
1 Introduction

*“What pattern connects the crab to the lobster
and the orchid to the primrose
and all four of them to me? And me to you?”*

Gregory Bateson, *Mind and Nature*

The present work seeks to describe implicit patterns based on natural language and culture in human-computer interaction (HCI), and user experience (UX). For our purposes we shall use the term HCI as concerned about the structure of the system, while the term UX shall be used for the activities related to the HCI design process, such as planning, researching, analyzing, designing, implementing, evaluating, documenting, training, and maintaining (Marcus, 2009). The user interface (UI) is the external effect (or representation) of both HCI, and UX.

Although extensive research has been done in the fields of HCI semiotics, and the cultural aspects of HCI, we seek to bring novel insights by informing these fields through the linguistic perspective, and to propose a set of design guidelines for the international HCI/UX practitioners. The goal to achieve this is twofold: First, to define the semiotic and linguistic system of HCI and create a UX methodology (Part I), and second, to apply the acquired methodology for cross-cultural comparison (Part II).

We consider semiotics as a foundation of interaction and communication design in HCI, because it is concerned with meaningful arrangement of UI elements across space and time.

However, the above method can work well only when we acknowledge the influence of our native language and culture on our thoughts and actions. The potential differences are further accented by globalization, because when using communication technology, we are faced more and more with UIs coming from rather different cultural backgrounds. In order to tackle the differences in a meaningful manner, there is a growing need to design UIs that are usable and well accepted in the target culture.

Cross-cultural testing of UIs is the most comprehensive way to meet this goal, but it is also the most financially demanding. Therefore, by defining a usable set of UI design guidelines for a target culture, designers could market their products with lower costs and with better acceptance.

We chose to work from the semiotic perspective, which helps us uncover the sense-making processes of the users. We used semiotic methods to build a common framework to gather and analyze cross-cultural data. And, we started our analysis by looking at the UI as an example of complex language.

To acquire the necessary preliminary insights about users from diverse cultural backgrounds, we carried a pilot study targeted at the habits, mental models, and UI preferences of Chinese and Czech users. The scientific rationale of choosing Czech and Chinese respondents for comparison was to search for meaningful differences

between cultures, which could be turned into usable design guidelines for the UX community. The two groups were chosen, first, because one is a part of the Western culture, and the other is a part of the Eastern culture. Previous literature showed interesting differences related to HCI between these two groups. Second, the author was able to conduct the research in these two groups according to the method presented above, thanks to his direct access.

In our work we followed and expanded upon a body of previous research in the field of cross-cultural research. In our view, however, only limited work has been done in creating usable guidelines for cross-cultural UI design. We bring our insights from our cross-cultural research and propose a set of design guidelines.

The present book aims at analyzing HCI/UX following these main theses:

1. **The UI is a means of sharing and interpreting information between systems.** Our thoughts and actions are guided by intrinsic logic rules, supported by the system of language and culture. Language provides an architecture of the design space of HCI/UX. Linguistics and semiotics provides effective methods to solve problems in communication and interaction design. These methods help define the users in their culture, rather than as culture-independent agents. Moreover, each UI stands on a certain paradigm of use which is not always apparent. The HCI ideology defines what relations between users and objects can (or should) be made.
2. **Every sign in HCI is cultural and therefore informational.** The UI provides a lens for reading and writing cultural data. The user's native language and culture determines his/her mentality, rationality, and the discourse involved. By expressing in different systems of meaning (e.g., languages, UIs), we accent different objects and experiences, which results in different insights into the world we live in. When UIs take into account those differences, they can promote both usability and cultural diversity.

The theoretical backbone of our work can be illustrated by the following concepts and their relations:¹

Data -> Facts -> Thought/design – **Picture of reality**/ideology <-> Form/ design
– **Language**/culture <-> **Information** <-> Language/UI <-> **Interaction**.

Data are factual information (Merriam-Webster, 2013a); facts are the existence of states of affairs (Wittgenstein, 1922, p. 25). Out of the sensory data a person receives, he or she interprets the world to make sense of it (“The world is the totality of facts. . .” Ibid.). We are used to structure the interpreted data, or facts, in relations that make sense to us. As Wittgenstein reminds us, “The logical picture of the facts is the thought” (Ibid., p. 30). Logic comes from the Greek *logos*, which stands for speech, word, and reason; it is the “controlling principle of the universe”

¹ The relations are inspired by Hjelmslev (1961), and we use the following symbols: “->” for determination, “-” for constellation, “<->” for interdependency.

(MerriamWebster, 2013b). Although different systems and entities, such as humans and computers, interpret data differently, they are able to share certain logical structures of objects and processes. Thanks to this unifying principle, our natural language can create various programming languages, which strictly follow a set of logical rules, allowing them to be readily interpreted and executed by the computer. The execution of commands given to the computer is analogous to our utterance of commands, as is the case of speech acts. Speech acts were coined by Austin (1962) for utterances performing actions in the world (e.g., when promising or ordering something).

Thought has therefore a strong relation with logic. “The thought is the significant proposition” (Wittgenstein, 1922, p. 38), that is, a proposition with a sense. Wittgenstein suggests language is “[t]he totality of propositions” (Ibid.). What are the aspects of language we shall work with? According to Searle, language possesses the following three aspects: qualitiveness, subjectivity, and unity. Qualitiveness is a “character of conscious thoughts, or qualia” (Searle, 2002, p. 40). Subjectivity is a “first-person ontology of subjective conscious states, because they exist only when they are experienced by some human or animal agent” (Ibid., p. 41). For unity, “all conscious experiences at any given point in an agent’s life come as part of one unified conscious field [. . .] A conscious state is by definition unified, and the unity will follow from the subjectivity and qualitiveness” (Ibid.). Natural language is characterized by discreteness, compositionality, and generativity (Searle, 2009, pp. 63–64). A well-defined UI language should also have these features, in order to work properly. For the linguistic and semiotic perspectives of HCI/UX design see Part I, “Semiotics of Interaction.”

Thought thus arranges facts as pictures in the processing of reasoning. This means the thought connects within itself a logical system of language together with its depiction, or model, because “[t]he picture is a model of reality” (Wittgenstein, 1922, p. 28). Thought as a reasoning and logical process provides thus a link between systems that are mutually untranslatable, but which interact with one another. We can notice the link in the above example with natural language and the programming language, which stands behind the UI. Thought connects also the textual and pictorial expression with design. The UI “is always an effect. It is always a process or a translation” between significant expressions (Galloway, 2008, p. 939). The UI stands on a system of ideas and beliefs, an HCI ideology.

Thought joins ideology with action. The nexus of both of them finds its place in the UI. The UI as an artifact has a strong analogy with architecture, as it is presented by Somol and Whiting (2002). According to them, architecture can be regarded as an index, or “mediator [which combines] materialism with signification” (Ibid., p. 74). “Architecture is both substance and act. The sign is a record of an intervention—an event and an act [. . .]” (Ibid.). The UI as a mediator presupposes a user to work with it, thus enacting the ideology behind it. In the context of theater this is known as a parallax. “[P]arallax is the theatrical effect of a peripatetic view of an object. It takes into account how the context and the viewer ‘complete’ the work of art” (Ibid., p. 76). While parallax is purely optical, the Doppler effect is more general. “[The Doppler effect is] an atmospheric interaction. It foregrounds the belief that both the subject and the object carry and exchange information and energy. In short, a user might be more attuned to certain aspects of a building than others” (Ibid.). And

that is why architecture can provide important implications for the design space of HCI/UX. The HCI ideologies present in the UI are discussed in Section 2.3, “Ideology, persuasion.”

Thought, or consciousness, and all mental phenomena are “higher level features of the brain,” that are “caused by lower level neurobiological processes in the brain” (Searle, 2002, p. 18). As such, consciousness processes sensory data from different sources. Searle continues, that consciousness and intentionality build language (Searle, 2009, p. 64). In the context of the present work, we conceive intention as design, and intentionality as a designing force. Therefore, for the purposes of our work, we understand the linguistic elements present in the UI (or, the UI language) as a product of a thinking process of a designer. Thought can produce designs, or we can identify it with design itself. As etymology reminds us, design comes from the Latin *designare*, to mark out; composed from *de-* + *signare* to mark (Merriam-Webster, 2013c). As a verb it means to conceive or execute a plan or a scheme, and as a noun it stands for a project, sketch, or pattern. By marking a material we leave a sign in it. Therefore, we inform it. Design is thus the nexus between the immaterial (intention) and the material (matter) that informs (from the Latin *informare*, see Merriam-Webster, 2013f). By giving a form or a character to something, we communicate information. A similar argument is put forward by Flusser (1999). Following the above definitions, we see design as closely related to semiotics (through signs and intentionality) and to information science (through information). In the context of UX, design finds its application in industrial design, interaction design, and communication design. Industrial design is related to material (tangible) artifacts, whose operation is guided by interaction design. The latter is supported by communication design through immaterial cues, which inform the users on the operation results. In this work we shall focus on the dynamic and immaterial applications of design, i.e., interaction and communication design.

Language constitutes a frame for thought and experience by creating conventions. Conventions are arbitrary, but once they are settled they give the participants a right to specific expectations. They are normative (Searle, 2009, p. 87). Conventions lead to institutions. “Language is essentially constitutive of institutional reality” (Searle, 1995, p. 59). Language completely interpenetrates with experience (Sapir, 1949, p. 11). Therefore, when a designer wants to create a certain UX, he or she should constitute it primarily through the system of UI language. And, by that the designer acts upon a user’s natural language and thought. Because language creates cultural conventions, culture stands therefore on natural language. Language is used for cultural accumulation and historical transmission: proverbs, medicine formulae, standardized prayers, folk tales, standardized speeches, song texts, genealogies, etc. (Ibid., p. 17). “Every complex of a culture and a lge [language] carries with it an implicit metaphysics; a model of the universe, composed of notions and assumptions organized into a harmonious system which is valid for framing statements about what goes on in the world as the carriers of the culture see it” (Whorf, 2012, p. 361). This model of the universe sets the basic ideological frame for our interaction, both in the social context, as well as the computer context. Social interaction is crucial for the experience with the environment, because the interaction is processed in natural language. According to Sapir, in a society “even the simplest environmental influence is either supported or transformed by social forces. Hence any attempt to consider even

the simplest element of culture as due solely to the influence of environment must be termed misleading” (Sapir, 1949, p. 89). Therefore, every UI with its designers and users has to be scrutinized, not only from the perspective of HCI, but also from the perspective of culture of the HCI participants. The cultural differences in interaction are discussed in Part II, “Culture of Interaction.”

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