

Enculturating human–computer interaction

Matthias Rehm · Yukiko Nakano · Elisabeth André ·
Toyoaki Nishida

1 Introduction

This special issue of *AI and Society* is based on a workshop held in conjunction with *Intelligent User Interfaces 2008* and brings together selected papers from this workshop as well as additional work on cultural aspects of human–computer interaction. The idea for this workshop was born from discussions in the German–Japanese project *CUBE-G¹* (*C*ULTure-adaptive *B*EHavior *G*eneration), which focuses on the challenge of integrating cultural heuristics into the interactive behavior of multimodal systems. Although cultural usability is a well-established field, deeper levels of intelligent multimodal interfaces lack sophisticated models of culturally influenced interaction. That is amazing insofar as our social and cultural background (our identity) influences how we behave and how we interpret behavior. Thus, it seems for instance inevitable for a

persuasive system to adhere to the persuasive strategies that are predominant in the user’s culture.

What are the main challenges for integrating cultural aspects in the human–computer interaction? First of all, we have to cope with the problem that culture is an ill-defined domain (Blanchard and Mizoguchi 2008) meaning that it is easy to argue with culture in an everyday conversation, but it is hard to pinpoint down the constituents of culture and its effect on interaction. Moreover, culture is a multilevel concept incorporating such diverse notions as national culture, work culture, music culture and many others, which each might specify situated and contextual heuristics for an interaction. To be able to enculturate human–computer interaction, parameterizable models of cultural interactions are necessary to prevent building unique versions for each culture in which a system is going to be deployed. In addition, different layers of phenomena exist that are influenced by culture like the verbal and non-verbal behavior, appearance, proxemics, learning strategies and many more. Data on cultural heuristics are sparse and often the structure of the available data on a specific phenomenon is inconsistent over different cultures due to an asynchronous data collection. The workshop brought together researchers focusing on bits and pieces of these problems allowing us to outline the challenges that lie ahead of us more clearly. Ideally, this will trigger the rise of a new research community working on cultural aspects of interactive systems beyond aspects of usability. The promising results from the first workshop led to a follow-up event, a parallel session on *Enculturating HCI* that will take place at *HCI International 2009*.

M. Rehm (✉) · E. André
Faculty of Applied Informatics, Augsburg University,
Universitätsstr. 6a, 86159 Augsburg, Germany
e-mail: rehm@informatik.uni-augsburg.de

E. André
e-mail: andre@informatik.uni-augsburg.de

Y. Nakano
Faculty of Science and Technology, Seikei University, 3-3-1,
Kichijoji-Kitamachi, Musashino-shi, Tokyo 180-8633, Japan
e-mail: y.nakano@st.seikei.ac.jp

T. Nishida
Department of Intelligence Science and Technology,
Kyoto University, Yoshida-Honmachi,
Sakyo-ku, Kyoto 606-8501, Japan
e-mail: nishida@i.kyoto-u.ac.jp

¹ <http://mm-werkstatt.informatik.uni-augsburg.de/projects/cube-g/>

2 Enculturating human–computer interaction

We are living in a globalized world, but local or cultural identities strongly influence our patterns of behavior and interpretation by establishing certain norms and values. Nevertheless, current computer systems seldom reflect such cultural “mental programs” as Hofstede (2001) has termed this effect. Thus, users are forced to adapt their way of interaction and interpretation to a given (most of the time Western) perspective. Instead, it would be much more reasonable to allow, e.g. for culturally tailored presentation of information. Although there is no principled approach yet to challenge the importance of cultural patterns in human–computer interaction, there are a number of promising results from a variety of research projects around the world that have started to integrate cultural aspects in the interaction. This special issue brings some of them together and is centered on three main research challenges:

1. Computationally viable models of cultural aspects of interaction: cultural norms and values penetrate all our communications and interactions by giving us heuristics how to behave and how to interpret the verbal and nonverbal behavior of others. To make such a notion available for computing, we need theories that allow predicting (group) behavior based on the observable/measurable variables; otherwise the integration of cultural aspects will result in a number of idiosyncratic sample applications but nothing more. Theories of culture on a national level are prevalent and despite arguments questioning their validity (Cassell 2009), we argue that they present a valuable starting point allowing to develop models of cultural influences on the interactive behavior of a system (Rehm et al. 2009). The most cited theoretical approach to culture in HCI research is Hofstede’s (2001) dimensional model. Nazir et al. describe how the relation between Hofstede’s cultural dimensions, personality traits, and emotions could be formalized in an integrated model. To this end they rely on the PSI model of emotion which is enriched with the Big Five model of personality (McCrae and John 1992) and Hofstede’s dimensions. This interrelation between culture and other determinants of behavior and perception is also analyzed by DeAngeli who presents different evaluation studies, focusing on design patterns and communication style but also on the relative importance of cultural aspects and personality in influencing perceptions.
2. Reliable empirical data on cultural/cross–cultural interaction: to realize technical systems that take cultural influences on behavior and perception into account, precise data analysis on how this influence manifests itself is necessary. Because this information

is often scattered throughout the literature, it is necessary to provide meta-analyses of specific behaviors. Moreover, there is a need for large databases of comparable multimodal corpora from different cultures. Rehm et al. present analyses of multimodal culture-specific human interaction relying on the CUBE-G corpus focusing on gestural expressivity as well as posture shifts in the German and the Japanese culture. Based on their analyses, they present a parameterizable model of non-verbal behavior for embodied conversational agents. Ruttkay concentrates on the question where in the development process of such agents cultural influences have to be considered and comes up with some surprising results. Another aspect is taken up by Riley et al. who widen the scope to the perception and acceptance of new technologies. They analyze attitudes towards the biometric authentication in relation to Hofstede’s dimensions.

3. Enculturating human–computer interaction: having identified cultural influences on interactive behaviors, it remains to be shown how this can be applied to the development of human–computer interfaces, for instance in a virtual character reflecting the user’s culturally determined behavior patterns. Moreover, the effect of systems taking cultural variables into account has to be evaluated to provide a sound empirical foundation for further developments. What makes the evaluation so difficult is the challenge of isolating the causal relations between cultural heuristics and effects on the perception of the interaction. Currently, there is no well-defined evaluation methodology for complex multimodal interactive system to test for the effects of cultural aspects on the interactive behavior. First proposals include perception experiment testing single dimensions such as facial displays or gestural expressivity. Melis et al. focus on cultural variability in learning and show that even in a clear domain-like mathematics cultural aspects play a role. They present an ITS system that takes such variability into account. Prototypically suited for adapting to a user’s cultural background are embodied conversational agents. Huang et al. present a complete architecture for an information presentation system that can be tailored to the user’s cultural background and discuss where cultural influences manifest themselves in such an architecture. Koda et al. emphasize that not only behavior but also perception is based on the cultural preferences. She presents a series of cross-cultural evaluations of avatar facial expressions that illustrate this effect.

The articles in this special issue tackle the challenges of enculturating HCI in unique ways, focusing on different

aspects of each challenge. Taken together, they exemplify the lively research environment on cultural aspects of human–computer interaction, which is still in its infancy and currently struggling with identifying the relevant questions. This special issue is intended as a signpost for this struggle.

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