

2 Theoretical Characterization

The phenomenon of interest for this thesis is human-computer interaction in cross-cultural systems in the Web. More specifically we are interested in the HCI design process of such systems. This chapter presents a specific theoretical characterization of this phenomenon, i.e., the concepts from theories or views that framed the research space of this thesis.

We adopted the communicative perspective of Semiotic Engineering (de Souza, 2005a). This theory was instrumental in this cross-cultural context because it views HCI as a computer-mediated human communication process, where designers – through systems interfaces – are indirectly (or at times quite directly) *telling* users how, why, when and where to communicate with the system in order to achieve a number of tasks and effects. We investigated the contributions and gaps of Semiotic Engineering concepts to support cross-cultural design process.

Semiotic Engineering considers culture a part of this semiotic design process, since this theory has inherited Eco's view of Semiotics as 'the logic of culture' (Eco, 1976). Culture has always been implicitly part of whatever Semiotic Engineering theorization about HCI. However, Semiotic Engineering has not theorized specifically about cultural issues in HCI, i.e., about the roles of culture in the many research questions and, as is the focus of interest of this thesis, on the role of culture in cross-cultural HCI design.

Designing cross cultural systems must take into consideration the needs, expectations, specificities and possible encounters of different cultures (the designers', the users' and that of the domain itself) at design and interaction time. So, in order to understand the nature of the relationship between culture and this specific communication setting, we studied concepts from Semiotics (Danesi & Perron, 1999; Eco, 1976) and Intercultural Communication (Hall, 1959, 1966, 1976; Hall & Hall, 1990; Gudykunst, 2003) to find out which elements and concepts could be used to expand the Semiotic Engineering account of HCI.

Our work explicitly uses metaphorical reasoning to explore cultural perspectives in cross-cultural HCI design. We propose conceptual metaphors to help designers think of cultural issues in new ways (see Chapter 4). As explained later this work is influenced by Lakoff & Johnson's (1980) view of conceptual metaphor, in which a metaphor "is understanding and experiencing one kind of thing in terms of another" (*ibid.*, p.5).

We start our theoretical characterization with an overview of definitions for "culture" and a discussion about the relationship between culture and communication from both an anthropological and semiotic perspectives. We aim at analyzing how Semiotics and Culture theories may influence and change Semiotic Engineering so that this theory may advance studies about cross-cultural design.

Section 2.2 presents the concepts of Semiotic Engineering theory that we used to frame and organize the research space for this thesis. It also presents our interpretation of the HCI design space, if culture is to be taken in consideration. Next, Section 2.3 presents how the use of metaphorical expressions to name cross-cultural perspectives throughout this theoretical characterization helped us to map observable things to abstract concepts.

2.1. Culture and Communication

According to the literature the concept of culture from an anthropological viewpoint was first defined in print by E. B. Tylor in 1871: "Culture, or civilization, taken in its broad, ethnographic sense, is that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society"² (Tylor, 1958, *apud* Laraia, 2009, p. 25).

Many years later, after reviewing over 150 definitions of culture, Kroeber & Kluckhohn (1952) found consensus on two points: "that culture is a way of life based on some system of shared meanings; and that it is passed on from

² Original Text in Portuguese: "Cultura ou Civilização é este todo complexo que inclui conhecimentos, crenças, arte, moral, leis, costumes ou qualquer outra capacidade ou hábitos adquiridos pelo homem como membro de uma sociedade".

generation to generation through this very system” (*ibid. apud* Danesi & Perron, 1999, p. 22).

In more recent years, the HCI literature about culture has adopted a different definition. Borgman (1992), for instance, claims that “culture includes race and ethnicity, as well as other variables, and is manifested in customary behaviors, assumptions and values, patterns of thinking, and communicative style” (*ibid.*, p.31).

Barber and Badre (1998), in turn, introduced culture as follows:

“We use the word ‘culture’ as a means of distinguishing among the different countries and their respective websites. Our use of the term is not intended to be indicative of all the nuances and properties frequently implied by the term, but rather to permit discourse about the features that distinguish one country or region of the world from another in the electronic medium of the Web” (*ibid.*, p.1).

The definition proposed by Hofstede (1984) is also widely used in HCI research: “culture is the collective programming of the mind which distinguishes the members of one category of people from another” (*ibid.*, p.51). This taxonomic view takes culture as a means to distinguish and classify people, activities, and settings. Hofstede’s model has been widely used by HCI researchers to explain and predict cultural differences.

Clemmensen & Roesse (2009) reviewed a decade of journal publications about Culture and Human-Computer Interaction and defined culture as “country boundaries, language, cultural conventions, race and religions, not including organizational culture or other group cultures, such as different virtual environments or customer groups” (*ibid.*, p.4).

Concepts from Intercultural Communication research area was also used in this research. This area investigates situations “where people from different cultural backgrounds interact”, where “culture is the link between human beings and the means they have of interacting with others” (Hall, 1959, p. 213).

Hall’s view about culture as a form of communication opened our mind to understand the nature of culture in relationship to communication. Communication is itself the means through which **cultural variables** (such as language, symbols, rules, gestures) are created and shared, and it is also through communication between individuals that cultures change over time.

Each person involved in a communication encounter brings to it the sum of his or her own cultural background. So, we can say that any encounter between individuals is an intercultural communication situation and this influences both individuals and cultures over time. In real life, for instance, when visiting other groups, domains, organizations, and, especially, other societies, people are often confronted by—and therefore become aware of— different customs, rituals, and conventions.

In HCI, in turn, there are many situations where people from different cultural backgrounds interact in an intercultural communication encounter. At interaction time, the Web 2.0 promotes multiple and diversified encounters between users with different cultural backgrounds through on-line communities, blogs, wikis, social-networking sites, and so on.

In this work, we adopted a definition of culture as generally seen by semioticians: “a communal system of meanings that provides the means for human beings to translate their instincts, urges, needs, and other propensities into representational and communicative structures” (Danesi & Perron, 1999, p. 15). This definition is in line with Hall’s view where culture and communications are closely connected to each other.

We also take the definition of Cultural Diversity proposed by Borgman, (1992, p.1), who sees it “as the acknowledgement that we live in a multicultural society and that culture determines much of our behavior, whether we are conscious of it or not.”

To us, culture is, then, a shared system of interpretations (meanings) that allows us to make sense of the world around us. The way we make them understandable to others is by representing our desires, beliefs, needs, feelings and attitude in specific ways. We do so using communication means and resources (art, words, gestures, interactive systems). This is, of course, how culture is transmitted (consciously or not) to other members of the collectivity, through representational and communicative systems.

This is in line with Hall’s view that “culture comprises some aspects that can be talked about and some that cannot” (Hall, 1959, p. 62). Kluckhohn, for instance, categorized these two different levels of culture in explicit and implicit culture. Explicit culture includes such things as law, what people talk about and

can be specific about. Implicit culture (*e.g.* our feelings about success) is what exists “on the fringes of awareness” (Kluckhohn *apud* Hall, 1959, p. 61).

HCI designers, like all human beings, use this shared system of meanings for the creation of representational and communicative systems, namely, interactive artifacts. In other words, the interactive systems created by designers are cultural expressions of those who created them, and also a means of communication for culture itself.

In the next section, we present the concepts and design space proposed by Semiotic Engineering, which helped us to think about the interlocutors in cultural processes, and to map our field of study, *i.e.*, the design space of cultural diversity.

2.2.

Semiotic Engineering concepts and cross-cultural design

Semiotic Engineering (de Souza, 2005a) advances a particular view of human-computer interaction based mainly on Eco’s framing of Semiotics: a discipline that studies signification and communication (Eco 1976, 1983). *Signification* is the process through which certain systems of signs are established as a result of social and cultural conventions adopted by the interpreters and producers of such signs. *Communication* is the process through which, for a variety of interpersonal purposes and effects, sign producers express intended meanings by exploring the possibilities of existing signification systems. Occasionally, they may even resort to unconventional signs, which they invent or use in unpredicted ways for typically rhetorical reasons. Eco’s Semiotics also distinguishes three fundamental elements in communication: *intent* (what you want to achieve with communication), *content* (what information you use) and *expression* (what forms and means of communication you choose).

In the Semiotic Engineering account of human-computer interaction as a computer-mediated human communication process, there are three *agents* involved: designers, users and system. They are brought together at interaction time through *metacommunication*. In this particular process, through the interface, the designers’ deputy (the system) sends an interactive message to users telling them about who the designers think the users are, and what they know the users

need or want to do. They also tell them about how and why the users should communicate with the system while aiming to achieve a certain range of anticipated goals.

The users take part in the metacommunication process by continually interpreting the designers' message expressed in the system's interface, and by communicating back with the system according to the possibilities and alternatives they see. The interface represents the designer at interaction time, and plays the designer's role in communication. Regardless of whether the interface represents the designer in anthropomorphic ways or in the guise of inanimate artifacts and devices, it always communicates to users what the designer wants to say, and listens *back* to the users' reaction, thus establishing a **mediated** conversation with (and about) the system. When full metacommunication is achieved, the user receives and interprets the whole message from the designer, which can be paraphrased by a generic template – called the *metacommunication template* (de Souza, 2005a) – that says:

“Here is my [the designer’s] understanding of who you [the users] are, what I’ve learned you want or need to do, in which preferred ways, and why. This is the system that I have therefore designed for you, and this is the way you can or should use it in order to fulfill a range of purposes that fall within this vision.”

Semiotic Engineering structures the designers' semiotic activity and organizes elaboration of metacommunication process with the model of communication (see Figure 1) proposed by Roman Jakobson (1960). In this model, six elements structure the communication space: context, sender, receiver, message, code and channel.

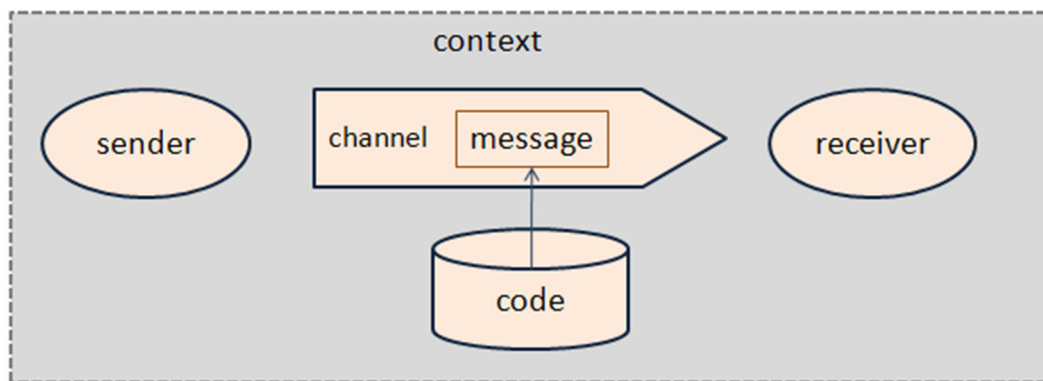


Figure 1: Graphic scheme of Jakobson's (1960) model of communication space.

The semiotic engineering design space, then, expresses the elements from Jakobson's model where the designer is 'the sender'; the user is 'the receiver'; the computer is 'the channel'; the messages are (portions of) the system's interface, at different levels of abstraction; messages are encoded in computational codes; and the context represents where the communication process takes place. Furthermore, this design space refers to each of the elements that the designers should make decisions about and account for in the construction of metacommunication discourse (see Figure 2).

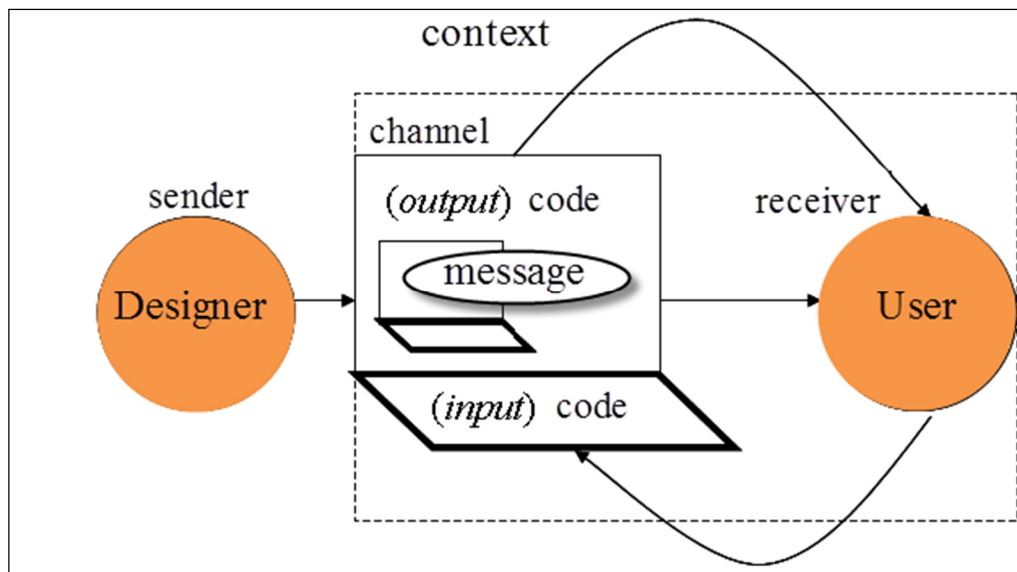


Figure 2: The Semiotic engineering design space (de Souza, 2005a).

Semiotic Engineering organizes the designers' messages in this specific communicative scenario. The designers' semiotic processes, then, determine the system's meaning, which is represented by interface language constructs. The mutual understanding between designers and users (through system) is possible (at interaction time) when and if there are shared meanings in the designers' and users' semiotic processes.

According to Intercultural Communication studies (Hall, 1959; Allwood, 1985), the basic difficulty to achieve this mutual understanding is the differences that exist between the sender's and receiver's cultural backgrounds and way of communicating. A first action to reduce the risks of misunderstanding would be to gather good insight into the differences and similarities that exist.

Although Semiotic Engineering considers culture as part of signification process which takes place in communication, this theory does not address possible

cultural mismatches between the encounter of different cultures (the designers', the users' and that of the domain itself) **at design and interaction time**.

Regarding design time, it may involve encounters and promote exchanges in different ways and contexts:

- with a culturally diverse group of users (no matter whether the designers come from different cultures or not);
- with a culturally diverse group of designers (no matter whether users come from different cultures or not);
- with a culturally diverse group of designers building cross-cultural systems for culturally diverse groups of users, which seems to be most common in the context of Information and Communication Technologies (ICT) today;

Any of the above communicative situations also may happen in a context where participants do not share the same cultural characteristics with the domain itself. Such is the case, for instance, when Indian designers produce systems to American users about a domain with different commercial practices among these cultures.

Concrete examples of those intercultural encounters at design time may take place in participatory design contexts (designers and users), virtual teams (people coming from different places), end-user development (users participating in a culture of software development), and so on.

Regarding interaction time, intercultural contact may happen in many situations in HCI. On one hand, the user may be in contact with other culture directly by interacting with other in Computer-Mediated Communication (CMC) technologies, such as instant messages, e-mails, chat rooms, collaborative environments and so on. CMC provides opportunities for direct intercultural encounters, since the contact among two or more users, i.e. user-to-user (U-U), may happen without intermediaries.

On the other hand, the users may be in contact with characteristics of a foreigner culture by interacting with cross-cultural applications which explicitly communicates **cultural variables** (knowledge, belief, art, morals, law, custom, language, symbols, cultural conventions, communication styles and so on). The sharing of cultural characteristics is not necessarily consciously perceived by the

participants of the communication process, but it happens, since culture is the means of communication.

The design intent of such applications is usually to *expose and explore* cultural diversity by providing opportunities to indirect intercultural encounters, since it is not U-U. The International Children's Digital Library³ and the Unesco⁴ websites are examples of systems that fall in this category.

Although Semiotic Engineering does not address *how* culture should be taking into account in the organization of interactive discourse at design time, a theoretical reflection about how culture influences the three fundamental elements in communication process (intent, content and expression) and its impact in HCI helped us to explain *why* culture is critical in cross-cultural HCI design.

Semiotic Engineering argues that a system's interface *signifies* (or expresses) the design intent by means of a finite set of elements and structures that are specifically associated to systems states and behavior. This constitutes a purposefully designed signification system, in which certain kinds of signs are deliberately associated to certain kinds of contents in order to support communication of (and thus convey) a certain range of design intentions. In this communication process, users access the information (content) which interactive systems want to convey through signs (expression) available in the system's interface.

Cross-cultural HCI design should take culture into consideration for at least three reasons. Firstly, because the context, the existing culture in the systems' domain and the designers' own cultural background strongly influence decisions about the top-level design *intent*. For instance, with target users coming from different cultures, the design intent may be to have a standard "international" interface for all, or else to offer a "specifically adapted" interface for each of the cultures involved.

Decisions regarding design intent may also take into consideration that the system's domain can be differently perceived and used by people from different cultures. There may be distinct commercial practices, for instance, that are specific to each one of the cultures involved. Another possible cultural perspective to design intent may have to do with intercultural contacts that may or may not

³ <http://en.childrenslibrary.org/> last accessed in Feb 3, 2011.

⁴ <http://www.unesco.org/new/en/unesco/> last accessed in Feb 3, 2011.

happen at interaction time, which clearly affects the user experience. The design intent may be to value and promote intercultural contact among *users* with diverse cultural backgrounds (through chats, on-line communities, etc.), or to promote the contact between user and the cultural diversity of the *systems' domain* (at a representational level), without actually communicating with *people* (other users) with that cultural background.

Secondly, because from this design decision various choices about cultural content follow, including the kinds of communicative strategies and signification systems that will more effectively and efficiently convey the designer's message.

The quality and quantity of cultural referents elicited for each culture will also depend on the kinds of experiences that designers want users to be able to engage in. Some make more sense or are more important in one domain than in others. For example, in international digital libraries, the direction of reading and the way books and printed material are manipulated is a relevant cultural variable. Likewise, in international car rental websites, road conventions and driving legislation in various countries are relevant cultural variables that customers should be aware of. Some other cultural variables, however, are relevant across many domains of activity. Such is the case of language, units of measurement, currency, and reputation, for instance.

Finally, because interface elements and interaction patterns *express* the designers' views, intent and expectations about how to respond to the users' needs, preferences, opportunities and beliefs in a particular domain of activity. So, when dealing with systems whose purpose explicitly includes cross-cultural issues, design process should lead designers to decide how to communicate their intent. As a result, we may say that designers' message always communicates something regarding culture. Furthermore, we can say that the interlocutors' culture affect the communication process in HCI.

After analyzing the possible intercultural encounters in HCI in light of Semiotic Engineering concepts, the design space proposed by this theory may explicit the **cultural interlocutors**, namely, the designers, the users and the system, in HCI. It is worth remembering that "the designer-to-user conversation at design time does not constitute per se an object of investigation for semiotic engineering" (de Souza & Leitão, 2009, p. 19), so this design space concerns "the

set of all computer-encoded conversations that the designer's deputy can have with users at interaction time" (*ibid.*, p.19).

Figure 3 should show that: (1) designers' message is sent by designers (senders) of different cultures; (2) receivers' from different cultures get the senders' message; (3) such users (receivers) could talk to each other through the system; and, (4) the message refers to a system's domain which may be multi-cultural and/or differ between cultures.

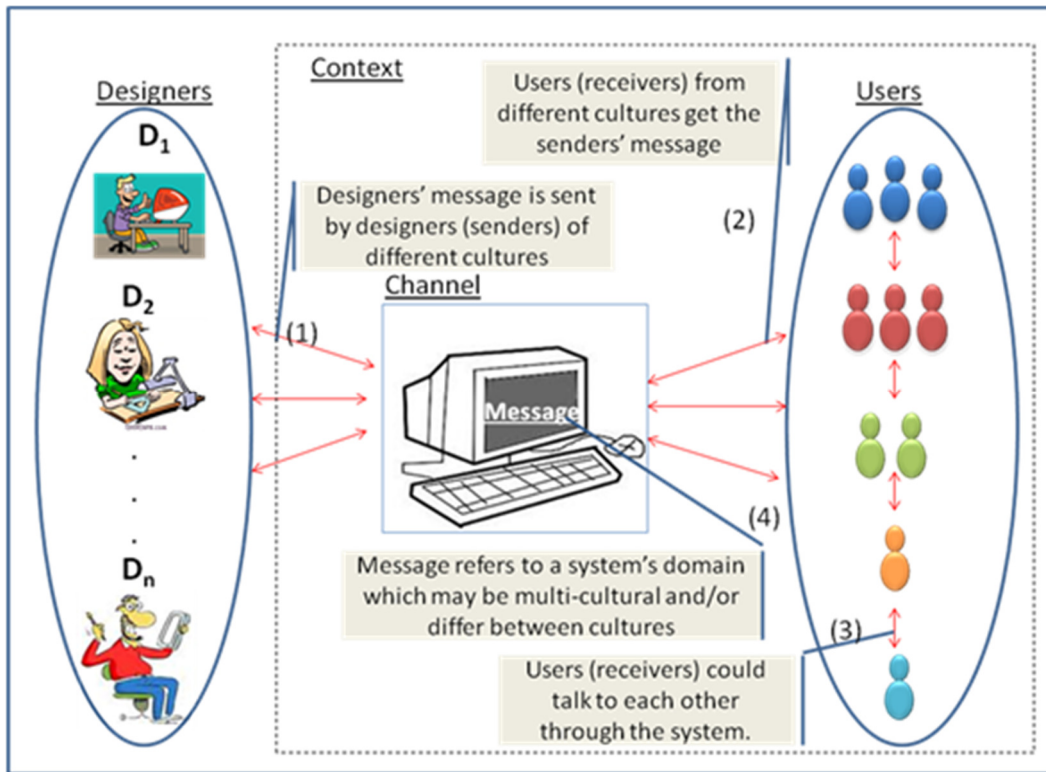


Figure 3: The Semiotic Engineering design space taking into account cultural diversity.

This preliminary mapping of cultural diversity design space represents and frames the study field determined by the combination of culture and HCI, to which Semiotic Engineering can contribute. It starts by expressing who the cultural interlocutors in human-computer interaction design space are, i.e., each one of the speakers and listeners involved in the communication process of culture: the designers, the system (the designers' deputies at interaction time); and the users.

From this mapping various research questions follow. Some of them arise by looking at the receivers:

- a) How do the receivers from different cultures get the senders' message?

- b) What is the impact of the users' culture on reception of the senders' message?
- c) How may receivers from different cultures talk to each other through the system?

Other questions regard the emission of the metacommunicative discourse by the senders:

- d) How do senders from different cultures send a unique and unified message?
- e) What are the impact and consequences of the designers' cultural background on the metacommunication elaboration process and quality?
- f) What are the possible communicative strategies to send a message to receivers from different cultures?
- g) Which level of awareness about cultural differences among interlocutors is appropriate to senders?

Last, but not least, we have some questions regarding a context in which the subject matter is a multi-cultural domain, with emphasis on how cultures differ from one another:

- h) Should/Could the cultural diversity of system's domain be the subject of metacommunication?
- i) How can we identify which type of cultural phenomena should be considered with respect to the activity and information that constitute the object of in the message?
- j) What are the possible communicative strategies to send a message about cultural diversity?
- k) What is the influence of the designers' cultural background in the metacommunication of culture diversity?

This thesis does not aim at addressing all these questions, since they try to cover various intercultural encounters at design and interaction time. Actually, we are interested in the specific situation where indirect intercultural contact situations in human-computer interaction takes place, i.e., in situations where the users get in touch with a different culture through the interface signs.

In these cases, the system intentionally offers to the users opportunities to get in touch (through the interface at interaction time) with explicit signs of

another culture, without any direct contact with people from the other culture. So, the system provides an interactive mediation space about cultural diversity.

Although this thesis deals with the dialogical relationship between two different cultures at interaction time (the users' culture and the cultural diversity signs of a particular domain where the system is placed), we are interested in HCI design process of systems that are meant to support this kind of intercultural contact. More specifically, our focus is on the semiotic engineering of systems aiming at promoting an intercultural computer mediated contact between the user and signs of a foreign culture expressed by interface language constructs.

This work, then, wants to address a research question ('j'), which has not yet been explored in HCI literature: "Which are the possible communicative strategies to send a message about cultural diversity?" Our object of study is, then, the HCI design process of mono-users cross-cultural applications available in the Web. We emphasize that we are dealing exclusively with systems that intend to promote cultural contact between the users and (multi) cultural content in the system's domain intermediated by the interface.

Chapter 4 presents our contribution to HCI cross-cultural design by helping designers while elaborating an interactive message which communicates the cultural diversity of a particular domain to users with the use of conceptual metaphors. First, however, next section presents why metaphors are an interesting alternative to address the research question we are focused on.

2.3. Conceptual Metaphors

The term metaphor is itself a metaphor (*meta* "beyond" + *pherein* "to carry"). It is traditionally defined "as the use of a word or phrase denoting one kind of idea or object in place of another word or phrase for the purpose of suggesting a likeness between the two" (Danesi & Perron, 1999, p. 162).

Although people still think of metaphor as verbal ornamentation or a stylistic device for decorating messages, "it is the sum and substance of abstract thinking" and it is "evidence that the human mind has a tendency to think of certain referents in term of others" (*ibid.*, p. 165).

In semiotic terms, a metaphor has two referents, not one, which are related to each other. For instance, “*The professor is a snake*”. *Professor* is the primary referent, the topic of the metaphor. The *snake* is a second referent, the vehicle of the metaphor. It is not the denotative meaning of snake (the vehicle) that is transferred to *Professor* (the topic), but its connotations. So, the cultural characteristics perceived in *snake* which give meaning to the topic (danger, slyness and so on).

In the early 1980s, Lakoff & Johnson introduced a new theory of metaphors arguing that metaphors are the data that reveal how abstract thinking occurs. Metaphors, they said, are “pervasive in everyday life, not just in language but in thought and action” (*ibid.*, p. 3). Their main point was that our conceptual system is fundamentally metaphorical in nature.

Two millennia before, the philosopher Aristotle (*apud* Danesi & Perron, 1999, p. 164) saw the power of metaphorical reasoning in how it allowed people to produce knowledge. Additionally to Aristotelian notion that there are two types of concepts (concrete and abstract), Lakoff & Johnson (1980) claimed that abstract concepts are built up systematically from concrete ones through metaphorical reasoning. The next step was to rename abstract concepts to conceptual metaphors, defining them as generalized metaphorical formulas that characterize specific abstractions.

For instance, “*The professor is a snake*” is a token of a general metaphorical idea: “*People are animals*”. Such formulas are what Lakoff & Johnson (1980) and Lakoff (1993) call conceptual metaphors. *People* are the target domain because it is the abstract topic itself; and *animals* are the source domain because it represents the class of vehicles. An abstract concept is defined, then, as a mapping of one domain onto the other.

Throughout this doctoral research, results from the theoretical characterization presented in this chapter and from exploratory and empirical studies with Semiotic Engineering (Salgado, 2009a, 2009b; de Souza *et al.*, 2008) led us to make use of metaphorical expressions to name, to think and characterize the observed phenomenon (human-computer interaction in cross-cultural systems in the Web). So, we conceived the nature or intensity of intercultural contact that takes place in human-computer interaction in terms of the possibilities that may

occur in our real life. Such is the case when we are in touch with other cultures, traveling to other countries, watching foreign movies, listening to songs from a far-away country, and so on.

When traveling, for example, one can use the service of a tourist guide, who speaks one's language and can help bridge cultural gaps. Others might decide to explore the culture without intermediaries, having as much direct experience and exposure as they can. We, then, began to organize the range of the users cultural exchange possibilities by categorizing the kinds of cultural contacts they may have (Salgado *et al.*, 2009b). The categorization was done in terms of how far a presumed user is from a foreign culture when he or she begins to approach it **through interface signs**: non-existent multi-cultural contact (maximal distance); remote contact (far), close contact (closer), direct contact (closer yet); and, direct cultural contact (minimal distance).

Bishop remarked that "since earliest times, the act of travelling has been seen as a natural metaphor for learning, for the acquisition of experience and knowledge" (Bishop, 1976, p.1). Actually, metaphorical reasoning about intercultural contacts in HCI using the basic 'journey' metaphor functioned primarily as a means to help us understand and map observable evidence onto more abstract categories and concepts. Throughout this process we were involved in a cognitive process that analyzed the correspondence between elements from a source domain (travel) and a target domain (the user's experience).

Our general metaphorical structure then views "HCI as a journey" (in the context of cross-cultural system) and "Users as travelers". We are not, as it might be expected from the cultural pervasiveness of the metaphor we chose, the only ones to use the 'journey' metaphor to generate domain conceptualizations. According to Lakoff & Johnson (1980), there is abundant evidence that 'Love', for instance, is conceptualized as a 'Journey'. Think, for example, of expressions where 'Love' is described as follows: *Look how far we've come!* or *The relationship isn't going anywhere*. In these cases, the domain of 'Love' is understood in terms of the 'Journey' domain.

Lakoff & Johnson argue that in the 'Love is a journey' conceptual metaphor, lovers are travelers on a journey together and the relationship is the vehicle that allows them to pursue their common goals together. We, in a different context, believe that in our 'HCI is a journey' conceptual metaphor, users are

travelers and the metacommunication process is the vehicle that will take them to foreign spaces.

In previously reported HCI research, Barber and Badre (1998) made an explicit connection between the ‘travel domain’ and the Web to explain the importance of *Culturability*, a term that emphasizes the importance of the relationship between culture and usability in cross-cultural web design:

“Sounds, smells, architecture, geography, flags, mode of dress, signs, customs, language, currency, and many other features contribute to the traveler’s awareness of being in an unfamiliar place, which can be exciting when one wants to explore, and frustrating when one needs to accomplish a complex task easily and efficiently. Apply the traveler’s analogy to the WWW, and the similarities are striking. Just as physical cities and countries differ and reflect their inhabitants, so do Web sites.” (*ibid.*, p.1)

In Chapter 4 we formally present our conceptual metaphors and their role in HCI cross-cultural design stages. But, before we proceed, in the next chapter, we present a survey of previously published work about culture and HCI.