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Usability in the Future –explicit and implicit effects in cultural computing

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Abstract

I present an extension of Kansei mediated communication in the field of cultural computing. I propose to do so by implementing Cultural Computing concept and enriching it with Kansei Mediated Interaction. I present some inspiration for my approach in terms of culture and then discuss them. I relate my work to the Eastern and to the Western world, i.e. I use cultural examples from Japan and England. I propose as a new direction for HCI, cultural computing with its related paradigm I call Kansei Mediated Interaction. Based on a short overview over the different paradigms for human computer interaction I introduce and discuss the most recent paradigm of cultural computing. Cultural computing addresses underlying and almost unconscious cultural determinants that have since ancient times a strong influence on our ontology and epistemology. Different cultures worldwide will have different approaches to address their particular cultural determinants. In the East, the project ZENetic Computer is a first and very promising approach for cultural computing addressing Eastern cultural determinants. In the West, I propose an interactive experience based on the narrative 'Alice's Adventures in Wonderland' to address the main characteristic of the Western culture: analytical reasoning based on formal logic.

1   Introduction

From a historical perspective, Human-Computer Interaction (HCI) has evolved over more than five decades. Although the history of HCI[1] is rich and complex, within the scope of this paper we will summarise some of the major paradigms that are: (1) personal computing, (2) cooperative computing, (3) social computing, and (4) cultural computing (see figure 1). The history of HCI goes back to the 60s. Originally it was about Man-Machine Interaction and the emergence of the Personal Computing (PC) paradigm. In the 80s, HCI was investigating media rich computing with the paradigm of networked computer mediated interaction. Interactive multimedia was the focus of attention. More recently, at the turn of the century, HCI

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[1]   http://www.idemployee.id.tue.nl/g.w.m.rauterberg/presentations/HCI-history_files/frame.htm

was about the social computing paradigm with community mediated interaction[2]. The HCI community investigated applications such as Computer Supported Cooperative Work (CSCW), and the Internet (e.g., on line communities). With mobile, portable and ubiquitous technology, HCI is looking at more personalised and intimate interaction with positive experiences. Several concepts have emerged in recent years for the future directions of HCI: ubiquitous, nomadic, mixed-reality computing, and so on. In general all these new directions have some common properties: (1) the disappearing computer; (2) the ease of use and positive experience and; (3) the building of communities. The computer is no more the centre of interest, nor is it the focus of attention of the user. It is the running applications and the benefits and effects these have on the user that matter. Finally, Nakatsu, Rauterberg and Salem (2006) propose as a new paradigm for HCI, *cultural computing* which is based on what we call Kansei Mediated Interaction. Kansei Mediation is a form of multimedia communication that carries non-verbal, emotional and Kansei information (e.g., unconscious communication). It is a combination of Kansei Communication (i.e., 'content') and Kansei Media (i.e., 'form'). The main research objectives in Kansei Mediated Interaction are the underlying almost unconscious cultural determinants (see also Salem & Rauterberg, 2005b).
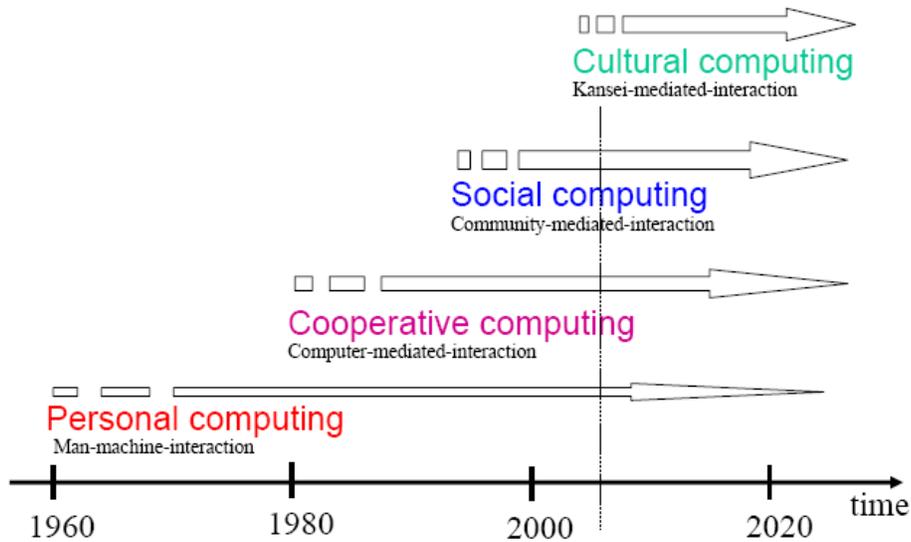
Figure 1. *From Personal to Cultural Computing, an overview over the most relevant interaction paradigms.*

Although the cultural dependency is somewhat a drawback it has many advantages. Cultural computing allows for a much richer experience to be rendered. This is caused by the complexity and depth of the semantics involved. There is also the advantage of higher bandwidth of information at the interface as symbolic meanings and implicit knowledge can be used.

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[2]   http://www.idemployee.id.tue.nl/g.w.m.rauterberg/Movies/Living%20Memory/Living%20Memory.htm

The interface is not limited to explicit messages and meanings. However, there is a challenge in finding culturally rich media that could be used to deliver cultural experience. One of the major points of this approach is the proposal and intent on relaying on Kansei Mediation as a mean to deliver the necessary media and bandwidth rich interface.

Kansei Mediation is a form of multimedia communication that carries non-verbal, emotional and Kansei information (Nakatsu et al., 2006). It is a combination of Kansei Communication and Kansei Media. In essence it is about exchanging cultural values efficiently and effectively. Kansei Communication is about sharing implicit knowledge such as feelings, emotions and moods. Kansei Media are the channels used to do so, such as voice tone and non-verbal communication. The integration of multiple, multimode and Kansei Media can enable a type of interaction that is neither biased towards cognition, nor biased towards awareness. This is what we call Kansei Mediated Interaction. Several cognitive functions can be ordered according to their life-span. Kansei Mediated Interaction has the potential to stimulate and influence most of these functions. The cognitive functions are: *reflexes*, *sensations*, *thoughts*, *dreams*, *emotions*, *moods*, and *drives*.
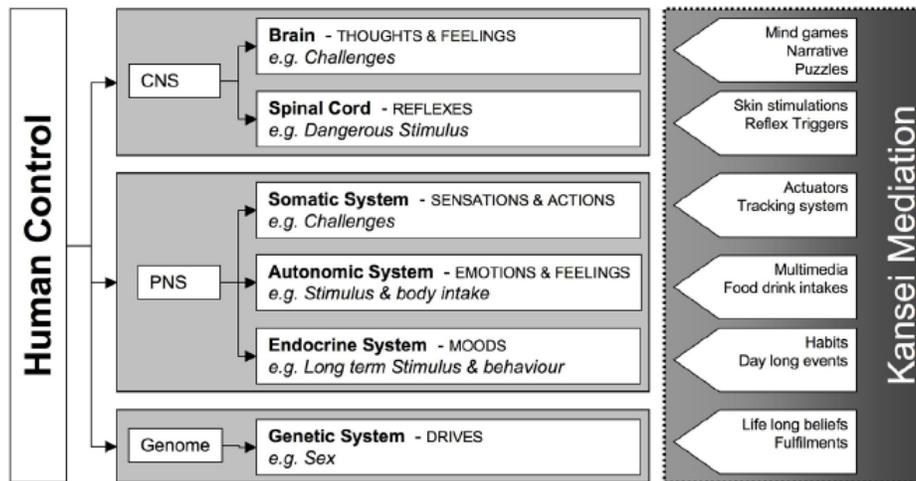
Figure 2. *From human control mechanisms to Kansei Mediation. [CNS: Central Nervous System, PNS: Peripheral Nervous System] (adopted from Salem, Rauterberg and Nakatsu, 2006)*

These different cognitive functions are linked to different control systems (bold black in Fig. 2) of our body, show the mapping of the links. In turn, these links help us design the right interaction (italic in Fig. 2) through various body parts and control systems. To achieve Kansei Mediated Interaction, one needs to address these interactions with the right channels (as the examples given to the right part of Fig. 2).

2   Cultural Computing

The word *culture* (from the Latin 'colo, -ere', meaning 'to cultivate', 'to inhabit' or 'to honor') has been defined and used in many ways throughout different contexts. Kroeber and Kluckhohn (1952) compiled a list of more than 156 different definitions for *culture*. One of the most popular definitions of culture in the field of anthropology is "a complex web of shifting patterns that link people in different locales and that link social formations of different scales"[3]. Culture is the integration of human behaviour that includes attitudes, norms, values, beliefs, actions, communications and groups (ethnic, religious, social, etc.). Cultural computing[4] is more than integrating cultural aspects into the interaction. It is about allowing the user to experience an interaction that is closely related to the core aspects of his/her culture. In a way that let him/her engage with an augmented reality using the values and attributes of his/her own culture. As such it is important to understand one's cultural determinants and how to render them during the interaction. In this paper we will focus on two cultural computing projects, one from the Eastern World (prevailing in Japan) and one from the Western world (prevailing in England).

Over the last 3000 years the peoples of four distinct regions of the civilized world created the religious and philosophical traditions that have continued to nourish humanity into the present day: *Confucianism* and *Daoism* in China; *Hinduism* and *Buddhism* in India; *monotheism* in middle east; and philosophical *rationalism* in Greece. 'Monotheism' and 'philosophical rationalism' is the religious and cultural foundation of the occident. We have investigated illustrative stories that are well known, accessible, classical in their culture and relevant from the point of view of cultural computing. We primarily looked for narratives that would be helpful in the understanding of the essential aspects of both Japanese and English cultures. To this effect, we have selected the story of '*ZEN Buddhism*' attributed to a Boddidharma (circa 500 AC), and '*Alice's Adventures in Wonderland*' by Lewis Carroll (1865). Both are detailed in the next sections, and both are examples either to help understand the underlying cultural value (i.e., Zen) or question it (i.e., Alice). For the Eastern and Western culture, the main value dealt with is *enlightenment*, but in different ways. Utilizing on modern technology Nakatsu et al (2006) try to give a new direction in form of 'Kansei Mediation' to enable societies transforming towards enlightenment (see also Rauterberg, 2004). Salem and Rauterberg (2005a) discuss the relationship of cultural computing and entertainment, and Hu and Bartneck (2005) could conclude that 'culture matters'.

2.1   Eastern Culture: ZENetic computer

In the East enlightenment is the state of awakening that a Buddha has attained, and is the ultimate goal of Buddhist practice and the highest of the 'Ten Worlds'. The concept enlightenment is regarded as a state of perfect freedom, in which one is awakened to the eternal and ultimate truth that is the reality of all things. This supreme state of life is characterized by

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[3]   http://en.wikipedia.org/wiki/Culture.

[4]   http://www.culturalcomputing.uiuc.edu/

boundless wisdom and infinite compassion.[5]. With the spread of Zen Buddhism in the thirteenth century, the arts of Japan took on a new focus. Here was a religion which cultivated self-discipline and austerity as the path to enlightenment. Meditation is at the centre of Zen practice and many Zen art forms can be seen as vehicles for inward reflection or as visualizations of the sudden and spontaneous nature of enlightenment. A *love of nature* lies at the very core of Zen. The qualities of abstraction and suggestion which characterized *suiboku-ga* were fittingly applied to the design of Zen gardens. Japanese gardens employ artifice to create an environment that appears more natural than nature itself. Trees and bushes are carefully pruned, color is restricted and water channeled to convey, in one setting, the essence of the natural landscape. The word for landscape in Japanese is *sansui*, meaning 'mountain and water'. In Zen-inspired *kare-sansui* or 'dry landscape' gardens, such as that of Ryoan-ji in Kyoto, these two elements are symbolically combined. *Kare-sansui* gardens consist only of carefully selected and positioned rocks in a bed of sand or gravel which is raked into water-like patterns. As vehicles for contemplation, such gardens convey the vastness of nature through the power of suggestion.

Tosa et al. (2005) think of cultural computing as a method for cultural translation that uses scientific methods to represent the essential aspects of a culture. Including cultural concepts that heretofore have not been the focus of computing, such as mental images of Eastern thought and Buddhism, and the Sansui paintings, poetry and kimono that evoke these images, they projected the style of communication developed by Zen schools over hundreds of years into a world for the user to explore – an exotic Eastern Sansui world: the ZENetic Computer. ZENetic Computer was and still is an ambitious project that tries to crosses boundaries and complicates simple binary divisions such as those between East and West (i.e., modern and pre-modern, science and religion, science and art, etc.). The ZENetic Computer is based on cutting edge technology to offer users a chance to engage and understand Buddhist principles of 're-creation' of the self. The Eastern essence of an ancient culture is delivered by means of Western technology to create an interactive experience dealing with complex issues such as human [un]consciousness. Through encounters with Zen Koans and haiku poetry, the user is constantly and sharply forced to confirm the whereabouts of his or her self-consciousness. So, what would be an equivalent system for Cultural Computing in the West?

2.2 Western Culture: Alice in Wonderland

In the West Kant (1784) gave an answer to the question, "What is enlightenment?" He indicated that the 'way out' that characterizes enlightenment in the West is a process that releases us from the status of 'immaturity'; and by 'immaturity,' he meant a certain state of our will that makes us accept someone else's authority to lead us in areas where the use of reason is called for. In the Western world *enlightenment* is defined by a modification of the preexisting relation linking will, authority, and the use of reason[6].

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[5]   http://www.experiencefestival.com/a/Buddhahood/id/79203

[6]   http://en.wikipedia.org/wiki/The_Enlightenment

Nisbett et al. (2001) can confirm that Westerners are *analytic*, paying attention primarily to the object and the categories to which it belongs and using rules, including *formal logic*, to understand its behavior. In contrast East Asians are more *holistic*, attending to the entire field and assigning causality to it, making relatively little use of categories and formal logic, and relying on '*dialectical*' reasoning. These Western and Eastern types of cognitive processes are embedded in different naive metaphysical systems and tacit epistemologies. Nisbett et al. (2001) speculate that the origin of these differences is traceable to markedly different social systems as part of the underlying cultural determinants.

To address logical reasoning in the western culture the most appealing narrative is 'Alice's Adventures in Wonderland' of Lewis Carroll (1865). Charles Lutwidge Dodgson (1832–1898), better known by the pen name Lewis Carroll, was a British author, mathematician, logician, Anglican clergyman and photographer. His most famous writings are 'Alice's Adventures in Wonderland' and its sequel 'Through the Looking-Glass'. His facility at word play, logic, and fantasy has delighted audiences ranging from the most naive to the most sophisticated. He was exceptionally gifted and achievement came easily to him. His works have remained popular since they were published and have influenced not only children's literature, but also a number of major 20th century writers such as James Joyce and Jorge Luis Borges. There are societies dedicated to the enjoyment and promotion of Lewis Carroll's works in many parts of the world including North America, the United Kingdom and New Zealand. In this perspective the book 'Alice's Adventures in Wonderland' can serve as input for a Cultural Computing project in the West.

The first interactive, but semi-immersive virtual reality system based on parts of 'Alice in Wonderland' was developed at the Entertainment Technology Center of Carnegie Mellon University. Pierce et al. (1999) created a successful virtual experience based on a head-mounted display to overcome some or all of the following problems: entering a virtual world is a jarring experience, people do not naturally turn their heads or talk to each other while wearing a head-mounted display, putting on the equipment is hard, and people do not realize when the experience is over. In the Electric Garden at SIGGRAPH 97, they presented the Mad Hatter's Tea Party, a shared virtual environment experienced by more than 1,500 attendees. They addressed these head-mounted display related problems with a combination of back story, see-through head-mounted displays, virtual characters, continuity of real and virtual objects, and the layout and setting of the physical and virtual environment.

We started the cultural computing project ALICE as an interactive, entertaining experience (see Nakatsu, Rauterberg & Vorderer, 2005) inspired from 'Alice in Wonderland' (Carroll, 1865). In the scope of this project interactive adventures are experiences provided by an Augmented Reality (AR) environment based on selected parts from Lewis Carroll's book 'Alice's Adventures in Wonderland'. The user assumes the role of Alice and explores this interactive narrative. ALICE is an exploration of interactive story-telling in AR. By exploiting the unique characteristics of AR compared to established media such as film and interactive media, the project uses AR as a new medium for edutainment and entertainment as a particular carrier for cultural transformations. Innovations include the refashioning of conventions used in film and interactive tools for the development of an AR narrative, and the use of simple artificial virtual and real characters (avatar and robot respectively) to create an immersive interactive experience.

ALICE is an augmented reality (AR) narrative with intelligent agents acting as characters who lead the user through virtual and real locations, moral choices and emotional states. The narrative is a surreal quest, sometimes funny, sometimes disturbing. The character White Rabbit (representing the concept of *time*) introduces him and joins with the user in a series of absurdist challenges. ALICE is an educational journey towards the user's heart's desire, designed to provoke self-reflection on a number of other issues: bullying and trusting others; selfish- and selfless-ness; enjoying the moment or sublimating pleasure. The user is given the opportunity to occupy and experience any of these mental and emotional positions. This will be achieved in line with the 'Alice in Wonderland' plot (albeit shortened).

Alice in Wonderland can be used to give interesting examples of many of the basic concepts of adolescent psychology. Alice's experiences can be seen as symbolic depictions of important aspects of adolescent development, such as initiation, identity formation, and physical, cognitive, moral, and social development (Lough, 1983). Alice's adventures are deconstructivist[7] in nature and as such are directly challenging the strongly held belief of a linear, single track and sequential reality.

3   Discussion and Conclusions

The upcoming paradigm of cultural computing introduces new research challenges, such as: (1) what are the relevant cultural determinants in different cultures to enable the user to transform his/her self towards enlightenment (see Salem & Rauterberg, 2005b); (2) what kind of interactive experiences will have the most supportive potential regarding this transformation (see Nakatsu et al., 2005), (3) what are the differences between cultures worldwide and how to address them, and (4) how to measure the effects regarding the progress achieved in transforming once self. We have discussed several possible answers to these challenges and can conclude that (ad 1) the Western culture is mainly characterized by analytical reasoning based on formal logic (Nisbett et al., 2001), (ad 2) the narrative Alice in Wonderland is a promising candidate for such kind of interactive experiences to address the before mentioned cultural determinants, (ad 3) cultural computing projects (e.g. ZENetic Computer) will not fit to western cultures, and (ad 4) cultural awareness might be assessed by utilizing on the concept of the mandala as introduced by Jung.

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7   http://en.wikipedia.org/wiki/Jacques_Derrida

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