Special Issue Editorial: *Cultural Aspects of Interaction Design*

Keiichi Sato [1] and Kuohsiang Chen [2]

[1] Institute of Design, Illinois Institute of Technology, Chicago, USA
[2] Department and Institute of Industrial Design, National Cheng Kung University, Tainan, Taiwan

The notion of interaction design has become an indispensable aspect in any new product design and development, especially for those products with embedded information technologies. While traditional industrial design focuses on a product's functionality and its physical features, interaction design requires different perspectives and approaches for increasingly complex design problems. New technologies such as networking and embedded technologies provide opportunities to develop new categories of products with a much wider range of services that combine many physical and informational functions. Since such products are more interactive and are more pervasive in our daily activities, design calls for much deeper understanding from more diverse perspectives of product use. This discussion applies not only to physical products but also to other forms of artifacts. For instance, communication media have gone through an astonishingly rapid transformation, from print media to digital media--further extending their ubiquity and interactivity. This technological development has introduced new types of functionality, related for example to control, monitoring, searching, and transactions for many different applications. New technologies such as the Internet and mobile phone networks have changed the way people live and work. Such technological changes are taking place in the social and cultural landscapes of our daily life, and are fundamentally affecting many aspects of our lives.

When a group of people, no matter its scale, start sharing common ways of thinking, feeling and living, culture emerges. Culture therefore can emerge from any population segment. It is not limited to a geographic area or ethnicity. Different cultures can be distinguished by their individual and group characteristics, e.g. the mental models, behavioral patterns, emotional responses, aesthetics, rules, norms, and values that group members share. Different cultures therefore produce different artifacts and environments based on their cultural characteristics. On the other hand, artifacts, through people's interactions with them, influence cultures and can even produce a new culture.

We all carry multiple cultures. For example, we might embrace ethnic cultures from two different regions, one from where we grew up and the other from where we live. We might also carry with us a professional culture as an academician or a designer. Some cultures manifest more dominantly over others depending on the nature of activities and situations. Different cultures also interact with each other and produce intricate patterns of human behavior in relation to given situations. Such cultural characteristics of users play a major role in their interactions with artifacts. The design of an artifact, therefore, needs to incorporate a wide range of cultural factors concerning users, organizations, practices and environments in order to most effectively perform its intended role throughout the use process.

Though the notion of multiple cultures and the cyclical relationship between culture and artifact are only two of many aspects of culture in design, they alone raise many questions in design research and practice. A few examples are: How should we consider cultural factors in the design of artifacts? How will people in a cultural group accept new artifacts or technologies? How will new artifacts or technologies impact our culture? How can dominant cultural influences be identified? How do multiple cultures interact during user-artifact interaction?

This special issue called for both academic and practical contributions that would enhance understanding, acceptance, positioning, and use of an artifact by addressing cultural aspects of human-artifact interaction. The quality of interactive experience with artifacts is produced in a particular cultural context and only determined or evaluated in the context of use. Yet knowledge about cultures and about cultural implications for design is insufficient at all levels—conceptual, theoretical, methodological, and practical. Incorporation of cultural factors in design thinking and design processes is critical to achieve the high quality of human-artifact interaction that enables our experience with the artifact to be effective and convivial.

This special issue called for papers that present breakthroughs in conceptual, theoretical, methodological and practical research. In particular, it intended these contributions to focus on making cultural factors describable, operable, and usable forms of design knowledge. The following topics were listed to exemplify particular fundamental and contemporary issues in this domain:

- Conceptual framework of cultural factors in interaction design
- Acquisition and representation methods for cultural factors
- Formal models of cultural factors
- Planning, design, and evaluation methods
- Assessment of cultural impacts of interactive products
- Cultural factors in Kansei Engineering
- Cultural contexts of interaction design for ambient intelligence environments
- Cultural factors in Usability
- Cultural Studies

The papers contributed address a wide range of issues and approaches to the theme of cultural aspects in interaction design. Cultural issues have been identified and positioned in different aspects of design and design research. The distribution of major areas of focus in this special issue, allowing multiple counts for each paper, are as follows: Three papers address different aspects of website design; two papers focus on cultural factors in usability evaluation; three papers deal with comparative studies

of behavioral patterns in different cultural groups; and four papers focus on the application of some sort of theoretical framework.

Based on Fauconnier & Turner's blending theory, in the paper "Mapping Cultural Frame Shifting in Interaction Design with Blending Theory," Markussen and Krogh introduce a new conceptual framework to interaction design called "cultural frame switching." The approach intends to demonstrate how meaning formation and embodied cognition actually coalesce in "cultural frame switching." The authors claim that the proposed theoretical framework offers formal models and analytical tools that enable designers accurately to evaluate and represent effects of culture on user experiences. Such research attempting to introduce conceptual frameworks is important for extending the scope and foundation of this research area, particularly with regard to developing methodologies and design principles that guide incorporation of cultural aspects into interaction design.

Applying Nisbett's cognitive model, in "A Cross-Cultural Comparative Study of Users' Perceptions of a Webpage: With a Focus on the Cognitive Styles of Chinese, Koreans and Americans," Dong and Lee hypothesize that differences between Holistic thought and Analytic thought can be reflected in webpage perception. They conclude that even cognitive differences exist among Holistic people and Analytic people and that webpage design should be carried out according to the target audiences' specific cognitive style in order to enhance perception and usage of the webpage. We could argue that every person has many different ways of viewing the world, including holistic and analytic. This research indicates an important research area, in which theoretical frames and models can be effectively applied to enhance the way we understand and design cultural aspects of interactive systems in general.

Keiichi Sato is a Professor and Co-coordinator of the Ph.D. program at the Institute of Design, Illinois Institute of Technology. His research and teaching focus on design theory/methodology and interactive systems design. His current research includes design knowledge representation and management, spatial, temporal and learning aspects of interaction, and human-centered product/system architecture and integration. He has received awards for his academic and professional work, including the Best Paper Award at the ASME Design Theory and Methodology Conferences, Best Paper Award at the IEEE International Workshop on Robotics and Human Interactive Communications, Design Innovationen at Haus Industrieform Essen, and Best Paper Award at the ACM-IEEE Design Automation Conference. He is a Fellow of the Design Research Society (UK), a member of IEEE, ACM, ASME, the Design Society, and the Japanese Society for Science of Design. He has been Visiting Professor at Darmstadt University of Technology and at Musashino University of Fine Arts. He holds an M.S. in Product Design, and B.S. and M.S. degrees in Engineering.

Kuohsiang Chen, with Ph.D. and M.S. degrees from the Institute of Design, IIT, and serving as section editor for the *Journal of Design* and the *International Journal of Design*, is teaching at the Department of Industrial Design, National Cheng Kung University, Taiwan. Dr. Chen has conducted a cross-university research project on Integrated Multi-sensory Kansei Engineering for Product Development (2002-2006), and has been the Deputy Director for the Educational Resources Center for Life Trendy Goods Design (2004-2007). His professional experiences include: Product Designer for SINO Design & Development and the SAMPO Company; Diagrams Researcher & Programmer for SPSS Inc.; and Design Specialist for the China External Trade Development Council, the China Productivity Center and the Council of Labor Affairs. His principal areas of research interest cover: form languages, style cognition, form generation and style association, Kansei Engineering, and interaction design. Dr. Chen has publications in areas of form and style languages, computer-supported formal design, influential factors in interface design, and Kansei Engineering.

The paper "Influence of Cultural Background on Non-verbal Communication in a Usability Testing Situation," by Yammiyavar, Clemmensen and Kumar, looks into the influence of cultural factors on usability evaluation. It points out that the rich qualitative cues embedded in non-verbal communications such as gestures are often ignored even when user data are collected across different cultures. The paper analyzes the patterns of gesture occurrence among users with different cultural backgrounds, Indians, Chinese and Danish, to reveal that non-verbal gestures do give cues or messages helpful to designers. It is hoped by the authors that this study can draw the attention of designers and other researchers to this unexplored area. We expect that additional research with more thorough and carefully designed experimental studies concerning non-verbal behaviors and other alternative approaches could lead to the development of practical and universal methods and guidelines for dealing with cultural factors in usability testing.

In the paper "Requirements for the Design of Advanced Driver Assistance Systems – The Differences between Swedish and Chinese Drivers," Lindgren, Chen, Jordan and Zhang observe differences between Swedish and Chinese drivers and conclude that Advanced Driver Assistance Systems (ADAS) designed for the Western world may not necessarily be optimal in other markets. They claim that if the full benefits of ADAS technology are to be realized, the systems must be adapted to take into account local issues, including infrastructure and driving behavior. In other words, cultural difference has become one of the key issues needing to be addressed carefully in any successful interaction design.

Based on information theory, in "Exploration in Emotion and Visual Information Uncertainty of Websites in Culture Relations," participants were asked to evaluate a webpage comprising six variant levels of information uncertainty and to respond to instruments designed to measure the relationship between the information certainty of a webpage and a participant's emotional response. Tsai, Chang, Chuang and Wang report this about the correlations that exist between the emotions invoked in the viewers and the level of information uncertainty on the web pages: Both higher and lower information uncertainty induce a stronger arousal of emotion while a moderate level of uncertainty induces a moderate level of emotional arousal that leads to a sense of comfort.

Based on Hoftstede's model and Aaron Marcus's approach, the next paper, "Political and Cultural Representation in Malaysian Websites," by Tong and Robertson, investigates the representation of the cultural and ethnic mix of Malaysia in the public information systems, using an official government website for a case study. By the use of mood boards, cultural markers and site analysis, the author has developed a set of broad multicultural guidelines that combines the theoretical model of cross-cultural design and practical development through styled menus. The author demonstrates the effects of emotional preferences among different cultures and points to the future development of Kansei Engineering in cultural studies.

In "Social Interaction Design in Cultural Context: A Case Study of a Traditional Social Activity," Huang and Deng argue

that social activities are inherently embodied in a cultural context. They conducted a field study of the traditional social activity of tea drinking in Taiwan to reveal the abundance of cultural features that mark such an activity. Based on the findings, an enhanced cultural model is proposed to show the cultural significance of social activities. It is concluded that cultural characteristics of a society should be a key factor for designing interactions. Case studies in different areas of design together with further theoretical research would enhance the research approach introduced in this paper.

These papers demonstrate a wide variety of approaches to understanding cultural aspects of interaction design and incorporating them into design processes. In spite of the high awareness of cultural issues in design, research in this domain is still in an exploratory stage. The definition of "culture" itself is still vague or inconsistent across the areas of design and design research. The attempt to introduce a standard definition of culture and cultural factors might be unproductive because of the diversity of cultural factors and implications for design. In specific sub-areas of cultural studies in design, however, it is much easier to establish area-specific common foundations that allow research output to be cumulative and transferable. Yet it is still important to introduce common reference points among different areas in order to allow the exchange of research findings.

By establishing cumulative and interpretive mechanisms across disciplines, design research becomes well grounded on a broader and deeper foundation and can have greater influence beyond design research. In turn, design research can offer rich resources for cultural studies in other disciplines.

Acknowledgements