

1

Introduction

Today, collaborative work between people from all over the world is widespread, and so are the socio-cultural exchanges involved in online communities. In the Internet, users can visit websites from hundreds of different cultures. They may do it for a variety of purposes: commerce, tourism, reading, fun and so on. For instance, through e-commerce, nationals from one country may buy products from another country's website, and have them delivered in yet another country.

As access to the Internet increases, the World Wide Web (Web) is becoming a prime medium for *intercultural encounters*¹ and is playing a leading role in heightening both visibility and awareness of cultural diversity. Furthermore, the communicative possibilities provided by the Web 2.0, i.e., the second generation of web applications, give users new ways to interact and collaborate with each other. In applications like blogs, wikis, social-networking sites and so on, users may create and share unlimited information freely.

Dealing with cross-cultural systems is beyond any doubt a requirement for interaction designers of Web 2.0 applications. One of the challenges for interaction design, however, is the development of systems aiming to attend to the needs and expectations of people with different cultural and social backgrounds.

In the last 15-20 years, HCI researchers have been trying to understand the impact of culture on the users' experience and HCI design process in order to frame cultural issues in HCI (del Gado & Nielsen, 1996; Dunker, 2002; Curzon *et al.*, 2005; de Souza *et al.*, 2008, Sakala, 2009). Some studies, additionally, have proposed alternatives or solutions to change the design and evaluation process (Nielsen, 1990; Russo, 1993; Bourges-Waldegg & Scrivener, 1998; Barber & Badre, 1998; Shen *et al.*, 2006; Irani & Dourish, 2009) so as to accommodate culture-related issues in HCI.

¹ We use the term intercultural instead of cultural to emphasize the dialogical relationship of at least two representatives from different cultures.

The most prominent HCI perspective for creating *cross-cultural applications* is the internationalization-localization (Int-Loc) approach (Nielsen, 1990; del Gado & Nielsen, 1996; Marcus, 2002; Aykin, 2005; Hisham & Edwards, 2007). Internationalization is the process of creating a base design that can be easily adapted for various international markets (Fernandes, 1995). With internationalization, the core functionality of the system is separated from localized interface details (text, numbers, dates, etc.), whereas with localization, the interface of a system is customized for a particular audience (not only through language translation, but also through technical, national, and cultural features of the system) (Marcus, 2002).

The expression “*cross-cultural applications*” may suggest that users, no matter the cultures they come from, can interact with the application preserving their cultural identity. Also, the expression is often linked to Int-Loc projects in HCI literature. Nevertheless, we propose a broader definition for it. In this work, *cross-cultural applications* are simply systems that aim to attend to the needs and expectations of people with different cultural backgrounds.

Cultural differences throughout the world multiply the challenges of good HCI design. An Int-Loc perspective deals with them by helping us *design for all* (Int) and *design for each* (Loc) culture. In essence, this approach neutralizes cultural differences emerging at the user interface level, by trying to avoid foreign cultural references that may *confuse* the users during interaction. This thesis shares the Int-Loc approach concern about *not confusing the user*, but instead of neutralizing cultural differences, we fully embrace cultural diversity and try to *design for communicate cultural diversity*.

This thesis takes an alternative path, that of deliberately helping designers to think about how to *expose* and *communicate* the very idea of cultural diversity, when the purpose of the designed system is to stimulate the user’s contact with signs of a foreign culture. We intend to support designers while reasoning and making decisions about different levels of intercultural contact, which may increase the users’ perception of cultural diversity in the particular domain where the system is placed.

The next section briefly summarizes the steps taken in this doctoral research to frame an object of study and to elaborate on a research question in order to

advance the state of art in HCI. Then, Section 1.2 summarizes the contributions of this thesis.

1.1.

The research question, objectives and scope

Because of our natural commitment with the Semiotic Engineering Research Group (SERG), where this thesis was developed, our first step in this research was to investigate the contributions (if any) and gaps in Semiotic Engineering (de Souza, 2005a) concepts and evaluation methods (see details in Chapter 2) when used to support design decisions for elaborating the designers' mediation discourse in cross-cultural applications.

Initially we conducted empirical studies applying Semiotic Engineering evaluation methods to analyze and re-design cross-cultural systems interfaces. Specifically, we used two evaluation methods: Communicability Evaluation Method (CEM) and Semiotic Inspection Method (SIM) (de Souza *et al.*, 2006; de Souza *et al.*, 2010; Prates *et al.*, 2000).

We took a paradigmatic example of a cross-cultural system, the International Children Digital Library (ICDL) website, as an object of study. The ICDL website was developed by the University of Maryland (ICDL-website). This is a public digital library designed to provide a collection of 10000 books in 100 languages for children (from 3 until 13 years old – age between 3 and 13), teachers, and researchers on the Internet. ICDL was launched in 2002 with the purpose of exposing children from all over the world to different cultures through literature.

We began with a study previously carried out using CEM (de Souza *et al.*, 2008). It focused on how well the designer-to-user metacommunication (communication about communication) is received, with an emphasis on communication involving explicit cultural elements (e.g. language, reading practices). According to the authors, the most important result from this study was an urgent need for cultural references to orient ICDL users as they move across cultural boundaries. The ICDL interface should present not only linguistic alternatives, they said, but also cultural markers (Barber & Badre, 1998) and a

cultural “*home base*” (i.e., a familiar place to which they can return or refer in multi-cultural explorations).

Then we conducted ourselves a study with SIM (Salgado *et al.*, 2009a) to evaluate the emission of the designer-to-user meta-communication. The results from this new investigation led us to realize that ICDL is not fully prepared to face the needs of users from widely different cultures, because the only cultural parameter in the ICDL interface that can be changed to adapt to users from different cultures is language.

Although CEM and SIM have not been designed (and therefore are not prepared) to deal specifically with cultural issues, the results of both evaluation studies clearly indicated some actual and potential communicative breakdowns when ICDL users get in touch with content from foreign cultures while interacting with the system. Furthermore, the studies gave us insights about the complexity of cross-cultural design *per se*, and – given our particular framing of HCI – the complexity of organizing the designers’ discourse about multicultural experience in systems like ICDL. Our conclusion, after revisiting these studies, was that intercultural encounters in websites like ICDL bring about many exchange opportunities, but they are not always organized and, probably for this reason, experienced by users in the way intended by the systems’ designers.

The theoretical and empirical results collected in the ICDL website, combined with design issues informed by epistemic design tools proposed by Semiotic Engineering, served to demonstrate the benefits of a semiotic approach when organizing intercultural communication in cross-cultural HCI design.

Our second step in this research was an in-depth theoretical analysis of the cultural aspects of HCI in a semiotic engineering perspective. We investigated if and how this HCI theory could help designers to elaborate the intercultural mediation discourse (or *metacommunication* in Semiotic Engineering terms) in the context of cross-cultural applications.

We borrowed concepts from Semiotics (Danesi & Perron, 1999; Eco, 1976) and Intercultural Communication (Hall, 1959, 1966, 1976; Hall & Hall, 1990; Gudykunst, 2003) in an attempt to find out which elements from these two areas could be incorporated or adapted by Semiotic Engineering in order to improve its theoretical power in dealing with a specific kind of metacommunication, namely

one that intends to mediate intercultural contact between users and signs of a foreign culture. When we speak of *signs of a foreign culture* we separate human actors (which some semiotic theories take to be signs themselves) from whatever it is that they produce as a result of their presence and activity. In other words, our interest rests very specifically on metacommunication that promotes a user's contact with the signs (the *trace*) of human presence and activity from another culture. This is an *indirect* intercultural contact, compared to *direct* person-to-person conversations that take place in chats and social networking applications, for example. The value of segmenting the problem space in this way is that we can focus very precisely on *cultural signs* that must be communicated or understood in the *absence* of synchronous or asynchronous human communication that can provide contingent additional explanations.

As explained in Chapter 2, concepts from Semiotics and the Intercultural Communication area helped us understand the relationship between culture and communication and the *spectrum* of intercultural encounters in HCI from both anthropological and semiotic perspectives. We then combined elements from these areas with the Semiotic Engineering account to improve its capacity to deal with a kind of metacommunication which intends to communicate cultural diversity.

As a result, we mapped the design space of cultural diversity to which Semiotic Engineering can contribute. By conceptualizing HCI as a phenomenon of designer-to-user metacommunication, Semiotic Engineering reveals the existence of a new axis of intercultural contact and gives us the opportunity to study – among many other topics of interest – the conditions and the strategies for communicating intercultural content through systems interfaces. In particular, with this theory we can study how designers may offer opportunities for the users to be in explicit and intentional contact with signs from a foreign culture while interacting with a system. This led us to a research question:

“Which communicative strategies can we use when composing our metacommunication message about cultural diversity?”

This research question was then framed within a specific area of interest: the HCI design process of cross-cultural applications in the Web that are meant to

support intercultural contacts between users and signs of cultural diversity (see Chapter 2, Section 2.2).

Our objects of study was finally defined as the HCI design process of single-user (*i.e.*, which do not support user-to-user communication) cross-cultural Internet applications which explicitly promote intercultural contact between the users and foreign cultural content.

The collected theoretical and empirical results from first and second steps led us to propose, in 2009, five conceptual viewpoint metaphors (CVM) to guide different communicative strategies that affect both designer-to-user communication and user-system communication (Salgado *et al.*, 2009b). As Chapter 4 describes, since then, these metaphors evolved as a result of multiple empirical experiments, exploratory studies and continuous theoretical analysis.

In the third step we investigated if and how CVM actually support HCI professionals/practitioners. We carried out a case study to assess how CVM can be used both in design and evaluation activities (see Chapter 5). We found out that CVM do play an important role in early design stages, helping designers to *reason* about cross-cultural experiences while determining which cultural perspective they want to adopt. Furthermore, CVM features provide a rich **epistemic grid** where the consistency of design choices stands out more clearly.

1.2. Contributions

This thesis contributes to HCI in general and Semiotic Engineering theory specifically by producing new knowledge and new research questions.

Regarding contributions to HCI, this thesis contributes by offering CVM as a conceptual design tool that can be used when cross-cultural system designers explicitly want to support and promote different levels of contact with cultural diversity.

Results from the case study (see Chapter 5) reveal the epistemic value of CVM on cross-cultural design and evaluation. The metaphors help in building new knowledge and understanding about culture itself, while helping designers to think of how to expose and communicate the very idea of cultural diversity. It is worth saying that CVM help HCI practitioners to explore the design space of

cross-cultural Web applications no matter the level of Semiotic Engineering knowledge that they have.

At design time, CVM help designers to reason about cross-cultural contacts while determining which cultural perspective they want to adopt. They also help them select and structure a top-level communicative strategy to stimulate users in increasing their perception of cultural diversity within the domain of the system. At evaluation time, in turn, the value of CVM is evidenced since they guide HCI evaluators to inspect and evaluate the communicability of cultural diversity in a systematic way throughout the process.

For Semiotic Engineering theory, this thesis' contribution is an exploration of a gap. Until now, culture was tacitly dealt with in this theory through Eco's view of Semiotics as the logic of culture (Eco, 1976), which Semiotic Engineering adopts and acknowledges. However, the theory never formulated clear cultural *questions* to be answered and decided in the design process. With CVM, we explored metacommunication in different contexts of intercultural contact, and expanded the range of issues that Semiotic Engineering can explicitly bring to bear in its account and study of metacommunication through systems interfaces.

Finally, this thesis makes an additional and important contribution to Semiotic Engineering by aligning semiotic characteristics of CVM with theoretical elements drawn from Peirce's typology of signs (1992-1998). This opens the way for a new line of investigation regarding the *rhetoric* of metacommunication in cross-cultural contexts, which has no parallel inside or outside the limits of Semiotic Engineering.

1.3. Outline

The reminder of this thesis is set out as follows: Chapter 2 presents a specific theoretical characterization of the phenomenon of interest of this thesis, i.e., the human-computer interaction in cross-cultural systems in the Web. Chapter 3 reviews the related literature. In Chapter 4 the five cultural viewpoint metaphors are presented, followed by experimental evaluation done with these metaphors in Chapter 5. Our discussion and conclusions are then presented in Chapters 6 and 7, respectively.