

# CHAPTER 1

# INTRODUCTION

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## 1.1 Introduction

This study proposes a conceptual model of usability that can be used to investigate the effects of culture on usability. Specifically, this study investigates the factors that influence usability in order to identify the variables that need to be controlled for when researching the influence of subjective culture on the usability of computer-based systems.

## 1.2 Motivation for the study

Culture can be broadly categorized into objective and subjective culture [Hoft, 1996]. Objective culture considers issues such as language, date and time formats, and nationality; in contrast, subjective culture encompasses beliefs, patterns of thinking, and values. The influence of subjective culture on usability is a contentious issue in the field of human-computer interaction (HCI). Some members of the discipline regard the lack of accommodation of subjective culture into the design of user interfaces as an important cause of decreased usability [for example, Marcus, 2001; Smith and Chang, 2003], whilst others [for example, Bourges-Waldegg and Scrivener, 1998] contend that objective culture is more relevant to usability.

The interest in culture stemmed from the ability of information technology to support a global market [Marcus, 2000]. In particular, the World Wide Web enables global distribution of products and services through websites. These products and services include software applications as well as the websites that are used to market them. Although numerous usability principles and guidelines have been identified and used in an attempt to enhance usability, many of the software applications and websites currently available are still difficult to understand, hard to learn and complicated to use [Bevan, 1995].

Due to the numerous benefits of usability to users and suppliers, user interface designers are being pressurized to optimize the usability of their products [Bevan, 1995]. More recent research suggests that enhanced usability can be achieved by considering the impact of culture on the understanding and use of user interfaces [Marcus, 2001; Hoft, 1996; Carey, 1998; Honold, 2000; del Galdo and Nielsen, 1996], particularly in light of the cultural diversity of a global target user market.

Substantial research has previously been conducted that has empirically identified a comprehensive list of the objective cultural variables that influence usability. However, this is not the case for subjective culture. Prior research in this area has culminated in contradictory and therefore inconclusive results; thus, whilst there is sufficient theoretical evidence to suggest that subjective culture does indeed influence usability [Smith and Chang, 2003; Straub, Keil and Brenner, 1997; Hall, Lawson and Minocha, 2003], this relationship is yet to be empirically determined.

The contradictory theoretical and empirical evidence led us to conduct an experiment in an attempt to resolve this issue. Although we followed the methodologies used in other similar research, the results of our experiment were inconclusive. Further analysis of the results highlighted a number of additional variables that could influence usability and therefore should possibly be controlled for when conducting research on cultural issues in HCI.

As a result, our original research problem was revised. Rather than attempting to determine whether or not subjective culture influences usability, we believed it necessary to first develop a more comprehensive model of usability that could be used when conducting research of this kind. Consequently, we needed to (1) establish whether other research on cultural issues in HCI confirms the importance of the variables identified, and whether there are other variables that should also be considered, and (2) synthesize these variables, and those known to influence usability, into a comprehensive model of usability that will assist researchers to produce reliable and valid data on the influence of culture and usability.

## 1.3 Aims

This dissertation followed a rather unconventional route as the original aim was revised during the study. The original aim was to establish empirical evidence of a causal relationship between subjective culture and usability, thus resolving the conflict that exists in the discipline of human-computer interaction. This was expected to be achieved by testing the effects of selected subjective cultural dimensions on the usability of computer-based interfaces. The inconclusive results of the experiment led us to revise the aim of the study. Our revised aim is to propose a conceptual model of usability that can be used to better understand the relationship between culture and usability. In developing this proposed model, our research aims to identify the variables other than the specific subjective cultural dimensions that affect the usability of computer-based interfaces, and, where possible, to propose strategies for controlling these variables when investigating the effect of culture on usability.

## **1.4 Research Design and Methodology**

The research design and methods appropriate to a particular research undertaking are dependent on the research problem and question [Mouton, 2001; Hair, et al., 2003; Ghauri and Grønhaug, 2002]. As discussed in section 1.3, there are two aims of the study, each stemming from a different type of research question. Consequently, each of the research problems requires a different type of research design, comprising different sets of methods and techniques.

The original research problem aims to test the influence of selected subjective cultural dimensions on the usability of user interfaces, and is therefore causal in nature. When viewed from the perspective of general and business research designs, causal questions require the use of controlled experiments [Hair, et al., 2003]. To answer this question, it will be necessary to assess and compare the usability of different interfaces, when used by users with matching and opposing cultural dimensions. There are many usability evaluation methods that are used in HCI research, however, user testing is considered to be the most robust, as it is a form of controlled experiment [Nielsen, 1993; Atwater and Barbaria, 2001]. Consequently we will make use of a usability test as the primary research method for our original research problem, supported by questionnaires to determine the satisfaction of the users. This research design and methodology will be discussed in more detail in chapters 3 and 4.

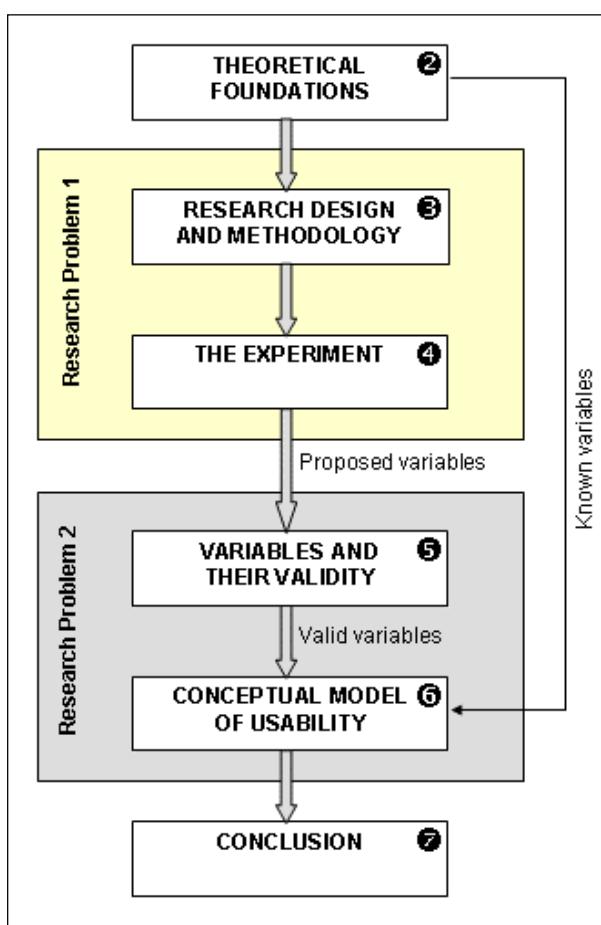
The revised research problem aims to develop a conceptual model of usability, and is therefore conceptual in nature [Mouton, 2001]. Of the research designs proposed by Mouton, the theory / model building research design is identified as the most appropriate, as it is used to develop new, or refine existing models and theories to explain particular phenomena. The primary research method used will be a literature survey, supported by deductive arguments to establish the validity of the proposed variables. Where no evidence was found in the literature, analogical reasoning will be used to establish validity based on similarities that exist between the proposed variables and the variables previously shown to influence usability.

## **1.5 Limitations of the Study**

Three main limitations of this study have been identified, each of which provides opportunities for further research in this area. These are as follows:

- (1) It was not possible in this study to consider all possible models and definitions of culture. Therefore, one model of culture was used in favour of many other models.
- (2) The validity of some of the proposed variables could not be conclusively established.
- (3) The conceptual model of usability will be proposed but not tested.

## 1.6 Outline of the Dissertation



**Figure 1.1:** Dissertation Outline

The dissertation comprises seven chapters. As depicted in Figure 1, Chapter 3 and 4 are focused on the original research problem, while Chapters 5 and 6 relate to the revised research problem. Chapter 2 serves as the theoretical foundation for both research problems.

Chapter 2 contains a review of the prior research on subjective culture. The chapter reviews the discipline of human-computer interaction, the concepts of performance, usability and culture, and the arguments for and against the importance of culture in human-computer interaction. Theoretical evidence that subjective culture influences usability, and that Hofstede's cultural model is an appropriate and relevant basis for researching this relationship were synthesized from prior research studies. The chapter

concludes by noting that such theoretical evidence is contradictory to the empirical evidence reported in the existing literature, thus supporting the need for the experiment.

The research design and methodology followed for the experiment are presented in Chapter 3. Chapter 4 reports on the results of the experiment. The objectives and hypotheses are presented first, followed by a more detailed description of the experimental design and methodology. The results of the experiment are presented next. The chapter concludes with a discussion of the problems that were experienced and the identification of a set of variables that could have influenced the results of the experiment. The findings reported in this chapter led to the formulation of the revised research problem.

Chapter 5 reports on the second literature investigation undertaken to establish the validity of the variables identified in Chapter 4. The validity of the proposed variables is discussed, together with the validity of additional variables that could influence usability that came to light

during the investigation.

Chapter 6 presents the proposed conceptual model of usability. The model incorporates the variables known to influence usability that were identified from the existing body of knowledge, and the variables that were identified as valid in Chapter 5. The implications of these variables on future experimental research are discussed in terms of

- the selection of test subjects;
- the identification of test interfaces;
- the development of test tasks; and
- the execution of the experiment.

Chapter 7 concludes the dissertation by summarizing its contribution to the body of knowledge and to research in cultural issues in HCI in particular. The need for testing of the conceptual model generated by this research is identified, together with suggestions for future research into the variables that could not be validated from the existing body of knowledge.