

A Theoretical Model for Cross-Cultural Web Design

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Abstract. People from different cultures use web interfaces in different ways; they hold different mental models for visual representations, navigation, interaction, and layouts, and have different communication patterns and expectations. In the context of globalisation, web developers and designers have to make adaptations to fit the needs of people from different cultures, but most previous research lacks an appropriate way to apply culture factors into the web development. It is noted that no single model can support all cross-cultural web communication but a new model is needed to bridge the gap and improve the limitations. Thus, in this paper, a thorough literature review is conducted to develop a theoretical cross-cultural model to facilitate effective communication (usability) for web design, in which the variable (cultural factors), the process of developing cross-cultural websites, and measurement criteria are identified, and two related testable hypotheses are generated.

Keywords: Web interface, globalization, cross-cultural web communication.

1 Introduction

The majority of current web-based applications assume a one-size-fits-all model (North American model), whereas people from different cultures interact and communicate according to their cultural context. North American models do not necessarily fit the needs of people from other cultures. Jagne & Smith-Atakan [13] observed the trend and stated that, “Computer software and the internet were predominately a North American skilled white male market. It has now become a worldwide commodity and the market has now grown to include all nations, creeds, gender and task use”. Now, many non-English users have expanded their internet activities and have increased their utilisation of the internet.

If companies seek to expand globally, there is a growing force to provide appropriate products and services for diverse audiences (non-English users), which are increasing. Therefore, when web-based artefact developers and designers want to localise their products, they need to take the context of the target culture into account. In the past, web developments were aligned with cognition theory and computer technology. Now more companies are aware of the importance of using localisation to extend their customer base in the globalisation age. However, this research, with

regard to applying cultural issues to web design development, needs to be considered deeper and be applied properly into the web design process.

Cultural diversity makes it impossible for designers to depend on instinctive knowledge or personal experience, therefore, many researchers have identified the need to explore cultural issues in web interface design. For example, Marcus & Gould [15] pointed out that web designers need to do much planning, research, analysis, design, evaluation, documentation, and training to deeply comprehend the requirements of the user, market, and business. Indeed, people from different cultures use web interfaces in different ways, hold different mental models for visual representations, navigation, interaction, and layouts, and have different communication patterns and expectations. In the context of globalisation, web localisation becomes a powerful strategy to acquire an audience in a global market. Therefore, web developers and designers have to make adaptations to fit the needs of people from different cultures.

Most previous research lacks an appropriate way to apply culture factors into web development. The existing culture models are not sensitive enough to the applied context of target-culture and they are too stereotypical and lack usability tests to support their claims. It is noted that no single model can support all cross-cultural web communication but a new model is needed to bridge the gap and remove the limitations. This paper presents a new model of cross-cultural web design to contribute to effective communication. According to the review of the previous research, in identifying and reducing the limitations, and bridging the gap, a new theoretical cross-cultural model for web design will be formulated.

2 Cultural Factors and Related Hypotheses

2.1 Cultural Factors

In the theoretical model proposed in this paper, Hofstede's [12] cultural model and Hall and Halls' [11] model are applied, where cultural dimensions are defined as collectivism vs. individualism, uncertain avoidance, short vs. long-term time orientation, power distance, masculinity vs. feminism, and high vs. low context culture. The web interface design characteristics which would influence web communication are defined as visual representation, multimedia, colour, navigation, layout, content and structure, links, and language.

2.2 Two Related Hypotheses

A review of the literature forms the basis of this research. Firstly, the key question "How can culture factors be incorporated into web design to facilitate communication?" is formulated, and then a theoretical cross-cultural model for web design is proposed to answer the key question, in which the variable, the process of developing cross-cultural websites, and measurement criteria are identified, and two related testable hypotheses are generated. The first hypothesis is – that there are significantly different preferences for web interface design across cultures, and the local website audit will be constructed to test this hypothesis. Furthermore, it is questioned that, if the cultural differences (significantly different preferences) do exist, can those cultural differences be applied to improve web usability? Therefore, the second related

hypothesis is proposed - if the websites are embedded with culturally preferred elements and incorporated with their cultural dimension, it can be more effective in communication. To test the second hypothesis, a web experiment will be developed. Based on the two hypotheses, the proper methods, data collection instruments, and different data analysis methods are applied.

3 Cultural Models and the Existing Cultural Web Model

3.1 Hofstede's Cultural Model

According to Hofstede's [12] theory, culture can be defined as the accumulation of symbols, rituals, behaviours, customs, norms and values that distinguish a society. Symbols, heroes, rituals and values are four key terms of culture, values are the core of culture, and these terms can be applied by designers to formulate an approach to web communication. Hofstede [12] states that everyone carries their own patterns of thinking, feeling, behaviours which are accumulated from their lifetime, mostly learned from childhood. He defines the patterns of feeling, thinking, and acting as mental programs, and these vary as much as the social environments in which they were acquired. Hofstede examined IBM employees in 53 countries from 1978 to 1983. He defined patterns of differences and similarities among the replies of employees through statistical analysis of many valid data and formulated the five dimension culture theory from analysing these data. The five cultural dimensions are introduced as below.

Collectivism and Individualism Dimension. This refers to the extent to which the individuals incorporate with the group. Collectivist cultures (e.g., Taiwan and China) tend to prioritise group welfare over the individual's target. Individualistic cultures (i.e. USA, Australia) are inclined to lose ties, where everyone is expected to look after themselves.

Uncertain Avoidance Dimension. This refers to the degree to which people are comfortable with uncertain conditions. Cultures (e.g., Japan and China) with high uncertainty avoidance tend to be expressive, speaking with gestures and showing their emotions, whilst cultures with low uncertainty avoidance (countries like the USA and UK) tend to be less expressive and act without strongly showing their emotions.

Short and Long-Term Time Orientation Dimension. Long-term time orientation plays a crucial role in Asian countries (e.g., Taiwan and China) that have been influenced by Confucianism. People in these countries believe strongly that an unequal state of connection is required to keep a society stable, and virtuous behavior is identified as hard-working and perseverant. People in countries with short-term time orientation (e.g., UK and USA) tend to prefer the equal relationships.

Power Distance Dimension. Cultures with high Power Distance (e.g., Malaysia and Mexico) are characterized by hierarchies in organizations and autocratic leadership. On the contrary, cultures with low Power Distance (e.g., Austria and New Zealand)

tend to have characteristics such as more equal relationships between leaders and subordinates, and elders and youngsters.

Masculinity and Feminism Dimension. This refers to gender roles within a culture. Countries with Masculine cultures (for example, Japan) tend to present assertive, competitive qualities. On the contrary, countries with feminine cultures (e.g., the Scandinavian countries) tend to collapse gender distinction and present tenderness roles.

3.2 Hall and Halls' High and Low Context Culture

High context communication and Low context communication is defined by Hall [10] as, "A high context (HC) communication or message is one in which most of the information is already in the person, while very little is in the coded, explicit, transmitted part of the message. A low context (LC) communication is just the opposite". According to Hall and Hall [11], Kaplan [14], Chen and Starosta [4], and Choe [5], the attributes reflected in high and low context cultures are introduced as follows:

Communication Pattern. People from high context cultures countries are inclined to have more confidence in their non-verbal communication, and face-to-face communication is characterised by applying the non-verbal way for transferring meanings extensively. People from low context cultures are inclined to express meaning depending on content and the oral language.

Indirectness. People from high context cultures tend to use indirect and harmonious ways to communicate, whilst people from low context cultures tend to express themselves in a more direct way.

Thought Pattern. People from a high context culture tend to use an indirect strategy in their communication, usually not stating the subject directly. People from a low context culture have a strong belief that there is one objective truth which can be reached by linear exploration, so they want to meet their aims directly by applying logical thinking.

Polychronic & Monochronic Time Perception. People from high context cultures tend to be polychronic in time perception and think that everything will happen when the right time comes, whilst people from low context cultures tend to be monochronic in time perception and believe that executing a task on time..

3.3 The Existing Cultural Web Model – Theoretical Studies

Theoretical studies are constructed based on the existing cultural models. For example, Marcus & Gould [15] applied Hofstede's [12] five dimension cultural model to build up the guidelines for designing web interfaces for different countries, and outlines how these dimensions can influence components of a web interface design. Sheridan [18] also applied Hofstede's [12] cultural model to develop web interface design guidelines for localisation. Her guidelines are developed following the patterns of Marcus & Gould

[15] and predicted the tendencies of web interface design attributes in each cultural dimension. Reviewing the theoretical model built up by Marcus & Gould [15] and Sheridan [18], there is no user usability test from different countries to back up their guidelines and it is too stereotypical, with users from the same country not always conforming to Hofstede's model. Therefore, the validity of their model is questionable.

Gould, Zakaria, and Yusof [9] built up their research to compare the cultural orientations and design preferences for web interfaces between Malaysian and USA websites. Eventually they suggested design guidelines for cultural localization for Malaysia and USA based on using Hofstede's [12] cultural model and Trompenaars's [23] cross-cultural theory, but no usability test to support their claims.

3.4 The Existing Cultural Web Model – Experimental Studies

Experimental studies have been conducted using the existing cultural dimension model as a way to choose and identify samples by fitting them into a cultural category. Some empirical studies which adopt cultural dimension models are presented below.

Ford & Gelderblom [8] applied Hofstede's five dimension model to construct their empirical study. In their study, they examined whether the user's performance would be influenced by the culture variables. The results of this experiment did not provide enough evidence to support the hypothesis that cultural variables influenced the subjects' performance, but the performance levels gained revealed that the usability of the interfaces was increased for all of the subjects, as a result of incorporating the five cultural dimension attributes into the web interface design.

Smith et al. [20] constructed their study with target-culture users to determine the extent to which cultural factors influence the usability and acceptability of international websites. Based on Hofstede's [12] study of cultural dimensions, their experiment adopted the Taguchi method to investigate the differences between British and Chinese users' preferences and satisfaction within websites. Significant preferences between British users and Chinese users were found. They mentioned the preferences and perception, but did not state that satisfaction and perception were equivalent. The issue of performance was not considered in a usability test, with the focus on perception alone.

Simon [19] used Hofstede's [12] dimension as a method to examine the perception and satisfaction differences between the cultural groups and gender groups within different cultures. The analysis of this study indicates that there are differences between cultural and gender-based perception and satisfaction within different cultures. However, perception and satisfaction in this study were not defined very clearly.

3.5 The Existing Cultural Web Model – Synthesis Theoretical Works

Some researchers have seen the limitations of developing the current cross-cultural web model based on anthropologists' cultural models, so Zahedi et al. [25] and Sun [22] incorporated other theories into their cross-cultural web model. Zahedi et al. [25] combine the social construction theory with Hofstede's [12] cultural model to develop

their conceptual cross-cultural web design model. The aim of their conceptual model is to analyse how the cultural and individual factors impact on the effectiveness of web designs. They claim that their conceptual framework is for web design, but actually the propositions of their study just emphasises web documents whilst other important web interface characteristics are not considered. Therefore, doubt is cast over their conceptual model, and no usability test was constructed to conclude their propositions.

Sun [22] incorporated a dynamic process and changing variables by integrating the study from previous researchers such as Hofstede [12], Hall & Hall [11], Marcus & Gould [15], and Zahedi et al. [25], but there was no usability experiment to support his claim, and it is questionable whether to validate Sun's model for cultural usability. Jagne & Smith-Atakan [13] developed a strategy for cross-cultural interface design, which combines the theory of Hofstede, the design guidelines from Marcus & Gould [15] and Barber & Badre [1], but lacks an empirical study to support their model.

4 Formulating a Theoretical Model for Cross-Cultural Web Design

4.1 The Limitations of Previous Research

Reviewing the above existing cultural web models, there are some limitations in previous research. Bourges-Waldegg and Scrivener [2] have pointed out that the existing culture models are too general and not sensitive enough to the applied context of target-culture. Most of the existing models for web interface design are too stereotypical and lack usability tests to support their claims, and one of them (the model of Zahedi et al.) just focuses on web documents, ignoring the other crucial web interface design features.

Based on reviewing previous research and criticising the drawbacks of the current model, there is a need for a new model to fill the void. Therefore, a new theoretical cross-culture web design model is proposed. It is recommended that web designers and developers should be careful that the established cultural model might be too stereotypical and does not really fit the target culture market. As Del Galdo and Nielsen [7] suggested, the web designers should get involved into the target culture directly. In Sun's study [21], it is documented how culturally preferred design elements (cultural markers) such as visuals, language, colours affect web usability by interviewing target culture users about their experiences. Also Sun [22] declared that cultures continue to develop and interact, and they are not ontologically objective. It reminds web developers and designers to maintain practical observation of the target-culture users, because culture is constantly changing, particularly in the internet era.

To avoid being too stereotypical by applying the existing cultural model and to engage the target culture directly, this new model not only adopts the established cultural model, but also applies the "Cultural Markers" [1] approach to find out the culturally preferred web interface design attributes from the target culture. A new theoretical model of cross-culture website design is formulated (see Figure. 1). The new proposed model consists of four stages and will be introduced in detail below.

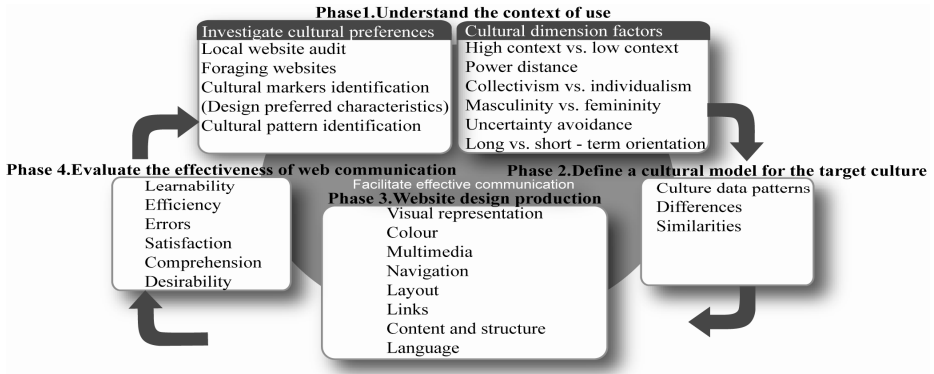


Fig. 1. Theoretical cross-cultural web design model

4.2 Understand the Context of Use

To understand the context of use, cultural models are incorporated and cultural preferences (cultural markers) are investigated. The concept of cultural markers [1] is adopted to define the web interface characteristics that reflect the signs and their meanings to match the expectations of the local culture audience. According to Smith et al. [20], to better understand how to create a website that is appropriately pitched to the target culture users, it is essential to examine the different signs or symbols (or visual representation) in a target culture, the usage of signs based on the context, and how the target culture audience interprets these signs. This can be achieved by conducting an audit of local indigenous sites. Thus, a local website will be established and comprises three steps shown below. Firstly, previous research involving cultural preferences is consulted, such as those of Barber & Badre [1], Sun [21] and Cyr & Trevor-Smith [6]. Secondly, observing the real features in websites that have been selected. Thirdly, Hofstede's [12] cultural dimension, Hall and Halls' [11] high and low context dimension, Marcus and Goulds' [15] cultural web model [15], and Würtz's [24] cross-cultural web model are incorporated, and web design characteristics (cultural markers) are identified by integration with the elements from previous research involving cultural preferences, as well as detailed inspection of the scope websites. Finally, the culturally preferred design elements are defined and comprise of eight categories: visual representations, multimedia, colour, layout, navigation, links, content & structure, and language. These elements are united to match the cultural expectations of the users from specific culture.

4.3 Defines a Cultural Model for the Target Culture

This stage defines a cultural model for the target culture and aims to identify and state a picture of differences and similarities in the observed attributes of the target-culture users' specific practice. The objective of this stage will identify the international variables needed to define a cultural model. The next step will compare and find out the similarities and significant differences in the response of the samples in order to create a pattern of the target-culture customers.

4.4 Website Design Production

Based on the results from Phase1 and 2, the website's prototype will be constructed, and the webpages will be embedded with the observed culturally preferred characteristics. The web interface's preferred design characteristics are categorised into several aspects such as visual representation, navigation, multimedia, colour, layout, language, interaction, and content and structure. This stage focuses on the production of the website's prototype.

4.5 Evaluate the Effectiveness of Web Communication

Reviewing previous research from Nielsen [16], Brink et al. [3], Preece [17], and Zahedi et al. [25], the components of web communication effectiveness can be derived from web usability. In order to measure effectiveness of each design, the evaluation criteria of web communication effectiveness are identified, which include learnability, efficiency, minimal errors, satisfaction, comprehension, and desirability. The assessment criteria are presented as follows:

- **Learnability:** Is it easy to learn? How quickly can new users learn to accurately execute the process of a task is determined by ease of learning. Usually, the fewer steps a procedure requires, the easier it is to learn.
- **Efficiency:** Is it efficient to use? Efficiency can be the assessment of the time or actions needed to carry out a task. The process of executing a task faster implies greater efficiency.
- **Errors:** Based on Nielsen [16], the evaluation criteria of errors is defined as, "users should make as few errors as possible when using computer system".
- **Satisfaction:** Is it pleasant to use? A user's perception of satisfaction can be influenced by visual graphics, layout, typography and other visual interface elements, so users' satisfaction is a combination of all of these criteria.
- **Comprehension:** Is it easy to understand? Is it readable?
- **Desirability:** Does it fit the expectation and preferences of users? The proportion of users who state that they would prefer using the web site over some specified website is used to evaluated the desirability.

Data are analyzed to modify the websites based on the results of the usability test (web experiment). A replicable process should take place subsequently by modifying the prototype website based on the results of the evaluation.

5 Conclusion

This model comprises four phases, and the process is replicable. In cross-cultural web design development, there needs to be a strong relationship between cultural theory and practical design approaches, so that an improved web product can be obtained by a replicable process of design, evaluation and reflection on theory.

This theoretical model is the initial phase of a multi-phase empirical research program, and the next step is to conduct the local websites audit to test the first related hypothesis, while a web experiment will be conducted to collect data, as well as data

analysis to validate this proposed theoretical model. A team should be organized for the localization within the target culture to meet the needs of the communication pattern from the target culture.

This model has the potential to contribute to the need of localization and help web developers and designers develop their web products as culturally appropriate.

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