

Cultural Diversity and Aspects of Human Machine Systems in Mainland China

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INTRODUCTION

Addressing intercultural considerations is increasingly important in the product development processes of globally active companies.

Culture has a strong relevance for design, which means that culture influences the daily usage of products via design. During humans' "growing up" time and socialization, the daily usage and the interaction with different products are very important. This forms the user behavior because it supports the forming of users' basic interaction styles. Education and interaction styles vary in different cultures. Hence, it should be interesting to look at the relation of users' behavior and culture.

BACKGROUND

For many years, researchers of social sciences have analyzed cross-cultural differences of interpersonal communication styles and behavior (Hofstede, 1991; Trompenaars, 1993). During the last ten years, usability engineers also have focused on intercultural differences of icon/color coding, navigation, and other human-machine interface components (Hofst, 1996; Marcus, 1996; Prabhu & Harel, 1999). The time for product development and the time between redesign efforts both are becoming shorter than ever before. Consequently, to prepare effectively interactive products for the global market, one must engineer their intercultural attributes of such a market. One basic step for intercultural engineering is the analysis of user requirements in different cultures.

Within the framework of this project described in the following, a requirement analysis of user needs in mainland China was conducted as first step of a human machine system localization. But, why do you

have to localize your product? Why is it important to know the culture of a target user group?

Bourges-Waldegg (2000) says:

...Design changes culture and at the same time is shaped by it. In the same way, globalization is a social phenomenon both influencing and influenced by design, and therefore by culture..., both globalization and technology have an effect on culture, and play a role in shaping them.

This article describes the analysis of culture-specific information from users in Mainland China and the application of different methods for different design issues, especially in an intercultural context. Selected results of this analysis will also be presented. The analysis and their results are part of the project INTOPS-2: Design for the Chinese market, funded by several German companies.

The project was carried out by the Center for Human Machine Interaction (the University of Kaiserslautern, Germany). The aim of the project Intops-2 was to find out the influence of culture on the design of human machine systems, and to analyze local specifics for the area of machine tools and the requirement analysis of the Chinese user from that area.

USER REQUIREMENT ANALYSIS IN MAINLAND CHINA

Study Outline

The requirement analysis in China was carried out at the end of 2000. During two months, 32 Chinese organizations in Shanghai, Beijing, and Chongqing were visited, of which 26 were Chinese industrial enterprises (including Chinese machine tool produc-

ers and some machine users). The other six organizations included some governmental organizations for import administration and some research institutes for machine user-interface design in China. The analysis was conducted by a native speaking Chinese researcher from the Center for Human-Machine-Interaction in Kaiserslautern, Germany.

Study Methods

The following three investigation methods were applied in the INTOPS-2 project: test, questionnaire, and interview. These methods have been followed

by another similar previous project, namely INTOPS-1 (see also Zühlke, Romberg, & Röse, 1998). The tests are based on the analysis of the following: Choong and Salvendy (1998); Shih and Goonetilleke (1998); Dong and Salvendy (1999); Piamonte, Abeysekera, and Ohlsson (1999); and Röse (2002a). However, to find out more details of the Chinese user requirements, a few new tests and a more detailed questionnaire and interview checklist have been developed for the INTOPS-2 project. An overview of all the implemented tests is presented in Table 1.

Table 1. Overview of implemented tests

No	Test	Aim	Material	Subject	Analysis
1	Preference to color composition for machine tools	Eliciting preferred color composition and difference to German one	10 cards with differently colored machine tools.	No special requirement	Average preference degree for each composition
2	Recalling performance for graphical information vs. textual information	Testing information processing ability for different information presentation methods	3 pieces of paper with different ways of info. presentations: only Text only picture text & picture	No special requirement	Average recall rate for each method. Characters for better recalled info.
3	Understanding of color coding	Testing the understanding of standard color coding and difference to German one	7 standard colors of IEC 73. 3 groups of concepts in daily life and at work (5 in each one)	Matching for concepts at work only for machine operators	The color association rate for each concept
4	Symbol understanding	Testing the understanding of standard ISO symbols and eliciting the preferred symbol characteristics for information coding	Icons from ISO and Windows. 2 kinds of materials: 18 icons, each with 3 possible meanings; 14 meanings, each with 3 possible icons	Machine operators	Average recognition rate for each icon Character for better matched icon
5	Familiarity with Windows interface	Testing the familiarity with the Windows interface	Integrated with Test 4	Machine operators	Recognition rate for Windows icons
6	Concept of grouping (Type of Card Sorting)	Eliciting the grouping rule and the difference to German one	74 cards with different CNC machine functions	Only with experienced CNC machine operators	Preferred structure for grouping
7	Preference for screen layout	Eliciting the familiar screen layout characters and difference to German one	Over 20 different cards in form and size representing the screen elements	CNC machine operators	Preferred layout for different screen elements
8	Understanding of English terms	Testing the English understanding ability	One table with 54 English technical terms	Machine operators	Average understanding rate Character for better understanding

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