

# Cross-Cultural User Experience Design Helping Product Designers to Consider Cultural Differences

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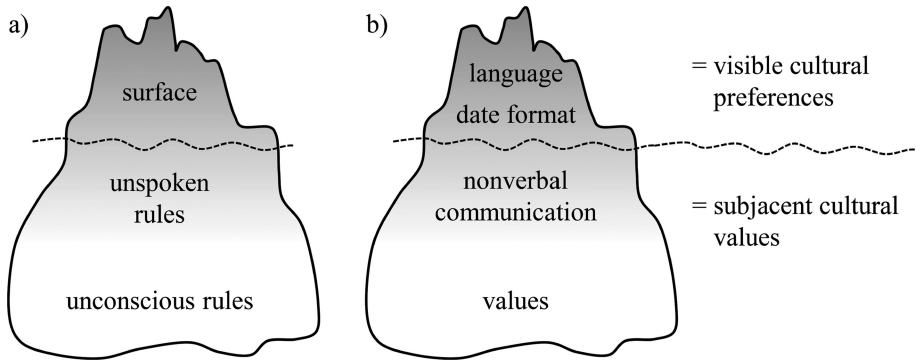
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**Abstract.** User experience (UX) designers aim to create a product that causes a pleasant emotional reaction in order to generate an enjoyable memory. However, emotions are subjective and diverse because of cultural differences. As a consequence, cultural differences in UX design are often considered only as theoretical exercises. In this paper, we aim to bridge the gap between theoretical cultural studies and practical application. We analyze established cultural dimensions as well as notes from observational studies, business presentations and ethnographic interviews. Finally, we present “Cultural Personas”, application-oriented tools that characterize derived cultural differences. That supports designers to consider a culturally sensitive UX and thereby to develop better, more enjoyable products.

**Keywords:** Country culture · Cross-cultural design · Cross-cultural evaluation · Personalities · Psychology · Personas · Storytelling

## 1 Introduction

Users’ experiences are embedded in a specific social and cultural context, including associated emotions, expectations, and individual preferences [1]. For user experience (UX) designers these contexts are difficult to anticipate as they are biased by their own culture, whereas considering cultural differences is crucial to design better products in globalized markets [2]. Culture is a commonly used term with a variety of characterizations and descriptions. Definitions range from the collective knowledge and associated behavioral patterns within national, ethnic or regional groups to a population’s field of action, containing objects, institutions, ideas, and values [3]. An established definition from Hofstede [4] describes culture as intellectual programming of peoples’ minds. However, the field of UX design misses effective tools that support a systematic approach to consider cultural differences in design processes and faces the challenge to incorporate such tools in organization frameworks [5].



**Fig. 1.** Iceberg model (a) from Hoft (1995) and (b) associated UX characteristics

Hoft [6] suggests the use of descriptive models to provide a better understanding of cultural characteristics and presents the cultural Iceberg model. Analogous to an ice-berg (Fig. 1), where approximately only ten percent is visible above the water surface, this model states that only ten percent of cultural characteristics, such as date formats or language, are easily recognizable. Consequently, ninety percent of cultural characteristics, such as nonverbal communication or values, are difficult to identify and easy to ignore. The cultural Iceberg model provides the basis of understanding for analyzing existing research projects and for the traceability of our approach.

In this paper, we aim to bridge the gap between theoretical cultural studies and application to support a culturally sensitive UX design practice. Based on the cultural Ice-berg model we analyze established cultural dimensions as well as notes from field observations and interviews to address subjacent cultural aspects such as unspoken and unconscious rules. We present “cultural personas” – application-oriented tools that are inspired by traditional personas and support designers during the development process to localize their product in order to design for a better UX.

## 2 Related Work

Previous research works already investigate how cultural differences should be considered in UX design processes. Most of them base their approaches on cultural dimensions, mainly addressing visible cultural preferences on a culture’s surface (Fig. 1). The following section defines cultural dimensions and provides an overview over existing cross-cultural design approaches identifying the research gap for this work.

### 2.1 Cross-Cultural Design Approaches

The influences of cultural differences on a product’s user interface have already been taken into account in academia and industry. In interaction design, it goes all the way back to Apple’s Macintosh Human Interface Guidelines [7]. With a focus on the visible

user interface these guidelines state that the use of colors, graphics, and text have to be localized for different geographical regions.

Barber and Badre [8] focus their investigation of cultural differences on website design and describe such culture-specific elements as “cultural markers”. Cultural markers influence a user’s performance and consequently a product’s usability. Barber and Badre [8] summarize their characterization by the term “culturability”. Besides colors and graphics, the Localization Industry Standards Association [9] broadens that perspective and mentions linguistic, physical (e.g. modification), business (e.g. currency), and technical issues to be considered in product design. These perspectives only consider visible aspects of a product’s design. Unconscious aspects, such as attitudes and values, are not considered.

Researchers base their work more and more on cultural dimensions in order to respect cultural differences in UX design (Fig. 2). Existing approaches either focus on a specific use case, a theoretical framework or analyze visible cultural preferences, neglecting subjacent cultural values.

Hsieh [10] evaluates visible cultural preferences on websites based on cultural dimensions for the specific use cases in Australian and Taiwanese contexts (Fig. 2a). Eune and Lee [11] analyze subjacent cultural values with respect to usage patterns and user perceptions of mobile phones (Fig. 2d). In contrast, Zakour [12] provides a conceptual model based on the technology acceptance model (TAM) while Eugene et al. [13] present a cultural relevance design framework. However, both approaches illustrate cultural differences merely theoretically (Fig. 2b/e). Liu and Keung [14] link cultural dimensions to a website’s user interface elements and provide a tool to be used by website designers – considering usability aspects but without subjacent cultural values (Fig. 2c).

## 2.2 Research Gap and Research Question

We identified a number of research approaches that explore cultural differences in UX design by presenting use cases or by providing a rather abstract theoretical framework. Application-oriented tools to support designers only consider usability aspects, thus remaining at the visible surface of the cultural Iceberg Model. In conclusion, there is

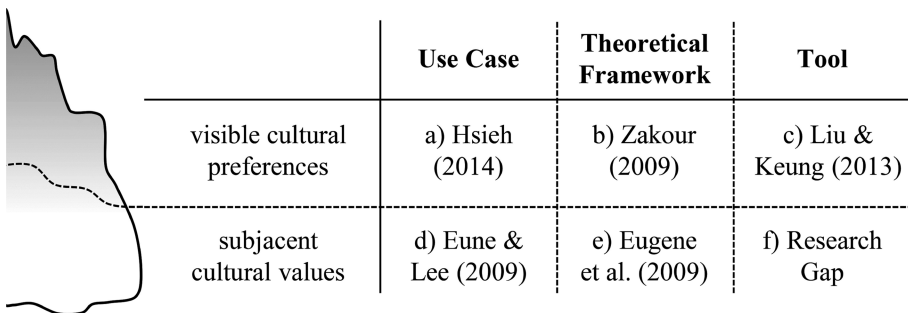


Fig. 2. Cross-cultural design studies (a–e) and research gap (f)

a research gap in self-explanatory tools considering subjacent cultural values being easy to use – such tools are highly appreciated by industrial designers [15]. In this paper, we address this gap by presenting an application-oriented tool that enables designer to effectively consider subjacent cultural values in UX design (Fig. 2f). We address the research question how we can help designers to consider UX-related cultural values in UX design processes.

### 3 Research Methodology

The goal of this research is to help designers to consider UX specific cultural differences, thus bridging the gap between theory and practical application. Therefore, we follow a two-step approach to gather relevant data. Firstly, we took notes during business related industry presentations, and conducted field observations and interviews (Sect. 3.2). Secondly, we supplement this qualitative data with culture-oriented literature review (Sect. 3.3). To ensure a structured approach we base our data collection and analysis process on the customer experience interaction model (Sect. 3.1).

#### 3.1 Customer Experience Interaction Model

We take the customer experience interaction model (CEIM) as the background for our understanding of UX (Fig. 3). It provides a holistic view on the interaction of users

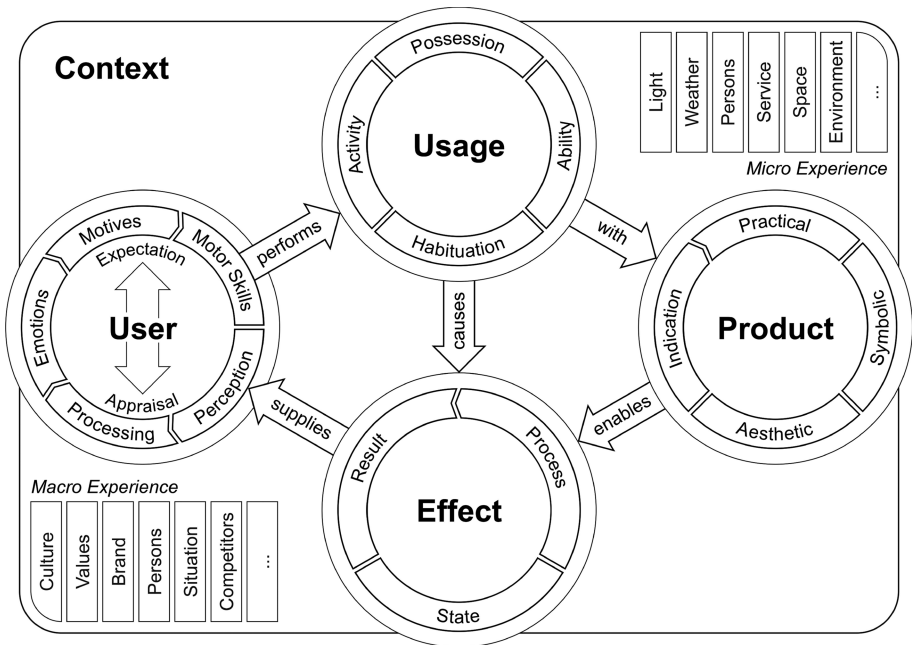


Fig. 3. Customer experience interaction model CEIM [16]

with products. CEIM incorporates different relevant models and views from the disciplines of engineering, human factors, industrial design and psychology [16].

CEIM is based on the block diagram of human machine system [17] – a classic ergonomics perspective with the goal to improve the working task fulfillment by adapting the machine, its interface and the environment impact to the user’s capacity. It focuses the human machine interaction with relevant parts (sensory organs, muscular system and user interface). Since UX requires a stronger consideration of the human perception and processing, CEIM details the user element by emotions and motives [16].

CEIM enlarges the classic functional understanding of products by indication, aesthetic and symbolic aspects. UX is more than just fulfilling tasks in a most efficient manner. The emotional value and experience by using an expensive sports car can be the result not only of great driving properties (practical function) but also of the pleasant exterior and interior design considering shape and materials (aesthetic function) as well as the prestige through product and brand (symbolic function) [16].

The UX caused by the user-product interaction is highly dependent on the surrounding context: The micro experience context represents the physical environment that rather disturbs the interaction: light, weather or space conditions. By contrast, the macro experience context stands for the social surrounding impacting the reflective UX. It represents the culture, society and corresponding values the user is embedded in.

In this work, CEIM serves as a basis for systematically classifying the following research findings, observations and interview data in an UX framework.

### 3.2 Qualitative Data Collection

In this work we look at UX related cultural differences of Australia, China, Germany, and Vietnam. In order to gather sufficient data we base our qualitative data collection process on three sources: business presentations, field observation, and ethnographic interviews. The goal of this data collection process is to gather personal experiences and stories of individuals in foreign countries. CEIM serves as the theoretical basis for the data collection methods and supports the consideration of UX related experiences.

First of all, the **business presentations** were part of a study trip organized by the Bavarian Elite Academy with companies like BMW, Siemens, Bosch Siemens Hausgeräte, T-Good, Linde, etc. These presentations consisted of talks by respective industry experts. They shared personal experiences and their opinions about differences in Germany, China, and Vietnam regarding business activities, lifestyle, and products. Statements and observations were gathered by note taking. To ensure the validity of this approach only statements that described the personal opinion of the presenter or statements that were underlined by a specific example have been noted. Thus, generalizations and evaluations of single circumstances have been left out.

**Field observation** represents the second method to gather qualitative UX-related data. Observations were conducted in Australia (Melbourne and Sydney), China (Beijing, Qingdao, Nanjing, and Shanghai), and Vietnam (Hanoi). Based on the CEIM categories the objective of these observations was to recognize and note specific

incidents regarding human behaviors, human-product interaction, product appearances, and environmental aspects, that seemed to be unusual or unexpected from the author's perspective. Having identified such an incident the situation was initially and retrospectively recorded in detail using Excel.

In order to avoid subjectivity and ensure validity of the qualitative data the industry presentations and field observations have been complemented by **ethnographic interviews**. Therefore we conducted 10 interviews, via Skype or in person, each about 45 min, with participants (9 Ph.D. students and 1 professor) from in total 5 different countries. The interviews were semi-structured with a certain amount of key questions based on the CEIM sub-categories. Focus of the interviews was to identify and discuss situations that contained unusual situations or interactions in foreign countries. Therefore, the participants were asked not only to explain but to compare recognizable situations with their home country or other countries. Thus it was possible to avoid a judgmental bias of specific cultures. In total the 10 participants were able to describe situations in about 10 different countries with a clear focus on Australia and Germany. All interviews have been recorded, transcribed, and analyzed together with the notes from the presentations and observations following a structured analysis process (Sect. 3.4).

### 3.3 Cultural Dimensions

Cultural dimensions are independent characteristics that describe a culture's preferences to answer basic problems that are common to all societies [4], such as the relation to authority or the relationship between the individual and the society [18]. The main application of cultural dimensions is to distinguish cultural differences at a national level [19].

Hofstede [4] describes five established cultural dimensions: **Power Distance** (the extent of inequalities and hierarchy that a society tolerates), **Uncertainty Avoidance** (the level of stress that is caused by unclear and ambiguous situations), **Individualism versus Collectivism** (how strong individuals are integrated in and feel responsible for a social group), **Masculinity versus Femininity** (the degree of differentiation of gender roles), and **Long-term versus Short-term Orientation** (the preferred focus of people's time orientation, on the future or the present). These dimensions are widely used and recognized in cross-cultural research projects due to Hofstede's extensive survey [12]. Therefore, they provide an ideal basis for the underlying research question.

In contrast, Edward T. Hall presents the following cultural dimensions to describe general cultural differences: **perception of space** (the physical distance that is perceived as comfortable) [20], the **context of communication** (whether communication is rather implicit or explicit, designated as high-context or low-context cultures) [21], and the **perception of time** (cultures that prefer to complete one task or more tasks simultaneously, designated as monochronic or polychronic cultures) [22]. Hall's dimensions represent the second set of dimensions that is commonly used in cross-cultural studies, as these dimensions are also more focused on human values than general beliefs [12]. Consequently, these dimensions, the context of communication

and the perception of time in particular, represent a sensible supplement to Hofstede's dimensions for our research approach.

Kluckhohn and Strodtbeck [23], Trompenaars and Hampden-Turner [24], and Schwartz [25] have presented further cultural dimensions. These dimensions do not distinctly differ from Hofstede's and Hall's dimensions, besides their naming [12]. In general, these dimensions also represent a society's overall problems, describing the relationship between humans, between humans and the environment as well as the perception of time and space. Consequently, in cross-cultural design these dimensions are usually only used to describe certain dimensions more detailed.

### 3.4 Analyzing Cultural Differences

We base our analysis on the structuring content analysis according to Mayring [26] to derive UX-related cultural differences from the underlying variety of diverse statements. The structuring content analysis is used to find similarities within documented communication and to derive strategies or measures of actions related to this communication [26].

Our analysis process follows the steps of the structuring content analysis: Initially, a category system has to be elaborated to structure the gathered statements. In this project, we choose the existing CEIM categories as it holistically describes UX and has already been used as a framework to effectively structure and conduct the described field observation and qualitative interviews.

Secondly, all of the notes from the presentations and the field observations as well as relevant statements from the interview transcripts are assigned to one CEIM-category and an associated sub-category. Following this process, 599 allocations have been assigned based on the notes and transcripts using Excel. Within these 599 allocations some statements are listed more often as multiple assignments are necessary for statements that suit to several categories.

Thirdly, the categories and sub-categories provide the basis to paraphrase the assigned statements. By paraphrasing the statements they are broken down to the basic message and are easier to understand and analyze. Finally, we looked at each category and sub-category to identify cultural differences and similarities. Thus, we were able to derive culture specific UX design characteristics, which are presented in the following section.

## 4 Results

In order to bridge the gap between the theory and practical application, the results from the literature review, e.g. evaluation of cultural dimensions, and analysis process get translated into an effective tool. Firstly, the following section describes the identified UX-related differences between the countries Australia, China, Germany, and Vietnam. Secondly, we discuss the "Cultural Persona" as a practical tool for developers and designers. Thirdly, there is a short discussion about possible areas of application within the product creation process.

## 4.1 Cultural Differences in User Experience Design

In this work we focus on the countries Australia, China, Germany, and Vietnam. This is due to the facts that most qualitative data was gathered within the interviews targeting these countries as well as that general conditions allowed the conduct of field observations in these countries and enabled the participation in industry presentations in China and Vietnam. The cultural dimensions represent the theoretical basis for this research project. The cultural scientists Hofstede and Hall describe established and suitable dimensions for UX design processes.

Hofstede et al. [18] explicitly describe the characteristics of more than 75 countries, including our target countries. They identified Australia and Germany as rather individualistic (personal achievements are important) and as countries with a rather low power distance (equalized distribution of power) but higher uncertainty avoidance (unknown circumstances are avoided). China and Vietnam show opposite results in these dimensions. Besides Vietnam, a feminine country (more consensus-oriented), Australia, China, and Germany are labelled as rather masculine (preference for material rewards). With regard to time orientation, China and Germany focus more on the future (long-term orientation) whereas Australia and Vietnam are described as short-term oriented (values are related to the past).

Hall [21, 22] does not provide explicit country information in his work. With regard to his dimensions context of communication (Contextuality) and perception of time (Time Perception), western-oriented cultures can be described as low-context (communicators are expected to be straightforward, concise, and efficient) and monochronic (time is perceived in a linear fashion, one thing after another) cultures, Asian cultures as the opposites: high-context and polychronic.

In addition to the comparison of established cultural dimension the analysis of the notes from the industry presentations, field observations, and transcribed interviews provide valuable insights in UX-related cultural differences. The identified aspects in this step of our research focused on general UX-related differences as illustrated in CEIM (Sect. 3.1). For each country five noticeable aspects have been derived from our data. In the following each aspect is stated and briefly described by mentioning an associated note or quote from our qualitative data set:

- **Australia.** People in Australia pay attention to their identification and an affiliation to a social group (“Every Australian I have talked to said the Victoria Bitter is kind of the student beer, you drink it because you are a student”), they prefer a trendy design with themed or unique features (“Buildings often have a fancy facade in Melbourne”) as well as regulations and simplicity (“It is obligatory to wear a helmet when you ride a bike”). Australians are laid-back (“I don’t think I have experienced such hospitality like that in any other place”), their lifestyle is influenced by living in a rather removed area (“Everything in general is more expensive”).
- **China.** Chinese people pay a lot of attention to avoid conflicts (“Emotions are rather withheld emotions to save their face”) and personal relationships are very important to them (“Food and drinks are always shared within the group when you are in a restaurant”). In general people in China appreciate a flashy, expensive



looking design (“Our products in China a very colorful and bigger”) and place value on a product’s first impression (“Almost every present you received was very much as you say, nicely packed”). Environmental and social differences however make China a very diverse country (“China is like many countries in one”).

- **Germany.** Germans appreciate functionality (“In Germany the aesthetics are strongly related to the technical features of a product”) and prefer high quality products (“Germans rather spend a little extra and it might not look as fancy but it will work better for a longer period”). Germans put a lot of value on individualism (“In Germany it was not about the brands it was about the look”) and appreciate efficient processes (“The size of the country and how everything is compacted into it is very obvious”). Although relationships are important for Germans they are in general initially reserved towards strangers (“You really have to make a real big effort to become a part of a community”).
- **Vietnam.** Superstition (“A fortune-teller had to approve our office floor plan”) and social conditions (“The differences between public and private hospitals are immense”) have a great influence on the Vietnamese lifestyle. They have a strongly anchored Vietnamese culture (“Radio stations mostly play Vietnamese songs”) that is more and more influenced by western values (“Young Vietnamese define status by having an iPhone and a Honda Airblade”). While the daily routine in Vietnam is rather hectic, Vietnamese are usually quite relaxed and friendly (“Nobody gets angry when you ignore their right of way”).

## 4.2 Cultural Personas in Design Process

Personas are mainly used to support a designer’s focus and by providing a common basis for communication [27]. They help to create a mutual language, to create empathy towards the user and thus to make better decisions [28]. Consequently, personas are usually created within a specific design project with specific requirements for a defined target group. However, our cultural personas have been created independently from any product or design project.

From our perspective they serve three different needs along the product development process: (1) Cultural personas can provide a basic understanding in target group definition and requirements engineering. At this stage of the development process a design team can identify suitable target markets by matching product characteristics with cultural UX-preferences. (2) Designers can adjust or add product features or characteristics to suit cultural regions, i.e. localizing a product. Localizing products and services is an important factor based on an ongoing trend towards globalization [29]. (3) Cultural personas provide a basic understanding in cultural differences and a basis for a shared communication regarding cultural aspects in UX design. Especially in time consuming design processes it is difficult to develop cultural knowledge from scratch but cultural personas can help to consider cultural differences to design better products.

### 4.3 Cultural Persona Form Sheet

The cultural persona is a two-page document containing a theoretical basis derived from suitable cultural dimensions and the findings from the qualitative data analysis (Fig. 4). The results are illustrated in three blocks – from general to detail.

Firstly, the cultural dimensions by Hofstede [4] and Hall [20–22] are presented to get a feeling for general preferences, values and characteristics of the culture. We illustrated the selected dimensions with slide controls to indicate that each manifestation is rather a tendency than an absolute value. Moreover, the dimensions were renamed to avoid scientific abstractions and enhance their comprehension, e.g. Hofstede’s [4] dimensions “femininity vs. masculinity” is named “motivation” as it describes what people drives. A brief description and a graphic icon explain the dimensions’ tendencies.

Secondly, the findings of the qualitative data analysis are shown below the cultural dimensions. Every country’s specific characteristics are symbolized by an icon and illustrated by three associated quotes from the interviews or observational notes. Thirdly, two personas per country summarize relevant cultural characteristics to enhance a designer’s comprehension. We based the creation of these personas on the approach of Adlin and Pruitt [28] and included a photo, a distinctive quote as well as information about the persona’s personal life, the environment, and likes/dislikes. We filled this data set with the results from the analysis (Sect. 4.1) as well as with information from the analysis of the cultural dimensions. Furthermore, we included two



Fig. 4. Cultural persona form: front page (left) and reverse side (right)

quantitative aspects, such as the population or age distribution, from CIA's World Factbook [30] or Think with Google [31].

## 5 Conclusion and Limitations

We discussed the customer experience interaction model (CEIM) that provides a holistic perspective on user experience (UX) and allowed us to systematically gather and analyze observable experiences. We did that based on statements and stories from industry presentations, field observations, and interviews. Our intention was to identify subjective experiences representing UX-related cultural differences. Thereby, we gathered data for evaluations regarding the countries Australia, China, Germany, and Vietnam. In addition to this qualitative data collection, we reviewed and compared established cultural dimensions, particularly from Hofstede [4] and Hall [20–22].

Both, the insights from our literature review and qualitative data analysis, provided the basis for the creation of cultural personas. A cultural persona is a two-page tool that contains culture-specific and UX-related country information and is illustrated by two fictitious, representative individuals per country. This tool can be used to communicate and understand cultural differences in the entire product development process and to identify and implement culturally sensitive product aspects.

With CEIM and the analysis approach of Mayring [26] we created a structured framework for this research project. However, we were only able to gather enough data for four countries, whereas further investigations can provide supplementary insights in UX-related cultural differences regarding other countries. Furthermore, the whole research was conducted from a western perspective while additional insights from researchers with other cultural backgrounds can complement and adjust the developed cultural personas. Moreover, it must be tested in development projects to see if they serve their aspired objectives. It has to be particularly evaluated if the presentation of only two personas is sufficient to take cultural differences in UX design into account. A web-based version of the developed cultural personas can thereby support the distribution and modifiability of the tool.

All in all we, see cultural personas as a top-level tool that enhances the understanding and communication in UX design processes and allows designers to consider UX-related cultural differences to create culturally targeted, hence better products.

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