

Defining Cross-Culture Theoretical Framework of User Interface

Ping Liu¹ and Chun Keung²

¹Department of Media Creative Design, Communication University of China
No.1 Ding fu zhuang East Street, Chaoyang District, Beijing, 100024, P.R. China
pingshui2001@hotmail.com

²Department of Chinese Language and Literature, Kookmin University
861-1, Jeongneung-dong, Seongbuk-gu, Seoul, 136-702, Korea
chinalaoshi@hotmail.com

Abstract. In an increasing global market place, UI designers are faced with the challenges of offering usable products and services to an enormous variety of users in different cultures. So far, the researchers involved are mostly from anthropology, sociology and computer science. They try to develop or evaluate the usability of products in different cultural contexts. However, their researches concentrate on the technical and evaluative level. The field lacks a systematic theory or principle: how can we convert these research results directly to certain tool or framework which can be used by designers directly. In this paper, we summarized previous researches on culture models and cultural markers, conducted an expert review to organize cultural design issues, and proposed a cross-cultural design element framework which can be directly referred and used by designers when designing products for a certain culture.

Keywords: Cultural Factor, Internationalization and Localization, UI Design Elements.

1 Introduction

Culture is and always has been a very abstract and complicated concept. It has various meanings to various people with various backgrounds. There are many different perspectives of culture in the literature, but there is no agreement on a specific, common definition of culture. Some examples of such definitions are: Culture is conceptualized as a 'system of meaning that underlies routine and behavior in everyday working life [1]. Culture includes race and ethnicity as well as other variables and is manifested in customary behaviors, assumptions and values, patterns of thinking and communication style [2]. Culture is 'the collective programming of the mind that distinguishes the members of one group or category of people from another, where the mind stands for thinking, feeling and acting, with consequences for beliefs, attitudes and skills [3]. Different cultural models can be derived from different perspectives. These cultural models serve as a starting point as described by, for example, Hofstede (1996) Edward Hall (1989), Trompenaars (1993), Victor (1992) .

However, although many researches, such as semiotics research in HCI (Bourges-Waldegg and Scrivener 1998 [4]) has been used to understand how cultural backgrounds influence people's interpretation of UI elements, the results of such researches on culture or cultural models cannot be directly used by designers and UX experts to produce usable products in a certain culture. One reason of this gap between cultural research and production is that designers consider concrete details while cultural researches usually generate abstract descriptions. For example “in some Asian sites the icon representing home is a pair of shoes, instead of a little house” by Fernandez (2000) [5]. Icons and symbols may also have culturally different meanings. In studies by Brugger (1990) [6], only 13 percent of Japanese recognized a first-aid symbol based on the Red Cross, and most did not associate the symbol letter ‘I’ as referring to information services. These concrete details are seldom addressed by related cultural theories.

In order to successfully build the bridge between these two worlds, user interface designers must increase their knowledge and awareness of cross-cultural differences. In this paper, we first summarize the results of existing mainstream cultural researches, and derive UI design elements based on culture markers through an expert review, and finally propose a design framework for cross-cultural UI design.

2 Background – Cultural Models

In order to give detailed views of the abstractness of culture, a number of cultural dimensions have to be identified and emphasized. Different combinations of cultural dimensions form different mental models of culture, which then form the basis for the development of different cultural theories. Hoft [7] describes four models of culture, developed by Hall [9], Trompenaars [10], Hofstede [3], and Victor [8], which are summarized in Table 1.

Table 1. Cultural models and their dimensions

Author	Focus of Culture	Variables identified
Geert Hofstede [3]	<i>Determining the patterns of thinking, feeling, and acting that form a culture's mental programming</i>	.Power Distance .Masculinity vs. Femininity .Individualism vs. Collectivism .Uncertainty Avoidance .Time Orientation

Table 1. (Continued)

David A. Victor [8]	<i>Determining the aspects of culture most likely to affect communication specifically in a business setting</i>	<ul style="list-style-type: none"> •Language •Environment and Technology •Social Organisation •Contexting •Authority Conception •Nonverbal Behaviour •Temporal Conception
Edward T. Hall [9]	<i>Determining what releases the right response rather than what sends the right message</i>	<ul style="list-style-type: none"> •Speed of Messages •Context •Space •Time •Information Flow •Action Chains
Fons Trompenaars [10]	<i>Determining the way in which a group of people solves problems</i>	<ul style="list-style-type: none"> •Universalism vs. Particularism •Neutral or emotional •Individualism vs. Collectivism •Specific vs. Diffuse •Achievement vs. Ascription •Time •Environment

3 Cultural Markers and Localization

The term ‘Cultural markers’ was first coined by Wendy Barber and Albert Badre to refer to ‘Cultural markers are interface design elements and features that are prevalent, and possibly preferred, within a particular cultural group.’ it is used to define “the interface design elements of the product that reflect the signs and the meanings to match the expectations of the local culture. The culture attractors typically comprise of colors , color combinations, banners, the use of metaphor ,language clues, navigation controls and similar visual elements that together create a ‘look and feel’ to match the cultural expectations of the users for a particular domain” (Barber and Badre,1998)[11].

However, when we consider the cultural markers of a certain culture, the size of the population within that culture, and the functional boundary of the culture should all be considered. In a general sense, there are 3 important levels of culture, namely, Globalization, Internationalization and Localization. Culture Markers may refer to different elements when discussing about these 3 levels separately.

Much of the research in HCI regarding culture and Usability has surrounded the internationalization and localization process (Bourges-Walderg & Scrivener1996)[4].

Internationalization “seeks to eliminate culture” (Young 2008)[12] by eliminating cultural symbols, religious references, and so on, while localization caters to the needs of the local target group and is intended to incorporate local content and functionality (Shannon 2000) [13] as well as local, context and culture (McLoughlin & Oliver 1999) [14]. Thus, in this paper, we focus on the level which has the most variety: Localization as the purpose of cross-culture design is to fit the product in a certain culture of a certain area.

From a cross-cultural usability perspective, localization refers to the adaptation of a product, application or document content to meet the language, cultural and other requirements of a specific target market [15]. A well localized design should look like it’s been produced in a certain local culture. In order to do this, a product should adapt to a specific language, culture, and expected local “look & Feel”. For example, when localizing a website interface, possible options include the change of language, time zones, currency, local color sensitivities, product or service names, gender roles, and geographic examples (Cyr & Trevor-Smith 2004) [16]. Similarly, these issues are very important when localizing the UI of any product. Here we summarized cultural markers related to Localization mentioned by different researchers in history, as shown in Table 2.

Table 2. Cultural markers and Localization

Scholars	Cultural Markers
Brugger 1990	Icons considered international are not necessarily understood globally
Russo & Boor 1993	Care should also be given to the presentation of pictures. Some cultures are very sensitive to how human features are represented.
Amara & Portaneri 1996	Design to fit the local writing style. e.g. languages such as Arabic are written right-to-left.
Dray, 1996	Translation of the menus, boxes, and icon text can also be problematic because the length of words varies between languages.
Barber & Badre 1998	Use of color in web design can impact on the user’s expectations about navigation, content, and links, as well as overall satisfaction.
Callahan 2005	New technical words in other countries have to be created by adapting English words or creating new ones based on native concepts.
Choong & Salvendy 1998	Using icons versus text for navigation can affect error rates and task completion times depending on culture.
Barber & Badre 1998	Specific orientations and page placement vary by culture
Duncker 2002	Icons based on metaphors such as the mailbox, trashcans may be interpreted differently.
Callahan 2005; del Galdo 1990	Cultures vary in how they present numbers, time, and dates.
Dong & Lee 2008	The way holistically versus analytically minded people scan a web page is different. Ordering and arrangement of information needs to be considered.

4 Cross-Culture UI Design Framework

4.1 Culture Markers and UI Design Elements

Culture Markers listed in Table 2 are still abstract and not well organized to be used directly by designers. In order to convert these issues into something that is meaningful to UI/GUI/Product designers. We have conducted an Expert Review to summarize necessary UI design elements for Cross-Culture products.

First, we use the widely applied 3 levels of design, namely Function, Interaction and Surface, as 3 categories to organize UI design elements. Function is about individual level, settings Input method, Tools and etc. Interaction is about Navigation, Feedback and etc. Surface is about typographic issues, color properties, visual information and so on.

Second, we selected 17 UI/UX experts to conduct Focus Group Interview to generate valuable UI design elements for Cross-Culture products. Since different experts may have different views toward valuable UI design elements in Cross-Culture design based on their knowledge and experience, we selected experts with various experience to try to combine their perspectives. Selected experts are shown in Table 3.

Table 3. Selected experts for FGI

Age	Experts	Experience
40+	1 people	20 years
30~40	5 people	> 5 years
20~30	11 people	< 5 years

During the FGI, selected experts were asked to assign design elements listed in Table 2 to 3 levels of design (Function, Interaction and Surface), and propose new design elements if necessary. The result of expert interview is shown in Table 4.

Table 4. Cross-Cultural Design Elements

Category	Elements	Definition
Function	Main/Sub Function	The basic and supplementary features a product or service can provide.
	Function Sequence	Process or steps to use a certain function
	Module	UI components arranged by its functions
Interaction	Input Interaction Style	Methods of inputting information or function
	Feedback(Feed forward)	System’s response when receiving user’s input
	Information Architecture	Information structure of a product or service

Table 4. (Continued)

	Label	The name of an information unit
	Status Indication	The information indicating the status of a product or service
Surface	Color	Main/Sub color used by a product or service
	Shape	The form factor of a product
	Icon	Text/Graphic to execute a certain function
	Material	The texture used by a product or service
	Font	The size and form of text used by a product or service
	Layout	Arrangement of existing objects in a product or service
	Sound	Audio elements provided by a product or service

4.2 Cross-Culture UI Design Framework

With the Cross-Culture UI design elements we derived from expert interview, Hofstede’s culture dimension theory can be applied in a meaningful way to product design and evaluation, as shown in Table 5. By referring to this framework, designers can focus on necessary UI elements of cultural aspects when designing a product or service.

Table 5. Cross-Culture UI Design Framework

Category	Elements	PDI	IDV	MAS	UAI	LTO
Function	Main/Sub Function					
	Function Sequence					
	Module					
Interaction	Input Interaction Style					
	Feedback(Feed forward)					
	Information Architecture					
	Label					
	Status Indication					
Surface	Color					
	Shape					
	Icon					
	Material					
	Font					
	Layout					
	Sound					

5 Conclusion

Designing for a certain culture has long been a challenge in design industry. The abstractness of culture seems to contradict the concreteness of design details. Very often the cultural difference will reveal when we make a mistake. In this paper, we proposed a Cross-Culture UI design framework by selecting the widely-used Hofstede's culture model and deriving valuable UI design elements through an expert interview. In this way, designers can consider and evaluate their design or ideas to judge that if it is suitable for a certain culture or not.

Future studies should focus on evaluating and testing this framework by using it in different cultures, such as Korea, China and US, to get designers' feedback and comments. As a result, a certain design guideline can also be derived from collected data.

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