



## Culture Centered Design: Reviews on Cultural Factors Influencing Interface Design Elements

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**Abstract** – Issues regarding misconception of the same piece of information are solicited from users with different cultural background and needs. Various efforts have been conducted to cater to such issue. However studies regarding cultivation of cultural elements in user interface design seem to be neglected. Numerous studies show that interface design preferences are related to the user's cultural background. Furthermore, studies of user cultural needs could enhance user's understanding and acceptance of the interface design. Thus, the purpose of this article is to review the cultural factors influencing interface design elements. Indirectly, it exhibits the concept of culture centered design.

**Keywords:** culture centered design, multicultural, user preferences, user interface, cultural factors.

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### Introduction

During the past decades, numerous studies have shown how user's preference profound impact in the area of human computer interaction. Interestingly, users can influence the acceptance and understanding of certain products (Alostath, Metle, Al Ali, & Abdullah, 2011; Jagne & Smith-Atakan, 2006). This results revealed that user elements are crucial in designing interface. More specifically, the needs of every user are vastly different and strongly related with their social cultural background.

In comparison with economic and environmental factors, cultural factors have been found dominating the study of human and machine (Lee, Kim, Choi, & Hong, 2010). Scholars have argued that culture is a major factor on how the users perceive their surroundings which show the differences in their pattern of thinking that can be seen in their language, food, artifact, behavior and fashion (Kluckhohn & Kelly, 1945). It is believed that users' preferences toward certain interface design are ultimately different and associated to their cultural background. The people who belong to the same cultural group perceive and process information in similar ways (Nisbett, 2004) which influence their acceptance and interaction with computers (Hisham & Edwards, 2007).

Culture Centered Design (CCD) is the design of the interface based on the background of the user (Shen, Woolley, & Prior, 2006). Such a study is widely known in developed countries; however, the such studies seem neglected in developing countries. Although various studies found user preferences differ according to their context (Callahan, 2005; Jagne & Smith-Atakan, 2006; Nielsen & Hackos, 1993), the majority of studies only focus on finding the differences at cross cultural level, especially between western and eastern countries (Jeon, Riener, Lee, Schuett, & Walker, 2012; Walsh, Nurkka, & Walsh, 2010). Therefore, CCD is known as an anchor to obtain the user's attention toward their product, and have been used extensively in numerous fields (Evers & Day, 1997; Ford & Kotzé, 2005). Hence, the awareness of the users' background is a key to retain the attention toward a certain product.

The aim of this article is to explore the cultural factors associated with interface design elements which consider users with different cultural backgrounds. This article is divided into four sections. Section 1 will focus on the importance of understanding user's cultural background while designing interface. Section 2 briefly reviews the related literature regarding culture in user interface design. Critical analyses of the cultural factors are discussed in Section 3. Finally, Section 4 concludes selected cultural factors influencing interface design elements.

### **Review of Culture Centered Design (CCD)**

This section reviews related literature on Culture Centered Design which contain several sub-section regarding the concept of culture, user cultural differences, importance and issues regarding CCD.

#### *Concept of Culture*

There are still disagreements on the concept of culture among scholars. In fact, culture has become a subject of interest among scholars from different fields that lead to various definitions. However various definitions of culture can be divided into two vast notions. The first notion describe culture as inherited through generation (J.R. Eshleman, 1985) while the other notion sees culture as a learned behavior through their social acquaintances (Banks & Banks, 1989; Herskovits, 1995; Linton, 1945). However the most often cited definition comes from Hofstede (1997) and to whom 'culture is the collective programming of mind'. Various other definitions also exist due to different areas of the researchers. Therefore, the definitions of culture are strongly related to the context of the studies.

The first notions believe that culture is passed through biological genes that can be seen in the similarity of characteristics between and among group members. The similarities come in term of their heredity behavior or their everyday practices or habits. It should also be noted that culture is a historical phenomenon, which is created and disseminated. The diffusion process resulting in the absorption of a good element is accepted by the group members and tailored to their existing system of life (Idris & Azzahra, 1996).

The other notions also have good evidence to show that culture is learned through their socialization with the environment, where the same group members shared the same activities and venue. They

influence the group members and come out with the shared meaning of culture for their own group. Daniels (2008) highlights that psychology pioneer Lee Vygotsky believes that the individual started socializing in their group of culture since birth and learned the values, beliefs and behave according to the respective cultural norms.

As regards multiculturalism where the same places are shared between different groups of people, they tend to tolerate the social meaning but at the same time protect their own traditions that are inherited from their ancestors. The social culture is shared and accepted as long as the ritual does not contradict their culture background. The possible explanation goes back to the basic tenet of culture – that their pattern of thinking is still associated with the biological genes but somehow influence by their social interaction.

#### *User Culture differences*

Several reviews on relationship between culture and human discovered that distinct group of people constitute the meaning of culture in their particular group (Marger, 2011). They possess the same set of culture element which can be manifested through their cultural traits. Indeed, this trait resembles in every group members, which can be seen vividly not only through their physical appearances but also through their pattern of thought and feeling (Harris, Moran, & J. Soccorsy, 1991; Parekh, 2005).

Addressing the differences among the group is the challenging process, because the traits are embedded in their personality; as a result, it would influence their reaction to certain stimuli. Hence, their differences and similarity may become the barrier to them if not resolve thoroughly (Hall & Hall, 1990; J.R. Eshleman, 1985). Members of common culture not only share information but also interpretation of that information (Hall & Hall, 1990). Hall and Hall (1990) are among the pioneer in cultural studies claimed that most of the communication are transmitted through non-verbal messages, not the language.

Thus, these differences indirectly lead to the existence of interface design issues especially for users with various cultural backgrounds. The differences should be put forward in order to avoid the occurrence of these issues regarding interface design.

#### *Issues of interface design regarding culture*

Currently, most of the technology based products are originated from western countries, consequently the designing process are based on European culture, whereby the need analysis of the products are focused to a targeted culture (Shen et al., 2006). This western sided interface evoke problem to the users in different context. This is supported by Nisbett (2004) whereby he emphasized that geographical differences causes Westerners and Asian think and perceive information differently. Similarly, Marcus (2005) also highlight how Asian prefers the image and graphical presentation, in contrast the European prefers textual information. Research by Shen et al. (2006) also shows similar results where the westerners prefer left to right, top to bottom layout, contradict with traditional eastern culture, they are familiar with right to left writing which influence their layout preferences. Comprehensive study by Noiwan & Norcio (2006) confirm that Asian websites prefer colourful and

animated interfaces in contrast with Europeans which are keen to use structured information web site. The above findings prove that different cultural backgrounds tend to have different perspectives, values and norms which influence their interface preferences (Jaramillo-Bernal, Collazos, Cauca, Arosemena, & Arteaga, n.d.; Reinecke, Bernstein, & Schenkel, 2010).

Recently Olaverri-Monreal & Bengler (2011) studies regarding Driver Information System (DIS) menu structure discovered that cultural based interfaces could alleviate complexity to provide better understanding. This finding is in line with Ford and Gelderblom (2003), indicate human brains are responsive toward certain stimuli which trigger their cognitive process. Cultural based interfaces attract the user to react to the stimuli which speed up the process. If the stimuli are not attractive to them, cognitive process automatically will be aborted. The studies within the same country also show similar reactions; differences in preferences of colors varies between regions in China, people from the north region prefer flashier colors while people from the south region prefer conservative colors. Research by Shen, Woolley and Prior (2006) result in the use of metaphors based on cultural characteristics could ensure the success of the application. As a result, the Chinese garden metaphor is used and exhibit positive outcomes for the users. Based on the above evidence, the process of synchronization between interface design and users' culture should be established at the initial stage. More specifically, it must focus on every feature of interface element.

While Ford and Gelderblom (2003) produce positive cognitive stimuli, however, O'Keefe et al. (2000) have different views where cultural based interface influence the behaviors of the users in the way they use technology. The pioneer in cultural research Hofstede (1997) claimed that every culture has a dimension index which will distinguish them from other cultural groups. The ways they behave toward technology are strongly connected with this dimension. For instance, behavior of internet users in Hong Kong and USA are radically different. Hong Kong users use internet as a hobby or as a medium of communication to strengthen their social relationship because Hong Kong is a collectivist country that is concerned about relationship and loyalty. Meanwhile America is an individualist country and use internet as a medium to get information (Hofstede, 1997; O'Keefe et al., 2000). The above proves that culture shapes technology (Leidner, 2006) due to the cultural traits in their personality which further influence the way they react.

Research in an eastern context shows similar findings where older adults are more attracted to their cultural based interfaces which focus on interface design elements to the atmosphere that they are familiar in order to overcome the technology barrier (Hisham & Edwards, 2007). Research on older adults in Malaysia discovered that cultural based interfaces attract and encourage users to use applications. Likewise research by Nordin & Singh (2011) investigated various cultures using directional kiosks discovered that there are differences in preferences toward interface design between users with different cultural backgrounds. Again study by Harn, Khatibi & Ismail (2006) reveals that only one ethnic group are keen to do online shopping in Malaysia.

In sum, all the issues discussed above prove that lack of understanding of the users' cultural background might impose interface design issues. Furthermore, it triggers the concept of CCD.

### *The Importance of CCD on the Interface Design*

The relationship between culture and user interface design has been discussed rigorously in the related literature since several decade ago (Aladwani, 2013; Ford & Kotzé, 2005; Grudin, 1993). As such these studies are still ongoing; scholars tend to explore the cultural influence in the choice of user interface design. Indeed, interface design elements are the prominent factors which bridge the gap between the user and product. Due to that, this study is important for interface designers in order to increase user acceptance and satisfaction. If the designers accidentally miss out user's cultural background in the designing process, it could lead to negative consequences toward certain product.

There are consensus among scholars that lack of understanding on the user's background could lead to wrong interpretation of information (Harris et al., 1991; Nazir, Enz, Lim, Aylett, & Cawsey, 2009). Therefore, CCD is very pertinent to cultural based research in order to focus the design on the user's cultural background which can further explore their cultural requirement and needs (Dormann, C., & Chisalita, 2002).

This article investigates and propose user interface design elements regarding the cultural differences of the user. The specific objective of this article is to determine the interface design elements that solicited with the various cultural backgrounds of the users.

### **Method and Selection Procedures**

This study determines interface design elements that are involved in cultural studies which will be further discussed in the next sub-section. Table 1 shows the procedures of selection. Similar approach was used by Lee et al.(2010) to find the relevant literature.

*Table 1: Procedure of Selection.*

<b>Procedures</b>	<b>Explanation of the procedures</b>
Article selection	Find the respective article associated with the cultural interface design research.
Interface Element Selection	Finding the prominent interface element utilized in the study.
Cultural Interface Element Characteristic	Detailing of the characteristic for every selected interface element.

### *Article Selection Process*

To determine interface design elements that solicited with the various cultural backgrounds, fifteen (15) research papers were studied thoroughly. The selected research articles are based on the following criteria:

- Research paper between years of 2003 – 2015: More than a decade (2003 – 2015) of research article is selected through university database journal. Comparison of this article is crucial in order to find the trend of cultural based research in the area of interface design elements throughout the years.

- Cultural interface design differences: The articles are further studied to include only the research that focuses on interface design that are aimed for various cultural background.
- Eastern and Western countries: The domains of the research include the cultural differences between region, countries and within the same country.
- International and ethnic differences: Cultural differences in the study inclusive of finding regarding cultural interface design elements at cross and inter cultural level.
- Keyword search: Several keyword searches were used while browsing for the article to control the searching process; culture differences, ethnic, international, similarities, interface pattern, multiculturalism, cross cultural, inter cultural, interface design preferences and cultural user interface.

Fifteen (15) research articles are shown in Table 2 which exhibit cultural differences and cultural interface design elements utilized in their studies respectively.

*Table 2: Cultural Differences Research Paper.*

<b>Author</b>	<b>Cultural Differences</b>	<b>Cultural Interface Design Elements</b>
Marcus 2005	International	Metaphors, Mental Model, Navigation, Interaction, Layout
Myers & Tan 2002	International	Hofstede's 5 Dimension
Cyr & Trevor-Smith 2004	Germany Japan US	Language, Page Layout, Content Structure, Symbol, Navigation, Link, Colour, Multimedia
Jagne & Smith-Atakan 2006	Asian African Caucasian	Colour, Metaphors, Symbol, Page Layout, Visual Appearance, Language
De Troyer et al. 2006	International	Image, Symbol, Logo, Colour, Layout
Shen et al. 2006	Taiwan	Icon, Metaphors
Tong & Robertson 2008	Malay and Chinese	Language, Layout, Symbol, Colour, Sound
Walsh et al. 2010	India, China, USA, UK	Usability, Aesthetical Aspect, Subjective Feeling, Satisfaction.
Olaverri-Monreal & Bengler 2011	Germany, UK, France, Spain, USA, Japan	Navigation
Reinecke et al. 2010	Rwanda, Switzerland, Thailand	Display Density, Navigation, Help, Color, Saturation Image To Text Ratio, Help
Alostath et al. 2011	Kuwait, Egypt, UK	Language, Metaphors, Mental Model, Navigation, Interaction,

Daniel, Yinka, Frank, & Adesina, 2012	International	Color, Metaphor, Language, Icon, Layout
Rimondi 2015	International	Language, graphics, layout and colors
Alhendawi & Meyer 2015	Germany	Metaphors, Mental model, Navigation, Interaction and
Lachner & Saucken 2015	Australia, China, Germany, and	Cultural marker: colors, graphics, and text

From Table 2, most of the studies are focused at finding the differences at cross cultural level involving region or countries, meanwhile the studies at inter cultural level are seem to be rare. For cultural research that aims to discover difference variables between two or more culture, usually involve three levels: cross cultural, inter cultural and intra cultural. This level have been discovered since several decades ago by psychology expert in cultural research; Georgas and Berry (1995), then it was further utilized by Asma (1996) to elaborate the concept of culture in the eastern context.

#### *Interface Design Element Selection*

Interface design elements utilized in the study can be grouped into four different aspect which are visual representation, navigational, aesthetical, and page arrangement(Marcus, 2011). However to clarify the detail of interface design elements that have been employ, this study use cultural markers suggested by Barber and Badre (1998), due to the detail in his marker and it has been used extensively in several cultural based studiesfor interface design (Callahan, 2005; Jagne & Smith-Atakan, 2006).

*Table 3: Culture Element*

Cultural Element	Frequency	Proposed	
		Cultural Element	Frequency
architecture	4		
color	11	Color	15
color combination	4		
flag	1		
font	2		
geography	3		
grouping	7	Page	7
html specific	5		
metaphors	9		
icon	5	Images	20
symbol	6		
links	4		
language	9	Language	9
orientation	4		
regional	2		
shapes	1		
sound	3		

specific color	1		
navigation	9	Navigation	9

Based on the Table 3, occurrence for the cultural elements in related studies are recorded. In this study, five elements were proposed to be the cultural interface design elements: colour, navigation, page layout, images and language.

*Interface Element Characteristic*

The proposed cultural elements are further studied to find the interface design characteristic. The characteristic of every element are derived from Research Based Web Design and Usability Guidelines (Leavitt & Shneiderman, 2006) and Marcus & Gould Interface Guidelines (2000). Based on these guidelines, characteristic of every element are further investigated to determine the applicable and characteristic which influence the users with various cultural backgrounds. The discussion begins by critically reviewing each element that justifies the selection of these factors. Hence, characteristic of every element are listed in Table 4.

- **Color**

Color is a crucial interface design element because it provide visual representations of the interaction (Daniel, Oludele, Baguma, & Weide, 2011). Color can give different meaning throughout the world. Red which signifies as a color of luck and happiness in China bring different connotation throughout the world. Red is the color of anger in Japan, the color of death in Egypt and the danger for America. Color also related to the religious, green is the Islamic color, meanwhile red, black and white signifies the Christians, and yellow represent Buddhist (Shen et al., 2006). Based on the literature regarding the preferences of color can be seen in the interface design of webpage involving the various cultural backgrounds. Western countries keen to use simple webpage background, in contrast eastern country prefer colorful background.

- **Navigation**

Navigation includes all navigational features in the web page. Research by Juric, Kim & Kuljis (2003) show how the use of link in the page are vary among different cultures. Some users are interested to the word-based links, while some user prefers image links. Navigational features have an efficacy to promote ease of use in a website. This feature helps user to move around, as a consequence if the interface is not familiar to users, they will be lost. Numerous studies discovered navigational and arrangement of the page are closely connected with the direction of writing and reading in their culture. Arabic countries are used to right to left writing style prefer direction of navigational according to their writing style. In similar vein, Taiwanese are used to top to down reading style prefer top to down navigational arrangement (Aykin, 2009; Marcus & Hamoodi, 2009).

- **Language**

Language in this study is inclusive of all type communication used to display information. Language is a compulsory in cultural research because every user practices own language to impose a communication. Language might impose certain issues if the targeted users are not defined correctly in the designing process which leads to miscommunication. Callahan (2005) focus on language barrier on university website discovered multicultural countries tend to use multiple language to cater students with various cultural background. Interestingly, the use of native language may bring the respect toward certain product, furthermore trigger the sense of belonging (Wallace & Yu, 2009).

- **Page Layout**

Page layout is the process of placing and arranging artwork, text, navigation in the page. Layouts of the page may vary across culture. Marcus (2005) discovered in his study, eastern countries prefer massive information which include all interface design in a single webpage. Similar finding by Tong and Robertson(2008)discovered that position of the menu items are vary across culture. Noiwan and Norcio (2006) found the users in developing countries are attracted to the animation features, in contrast users in developed countries prefer still information. Good arrangement of the layout could enhanced better understanding to the targeted users.

According on the critical review of each element, characteristic of every element are listed in Table 4 based on Shneiderman & Plaisant (2010) and Marcus (2011). These characteristics will elaborate the features of cultural interface design elements as shown in Table 4. Each one of these characteristics has strong impact towards culture based preference regarding interface design elements. Indirectly interface designers should cultivate culture centered design through combination of these characteristic in order to fulfill preferences of users with diverse cultural background.

*Table 4:* Characteristic of every element based on(Marcus, 2011; Shneiderman & Plaisant, 2010).

<b>Language</b>	<b>Page Layout</b>	<b>Navigation</b>	<b>Images</b>	<b>Color</b>
Language use	Banner	Navigation	People	Page
How many language	Menu	tool	Building	Background
The dominant language	Logo	Menu	Images	Header
	Title	Link Type	Description	background
	Search	Link Open	Types of	Title Text
Translation available	Menus Type	Link Clues	Images	Body Text
	Menus Position	Link option	Organization	Link
Headlines	Use of Frames	Link choice	Stamp	Menu color
Point form	Static Banner	access	Ratio of Image	Banner
Paragraph	Arrangement	authentication	people to	Dominant
Live Chats	Page	Return home	building	Color
Official Slogan	Orientation	button		
Orientation of Text	Page Length	Keyword		
	Total amount of	Search		

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Speech	item in home	Scroll Bar
Topics	page	
	Display Density	

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### Conclusion

Interface design based on cultural background could reinforce the relationship between human and machine. Hence knowing as much as possible about users is a one key premise to ensure the cultivation of culture centered design. This article provides an insight of interface design elements which are closely connected to user with various cultural backgrounds. Cultural Marker suggested by Barber & Badre (1998) was used as a guideline to find the occurrence cultural interface design element in selected research article between the years of 2003 – 2016.

The future research will involve finding specific pattern of preferences among users toward certain interface design based on the characteristic of selected cultural elements. Five interface design element are selected to be cultural element of user interface design which will be used in the next stage to find the cultural marker in the Malaysian context. It would involve 3 phases: (a) sample website selection based on selected websites based on certain distinct characteristic of cross cultural context in Malaysia (b) website pattern identification and (3) website pattern analysis.

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