A Cross-Cultural Study of How Usability Professionals Experience the Usability of Everyday Systems

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Abstract
Culture influences many aspects of the design and use of computer systems; understanding better this influence on their own thinking may benefit usability professionals who do cross-cultural usability work. Using Kelly's notion of personal constructs, we focus on one mediator of culture: how individuals interpret the world in terms of their own set of constructs. We conducted 24 repertory-grid interviews with Chinese, Danish, and Indian usability professionals about their experience with systems they use often. The results show that while fun seems important to all the usability professionals in the study, their understanding of fun systems differs across cultural backgrounds. Also, easy-to-use and useful systems are perceived as being similar or different depending on the usability professional's cultural background. Most other cross-cultural differences relate to categories of construct not included in conventional usability definitions.

Keywords
Cultural Usability, Repertory-grid Technique, Usability

ACM Classification Keywords
H5.2 User Interfaces – *interaction styles (e.g., commends, menus, forms, direct manipulation), user-centered design.*

Introduction

With the acceleration of globalization, cultural diversity is increasingly important to the design, evaluation, and use of computer systems [4, 12]. For instance, Barber and Badre [1] argue that users' cultural background can directly influence performance; Honold [7] shows that Indians and Germans use washing machines quite differently; and Clemmensen and Plocher [3] argue that cultural models should be at the heart of the study of human-computer interaction (HCI).

Among other things, cultural background may impact how usability evaluation in practice is performed by experienced usability professionals. A growing body of literature discusses and exemplifies the challenges brought to usability evaluation when users and test facilitators differ in their cultural background [e.g. 4, 13]. Since usability professionals' assumptions, beliefs, concepts, attitudes, and other conceptual structures are likely to affect evaluation practices and outcomes [11], it is important to investigate the impact of cultural background on usability professionals' conceptual structures.

In this paper we are particularly interested in how usability professionals describe their experience of using systems in their everyday work. The underlying assumption is that the manner in which usability professionals describe their experience of using their everyday systems reflects how they think about usability. According to Kelly's personal construct psychology [10], individuals interpret the world in terms of their own personal set of constructs – bipolar abstractions that a given individual uses to distinguish between similar and different elements in the world. Kelly proposed the repertory-grid technique as a method for exploring an individual's personal construct system. It enables the researcher to unpack the system of constructs through which a given participant makes sense of some particular event, context, or set of objects [5]. Hunter and Beck [8] suggested the use of the repertory-grid technique in cross-cultural information system research; we use this technique as our main tool for uncovering cultural differences in usability professionals' experience of systems.

This study extends the cross-cultural study by Hertzum et al. [6], who investigated cultural usability using Kelly's theory. They interviewed 48 developers and users divided according to their different cultural background (Chinese, Danish, and Indian), and found a culturally related diversity in usability constructs. We interview usability professionals who work with evaluation and improvement of the usability of computer systems. Our aim is to understand how culture may affect the thinking of usability professionals and thereby lead to cultural differences in usability work. The study also aims to improve our understanding of how culture mediates people's understanding of the software they use.

Method

Repertory-grid interviews were conducted for 24 usability professionals with three different kinds of cultural background. The interviews were analyzed by categorizing the constructs elicited and by using software specialized for analysis of repertory grids.

Twenty-four usability professionals (8 Chinese, 8 Danish, 8 Indian) participated in the study: 15 male and 9 female, mean age 30 years, and on average 4½ years of experience as a usability professional.

The procedure was similar to the procedure proposed by Kelly [10]. It consisted of five steps: (1) Explain the repertory-grid technique and study to the participant. (2) Obtain background information about participant. (3) Have the participant conduct training tasks to understand how to elicit constructs using the repertory-grid technique. (4) Ask the participant to select an actual system within each of six categories: my text processing system, my email, a useful system, an easy-to-use system, a fun system, and a frustrating system. The participant should choose systems that he/she was familiar with and could not choose the same system for two or more categories. (5) Elicit constructs. The participant was successively presented with groups of three of the selected systems and asked to report which two of the systems were alike and different from the third one in some important way from their personal experience. The participant was asked to write a short phrase that told how the two systems were alike – the construct – and another short phrase that told how the third system differed – the contrast. A seven-point rating scale was then defined with this construct-contrast pair as its end points, and the participant rated all six systems according to this rating scale. Step 5 was repeated for all twenty combinations of three systems (in random order), or until the participant was unable to come up with a new construct for two successive combinations.

Each interview lasted about 1.5 hours and was conducted individually. For each cultural group, the eight usability professionals were interviewed by a local interviewer (the authors JK, TC, and QS) in their native language. To ensure that the local interviewers conducted the interviews in a uniform manner, they used the same interview manual, and they met in Denmark to conduct and discuss pilot interviews prior to the interviews with the usability professionals.

The categorization of constructs was done in four steps. First, two groups of author categorized all the constructs using affinity diagramming [8]; this resulted in two classifications that reflect the contents of the constructs. Second, one Chinese and one Danish author compared and discussed the two classifications to reach a consensus. The consensus was composed of 41 groups, into which the 316 constructs could be categorized. Third, another Danish author independently assigned the 316 constructs to the 41 groups. The inter-rater reliability of the groupings from steps two and three was moderate (Cohen's kappa of .57). Fourth, disagreements were discussed and a consensus was reached.

In addition to the categorization, constructs were analyzed using WebGrid III, a specialized software tool for principal-component analysis of repertory grids (see http://tiger.cpsc.ucalgary.ca/).

Results

The 24 participants reported an average of 13.2 constructs (*SD* = 3.7). Examples of frequently mentioned constructs include 'boring', 'complex', 'funny', 'editable', 'creative', 'work oriented', 'used for fun', 'can be used to communicate with other people', and 'single function'.

Participants' Choice of Systems

In the category 'my text processing system', 22 participants selected Microsoft Word; in the category 'my email', 20 participants selected Microsoft Outlook; for the four other categories of system the participants

selected a more mixed variety of systems. No system was selected by more than seven participants in any of these four categories.

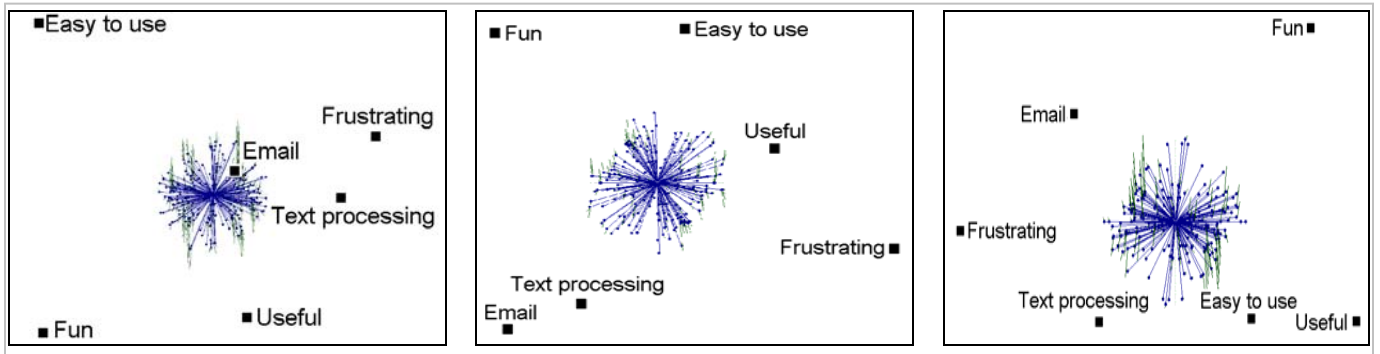
Differences among Systems

Figure 1 shows principal-component analyses of participants' perception of the six systems. Systems appear close together on either the horizontal or vertical dimension, if participants rated them similarly on the rating scales defined by their construct-contrast pairs, and far apart if participants rated them differently.

Across cultural backgrounds, the fun system was close to the end point of both the horizontal and vertical dimensions, giving constructs related to fun a prominent position in participants' perception of the systems. For the horizontal dimension, the system closest to the opposite end point was consistently the frustrating system, suggesting a contrast between fun and frustration. For the vertical dimension, Chinese participants perceived the fun system in opposition to the easy-to-us e system, Danish participants to email and text processing, and Indian participants to text processing, easy-to-use, and useful systems. This suggests considerable cultural variation in the second (vertical) dimension of participants' perception of the systems. While fun thus seems important to participants, their perception of it seems to differ.

Chinese participants perceived the easy-to-use system differently from the useful system. Indian participants perceived these two systems similarly. Danish participants were somewhere in between. Chinese participants perceived the easy-to-use system as different from all but the fun system. For Chinese and, to some extent, Danish participants, but not for Indian participants, ease of use was associated with constructs otherwise found only in fun systems.

While Danish participants perceived text processing similarly to email, Indian participants perceived these two systems differently, and Chinese participants were somewhere in between. For Indian participants the system most similar to text processing was the easy-



Chinese participants (*N* = 8) **Danish participants (*N* = 8)** **Indian participants (*N* = 8)**

Figure 1. Principal-component analyses of systems for Chinese, Danish, and Indian participants.

to-use system; for Chinese participants it was the frustrating system. Text processing was perceived very differently across cultural background, though all but two participants had selected the same system (MS Word) as their text processing system. For Chinese participants the similarity of text processing to the frustrating system may be due to troubles writing Chinese characters.

Differences in Constructs

Table 1 shows the five categories of construct containing most constructs within each cultural background, for a total of 41% of the elicited constructs. The most frequent category for Danish and Indian participants was user experience (positive or negative emotions such as pleasurable, exciting, entertaining, helpful, motivating), while the most frequent category for Chinese participants was usability with a particular focus on the systems' layout, menu, or structure. This category was almost exclusively elicited from Chinese participants. The category usability (effectiveness, efficiency, satisfaction) was common to many constructs for all three groups of participant, which is unsurprising given that participants were trained usability professionals.

Customization (e.g., "There are many customized functions & settings", "Control of the interface is not there... means that the look and feel of the interface cannot be customized") was a category common to Chinese and Indians but nearly absent for Danish participants. Since most of the systems selected by the participants originate from USA, they may be more consistent with Western, including Danish, views, whereas customization may be required to make them suited for use in China and India.

Table 1. Top-five categories of construct for each cultural background (and number of constructs).

Rank	Chinese	Danish	Indian
1	Usability of the layout/ menu (15)	User experience (18)	User experience (17)
2	Usability (13)	Usability (8)	Usability (9)
3	User interface style/aesthetics (9)	Work related (7)	Function specific (8)
4	Customization (9)	Net based, dependence (6)	Customization (6)
5	Single function - multiple functions (7)	One way/two way communication (6)	Text based - multimedia based (5)

The category 'work related' (in contrast to being used for fun) is more frequent for Danish participants, which might indicate a focus on work tasks. The category user interface style/aesthetics (e.g., "being alive", "active", "dynamic", "flexible versus static", "dead"), which may indicate holistic thinking about the system, is common in China and to some extent India, but not in Denmark. Notably, the cross-cultural differences relate mostly to categories of construct not included in conventional usability definitions (which tend to focus on ease of learning, ease of use, and user satisfaction [2]).

Discussion and conclusion

Usability professionals' personal constructs, as elicited in this study, are important indicators of their concept of usability. The personal constructs appear to be richer than conventional concepts of usability, which are defined analytically or with reference to standards [2, 9]. Our results show cultural differences in how

usability professionals construe usability, suggesting that data from cross-cultural usability evaluation may not be readily comparable. Limited comparability is, for example, suggested by differences in the usability professionals' perception of fun, in whether they perceive easy-to-use and useful systems similarly, and in their attention to customization. Comparing our results with those of Hertzum et al. [6] further suggests differences in how users and usability professionals construe usability; for example, users seem to perceive useful and frustrating systems similarly, whereas the usability professionals perceive them differently.

What can be done to enable comparison of cross-cultural usability data and align usability professionals better with users? While conceptual structures may be hard to change, we can begin to study empirically how usability professionals' usability constructs are tied to variations in their cultural background, usability evaluation practices, and kinds of user groups.

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