; Venkatesh 1999; Venkatesh 2000; Venkatesh et al. 2003). Websites designed with this strategy are designed to enhance productivity, whether in the form of one-click ordering (e.g. www.amazon.com) or wireless just-in-time personalized information service such as stock, weather and local traffic information (e.g. DoCoMo). The utility function of such Web strategy is to maximize convenience and efficiency.

Design guidelines for this type of task-oriented Web applications are similar to those for designing tools, such as the principles advanced by Norman for designing everyday things (Norman 1988), where content, functionality and usability are emphasized. Key usability issues for productivity applications are ease of use, clarity, consistency, freedom from ambiguity, and error. The aspect of ease of use includes both the use of the application itself and the setup and configuration to make personalized features functional. Consistency helps users better orient themselves to the site and alleviates cognitive effort. For example, in Amazon, the shopping cart is always on the upper-right hand corner, browsing history is always displayed on the left column, and recommendation list always appears after the user places an item in the shopping cart. In sum, instrumental personalization contributes to positive user experience by making the website more personally relevant, hence useful and easy to use. Formally we have:

H1a: The instrumental personalization will positively influence the perceived enjoyment of the website.

While instrumental personalization is generally utilitarian-oriented, architectural and social personalization are more hedonically-oriented. The latter two are used primarily for creating an attractive web environment, a comfortable, interactive social network, and a sense of psychological and social well-being. The design focus centers on the entertainment aspect of the user experience. Hence, a balance between form and function, as well as the meaning of the using the system is emphasized.

Research in architecture has shown that personalized design that incorporates the needs and requirements of users has significantly improved the quality and function of the built environment(Altman 1975; Becker 1977). Theories of behavior-environment congruence advance the premise that manipulating physical space provides an effective means for influencing the cognitive, affective and social-cultural aspects of residents. (Bonnes et al. 1995; Rose 2001). Websites designed following the architectural personalization design philosophy seek to honor individual experience sui generis, and therefore positively influences users' feelings of enjoyment when using the website. Hence formally we have:

H1b: The architectural personalization strategy will positively influence the perceived enjoyment of the website.

The social personalization strategy personalizes one's world by creating a unique web of social relationships. The hedonic value of social relationship is grounded in human motivation to be altruistic, interconnected, and seeking acceptance, attachment and care in interpersonal relationships (Argyle 1996; Argyle et al. 1990). Positive social relationships give individuals a sense of well being and a feeling of comfort by creating support and a sense that they are not alone and are valued. Therefore, building a personalized network of social relationships is a self-fulfilling emotional experience by satisfying the desire for social interaction, communication, and affiliation with others having similar interests or goals. This suggests the following:

H1c: The social personalization strategy will positively influence the perceived enjoyment of the website.

2. *Relating Personalization to Motivational States*

As reviewed earlier, according to reversal theory, two distinct modes, known as motivational states underlie the ways in which enjoyment can be experienced. Both states can be sources of enjoyment, although the nature of the enjoyment is different. In the telic state, enjoyment comes from the anticipation of reaching the goal, whereas in the paratelic state enjoyment is derived from the activity itself and the pleasure and excitement during the process of such activity. The characterizing feature that distinguishes one state from another is the presence of a pre-determined purpose. The telic state is characterized as highly purposeful and goal-oriented, whereas in a paratelic state, there usually exists no pre-determined purpose or self-imposed goal. Furthermore, because of its goal orientation, people engaged in the telic mode tend to be more serious-minded, focused on goal completion whereas the lack of pre-determined goal tends to free people from the concern of the goal itself, leading people to the fun-seeking, playful mode of paratelic state.

In the context of Web personalization, although we expect all strategies to contribute positively to user experience, personalization strategies derived from vastly different philosophies about the motives and purpose for personalization are likely to lend themselves naturally to different motivational states. Instrumental personalization, with its root in the utilitarian use of tools and systems, has the potential to elicit the goal-oriented, purpose-driven mindset in its users. The architectural personalization strategy, with an emphasis on creating delightful, aesthetically appealing digital space through customized design of Web artifacts, has the potential to elicit a sense of beauty and wonder, priming the users into a fun-seeking, exploratory state. The social personalization strategy, grounded in providing social motivation for being connected through the common platform of social network, encompasses both purpose and fun components. The purposeful element is captured in the view of relationship as social capital (Wellman 2002), alluding to the functional and meaningful aspect of social interaction. On the other hand, the high level of interactivity and connectivity during the process of social interaction provides engaging and sustained social satisfaction and fun.

This type of highly engaging and sustainable fun can be so overwhelming that the user may easily lose sight of his/her initial purpose/goal. Instant messaging and online group gaming are just a few examples of social activities that can easily induce a paratelic state. Recent studies in leisure activities showed that highly paratelic activities are characterized by a strong social dimension as compared to telic activities (Hills et al. 2000). This even applies to solitary activities such as watching TV, which has a parasocial component to it (Livingstone 1988). This suggests the following:

H2a: The instrumental personalization strategy will positively influence user's telic state

H2b: The architectural personalization strategy will positively influence user's paratelic state

H2c: The social personalization strategy will positively influence user's paratelic state

By formulating the hypothesis so that each personalization strategy corresponds to one motivational state, we do not discount the possibility that a given strategy will also elicit the other motivational state that is not being hypothesized. For example, by explicitly arguing that instrumental personalization will influence telic state, we are not implying that it will not induce a paratelic state. Likewise, we are not arguing that social personalization will not lead to a telic state. In the Stimulus-Organism-Response paradigm, any response is contingent upon the interaction between the stimuli and the organism (Mehrabian et al. 1974). Here we are only examining the potential or likelihood of certain Web personalization strategy to elicit and sustain the user's propensity for a certain type of motivational state. Whether such a priming effect actually occurs depends on the user's reception. Hence we expect to see a significant effect on the linkage we have hypothesized, but nonsignificant effects on those we have not proposed.

3. Experimental Design and Procedure

This set of hypotheses is tested on two data sets collected for two independent studies. The first data set was collected in Study One, described in Chapter III. The second data set was collected specifically for this study. It ran on a separate sample

group and used a different method of delivering the stimulus material. Instead of having subjects watching movie clips of use of personalization features as in Study One, in Study Two, subjects directly interacted with the website and used the personalization features. Using two methods of data collection is useful in cross-testing the results, providing stronger evidence of validity for the research. The same measurement procedures were used in both studies.

For Study Two, a total of 319 undergraduate students (167 male, 152 female) enrolled in an introductory IS course at a major U.S. research university were recruited to participate in the study for the benefit of extra course credit. Each subject was randomly assigned to use personalization features on one commercial website. The experimental session lasted for 30 minutes. To prime participants, we created a use scenario for each website describing the task and context of using the personalization features. Although the step-by-step user interaction with the website was not scripted, users were instructed to interact with specific web pages within the site to perform the tasks. Online user questionnaires were developed using HTML and ASP code to facilitate data collection and to ensure data quality. All 319 data points collected were useable.

4. Experimental Websites and Measurement

The websites used in Study Two were also different from those used in Study One. As part of Study Three (which chronologically came before Study Two, but is reported in the next chapter for logical reasons) we collected data relevant to site selection. In that study a total of 18 commercial websites were evaluated using the WPMI, from which 7 websites that obtained positive z-scores on perceived enjoyment was selected to be used in Study Two. Table-8 summarizes the personalization features subjects were assigned to use for each site.

The measurement in Study Two included 7 constructs that were operationalized with seven-point rating scales (scale values ranging from “strongly disagree” to “strongly agree”) or seven-point semantic differential scales. These included the three sub-

constructs of *personalization* measured by WPMI (15 items), *perceived enjoyment* measured by the instrument developed by Davis (reliability score of .89; 3 items) (Davis 1989), *arousal* measured by adapting the instrument developed by Mehrabian and

Table 8 - Experimental Websites Used in Study Two

Website	Features
MyMSN	Allowing users to customize Web content by selecting 1) desired information to display; 2) change the layout of the webpage by moving modularized content block to desired position; and 3) design Web aesthetics by choosing desired theme and color palate.
Ebay	eBay search engine allows you to build customized, sophisticated search terms by choosing from a list of specified parameters to narrow down search results
Ikea	3-D interactive design tool that helps users design and visualize, loaded with expert advices and design tips.
Nike	Customizing one's own shoes and sporting gears, 3-D interactive design tool helps users design and visualize
Amazon	1) Dynamically creating a browsing history displayed on the left column of the page consisting of hyper links that the user has just visited. 2) Personalized account for easy, one-click check out.
Facebook	Online directory that connects people through social networks at schools.
MySpace	An online community that lets you meet your friends' friends, create a private community, share photos, journals and interests with growing network of mutual friends.

Russell (reliability score of .89; 4 items) (Mehrabian et al. 1974), and *telic and paratelic states* measured by adapting the instrument developed by O'Connell & Calhoun (O'Connell et al. 2001) (reliability score of .83; 8 items).

5. *Data Analysis and Results*

5.1 Construct Validity and Reliability

In Chapter III, we discussed the construct validity and reliability of the WPMI based on the data collected from Study One. In this section, we analyze this issue using the data collected from Study Two. A confirmatory factor analysis (CFA) was performed using maximum likelihood estimation in order to assess the validity of the WPMI along with other constructs that were measured in the same study. These constructs, adapted from previous studies, include perceived enjoyment (Davis 1989), felt arousal (Mehrabian et al. 1974), and telic and paratelic states (O'Connell et al. 2001). The combined 30 items yielded a seven-factor model. Multiple fit indices were used for evaluating the model. The goodness-of-fit (GFI) was .828 and the adjusted goodness-of-fit (AGFI) was .797. The data yielded a comparative fit index (CFI) of .897, a normed fit index (NFI) of .85 and a non-normed-fit index (NNFI) of .89, and a root mean square error of approximation (RMSEA) of .076. The X^2/df ratio was 2.83, as shown in Table-9. In general, values of .8 or above for GFI and AGFI, higher than .9 for the NFI < CFI, NNFI, less than or equal to .08 for RMSEA are considered a good fit (Kelloway 1998; Kline 1998). By this standard, the seven-factor measurement model has a moderate fit. All factor loadings were significant and ranged from .62 to .93. The Cronbach's Alpha of each factor ranged from .94 to .66. Table-10 presents factor loading and item reliability.

Table 9 - Fit Indices for CFA from Study Two

X^2	df	X^2/df	GFI	AGFI	NFI	NNFI	CFI	RMSEA
1044.2	368	2.8375	0.828	0.797	0.85	0.89	0.90	0.076

Table 10 - Factor Loading and Item Reliability from Study Two

Constructs and Their Indicators	Factor Loading	T Value	SE	Cronbach's Alpha
Instrumental				0.9282
Instr1	0.8887	20.04	0.062	
Instr2	0.9139	21.01	0.061	
Instr3	0.8821	19.79	0.061	
Instr4	0.8601	18.99	0.06	
Instr5	0.7104	14.33	0.07	
Architectural				0.9407
Arch1	0.8414	18.98	0.083	
Arch2	0.8601	19.03	0.079	
Arch3	0.8929	20.04	0.071	
Arch4	0.9327	21.83	0.072	
Arch5	0.8413	18.38	0.072	
Social				0.939
Social1	0.905	20.72	0.08	
Social2	0.8993	20.49	0.07	
Social3	0.918	21.24	0.076	
Social4	0.8232	17.77	0.083	
Social5	0.8193	17.63	0.099	
Telic State				0.771
T1	0.7059	12.64	0.065	
T2	0.8727	16.04	0.054	
T3	0.8645	15.82	0.065	
T4	0.6199	11	0.07	
Paratelic State				0.662
PT1	0.6884	10.96	0.08	
PT2	0.6653	7.4	0.089	
PT3	0.6312	10.7	0.08	
PT4	0.704	7.55	0.09	

Table10 continued

Constructs and Their Indicators	Factor Loading	T Value	SE	Cronbach's Alpha
Arousal				0.796
Ar1	0.6391	11.69	0.059	
Ar2	0.6013	11.63	0.059	
Ar3	0.8365	16.38	0.07	
Ar4	0.7915	14.3	0.068	
Enjoyment				0.898
En1	0.9655	22.7	0.054	
En2	0.9053	20.39	0.054	
En3	0.7575	15.66	0.07	

5.2 Test of the Hypotheses

This section discusses the results of the analysis of the experimental factors in both Study One and Study Two. To test for the effects of Web personalization strategies on enjoyment and motivational states, and the effects of motivational states on enjoyment, we estimated the following regression equations: (1) the dependent variable (enjoyment) predicted by the independent variables (instrumental, architectural and social personalization strategies); (2) the dependent variable (telic) predicted by the independent variables (instrumental, architectural and social personalization strategies); (3) the dependent variable (paratelic) predicted by the independent variables (instrumental, architectural and social personalization strategies); (4) the dependent variable (enjoyment) predicted by the independent variables (telic and paratelic states)³; (5) the dependent variable (enjoyment) predicted by the independent variables (instrumental, architectural, social personalization strategies, and telic and paratelic states). The results

³ According to the Reversal Theory, one can only experience telic or paratelic state at any given moment. The two experiences do not happen simultaneously. However, during an extended period of time, people experience reversal between states. In this study, the telic and paratelic state variables are designed to capture subjects' motivational states throughout the entire web interaction session.

of the regression models are presented in Table-11. An immediately noticeable pattern in the results is that, all regression models from Study Three demonstrated greater explanatory power, as indicated by larger R^2 value and Beta coefficients, as compared to Study One. This result is not surprising considering the fact that stimuli were delivered through movie clips in Study One whereas subjects were actually driving the Web interaction in Study Two. Hence the strength of the stimuli was noticeably stronger in Study Two than that in Study One, resulting in more explanatory power of the predictor variables in accounting for the variance in the dependent variables. Next, we discuss the results from each regression model one by one.

The regression model (1) in both Study One and Study Two was significant ($F_{3, 307} = 42.017$, $P < .001$, $R^2 = .293$ in Study One; $F_{3, 318} = 104.174$, $P < .001$, $R^2 = .529$ in Study Two). All predictors of Web personalization strategies are significant at .001-level. In both studies, Beta (instrumental) is smaller than Beta (architectural) and Beta (social), indicating a stronger effect of architectural and social personalization on perceived enjoyment than the effect of instrumental personalization. This result provided evidence in support of H1a, H1b and H1c.

The regression models (2) in both Study One and Study Two were significant ($F_{3, 307} = 14.836$, $P < .001$, $R^2 = .128$ in Study One; $F_{3, 318} = 23.081$, $P < .001$, $R^2 = .18$ in Study Two). Beta(instrumental) = .288 in Study One and .368 in Study Two, both are significant at the .001-level, providing evidence for the significant positive linkage between instrumental personalization and the telic state. H2a is hence supported by both studies. On the contrary, Beta (social) is not significant in both studies, showing no significant linkage between social personalization and the telic state. This result conforms to what we have expected. Beta (architectural) is not significant in Study One, but it is significant at .05-level in Study Two. However, the size of the coefficient is relatively small (Beta (architectural) = .135, $p < .05$). This result suggests that architectural personalization may positively influence the telic state, but that its effect size is small.

Table 11 - Results of Multiple Regressions in Study One and Study Two

Multiple Regression		1		2	
Beta					
D.V.		Enjoyment		Telic State	
		Study One	Study Two	Study One	Study Two
I.V.	Instrumental	0.24***	0.405***	0.288***	0.368***
	Architectural	0.292***	0.438***	0.106	0.135*
	Social	0.238***	0.427***	0.054	0.091
	Telic State				
	Paratelic State				
F value		42.017***	104.174***	14.836***	23.081***
DF		3/307	3/318	3/307	3/318
R Square		0.293	0.529	0.128	0.18

Multiple Regression		3		4	
Beta					
D.V.		Paratelic State		Enjoyment	
		Study One	Study Two	Study One	Study Two
I.V.	Instrumental	0.084	0.068	0.119*	0.34***
	Architectural	0.21***	0.298***	0.238***	0.409***
	Social	0.146*	0.192***	0.182***	0.376***
	Telic State			0.221***	0.141*
	Paratelic State			0.26***	0.238**
F value		16.322***	19.002***	43.936***	143.25***
DF		3/307	3/318	5/307	5/318
R Square		0.139	0.153	0.421	0.641

Note: Clear columns are results from Study One. Grayed columns are results from Study Two.

The regression models (3) in both Study One and Study Two were significant ($F_{3, 307} = 16.322$, $P < .001$, $R^2 = .139$ in Study One; $F_{3, 318} = 19$, $P < .001$, $R^2 = .153$ in Study Two). $\text{Beta}(\text{architectural}) = .21$ in Study One and $.298$ in Study Two, both are significant at .001-level, providing evidence for the significant positive linkage between architectural personalization and the paratelic state. H2b is hence supported by both studies. $\text{Beta}(\text{social}) = .146$ ($P < .05$) in Study One and $.192$ ($P < .001$) in Study Two, providing evidence for the significant positive linkage between social personalization and the paratelic state. H2c is hence supported by both studies.

On the contrary, $\text{Beta}(\text{instrumental})$ is not significant in both studies, showing no significant linkage between instrumental personalization and the paratelic state. This result conforms to what we expected.

Although the results produced evidence in support of the positive influence of both architectural and social personalization strategy on the paratelic state, the small size of the $\text{Beta}(\text{social})$ relative to $\text{Beta}(\text{architectural})$ is not what we had expected. Given evidence from previous studies showing that social satisfaction is a strong and sustainable source of energy for paratelic activities (Hills et al. 2000), the small effect size produced from this research was not consistent with our expectation. We speculate that it may be due to subjects' insufficient exposure to the stimuli. The experimental session only lasted for 30 minutes, which may not be long enough for highly engaging social interactions to take place.

In summary, results from both the Study One and Study Two largely supported the hypotheses about the positive impacts of Web personalization on user experience. Among the three personalization strategies, architectural personalization demonstrated the largest effect size on users' perceived enjoyment, followed by social and instrumental personalization. In addition, the results supported that instrumental personalization is conducive to the telic motivational state, whereas architectural and social personalization is mostly affiliated with users' paratelic state. Between the two motivational states, the paratelic state contributes more than the telic state to the positive user experience. Having

investigated the impact of personalization on user experience, our next question is whether such impact is universal across all users. Is there any individual trait that moderates such a relationship? Specifically, we will look into the role of user values in influencing user's receptivity of personalization. However, before we start on this topic, we will take a detour in the next chapter to investigate the external validity of WPMI by applying this instrument to a wide range of commercial websites.

CHAPTER V

STUDY THREE: BUILDING WEB PERSONALIZATION PROFILES USING WPMI

In Chapter III, we addressed the reliability and construct validity the WPMI. Results of EFA and CFA in both Study One and Study Two produced evidence in support of content validity and reliability of the WPMI. In this chapter, we are engaged in two further investigations. The first tests the external validity of the WPMI by applying the instrument to a broad range of websites. By using cluster analysis, we will establish prototypical personalization profiles for these websites based on the three personalization strategies. Secondly, we investigate the predictive validity of the WPMI by relating personalization profiles to positive user experience, i.e. perceived enjoyment and its associated motivational states.

The rest of the chapter is organized as follows. We first discuss the external validity issue and the process of building personalization profiles. Methodological issues including experiment design, procedure and analysis will be discussed. The second part of the chapter is devoted to testing a set of hypotheses regarding the predictive validity of WPMI.

1. External Validity of the WPMI

1.1 Methodology

To establish external validity, we expect the WPMI to be able to (1) differentiate the three personalization strategies employed WITHIN a given website, i.e. the score that measures the personalization strategy that the website was chosen to represent should be higher than the other two scores of the strategies that the site was not chosen to represent; (2) differentiate BETWEEN a group of websites along the dimensions of the three personalization scores. The first task will be carried out by simply comparing the Z-

scores of the three personalization indices of the WPMI within each of the 18 websites. As each website offers specific personalization features associated with certain personalization strategies, which the subjects will be interacting with, we expect the Z-score of that specific strategy/strategies will be higher than those strategies that are not offered by the site. Cluster analysis will be used to handle the second task, which is to identify homogeneous subgroups among the 18 websites using the three personalization scores as criterion variables. By analyzing the characteristics of clusters, we will gain insight into the common strategy or combinations of personalization strategies that commercial websites have employed. In this way, prototypical Web personalization profiles can be established based on the three personalization strategies using WPMI.

1.2 Experimental Design and Websites

For Study Three, a total of 345 undergraduate students (180 male, 165 female) enrolled in an introductory IS course at a major research university in the U.S. were recruited to participate in the study for the benefit of extra course credit. In the experiment, each subject was randomly assigned to use personalization features on two commercial websites. The assignment was automated by a code of random number generator imbedded in the experiment website. The experimental session lasted for 1 hour. To prime participants, we created use scenarios for each website describing the context and the task of using the personalization features. Online user questionnaires were developed using HTML and ASP code to facilitate data collection and to ensure data quality. All 690 data points collected were useable.

The 18 websites were selected based on a third party web search ranking list – Alexa Web Search (www.alexa.com). Every three months, Alexa posts a list of top 100 sites in many different countries around the world. The traffic rank is based on three months of aggregated historical traffic data from millions of Alexa Toolbar users and is a combined measure of page views and users (reach). Our selection⁴ was based on the list generated in March 2006 for the United States. High volume of traffic is one indication of

⁴ An exception is the Texas A&M University library website. This site was chosen because of its familiarity to the subjects.

popularity of the sites among general public Web users. We further nailed down the 18 websites for their prominent personalization features covered in industry reports or business magazines. For example, MySpace and Facebook appeared in a special report on BusinessWeek (December 12, 2005 issue), Ikea was covered on a special report on BusinessWeek (November 14, 2005 issue), Land's End was used as a case study for mass customization (Ives et al. 2003), the Dell website was the winner of Interactive Media Awards, E-commerce class for 2005 (www.interactivemediaawards.com). Table-12 summarizes the features selected to be used in this experiment for each website, and the key personalization strategies of each website based on our interpretive analysis.

Table 12 - Experiment Websites Used in Study Three

Website Name	Website Feature	Key Personalization Strategies
MyMSN	Allowing users to customize Web content by selecting desired information to display; 2) change the layout of the web page by moving modularized content block to desired position; and 3) design Web aesthetics by choosing desired theme and color palate.	Instrumental, Architectural
Land's End	Allowing users to 1) build a customizable 3-D virtual model configured in one's own body parameters; 2) examine instantaneous fitting effect by trying clothes on the model; and 3) view clothes from different angles.	Architectural
Ikea	3-D interactive design tool that helps users design and visualize, loaded with expert advices and design tips.	Architectural
Nike	Customizing one's own shoes and sporting gears, 3-D interactive design tool helps users design and visualize	Architectural

Table 12 continued

Website Name	Website Feature	Key Personalization Strategies
Amazon	1) Dynamically creating a browsing history displayed on the left column of the page consisting of hyper links that the user has just visited. 2) Personalized account for easy check-out	Instrumental
Facebook	Online directory that connects people through social networks at schools.	Social
MySpace	An online community that lets you meet your friends' friends, create a private community, share photos, journals and interests with growing network of mutual friends	Social
Amazon Purchase Circle	Finding who is reading what. Search for best selling titles of communities of interest to you	Social
Blogger	Helping people have their own voice on the web and organizing the world's information from the personal perspective.	Social
Dell	The 'customize it' feature allows users to configure any type of systems ranging from desktop and laptop to small electronic devices.	Instrumental
Disney	Using "something for everyone" feature to make vacation arrangement, see activities and places of interest that are tailored to specific age groups	Instrumental
Ebay	eBay search engine allows you to build customized, sophisticated search terms by choosing from a list of specified parameters to narrow down search results	Instrumental
Flickr	Online photo management and sharing tool that reply on social tagging to manage pictures and communities	Social

Table 12 continued

Website Name	Website Feature	Key Personalization Strategies
Messenger	1) Text messaging, video chatting, PC-to-PC calling, PC-to-Mobile messaging, 2) customize ring tone and graphic icon	Social, Architectural
Sony Headphone	3-D graphic design that allows users to explore this high quality headphone by selecting interactive features, functions, use situations	Architectural
Sony Walkman	<i>Walkman Advisor Tool</i> feature help users to make sound choice about their purchase by providing prompting users for a series of preference questions	Instrumental
Texas A&M University Library	1) Personal book records allowing users to view and renew borrowed items online. 2) “My book bag” allowing users to save a reference to particular items of interest. 3) Using “deliverEdocs” function to arrange book loan from other libraries	Instrumental
USPS	Use NetPost™ Services online to create your own postcard, greeting card or photo card online and have USPS sent it out for you	Instrumental, Social

1.3 Data Analysis and Results

The first criteria for testing the external validity of the WPMI is that it should be able to differentiate the three personalization strategies employed WITHIN a given website, i.e. the score that measures the personalization strategy that the website was chosen to represent should be higher than the other two scores of the strategies that the site was not chosen to represent. Table-13 summarizes the mean and median of all three

personalization scores for each website. Comparing the three scores on each row of the table, we found that the highest scores did correspond to the type of personalization strategy that was projected in the prior analysis, as shown in Table-12, thus we conclude that all websites satisfy this criterion.

Table 13 - Descriptive Statistics of 18 Websites

Treatment		Zscore(instr)	Zscore(arch)	Zscore(social)
Amazon	Mean	0.067	-0.302	-0.447
	Median	0.147	-0.26	-0.463
Amazon Purchase Circle	Mean	-0.478	-0.419	-0.216
	Median	-0.571	-0.327	-0.285
Blogger	Mean	-0.552	0.347	0.511
	Median	-0.391	0.426	0.606
Dell	Mean	-0.244	-0.482	-0.512
	Median	0.057	-0.394	-0.345
Disney	Mean	0.321	-0.01	-0.17
	Median	0.506	0.339	-0.048
Ebay	Mean	0.326	-0.344	-0.16
	Median	0.506	-0.26	-0.048
Facebook	Mean	0.214	-0.353	1.19
	Median	0.326	-0.46	1.317
Flickr	Mean	-0.33	0.202	0.47
	Median	-0.301	0.206	0.307
Ikea	Mean	0.480	0.568	-0.654
	Median	0.686	0.74	-0.523
Land's End	Mean	0.106	0.278	-0.604
	Median	0.147	0.473	-0.642

Table 13 continued

Treatment		Zscore(instr)	Zscore(arch)	Zscore(social)
	Median	-0.391	0.339	0.901
MyMSN	Mean	0.004	0.694	0.127
	Median	0.147	0.74	0.189
MySpace	Mean	-0.172	0.736	0.944
	Median	-0.032	1.007	1.02
Nike	Mean	0.397	0.481	-0.554
	Median	0.506	0.673	-0.404
Sony Headphone	Mean	-0.557	0.147	-0.613
	Median	-0.391	0.339	-0.404
Sony Walkman	Mean	-0.074	-0.538	-0.676
	Median	-0.032	-0.527	-0.642
Texas A&M	Mean	-0.019	-0.693	-0.523
University Library				
	Median	0.147	-0.46	-0.404
USPS	Mean	-0.018	-0.081	0.515
	Median	-0.032	-0.060	0.664

To allow more detailed examination, cluster analysis was performed to identify homogenous subgroups among the 18 websites using the three personalization scores of WPMI as predictor variables. Two steps were involved in cluster analysis. First, Website means for each personalization variable were obtained for each of the 18 websites, averaged over all subjects. The website means of the three predictor variables in the form of Z-scores were subjected to Hierarchical clustering to determine the optimal number of clusters that fit the data. The 5-cluster solution provided by the Ward method gave an intuitively compelling grouping of the websites into reasonably sized clusters. After determining the number of clusters, in the second step, K-means clustering was applied to

assign each case to the K-clusters. Cluster membership⁵, cluster means⁶ and the Pearson correlations between enjoyment and each predictor variable are reported in Table-14.

Table 14 - Cluster Characteristics and Correlations with Enjoyment within Clusters

Statistics	Enjoyment	Instrumental	Architectural	Social
<i>Cluster 1 (high in all three personalization strategies)</i>				
<i>Websites: MyMSN, Facebook</i>				
<i>N (subject size)=147</i>				
Cluster mean	.7739	.66669	.76936	1.2159
Pearson Correlation		.217**	.379***	.435***
<i>Cluster 2 (high in instrumental and architectural personalization strategies; low in social)</i>				
<i>Websites: Ikea, Nike, Land's End, Disney, Sony Headphone</i>				
<i>N (subject size)=160</i>				
Cluster mean	.103	.60539	.73113	-.47585
Pearson Correlation		.277***	.432***	.159
<i>Cluster 3 (low in all three personalization strategies)</i>				
<i>Website: None⁷</i>				
<i>N (subject size) =47</i>				
Cluster mean	-1.18	-2.33743	-1.19632	-.92257
Pearson Correlation		.13	-.018	.185

⁵ Cluster membership for each website was determined by the cluster that has the highest frequency over all cases for that site.

⁶ Cluster means were computed using SPSS K-means clustering procedure.

⁷ Because cluster membership was determined by the cluster that has the highest frequency over all cases of subjects' rating for that site, it is possible, as it is in the case of Cluster 3, that an existing cluster was not assigned any website even though some subjects did rate this website that fits into this cluster profile. The zero membership of Cluster 3 is probably due to the fact that all websites in the study were selected from the good rating sites. We believe that in the entire population of the Web, there must be sites that fit into this category, thus we keep this cluster in our analysis.

Table 14 continued

Statistics	Enjoyment	Instrumental	Architectural	Social
<i>Cluster 4 (high in instrumental only; low in architectural and social personalization strategies)</i>				
<i>Websites: Amazon, Ebay, Dell, TAMU Library, Sony Walkman</i>				
<i>N (subject size)=116</i>				
Cluster mean	-.36	.23244	-1.26959	-.17119
Pearson Correlation		.431***	.173	.164
<i>Cluster 5 (high in social only; low in instrumental and architectural personalization strategies)</i>				
<i>Website: MySpace, Amazon Circle of Friends, Blogger, Flickr, USPS</i>				
<i>N (subject size)=223</i>				
Cluster mean	-.1479	-.50211	-.17119	.35125
Pearson Correlation		-.187**	.076	.385***

Cluster 1 is characterized as scoring high in all three personalization strategies. It is the only cluster of the five that has all positive cluster mean on the predictor variables. The cluster mean of perceived enjoyment is also the highest among all five clusters. Two websites, namely, MyMSN and Facebook belong to this cluster. Both websites had positive mean Z-scores of perceived enjoyment. Cluster 2 is characterized as scoring high in both instrumental and architectural personalization strategies, yet low in social. It contains five websites: Ikea, Nike, Land's End, Disney, Sony Headphone. Among the five websites, Ikea and Nike had positive mean Z-scores of perceived enjoyment. Cluster 3 is characterized as scoring low in all three personalization strategies. It is the only cluster of the five that has all negative cluster means on the predictor variables. The cluster mean of perceived enjoyment is also the lowest among all five clusters. Although 47 cases were assigned to this cluster by the K-means procedure, none of the 18 websites had the highest frequency of assignment to this cluster, hence no website belong to this cluster. Cluster 4 is characterized as scoring high in instrumental only, but low in both architectural and social personalization strategies. The following websites belong to this

cluster: Amazon, Ebay, Dell, TAMU Library, Sony Walkman. Among the five websites, Amazon and Ebay had positive mean Z-scores of perceived enjoyment. Cluster 5 is characterized as scoring high in social only, but low in both instrumental and architectural personalization strategies. The following websites belong to Cluster 5: MySpace, Amazon Circle of Friends, Blogger, Flickr, USPS. Among them, only MySpace had positive mean Z-score of perceived enjoyment.

2. *Predictive Validity of WPMI*

After building such prototypical personalization profiles, our next research question is – What do these personalization profiles mean in terms of positive user experience? By asking such a question, we are concerned with the predictive validity⁸ of the WPMI. In another words, we are interested in whether positive user experience, i.e. perceived enjoyment and its associated motivational states can be reliably predicted by knowing the strategy/strategies a website employs.

2.1 Predicting Perceived Enjoyment

In the previous section, we derived five prototypical profiles of websites based on different combinations of personalization strategies employed. To further examine whether the clustering solution can reasonably predict perceived enjoyment, a set of hypotheses was developed based on the knowledge gained in the studies reported in Chapter IV. Recall that in Chapter IV, H1a, H1b and H1c, hypothesizing respectively the positive effect of instrumental, architectural and social personalization on perceived enjoyment were supported by the results of Study One and Study Three. Based on the previous evidence, we expect to see Cluster 1, which employs all three personalization strategies, receiving the highest perceived enjoyment ratings of all 5 clusters. The same line of thinking also leads us to hypothesize that Cluster 3, which is perceived as low in all three personalization strategies by the subjects, has the lowest perceived enjoyment of all 5 clusters. Cluster 2 which employs both instrumental and architectural

⁸ Predictive validity is also known as criterion-related validity (Kerlinger 1986, p419).

personalization should outperform Cluster 4 and Cluster 5 which only employs one personalization strategy. Formally, we have the following hypotheses:

H3a: Among all five clusters, Cluster 1 (websites high on all three personalization scores) has the highest mean perceived enjoyment.

H3b: Among all five clusters, Cluster 3 (websites low on all three personalization scores) has the lowest mean perceived enjoyment.

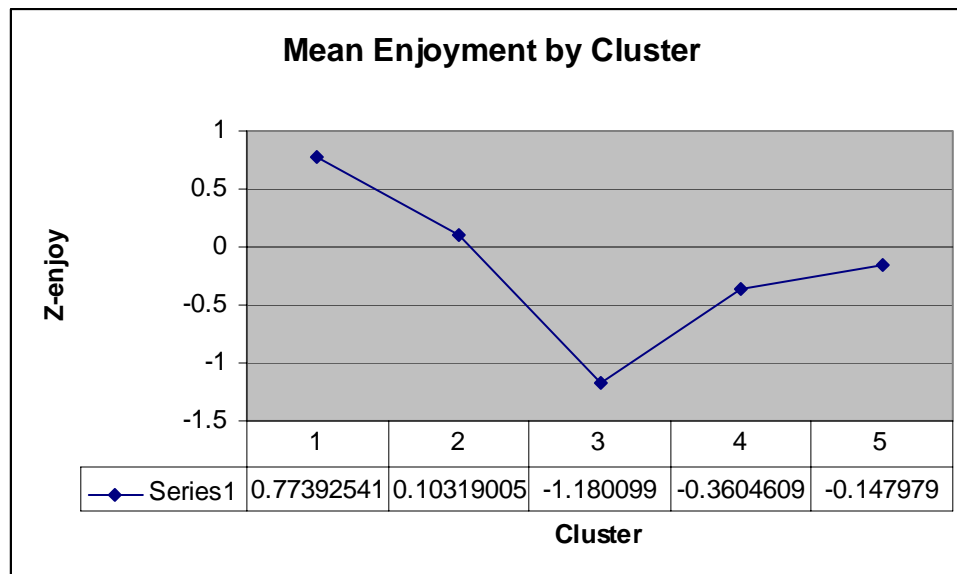
H3c: Cluster 2 (websites high on instrumental and architectural but low on social) has higher mean perceived enjoyment than Cluster 4 (websites high on instrumental only).

H3d: Cluster 2 (websites high on instrumental and architectural but low on social) has higher mean perceived enjoyment than Cluster 5 (websites high on social only).

A one-way ANOVA with post-hoc tests was performed using perceived enjoyment as the dependent variable and the clustering membership as the grouping factor. The result (summarized in Table-15) was significant ($F_{4,692} = 58.292$, $P < .001$). A follow-up post-hoc test using Tukey's HSD yielded ten significant pairs of comparisons. As shown in Table-15, the mean differences in perceived enjoyment between Cluster 1 and all others are all significant, with Cluster 1 having higher enjoyment ratings than all other clusters. Hence H3a is supported. In the opposite direction, all pairs of comparison with Cluster 3 are significant, with Cluster 3 lower than all other clusters. Hence H3b is supported. Cluster 2, which is high in both architectural and instrumental personalization strategies, is significantly better than both Cluster 4, which is high in instrumental only and Cluster 5, which is high in social only. Hence both H3c and H3d are supported. The difference between Cluster 4 and Cluster 5 is not significant. Figure-1 shows the cluster mean of perceived enjoyment of each cluster.

Table 15 - Post-Hoc Comparison of Perceived Enjoyment by Clusters

Cluster (i)	Cluster (j)	Mean		
		Difference (i-j)	Std. Error	Sig
1	2	0.671***	0.099	0.000
	3	1.954***	0.145	0.000
	4	1.134***	0.108	0.000
	5	0.922***	0.092	0.000
2	3	1.283***	0.144	0.000
	4	0.464***	0.106	0.000
	5	0.251*	0.090	0.042
3	4	-0.820***	0.150	0.000
	5	-1.032***	0.139	0.000
4	5	-0.212	0.099	0.204

**Figure 1 - Mean Score of Perceived Enjoyment by Clusters**

2.2 Relating Web Personalization Profiles to User Motivational States

In the previous section, we examined the predictive ability of WPMI by testing whether perceived enjoyment can be predicted by knowing the personalization cluster membership. In this section, we will take a reversed approach by asking whether we can predict what personalization strategies a website employs through the motivational states in which the website users are in. For this investigation, we will use the data collected from Study Three (Details about the experiment procedures, websites and measurement of Study Three are discussed in Chapter IV).

In Experiment Two, 319 subjects were recruited to use personalization features on one of seven websites. These 7 websites were selected from the 18 websites in Study Three because of their positive Z-score of perceived enjoyment. In Study Two, data were collected for each subject on the WPMI along with the variables measuring subject's perceived enjoyment and motivational states (telic score and paratelic score). Given that a person can reverse between the two motivational states during a period of time, according to RT, we foresee that subjects will experience full ranges of reversal during the entire session of interacting with the experiment websites. The two motivational states variables yield a total of four possible combinations of user motivational states: (1) Group 1 consists of subjects who had not experienced either the telic or the paratelic state; (2) Group 2 consists of subjects who had experienced the *telic* state only; (3) Group 3 consists of subjects who had experienced the *paratelic* state only; (4) Group 4 consists of subjects who had experienced *both* the telic and the paratelic state.

Recall that in Chapter IV, hypotheses H2a hypothesized the positive effect of instrumental personalization on the telic state, and H2b and H2c, hypothesized respectively the positive effect of architectural and social personalization on the paratelic state. All three hypotheses were supported by the results of Study One and Study Three. Based on the previous evidence, we have the following hypotheses:

H4a: Users in the *telic* state and *both* states will have higher *instrumental* personalization scores than users in the *paratelic* state or *neither* state.

H4b: Users in the *paratelic* state and *both* state will have higher *architectural* personalization scores than users in the *telic* state or *neither* state.

H4c: Users in the *paratelic* state and *both* state will have higher *relational* personalization scores than users in the *telic* state or *neither* state.

Recall that in Chapter IV, we argued that the positive effect of the *telic* state and the *paratelic* state on user's perceived enjoyment. Based on the previous evidence, we have the following hypotheses:

H5a: Users in both states will have the highest score of perceived enjoyment.

H5b: Users in neither state will have the lowest score of perceived enjoyment.

To test the above hypotheses H5 series and H6 series, ANOVA using the four motivational states as grouping factor, with a series of planned contrast testing were performed. Contrast 1 using instrumental personalization score as the dependent variable (coefficient -1, 1, -1, 1, representing Group 1, 2, 3, and 4, respectively), is developed to test H4a. Contrast 2 using architectural personalization score as the dependent variable (coefficient -1, -1, 1, 1, representing Group 1, 2, 3, and 4, respectively) is developed to test H4b. Contrast 3 using social personalization score as the dependent variable (coefficient -1, -1, 1, 1, representing Group 1, 2, 3, and 4, respectively) is developed to test H4c. Contrast 4 using the perceived enjoyment score as the dependent variable (coefficient -2, -1, -1, 2, representing Group 1, 2, 3, and 4, respectively) is developed to test H5a and H5b. All contrasts were significant at .001-level, supporting hypotheses H4a through H5b. Figures-2-5 show the mean score of instrumental, architectural, social personalization and the perceived enjoyment for each group of user motivational states.

Table 16 - Results of Planned Contrasts of User Motivational States on Perceived Enjoyment and Three personalization Strategies

Planned Contrast	Contrast 1				Contrast 2			
Dependent Variable	Instrumental Personalization score				Architectural Personalization score			
User State Groups	1	2	3	4	1	2	3	4
Contrast Coefficient	-1	1	-1	1	-1	-1	1	1
Contrast Estimate	0.913834226				0.584105113			
Std. Error	0.212499004				0.221672561			
Sig.	<.001***				.009**			

Planned Contrast	Contrast 3				Contrast 4			
Dependent Variable	Relational Personalization score				Perceived Enjoyment			
User State Groups	1	2	3	4	1	2	3	4
Contrast Coefficient	-1	-1	1	1	-2	-1	1	2
Contrast Estimate	0.7530347				1.8923624			
Std. Error	0.22080532				0.33097958			
Sig.	.001***				<.001***			

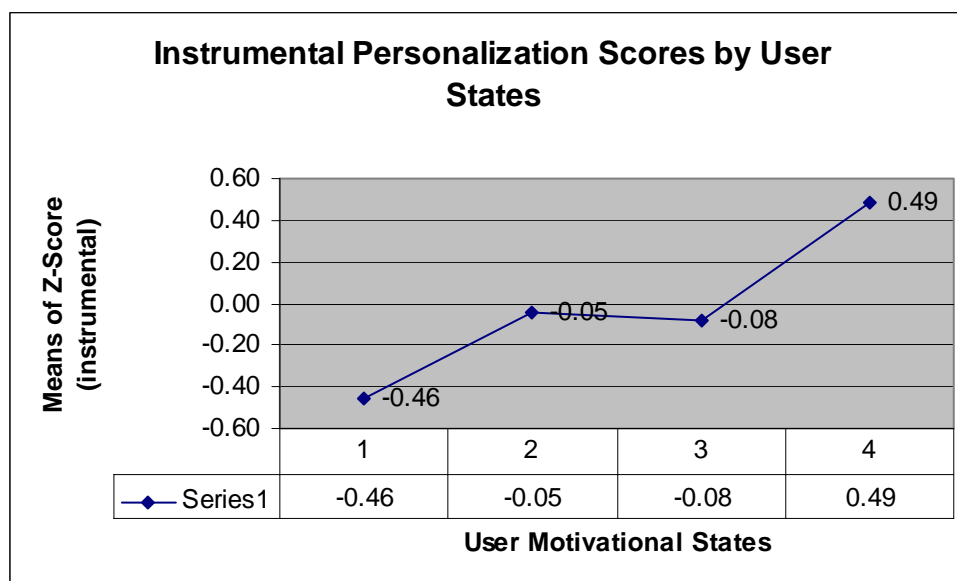


Figure 2 – Instrumental personalization Scores by User States

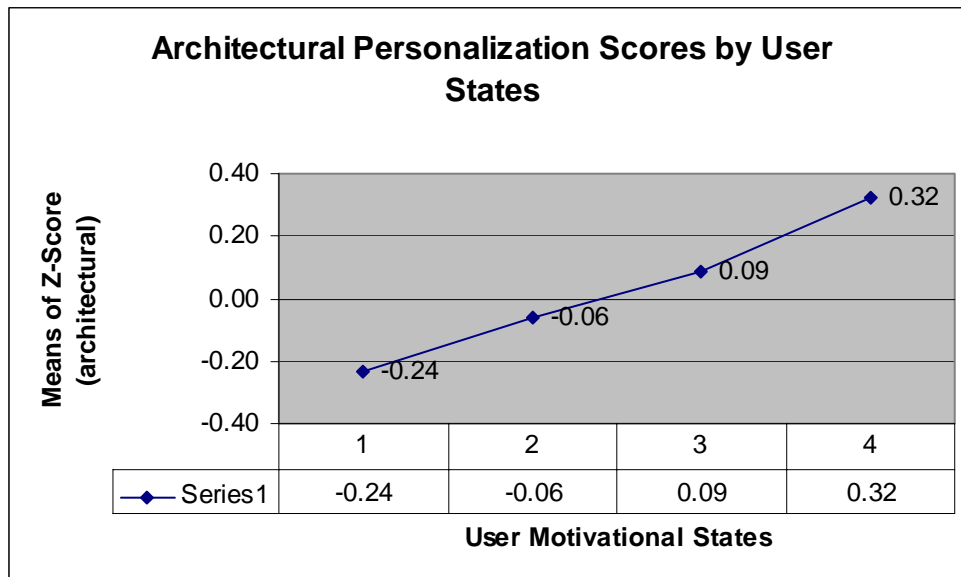


Figure 3 – Architectural personalization Scores by User States

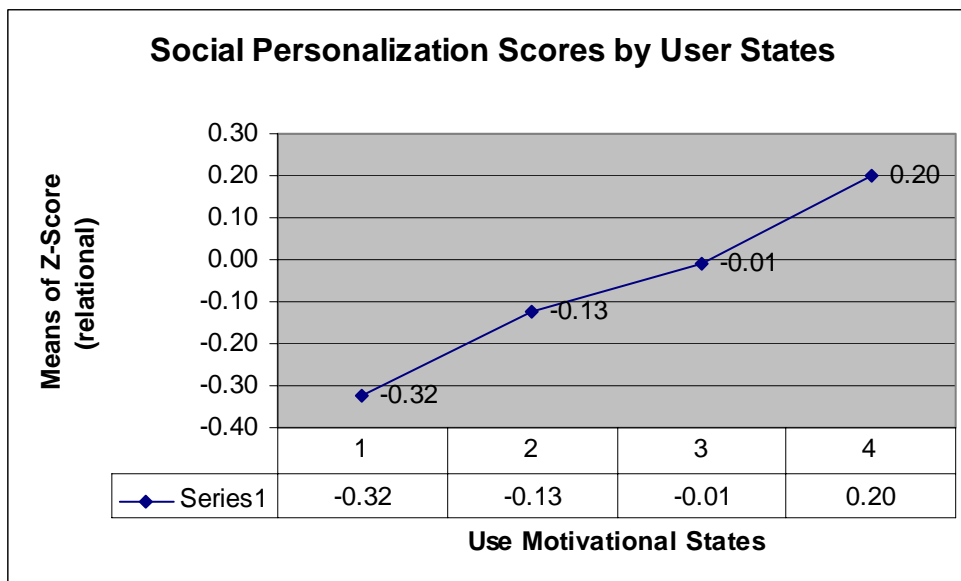


Figure 4 – Social personalization Scores by User States

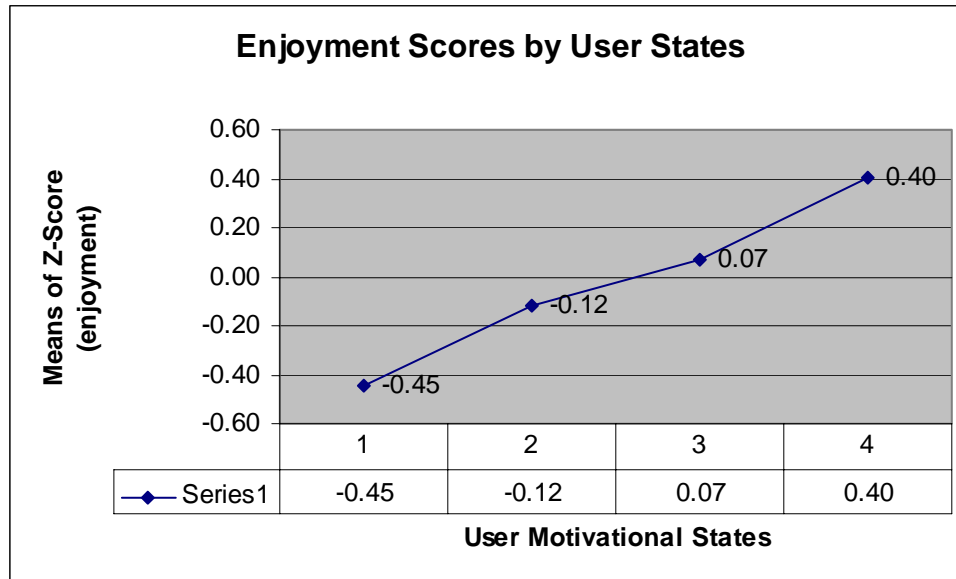


Figure 5 – Enjoyment Scores by User States

In summary, the results of Study Three evidenced external validity of WPMI by differentiating the three personalization scores WITHIN a website and by differentiating BETWEEN a group of websites along the dimensions of the three personalization strategies. Five distinctive clusters were identified among 18 websites to represent prototypical Web personalization profiles. These profiles were in turn used to predict user's perceived enjoyment and motivational states. All hypotheses were supported. In the next chapter, we will examine the role of user values in structuring user's receptivity to Web personalization strategies.

CHAPTER VI

WEB PERSONALIZATION AND USER VALUES

1. User Values Salient to the Three Personalization Strategies

In Chapters IV and V, we were primarily engaged in investigating the differential effect of Web personalization strategies on the user's positive experience and its associated motivational states. At that stage, we did not concern ourselves with individual effects, which extant literature had found supportive evidence for in the broad context of human-computer interaction. For example, individual traits such as autotelic personality have been found to be positively related to user's tendency for flow experience (Agarwal et al. 2000; Csikszentmihalyi 1990). An individual's level of perceived behavior control has been found to be significantly related to the individual's sense of autonomy, perceived ease of use, which ultimately influence perceived enjoyment (Venkatesh 2000; Venkatesh et al. 2003). User-artifact interaction has been recognized as adding an important layer of complexity to research on HCI (Finneran et al. 2003). Because Web users assume an active role in perceiving, interpreting, and evaluating websites, individual effect is important to investigate. In particular, the set of values that a user brings with him/her when interacting with the website will greatly influence subsequent experiences. Hence the effect of Web personalization will not be the same across all users, but should be moderated by the individual user's values. In this Chapter, we investigate moderating effect of user values on the experience of using Web personalization.

As noted in Chapter II, Schwartz's value typology is defined by its underlying needs, conscious goals and motivational concern (Schwartz 1992). On the other hand, personalization ideal types are defined in terms of the motivation they supply for personalization, the goals and means of personalization. Because both typologies are motivation-based, user values can be used as a reliable reference to infer one's subjective experience when interacting with Web personalization. Nevertheless, we do not expect a one-to-one mapping relationship between these two typologies because the value

typology pertains to a much wider scope of life than does the personalization typology. The latter only delineates needs and goals in the context of computer-mediated communication, whether in the form of human-computer interaction or computer-mediated interpersonal communication. Hence salient value types that can be used as reliable predictors of preferences for personalization types are expected to be a subset of the entire set of values defined in Schwartz's value typology. Next we will detail each of the value types and discuss how they relate to personalization types.

First, the *achievement* value reflects a desire for personal success through demonstrating competence according to social standards. People who attach high importance to achievement have a strong desire for rational thinking, personal success and goal accomplishment. Instrumental personalization with an emphasis on efficiency and productivity seems to well suit people's needs for a sense of accomplishment. Second, the *stimulation* value derives from the organismic need for variety and stimulation in order to maintain an optimal level of activation. People who attach high importance to stimulation tend to pursue aesthetic beauty, stimulation, excitement and novelty. Architectural personalization, with an emphasis on constructing pleasant online space, vivid and interactive Web presentation, and unique user experience, suits people's needs for variety and novelty. Third, *benevolence* refers to one's concern for the welfare of all people in all settings. Benevolence derives from the need for positive interactions in order to promote the flourishing of groups and relationships. People who attach high importance to benevolence value social welfare, interpersonal relationship and harmony with others. Social personalization, with an emphasis on building the social capital of networking, fulfills people's needs for communication and socialization.

2. *A Contingency Approach to Integrating User Values into Web Personalization*

In this section, we develop a set of hypotheses in an attempt to investigate the moderating effect of user values on their experience in using Web personalization. When developing the hypothesis, we are aware of the fact that an individual may subscribe to multiple values. For example, it is quite likely that a person could value both achievement

and stimulation. According to Schwartz's research, people may attach high importance to multiple values that are theoretically on opposite dimensions, e.g. achievement and benevolence (Schwartz 1992). Therefore, it would be overly simplistic to try to establish a one-to-one correspondence between certain personalization strategies and certain value types. However, it is intuitive that, for example, people with high value for stimulation, aesthetics and beauty will probably have a more satisfying experience on a website that employs the architectural personalization strategy than those who do not appreciate variety, aesthetics and beauty as much. Hence, we would expect that personalization strategies would not work their "magic" for all, but rather would work best for those whose values and needs match a particular type of personalization. The ultimate user experience of Web personalization is contingent upon the match between the user's values and the Web personalization strategy that fulfills those values. When such match is found, user experience will be more positive. Absence of such match will lead to a less satisfying experience.

To frame this contingency logic in measurable and testable terms, we will use difference score. We believe that there will be significant difference in positive user experience and its associated motivational states between people with different values. Such difference, however, does not exhibit universally across different Web personalization strategies. The difference occurs only in situations where there is a match between the user's value and the personalization strategy which fulfills that value. In other words, the user's values moderate the relationship between Web personalization strategy and the user's experience. Integrating these ideas and the evidence gathered in Chapter IV on the effect of personalization strategies on positive user experience and its associated motivational states, we arrive at the following set of hypotheses:

H6a: The difference in perceived enjoyment for subjects with *low achievement value* and subjects with *high achievement value* is largest for websites that employ *instrumental* personalization.

H6b: The difference in *telic state* score for subjects with low achievement value and subjects with high achievement value is largest for websites that employ instrumental personalization.

H7a: The difference in perceived enjoyment for subjects with *low stimulation value* and subjects with *high stimulation value* is largest for websites that employ *architectural* personalization.

H7b: The difference in *paratelic* score for subjects with low stimulation value and subjects with high stimulation value is largest for websites that employ architectural personalization.

H8a: The difference in perceived enjoyment for subjects with *low benevolence value* and subjects with *high benevolence value* is largest for websites that employ *social* personalization.

H8b: The difference in *paratelic score* for subjects with low benevolence value and subjects with high benevolence value is largest for websites that employ social personalization.

In testing these hypotheses, we are not so much interested in having the subjects indicate their preferences for Web personalization, as in previous studies (Lam et al. 2004), for the reason that one's own stated preference is not a reliable surrogate for the actual experience one has interacting with the website. Instead, we collected data on user's actual experience and motivational states as elicited by interacting with personalization websites.

3. *Experimental Design and Measurement*

Data collected in Study Two will be used for testing this set of hypothesis. Details on the experimental design, procedure, and websites were discussed in Chapter IV. Three value variables (13 items) were collected in Study Two along with the 30 items discussed in Chapter IV (15 items measuring the three personalization types, 8 items measuring

motivational states, 3 items of perceived enjoyment and 4 items of arousal). The 13 value variables were measured by adapting Schwartz's value instrument (Schwartz 1992) and Shorr's test of value activities (Shorr 1953). Each instrument has its own advantage: Schwartz's instrument uses semantic differentiation and is succinct, and it is more up-to-date. Shorr's instrument is activity-based and thus more concrete and descriptive; however, it is also dated. Matching on the same value dimensions, we used 10 items measuring achievement, benevolence and stimulation on Schwartz's instrument and 3 items from Shorr's instrument (See Appendix for this measurement scale).

4. Data Analysis and Results

4.1 Validity and Reliability of the Value Measurement

A confirmatory factor analysis (CFA) was performed using maximum likelihood estimation in order to assess the validity of the adapted value instrument. The analysis of the 13 items yielded a three-factor model. Multiple fit indices were used for evaluating the model. The goodness-of-fit (GFI) was .92 and the adjusted goodness-of-fit (AGFI) was .88. The data yielded a comparative fit index (CFI) of .9, a normed fit index (NFI) of .87 and a non-normed-fit index (NNFI) of .89, and a root mean square error of approximation (RMSEA) of .076. The χ^2/df ratio was 2.85, as shown in Table-17. In general, values of .8 or above for GFI and AGFI, higher than .9 for the NFI < CFI, NNFI, less than or equal to .08 for RMSEA are considered a good fit (Kelloway 1998; Kline 1998). By this standard, the three-factor measurement model has moderate fit. All factor loadings were significant and ranged from .54 to .9. The Cronbach's Alpha of each factor ranged from .79 to .69. Table-18 presents factor loading and item reliability.

Table 17 - Fit Indices of CFA for User Value Constructs

χ^2	df	χ^2/df	GFI	AGFI	CFI	NFI	NNFI	RMSEA
177	62	2.8548387	0.9183	0.8807	0.9083	0.8671	0.8876	0.0764

**Table 18 - Factor Loading and Inter-Item Reliability
for User Value Constructs**

Constructs and Their Indicators	Factor Loading	T Value	SE	Cronbach's Alpha
Achievement				0.766
Ach1	0.7	13.05	0.0517	
Ach2	0.82	16.08	0.047	
Ach3	0.6	10.2	0.046	
Ach4	0.7	13	0.052	
Ach5	0.72	13.74	0.0581	
Stimulation				0.795
Sti1	0.8689	17.53	0.072	
Sti2	0.894	18.2	0.067	
Sti3	0.62	10.428	0.058	
Sti4	0.6	10.15	0.06	
Benevolence				0.693
Ben1	0.68	10.68	0.046	
Ben2	0.65	10.4	0.052	
Ben3	0.66	10.75	0.048	
Ben4	0.54	9.79	0.083	

4.2 MANOVA Test

Three MANOVAs were conducted with perceived enjoyment and motivational states as the dependent variables and the personalization strategies measured by WPMI and user values measured by the adapted Schwartz's value instrument as the independent variables. In the first MANOVA, achievement value was the tested. In the second

MANOVA, stimulation value was the tested. In the third MANOVA, benevolence value was the tested.

Two steps of data transformation were taken to prepare the data for the test. (1) The original continuous variables of values were converted to categorical format by their Z-scores. Z-score above were recoded as high on a given value, Z-score below -1 were recoded into low, and Z-score between -1 and 1 were recoded into medium on the value. To increase the effect size of the test, only the data of high and low categories were used in the analysis. (2) The original three personalization scores measured by the WPMI were combined into one categorical variable of personalization strategy type. Each case was classified by the highest of the original personalization scores. For example, a case that has higher original Z-score of architectural than those of instrumental and social scores was categorized as having an architectural personalization strategy type.

As shown in Table-19, the MANOVA results several significant multivariate effects for both independent variables – personalization strategy and user value, and two of the three two-way interaction terms, i.e. the personalization-achievement two-way interaction term and the personalization-stimulation two-way interaction term. The personalization-benevolence two-way interaction term was not significant.

The F-statistics of the main and interaction effects of the independent variables for each dependent variable are presented in Table-20. The achievement value was found to have significant effects on perceived enjoyment ($F_{1, 95} = 18.567, P < .001$) and on the telic state ($F_{1, 95} = 31.263, P < .001$). However, the personalization-achievement interaction term was not significant on any of the dependent variables. A main effect of the stimulation value was significant on perceived enjoyment ($F_{1, 119} = 9.98, P < .001$) and on the paratelic state ($F_{1, 119} = 5.67, P < .05$). The personalization-stimulation interaction term was also significant for perceived enjoyment ($F_{2, 119} = 4.6, P < .01$) and for the paratelic state ($F_{2, 119} = 4.776, P < .01$). The benevolence value was significant on perceived enjoyment ($F_{1, 103} = 14.26, P < .001$) and on the paratelic state ($F_{1, 103} = 8.84, P < .01$).

However, the personalization-achievement interaction term was not significant on any of the dependent variables.

The insignificant results of the personalization-achievement interaction term and the personalization-benevolence interaction term were not expected. However, because the MANOVA and ANOVAs are omnibus tests, the results only inform us about the effects of the predictor variable on all levels of comparison, not specific comparisons between pre-specified levels. Planned contrast tests are necessary to reveal pair-wise comparisons.

**Table 19 - Multivariate Effects of Personalization Strategies
and User Value Types**

Source	Wilks' Lambda	DF_{numerator}	DF_{denominator}	F Value
Personalization Strategy (P)	0.909	6	176	1.426
Achievement Value (Ach)	0.696	3	88	12.793***
P * Ach	0.836	6	176	2.749**
Source	Wilks' Lambda	DF_{numerator}	DF_{denominator}	F Value
Personalization Strategy (P)	0.796	6	224	4.51***
Stimulation Value (Sti)	0.895	3	112	4.36**
P * Sti	0.885	6	224	2.347*

Table19 continued

Source	Wilks' Lambda	DF _{numerator}	DF _{denominator}	F Value
Personalization Strategy (P)	0.832	6	192	3.085**
Benevolence Value (Ben)	0.817	3	96	7.156***
P * Ben	0.921	6	192	1.350

Table 20 - Effects of Personalization Strategy, User Value on the Subjects' Perceived Enjoyment and Motivational States

Source	DF _{numerator}	DF _{denominator}	F Value of the Dependent Variables		
			Perceived Enjoyment	Telic State	Paratelic State
Personalization Strategy (P)	2	95	2.755	0.063	0.779
Achievement Value (Ach)	1	95	18.567***	31.263***	3.808
P * Ach	2	95	2.295	2.480	2.745

Source	DF _{numerator}	DF _{denominator}	F Value of the Dependent Variables		
			Perceived Enjoyment	Telic State	Paratelic State
Personalization Strategy (P)	2	119	9.772***	0.454	1.641
Stimulation Value (Sti)	1	119	9.98***	4.771	5.676*
P * Sti	2	119	4.604**	1.163	4.776**

Table 20 continued

Source	DF _{numerator}	DF _{denominator}	F Value of the Dependent Variables		
			Perceived Enjoyment	Telic State	Paratelic State
Personalization Strategy (P)	2	103	9.438***	0.445	1.262
Benevolence Value (Ben)	1	103	14.26***	6.901	8.84**
P * Ben	2	103	0.860	2.040	1.070

4.3 Planned Contrasts

Along with the MANOVA test, a series of planned contrasts were performed to test hypotheses H7-H9. Several steps were taken to transform the data so it was suitable for this analysis. (1) Because this set of hypotheses requires testing contrasts that involve two categorical variables – high and low categories of user values and types of personalization strategy respectively, a third dummy variable was created to store the information of the two vectors of categorical variables. The coding scheme is illustrated by Table-21. (2) The contrast coefficient (1, -1) – (1, -1) was constructed to reflect the logic of this set of hypotheses, i.e. comparing the difference between two difference scores. Breaking out the parentheses, the final contrasts were written like this: (1, -1, -1, 1). For example, H8, comparing the difference in the difference score between high and low achievement value using instrumental personalization versus using architectural personalization, can be written in contrast like this: (1, -1, -1, 1). The first coefficient (1) represents the high achievement value group and instrumental personalization, which is represented by dummy variable 1. The second coefficient (-1) represents the low achievement value group and instrumental personalization, which is represented by dummy variable 2. The third coefficient (-1) represents high achievement value group

and architectural personalization, which is represented by dummy variable 3. The fourth coefficient (1) represents the low achievement value group and architectural personalization, which is represented by dummy variable 4.

**Table 21 - Coding Scheme for the Dummy Variable in the
Planned Contrast Tests**

User Value Category	Personalization Strategy Type	Dummy Variable
High	Instrumental (1)	1
Low	Instrumental (1)	2
High	Architectural (2)	3
Low	Architectural (2)	4
High	Social (3)	5
Low	Social (3)	6

H6a was proposed to examine the difference score of perceived enjoyment between low-high achievement value by the three personalization strategy types. It was tested by Achievement Contrast 1, which has two parts. One part compares instrumental vs. architectural and the second part compares instrumental vs. social. Table-22 and Table-23, respectively, show the result of both parts of Achievement Contrast 1. The contrast estimate in both tests are positive, indicating the difference in instrumental personalization is greater than the difference in the other two personalization types, in the same direction as we had expected. However, the difference is only statistically significant for the instrumental vs. social contrast ($P=.033$). The contrast between instrumental versus architectural approaches significance ($P=.085$). Thus H6a is partially supported. This shows that while the instrumental personalization strategy has a significant positive influence on the user experience for people who have high achievement value, this strategy is not appreciated by people who have low achievement value, as indicated by their low mean score of perceived enjoyment. On the other hand, using social personalization has little impact on user experience regardless of whether the person has high or low achievement value.

H6b was proposed to examine the difference telic state score between low-high achievement value by the three personalization strategy types. It was tested by Achievement Contrast 2, which has two parts. One part compares instrumental vs. architectural and the second part compares instrumental vs. social personalization. Table-24 and Table-25, respectively, show the results of both parts of Achievement Contrast 2. The contrast estimate in both tests are positive, indicating the difference in instrumental personalization is greater than the difference in the other two personalization types, in the same direction as we had expected. However, the difference is only statistically significant for the instrumental vs. architectural contrast ($P=.019$). The contrast between instrumental versus social is not significant. Thus H6b is partially supported. Recall in Chapter IV, H2a, the positive influence of the instrumental personalization on the user's telic state, was supported by Study One and Study Three. Here H6b shows that after taking into user values into consideration, we found that a telic state is fostered only for people who have high achievement value. Telic state elicitation through instrumental personalization is not effective for people who have low achievement value.

Figures 2, 3, and 4 show the graphic representation of the mean score of perceived enjoyment, telic state and paratelic state, respectively, by low-high achievement group for the three personalization strategies. As Figures 6 and 7 clearly show, the difference between low-high achievement groups is greatest for the instrumental type, suggesting that for people who value achievement highly, using instrumental personalization tends to elicit a telic state and yield high perceived enjoyment. However, for people who do not value achievement, using instrumental personalization is unlikely to elicit a telic state, and as a result, perceived enjoyment is low. Figure-8 shows a crossed line at the architectural personalization type, suggesting that when using architectural personalization, high achievement people are less likely to get into the paratelic state than people who have low achievement value.

Table 22 - Results of Planned Contrast of Low-High Achievement Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Architectural Personalization

Planned Contrast	Achievement Contrast 1			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Architectural	Architectural
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Perceived Enjoyment			
Contrast Estimate	0.8526			
Std. Error	0.485			
Sig.	0.085			

Table 23 -Results of Planned Contrast of Low-High Achievement Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Social Personalization

Planned Contrast	Achievement Contrast 1			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Social	Social
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Perceived Enjoyment			
Contrast Estimate	0.525			
Std. Error	0.239			
Sig.	.033*			

Table 24 - Results of Planned Contrast of Low-High Achievement Value on the Score of Telic State between Instrumental Personalization versus Architectural Personalization

Planned Contrast	Achievement Contrast 2			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Architectural	Architectural
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Telic			
Contrast Estimate	1.065			
Std. Error	0.44			
Sig.	.019**			

Table 25 - Results of Planned Contrast of Low-High Achievement Value on the Score of Telic State between Instrumental Personalization versus Social Personalization

Planned Contrast	Achievement Contrast 2			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Social	Social
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Telic			
Contrast Estimate	0.29			
Std. Error	0.192			
Sig.	0.138			

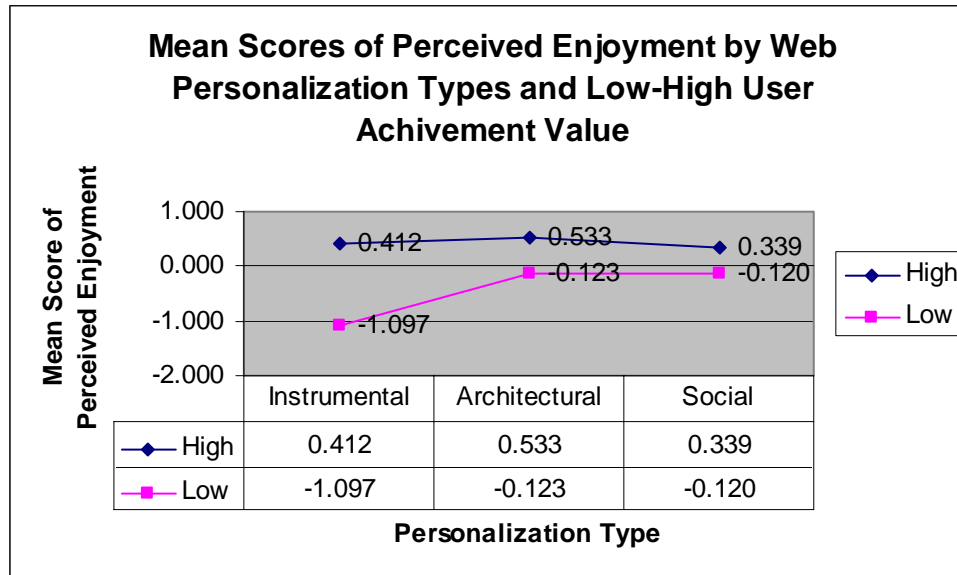


Figure 6 – Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Achievement Value

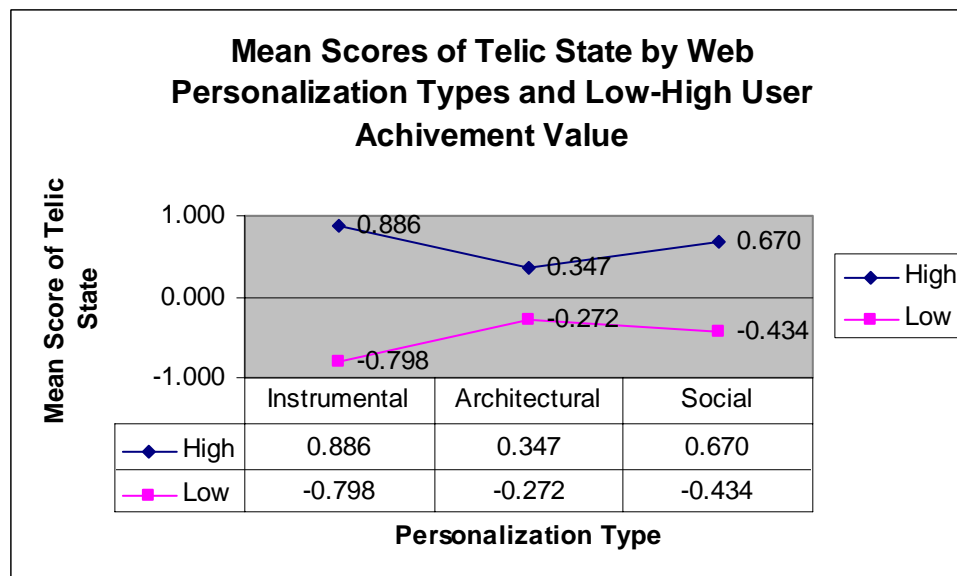


Figure 7 - Mean Scores of Telic State by Web Personalization Types and Low-High User Achievement Value

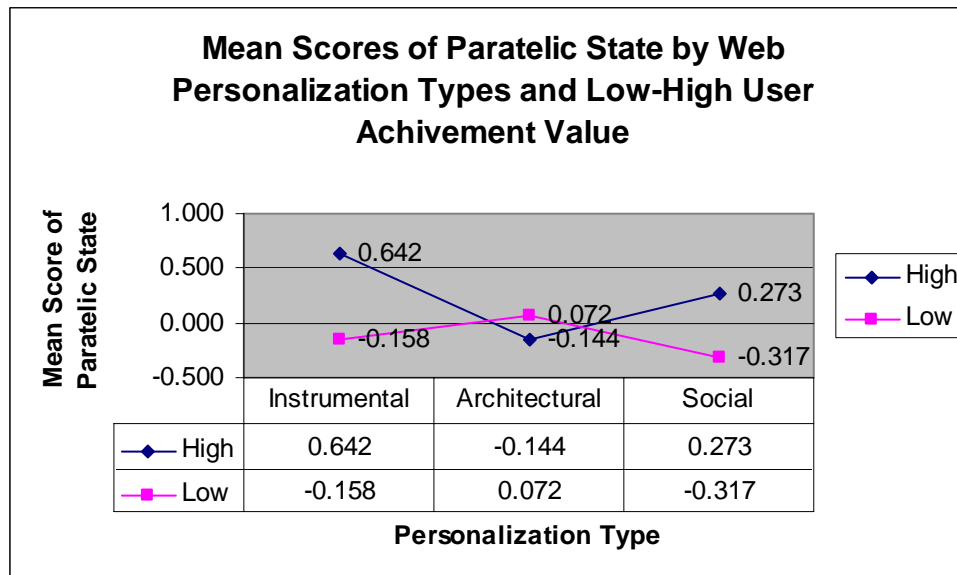


Figure 8 - Mean Scores of Paratelic State by Web Personalization Types and Low-High User Achievement Value

H7a was proposed to examine the difference on perceived enjoyment between low and high stimulation values by the three personalization strategy types. It was tested by Stimulation Contrast 1. Table-26 shows the contrast between instrumental versus Architectural strategies. The contrast estimate is negative, indicating the difference in instrumental personalization is smaller than the difference in the architectural personalization, as we had expected, and the difference is significant ($P=.008$). However, the contrast between architectural and social is not statistically significant. Thus H7a is partially supported. This shows that while the architectural personalization strategy has a significant positive influence on the user experience for people who value stimulation and beauty, this strategy is not appreciated by people who attach low value to stimulation and beauty, as indicated by their low mean score of perceived enjoyment. On the other hand, using instrumental personalization has little impact on user experience regardless of whether the person has high or low stimulation value.

H7b was proposed to examine the difference score on the paratelic state between low and high stimulation value by the three personalization strategy types. It was tested by Stimulation Contrast 2, which has two parts. Table-27 shows the contrast between

instrumental versus architectural. The contrast estimate is negative, indicating the difference in instrumental personalization is smaller than the difference in the architectural personalization, as we had expected, and the difference is significant ($P=.005$). However, the contrast between architectural and social was not statistically significant. Thus H7b is partially supported. Recall in Chapter IV, H2b, the positive influence of the architectural personalization on the user's paratelic state was supported by Study One and Study Three. Here H7b shows that after taking user values into consideration, paratelic state elicitation is greatest for people who place a high value on stimulation. Paratelic state elicitation through architectural personalization is not effective for people who do not value stimulation.

In addition, we conducted Stimulation Contrast 3, using the mean score of telic state as the dependent variable. This contrast was not significant, providing additional evidence for both H2b and H7b, suggesting that architectural personalization is conducive to the paratelic state but not to the telic state, even after taking into account user values on stimulation.

Figures 9, 10, and 11 show the graphic representation of the mean score on perceived enjoyment, telic state and paratelic state, respectively, by the low and high stimulation value group for the three personalization strategies. As Figure 9 and 10 clearly show, the difference between low and high stimulation value groups is greatest for the architectural type, suggesting that for people who value stimulation, using architectural personalization tends to elicit the paratelic state and yield high perceived enjoyment. However, for people who do not value stimulation, using architectural personalization is unlikely to elicit the paratelic state, and as a result, perceived enjoyment is low.

Table 26 -Results of Planned Contrast of Low-High Stimulation Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Architectural Personalization

Planned Contrast	Stimulation Contrast 1			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Architectural	Architectural
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Perceived Enjoyment			
Contrast Estimate	-1.253			
Std. Error	0.464			
Sig.	.008**			

Table 27 -Results of Planned Contrast of Low-High Stimulation Value on the Score of Paratelic State between Instrumental Personalization versus Architectural Personalization

Planned Contrast	Stimulation Contrast 2			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Architectural	Architectural
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Paratelic			
Contrast Estimate	-1.22			
Std. Error	0.425			
Sig.	.005**			

Table 28 - Results of Planned Contrast of Low-High Stimulation Value on the Score of Telic State between Instrumental Personalization versus Architectural Personalization

Planned Contrast	Stimulation Contrast 3			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Architectural	Architectural
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Telic			
Contrast Estimate	-0.723			
Std. Error	0.501			
Sig.	0.156			

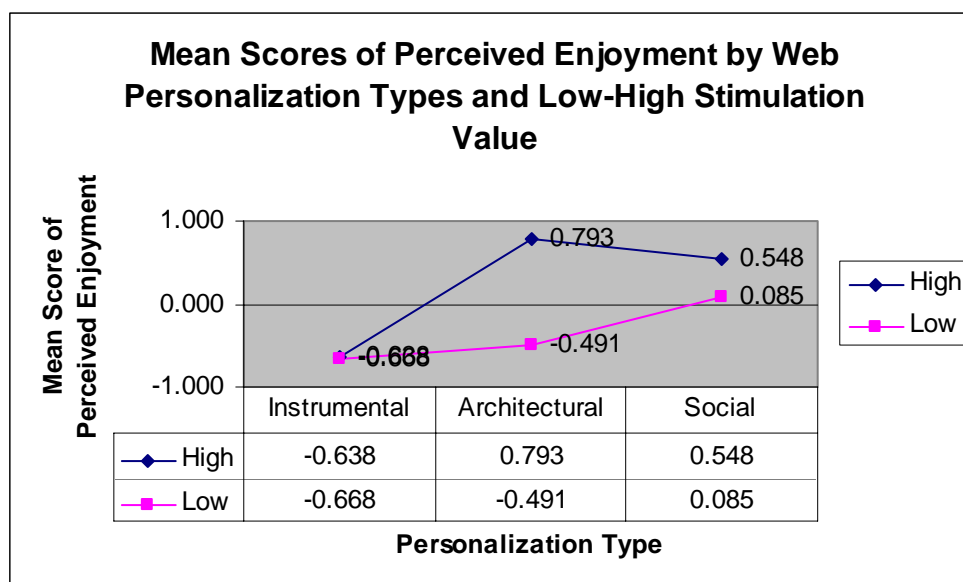


Figure 9 - Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Stimulation Value

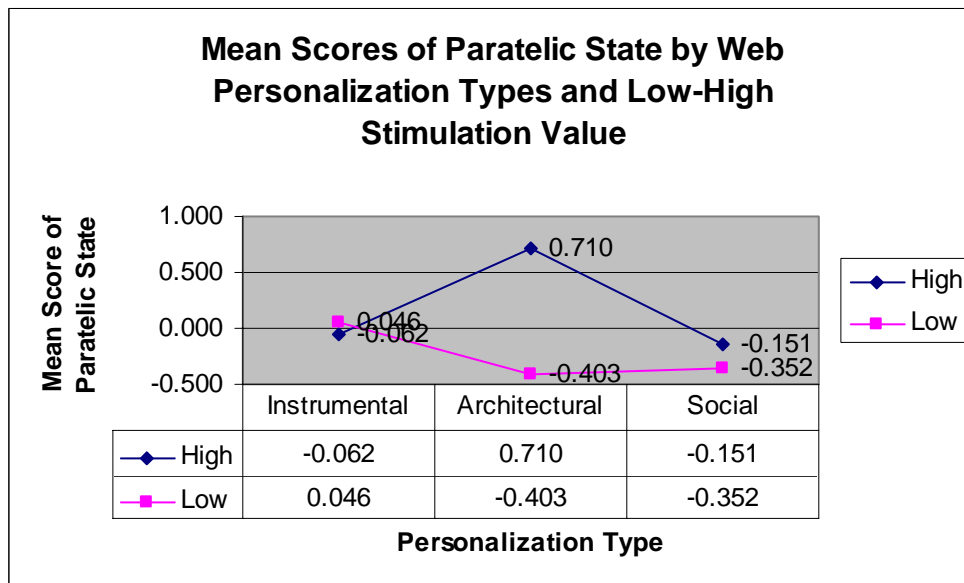


Figure 10 - Mean Scores of Paratelic State by Web Personalization Types and Low-High User Stimulation Value

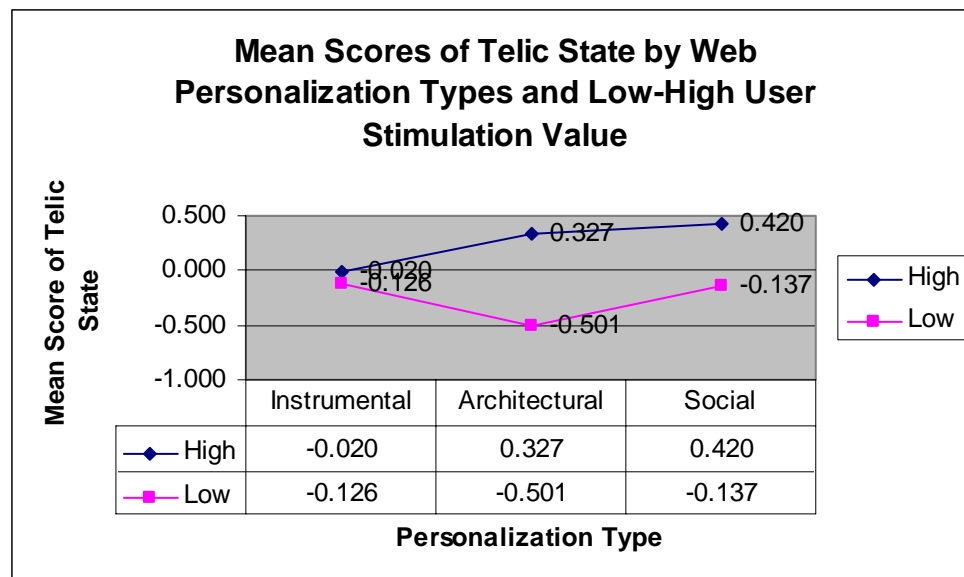


Figure 11 - Mean Scores of Telic State by Web Personalization Types and Low-High User Stimulation Value

H8a was proposed to examine the difference on perceived enjoyment between low and high benevolence value by the three personalization strategy types. It was tested by Benevolence Contrast 1. Table-29 shows the contrast between instrumental versus social. The contrast estimate is negative, indicating that the difference due to instrumental personalization is smaller than the difference due to social personalization, as we had expected, and the difference is significant ($P=.052$). However, the contrast between social and architectural personalization was not statistically significant. Thus H8a is partially supported. This shows that while the social personalization strategy has a significant positive influence on the user experience for people who value benevolence, this strategy is not appreciated by people who do not value benevolence, as indicated by their low mean score of perceived enjoyment. On the other hand, using instrumental personalization has little impact on user experience regardless of whether the person has high or low benevolence value.

H8b was proposed to examine the difference in the paratelic state between low and high benevolence value by the three personalization strategy types. It was tested by Benevolence Contrast 2, which has two parts. Table-30 shows the contrast between instrumental versus social. The contrast estimate is negative, indicating the difference due to instrumental personalization is smaller than the difference due to the architectural personalization, as we had expected, and the difference is significant ($P=.036$). However, the contrast between architectural and social was not statistically significant. Thus H8b is partially supported. Recall in Chapter IV, H2c, the positive influence of the social personalization on user's paratelic state was supported by Study One and Study Three. Here H8b shows that after taking into user values into consideration, paratelic state elicitation is greatest for people who value benevolence. Paratelic state elicitation through social personalization is not effective for people who have low benevolence value.

In addition, we conducted Benevolence Contrast 3, using the mean score of telic state as the dependent variable. This contrast was not significant, providing additional evidence for both H2c and H8b, showing that social personalization is conducive to the

paratelic state but not to the telic state, even after taking into account the user's benevolence value.

Figures 11, 12, and 13 show the graphic representation of the mean score of perceived enjoyment, telic state and paratelic state, respectively, by low and high benevolence groups for the three personalization strategies. As Figure-11 and Figure-12 clearly show, the difference between low and high benevolence groups is greatest for social personalization, suggesting that for people who value benevolence, using social personalization tends to elicit the paratelic state and yield high perceived enjoyment. However, for people who do not value benevolence, using social personalization is unlikely to elicit the paratelic state, and as a result, the perceived enjoyment is low. Figure-12 and Figure-13 have formed a contrast: while the difference of user's paratelic state is large between low and high benevolence values for the social personalization (mean difference =1.14), the difference of user's telic state for the same comparison is small (mean difference = .04). This again shows the moderating effect of the benevolence value on the relationship between social personalization and the paratelic state, but not the telic state.

Table 29 - Results of Planned Contrast of Low-High Benevolence Value on the Score of Perceived Enjoyment between Instrumental Personalization versus Social Personalization

Planned Contrast	Benevolence Contrast			
	High	Low	High	Low
User Value Groups				
Personalization Types	Instrumental	Instrumental	Social	Social
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Perceived Enjoyment			
Contrast Estimate	-0.393			
Std. Error	0.188			
Sig.	.052*			

Table 30 - Results of Planned Contrast of Low-High Benevolence Value on the Score of the Paratelic State between Instrumental Personalization versus Social Personalization

Planned Contrast	Benevolence Contrast			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Social	Social
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Paratelic			
Contrast Estimate	-0.513			
Std. Error	0.237			
Sig.	.036*			

Table 31- Results of Planned Contrast of Low-High Benevolence Value on the Score of the Telic State between Instrumental Personalization versus Social Personalization

Planned Contrast	Benevolence Contrast			
User Value Groups	High	Low	High	Low
Personalization Types	Instrumental	Instrumental	Social	Social
Contrast Coefficient	1	-1	-1	1
Dependent Variable	Telic			
Contrast Estimate	0.267			
Std. Error	0.31			
Sig.	0.399			

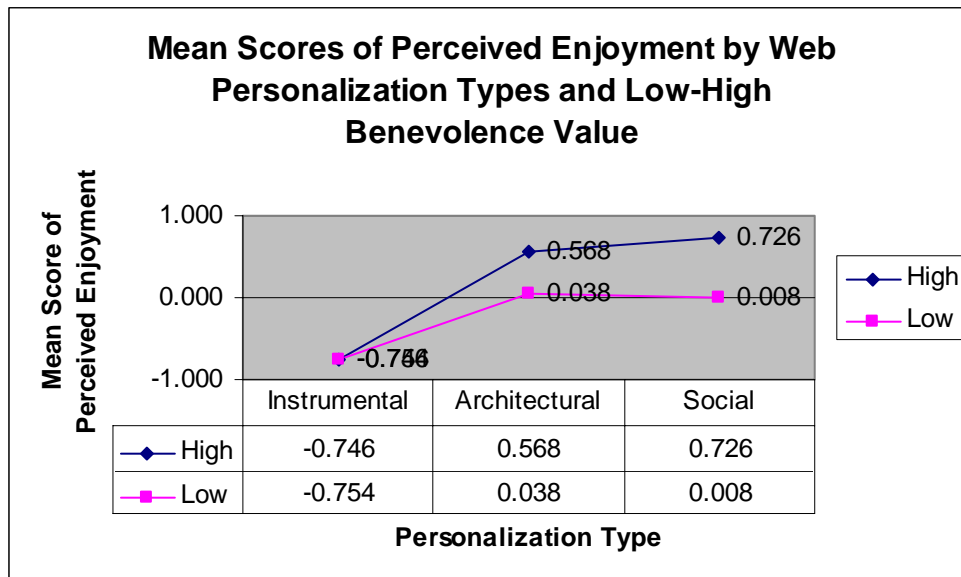


Figure 12 - Mean Scores of Perceived Enjoyment by Web Personalization Types and Low-High User Benevolence Value

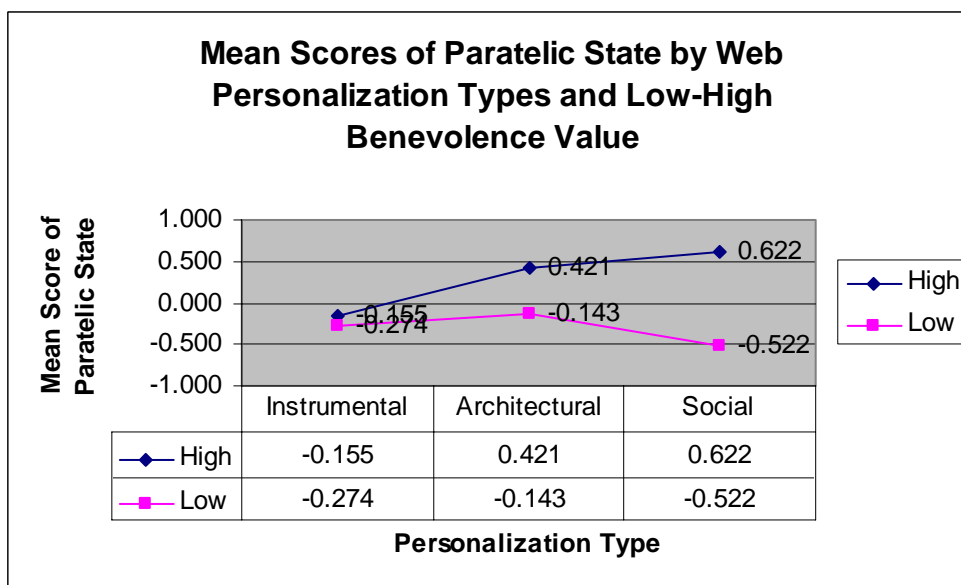


Figure 13 - Mean Scores of Paratelic State by Web Personalization Types and Low-High User Benevolence Value

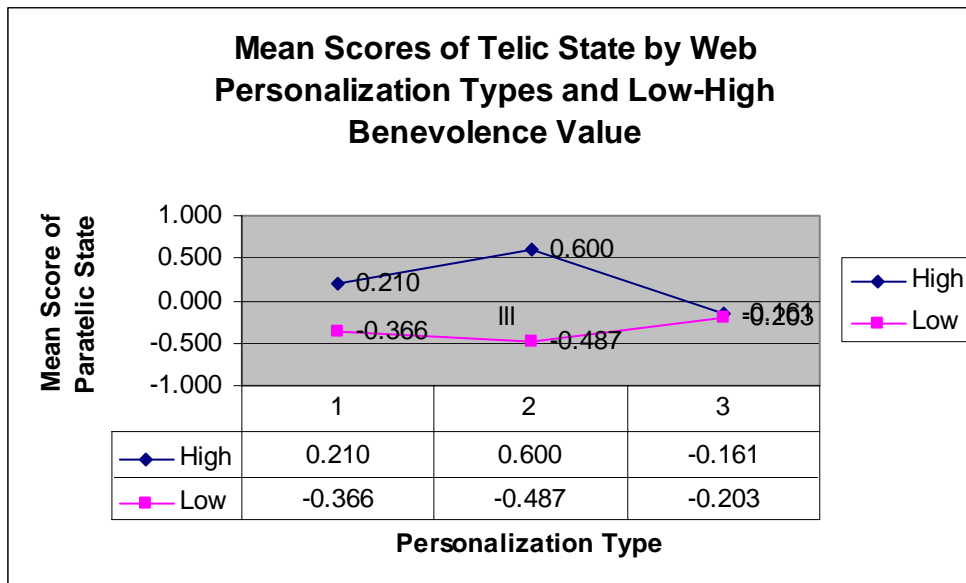


Figure 14 - Mean Scores of Telic State by Web Personalization Types and Low-High User Benevolence Value

In summary, this chapter examined the moderating effect of user values on the relationship between Web personalization and the user experience and its associated motivational states. Specifically, results of planned contrast tests between low-high values showed that while the instrumental personalization strategy has a significant positive influence on the user experience for people who have high achievement value, this strategy is not appreciated by people who have low achievement value. Similarly, architectural personalization is most appreciated by subjects who have high stimulation value. Social personalization is most appreciated by subjects who have high benevolence value.

CHAPTER VII

DISCUSSION AND SUMMARY

This dissertation investigated personalization, an important phenomenon in E-commerce and website design. It was developed centering on three main modules of research questions. First, we were concerned with developing the WPMI and assessing its reliability, construct validity, external validity and predictive validity. In Chapter III, the Web Personalization Measurement Instrument (WPMI) was developed based on the analysis of ideal types of personalization that are defined in terms of the motivation they supply for personalization and the goals and means of personalization. Reliability and construct validity of the instrument were established in this study. In Chapter V, external validity and predictive validity issues were investigated by applying WPMI to a wide range of commercial websites.

Second, this research examined the effect of Web personalization on positive user experience and its associated motivational states. In Chapter IV, using commercial websites as stimuli for three different types of personalization strategies, we conducted two independent studies and found supportive evidence for the positive influence of web personalization on user experience. In addition, we also identified distinct user motivational states salient to specific personalization strategies that are conducive to positive user experience.

Third, this research examined the moderating effect of user values on the relationship between Web personalization and the user experience and its associated motivational states. In Chapter VI, taking user values into account, we reexamined the influence of Web personalization on the user experience and its associated motivational states. The analysis identified important values that are salient to certain Web personalization strategies in eliciting positive user experience and its associated motivational states. The major findings of this dissertation research are summarized in this chapter. Table-32 lists the hypotheses and the results.

1. Measurement of Web Personalization

This research recognizes the multi-dimensionality of the personalization construct, and identified three personalization strategies that are defined in terms of the motivation they supply for personalization and the goals and means of personalization. The three types are instrumental personalization, architectural personalization, and social personalization. A 15-item instrument, the Web Personalization Measurement Instrument (WPMI), was developed to measure the different Web personalization strategies. Results from exploratory factor analysis and confirmatory factor analysis showed sufficient reliability, construct validity, discriminant and divergent validity. Even when pooled with another 15 items from measures of perceived enjoyment, arousal, and motivational states, the measurement model still showed that the personalization was an independent construct.

The external validity of the WPMI was established by applying the instrument to 18 commercial websites that utilized a variety of personalization mechanisms. Results of Study Three indicated that: (1) the WPMI was able to differentiate the three personalization strategies employed WITHIN a given website, i.e. the score that measures the personalization strategy that the website was chosen to represent was higher than the other two scores of the strategies that the site was not chosen to represent; (2) the WPMI was able to differentiate BETWEEN a group of websites along the dimensions of the three personalization scores. Five prototypical Web personalization profiles were generated by using cluster analysis. These were: (a) websites high on all three personalization scores; (b) websites low on all three personalization scores; (c) websites high on both instrumental and architectural but low on social; (d) websites high on instrumental only; (e) websites high on social only. These five profiles were in turn used to examine the predictive validity of the instrument by comparing the perceived enjoyment and its associated motivational states of each profile. The related hypotheses H4-H6 will be summarized in the next section in the discussion on the effect of Web personalization on user experience.

2. *Effects of Web Personalization on User Experience*

Results of Studies One and Two largely supported the hypotheses regarding the effects of Web personalization on positive user experience and its associated motivational states. The confirmation of H1a, H1b, and H1c suggested that all three personalization strategies contributed positively to the user's perceived enjoyment. In addition, the size of the effect of architectural personalization was consistently larger than the other two coefficients in both studies, and the size of the coefficient of the instrumental personalization was consistently smaller than the other two coefficients in both studies. This result suggested that the relative contribution of architectural personalization to the user's positive user experience was greater than that of instrumental personalization. The effect of social personalization is larger than that of instrumental personalization, however, is not as strong as architectural personalization. This could be due to the fact that the effect of social personalization had not been thoroughly teased out given the limited time of interactivity during the experiment.

The results for Hypothesis H2a confirmed the positive effect of the instrumental personalization on the user's telic state, while H2b and H2c confirmed the positive effect of the architectural and social personalization on the user's paratelic state. Combining the results of H1 and H2, we can come to an understanding that although all three personalization strategies contribute to positive user experience, the mechanism through which each strategy takes effect is different. Instrumental personalization, rooted in the utilitarian use of tools and systems, has the potential to elicit a goal-oriented, purpose-driven mindset. It is conducive to conditioning users into the telic state. The architectural personalization strategy, with an emphasis on creating delightful, aesthetically appealing digital space through the design of Web artifacts, has the potential to elicit a sense of beauty and wonder, priming users into a fun-seeking, exploratory state, i.e. the paratelic state. Finally, the high level of interactivity and connectivity during the process of social interaction offered by social personalization strategy provides engaging and sustained social satisfaction and fun, which is conducive to the paratelic state. In our view, the two

motivational states can be likened to two distinct channels of energy leading to a positive user experience by fulfilling different human needs. The telic state satisfies user's needs to "get things done" while the paratelic state fulfills needs for "enjoyment while doing it".

The H4 and H5 series of hypotheses were concerned with the predictive validity of the WPMI. H3a, H3b, H3c, and H3d compared the mean perceived enjoyment of five prototypical Web personalization profiles. The results for these four hypotheses provided additional evidence that Web personalization positively influence user's perceived enjoyment. H4a, H4b, and H4c were concerned with predicting website's personalization scores on the basis of user's motivational states. The evidence consistent with these three hypotheses provided additional support for the association between instrumental personalization and the user's telic state, and between architectural and social personalization and the user's paratelic state.

Table 32 - A Summary of the Results of Research Hypotheses

No.	Hypotheses	Results
H1a	The instrumental personalization strategy will positively influence the perceived enjoyment of the website.	Supported
H1b	The architectural personalization strategy will positively influence the perceived enjoyment of the website.	Supported
H1c	The social personalization strategy will positively influence the perceived enjoyment of the website.	Supported

Table 32 continued

No.	Hypotheses	Results
H2a	The instrumental personalization strategy will positively influence user's telic state	Supported
H2b	The architectural personalization strategy will positively influence user's paratelic state	Supported
H2c	The social personalization strategy will positively influence user's paratelic state	Supported
H3a	Among all five clusters, Cluster 1 (websites high on all three personalization scores) has the highest mean perceived enjoyment.	Supported
H3b	Among all five clusters, Cluster 3 (websites low on all three personalization scores) has the lowest mean perceived enjoyment.	Supported
H3c	Cluster 2 (websites high on both instrumental and architectural but low on social) has higher mean perceived enjoyment than Cluster 4 (websites high on instrumental only).	Supported
H3d	Cluster 2 (websites high on both instrumental and architectural but low on social) has higher mean perceived enjoyment than Cluster 5 (websites high on social only).	Supported

Table 32 continued

No.	Hypotheses	Results
H4a	Users in telic state and both states will have higher instrumental personalization scores than users in paratelic state or neither state.	Supported
H4b	Users in paratelic state and both state will have higher architectural personalization scores than users in telic state or neither state.	Supported
H4c	Users in paratelic state and both state will have higher relational personalization scores than users in telic state or neither state.	Supported
H5a	Users in both states will have the highest score of perceived enjoyment.	Supported
H5b	Users in neither state will have the lowest score of perceived enjoyment.	Supported
H6a	The difference in perceived enjoyment for subjects with low achievement value and subjects with high achievement value is largest at websites that employ instrumental personalization.	Supported

Table 32 continued

No.	Hypotheses	Results
H6b	The difference in telic state score for subjects with low achievement value and subjects with high achievement value is largest at websites that employ instrumental personalization.	Partially Supported
H7a	The difference in perceived enjoyment for subjects with low stimulation value and subjects with high stimulation value is largest at websites that employ architectural personalization.	Partially Supported
H7b	The difference in paratelic score for subjects with low stimulation value and subjects with high stimulation value is largest at websites that employ architectural personalization.	Partially Supported
H8a	The difference in perceived enjoyment for subjects with low benevolence value and subjects with high benevolence value is largest at websites that employ social personalization.	Partially Supported
H8b	The difference in paratelic score for subjects with low benevolence value and subjects with high benevolence value is largest at websites that employ social personalization.	Partially Supported

3. *Effects of User Values on the User Experience with Web Personalization*

Another significant finding of this dissertation research is the moderating effect of user values on the relationship between Web personalization and the user's perceived enjoyment and associated motivational states. The research identified user values that are conducive to positive receptivity to specific personalization strategies, i.e. achievement value to instrumental personalization, stimulation value to architectural personalization, and benevolence value to social personalization.

In Study Three, subjects who had high achievement value felt greater enjoyment and were more conditioned to the telic state than subjects with low achievement value. Most importantly, this difference was significantly greater in responding to instrumental personalization (H6a and H6b partially supported). Subjects who had high stimulation value felt greater enjoyment and were more conditioned to the paratelic state than subjects who had low stimulation value. Most importantly, this difference was significantly greater in responding to architectural personalization than to instrumental personalization stimuli (H7a and H7b partially supported). Finally, subjects who had high benevolence value felt greater enjoyment and were more conditioned to the paratelic state than subjects with low benevolence value. Most importantly, this difference was significantly greater in responding to social personalization than to instrumental personalization (H8a and H8b partially supported).

That H7, H8 and H9 were partially supported was mainly due to failure to establish significant differences between the effect of social personalization and the effect of architectural personalization. However, in view of the fact that both these personalization strategies are similar in their potential to evoke the user's paratelic state rather than the telic state, as does the instrumental personalization, the findings of insignificant difference between them were understandable.

CHAPTER VIII

CONTRIBUTION AND FUTURE RESEARCH

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

1. Theoretical and Practical Contributions

The contribution of the research is two-fold, theoretical and practical. From the theoretical perspective, the research contributes to the technology-centric and business-oriented personalization literature by recognizing the diversity of Web personalization strategies from the perspective of the user's motivation and needs for personalization. We identified and operationalized three distinct personalization strategies: instrumental, architectural, and social. Each strategy represents a different philosophy concerning the motivation for personalization and what personalization tries to accomplish (its goal). We investigated the potentials of Web personalization strategies as sources of enjoyment for Web users. The findings from our studies suggested that Web personalization contributed to positive user experience through eliciting different motivational states in the users.

On the practical side, the instrument WPMI we developed in this research can be used as a guideline for developing Web personalization strategy because it provided three basic means to personalize and possibilities how Web personalization can be achieved, i.e. by providing functionalities and information specifically needed by the user so as to enhance efficiency and productivity, by tailoring the interface to the user's own taste and style, by enabling interaction and connectivity specifically for the user's social network. In addition, WPMI can be used as a criterion for evaluating the effectiveness of the implementation of personalization strategy. For example, at design and testing stage, web designers and researchers can evaluate the performance of the site in terms of its ability to cater to user's personal needs by having the users rate the site against WPMI. Weak scores would indicate potential areas for improvement.

Secondly, the research contributes to the extant research by identifying two motivational states, the telic and paratelic states, as two distinct channels of energy leading to a positive user experience. Neither type of motivational state is inferior or superior to the other, as both fulfill different, basic psychological needs of the users. They serve different functions, and hence contribute in different ways the positive user experience. By examining the motivations behind using Web personalization, we were able to uncover different sources of enjoyment in using such interactive technologies. For use case where efficiency and convenience is essential, instrumental personalization should be implemented to render a sense of progress and accomplishment. For user case where exploration, experimentation, and interaction are desired from the user, architectural or social personalization may be used to promote a sense of wonder, delight and enchantment.

A direct implication is that to create an engaging user experience, Web design and application designs in general should fully utilize these two distinct ways of fulfilling user's needs by designing in such a way that there is joy of getting things done, as well as joy while doing it. For example, tax preparation is generally considered as a boring and tedious work. Tax software that was traditionally designed in the streamlined question-and-answer format though efficient, failed to cater to users' individualized needs. What about tax software that allows the user to choose the way they prepare tax by imposing different mental metaphors such as shoebox, binders, blackboard, etc. presented by various interfaces. What about tax software in the form of a game that entices the user to play around with his/her tax return to figure out an optimal tax return solution? What about one that automatically changes its content as the users' life stages evolve? What about one that connects the user to his/her friends, family and neighbor to chat about tax? There seem to be endless possibilities to integrate personalization into Web and application design.

Finally, our findings supported the moderating effect of user values on the subjective user experience with Web personalization. This implies that users' receptivity of certain Web personalization features would not be universally received. Certain

features would be more welcomed by certain users than others. At the design level, this means that designers need to do more up-front research to understand the user value types to deliver the desired experience. At the marketing level, this means that focused marketing effort is needed by targeting on the right population to drive the desirable effect.

In conclusion, this dissertation research points to a balanced view of design and research. On one hand, it addresses enriching positive user experience by designing the appropriate technology to elicit users' different motivational states, which speaks for the "designability" of the technology. On the other hand, it addresses the filtering effect of user values on their receptivity of the technology, which speaks for the "arousability" of the user. Our research view reflects Dewey's philosophy of experience, which argues for the co-construction of meaning between the designer, the contemplator, and the artifact (Dewey 1934). We believe that by understanding the richness and complexity of users' responses, technological artifacts can be designed so as to facilitate rich user experiences.

2.*Limitations*

One of the main objectives of this research was to develop an instrument to measure Web personalization strategies. In Study One, WPMI was developed and validated and was used as the base for all the subsequent studies. Although the instrument itself has been validated in terms of reliability, convergent and discriminant validity, this research suffers from a standing issue common to studies involving measurement of constructs, known as the common method variance effect. Because the WPMI is the only instrument used in the measurement of personalization strategy, and because the WPMI is based on self-report data, such single method tends to inflate reliability scores such as Cronbach's alpha (Tepper et al. 1993). In the classical measurement theory, measures obtained by a single method do not reflect their true scores as systematic bias due to singular method contributes to method variance. Despite method bias reducing researchers' ability to truly measure a construct, few researchers control for its effects. In IS research, Woszcznski and Whitman (2004) analyzed 116 empirical studies in the

field's top journals and found that 58% collected all of their data via just one instrument and only 10 studies (8.6%) explicitly mentioned potential method variance. Our plan to mitigate this problem will be addressed in the future study section that follows.

Another limitation of this research lies in its methodology, i.e. lab experiment, which is strong in terms of establishing control and testing for causal relationships, but weaker in terms of external validity. We attempted to mitigate this limitation by utilizing a wide range of commercial websites in the study.

Thirdly, the data were collected from a sample of students, which may not fully represent the entire Web user population. A particular concern is that this research involves investigation of user values, motivation and needs, which may be an age-sensitive issue.

3. *Directions for Future Research*

Addressing the common method variance effect provides one obvious path for future research. Given the multidimensional nature of personalization, measuring its true score requires one to measure each dimension of personalization with multiple methods. There are many approaches to this, for example, we could use existing validated instrument if available to cross validate the results. The construct measured from the perspective of the website's designer also provides a valuable source of data validation. Furthermore, the cognitive, affective and behavioral aspects of the construct can be measured separately using different methods. For instance, cognition and affect can be measured based on users' perception. Behavior can be measured by Web log or self-reports of usage. The aim is to use multiple methods to reduce method bias, and then use triangulation to confirm the overall pattern of results.

This research opens a variety of avenues for future research. First, this research focuses on the impact of Web personalization only on subjective user experience, without exploring its influence on user's cognition and subsequent behavior such as

approach/avoidance behavior, intention to purchase/continue/recommend, consumer choice. Future research is necessary to investigate how different Web personalization strategies impact user behavior. Secondly, this research focuses on Web personalization as the technology stimuli to elicit user's motivational states. There could possibly be many other mechanisms to condition users for different motivational states, for example, by manipulating navigational alternatives, by designing different effects of Web aesthetics, etc. Further exploration along this line of research will build up more knowledge about how to construct the computer mediated environment (CME) to better facilitate rich user experience. Thirdly, the experiments were run on a limited number of websites. As we projected that the personalization construct is applicable in a wide variety of computer applications and systems, one of our next step is to apply the instrument to other domain of computer applications.

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APPENDIX

INSTRUMENT USED IN THE STUDIES

Web Personalization Measurement Instrument (1= strongly disagree; 4 = neutral; 7=strongly agree)

Instrumental

- This personalization feature makes the web interaction more *productive* for me
- This personalization feature helps me to obtain my goal more *efficiently*.
- This personalization feature makes it more *convenient* for me to interact with the site in the long run.
- This personalization feature makes the site more *functional* for me.
- Personalizing the site helps me *locating the right information/product/service* I need.

Architectural

- This personalization feature enables me to *tailor the color and feel of the site to my own personal taste and style*.
- This personalization feature enables me to *customize the online space to reflect my own style*.
- This personalization feature allows me to create a web environment that is *aesthetically pleasing* to me.
- This personalization feature allows me create a web environment that is *visually appealing* to me.
- Personalizing the site makes it a greater *visual impact* on me.

Social

- This personalization feature helps to fulfill my *needs for socialization and communication* with others.

- This personalization feature *facilitates my interaction with others*.
- This personalization feature *creates a congenial social environment for me*.
- This personalization feature *bridges me to communities* that are potentially interesting to me.
- This personalization feature helps me to *stay in touch with people that are important* to me.

Telic State (1= strongly disagree; 4 = neutral; 7=strongly agree)

- I **want to accomplish something**
- I am feeling **serious-minded**.
- I **want to be efficient**.
- I want to **focus on the task at hand**.

Paratelic State (1= strongly disagree; 4 = neutral; 7=strongly agree)

- I **want to just have fun**.
- I am feeling **playful**.
- I **want to be entertained**.
- I am just **having fun**.

Perceived Enjoyment (1= strongly disagree; 4 = neutral; 7=strongly agree)

- I find using this personalization feature to be *enjoyable*.
- I find using this personalization feature is *pleasant*.
- I have *fun* using this personalization feature.

Arousal

The website makes me feel...

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>Calm</i>			<i>Neutral</i>			<i>Excited</i>
<i>Unstimulated</i>			<i>Neutral</i>			<i>Stimulated</i>
<i>Dull</i>			<i>Neutral</i>			<i>Novel</i>
<i>Sluggish</i>			<i>Neutral</i>			<i>Active</i>
<i>Sleepy</i>			<i>Neutral</i>			<i>Wide-awake</i>

VITA

Haiyan Fan received her Bachelor of Arts degree in English Education from South China Normal University in 1995. She earned her Master of Arts degree in English Language/Linguistics from the University of Arizona in 1999. She earned her Master of Science degree in Management Information Systems from the University of Arizona in 1999. She entered the Information & Operations Management Program at Texas A&M University in September 2002, and she received her PhD degree in August 2007. Her research examines different types of technology usage and perception as they link to individual well being and organizational performance. At the individual level, she is interested in motivational and affective factors in structuring user experience. At the group level, she is fascinated by innovative technologies that connect people together. Another set of practical problems that intrigue her are organizational deployment of user-centered design. She approached this topic from the organizational structure and coordination perspective, seeking ways to integrate UCD into the systems development life cycle and organizational processes.

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