

5

A Case Study

This chapter presents and discusses the main results of a case study carried out to assess HCI designers' and evaluators' understanding and use of CVM, as well as the metaphors' potential for informing and improving the design and evaluation of cross-cultural applications.

We chose the AVIS Rent a Car System[©] website (<http://www.avis.com/>)¹⁸ for this case study, because it is clearly a cross-cultural application in the car rental domain. There are several advantages in using an existing website. First, it is undoubtedly an instance of concrete objective design – not a conjecture. Second, because the design was by necessity carried out *without* using the cultural viewpoint metaphors, differences between using them and not using them can be made clearer. And third, this gives us the opportunity to see how the metaphors can be used epistemically (*i.e.* as a means to build new knowledge and understanding) while generating new design alternatives.

5.1.

Methodology

The general research question we were asking was: How can CVM support HCI professionals/practitioners (if at all) at design and evaluation time? In order to answer it, we ran two different experiments as part of a broader case study (see Figure 26) with the AVIS website. One assessed how CVM can be used at design time (Step One), and the other assessed how CVM can be used at evaluation time (Step Two). In both steps we ran pilot tests to check the methodology and to refine the experiments themselves. We also kept a practical perspective in both experiments – the types of tasks proposed to participants are familiar to any professional working in HCI design and evaluation. With findings from both steps, we refined our CVM proposal and generated further research topics for future work. Section 5.2 presents the procedures and results of this case study.

¹⁸ From now on we will refer to it in abbreviated form as “the AVIS website”.

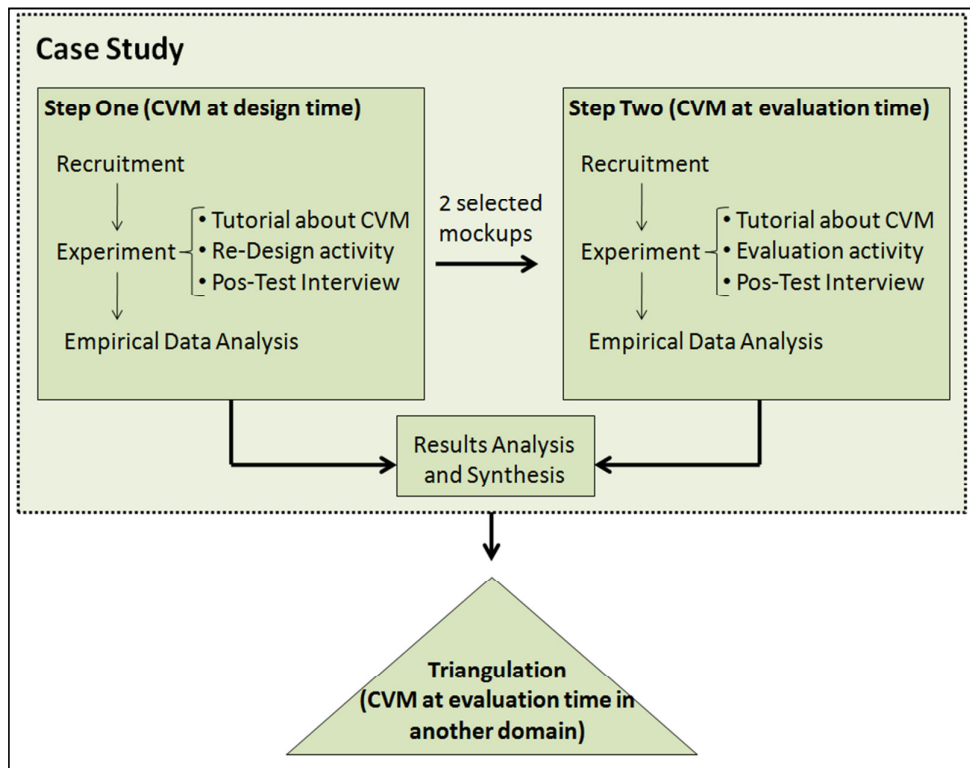


Figure 26 – Research Steps

For Step One (using the metaphors at design time), we recruited six participants, who were asked to do a re-design activity. They should have the following characteristics: a different cultural background than the American one expressed in the Avis website; have good knowledge level in HCI design; and, have reading fluency in English. Participants should also have different cultural background from one another.

We believed that new design alternatives elaborated by people with different cultural backgrounds would contrast with the American content of Avis website and enrich our research. So, the experiment scenario (see Section 5.2.1.2) led participant designers to think of an American user who is about to make a reservation on the AVIS website and chooses a foreign location for car pick-up. This location is culturally familiar to the participants (and varies from one participant to the other, according to their specific cultural backgrounds).

The six participants (in distinct sessions) listened to a tutorial introducing the cultural viewpoint metaphors (with concepts and examples), and then generated re-design alternatives for the AVIS website guided by CVM. When

finished, they participated in a brief individual post-test interview about the experiment.

Two mockups produced by this group of six were selected for the second experiment (Step Two), which involved four participants. They should have good experience in HCI evaluation and reading fluency in English. Unlike in the first experiment, in the second one the participants' cultural backgrounds were not recruitment criteria, since our focus this time was on tracing the presence of CVM in design which was an interesting opportunity to explore the meanings of metaphors for different people.

The four participants listened to a tutorial introducing the viewpoint metaphors (with concepts and examples) and then inspected a set of mockups following the proposed scenario for this experiment, and using CVM as a guide. As with the previous group, we also made a brief individual post-test interview with participants about the experiment.

We should mention that the level of knowledge in Semiotic Engineering was not a factor for recruiting participants in either of the experiments. This was because we wished to assess CVM understanding and use regardless of participants' preferences for one HCI approach or another.

The methodology of this research follows a non-predictive paradigm in science and makes use of interpretive qualitative methods (Nicolaci-da-Costa *et al.*, 2001; Denzin & Lincoln, 2003). Qualitative methods are especially appropriate for studies like ours, which aim at exploring intensively and at greater depth a specific research question. This is achieved with a small group of participants, focusing on the identification of meanings and interpretation thereof. Thus, by identifying various meanings that the participants assigned to CVM, we could investigate how they elaborated and used them to design and to evaluate the metacommunication discourse.

The main empirical evidence in this research was the participants' *discourse* about the mockups and the redesign activity, in Step One, and the evaluation process and results, in Step Two, as well as the participants' impressions and opinions expressed during the post-test interview.

We also analyzed the mockups (from Step One) and the evaluation reports (from Step Two), in a preliminary stage. We looked for consistencies and inconsistencies with the CVM concepts and built a semiotic reference (*i.e.* a

collection of articulated signs proposed for the interface (de Souza, 2005a) to compare with the participants' verbal statements, analyzed in the next step.

In the semiotic analysis of the mockups we identified how participants represented the cultural variables through interface signs; and the kinds of signs (texts, videos, images, graphs, and so on) and interaction styles (contrasts, simulation, tips) that were used.

We should clarify, however, that our aim in steps one and two was *not* to analyze the quality of the final design and evaluation *product* (the mockups and the evaluation reports, respectively). These products depend more heavily on the participants' technical abilities and talent than the interpretive processes and reflective perceptions that constitute the focus of our interest. Actually, our aim was to get inputs to analyze the participants' *discourse*. We believe that a good understanding of the final design and evaluation product could help us in interpreting the participants' *discourse* about the products' conception.

The participants' *discourse* produced in each step was then analyzed **separately**, using discourse analysis techniques (Nicolaci-da-Costa *et al.*, 2001). The analysis consisted of a systematic exploration of the participants' discourse in order to find out major meaning categories in it (see details about Step One and Two analyses in Sections 5.2.1.3 and 5.2.2.3, respectively). It began with an intra-participant analysis stage, which identifies meaning categories in the material produced by each participant. Then we proceeded to an inter-participant analysis stage, in which meaning categories from the intra-participant analysis are compared in order to show whether there are recurring elements among them. Finally, the set of categorized meanings from this step guides the interpretation of findings that helps us answer the primary research question. This thesis thus reports signs of our own systematic interpretation and analysis of situated participants' discourse, which we think are meaningful and applicable in larger contexts of professional activities and research in HCI.

The triangulation, i.e. a scientific validation of our qualitative research (Yin, 2009; Creswell, 2007; de Souza & Leitão, 2009), was achieved with an experiment with CVM at evaluation time carried out in another domain of activity. While the case study was focused on the car rental domain, the triangulation process used the football domain in an experiment with CVM at evaluation time.

Denzin & Lincoln (2003) claim that triangulation reflects an in-depth understanding of the phenomenon in question. So, in order to generate different perspectives on our research question, we compared and contrasted results from all experiments, looking for consistency and congruence among them (as is typical in validation of qualitative research) through an exogenous triangulation. “Exogenous sources refer to design artifacts that do not share the same domain model, yet share certain relevant design features.” (de Souza *et al.*, 2010, p.29). Section 5.3 presents the triangulation process and product (an in-depth comprehension about the researched context).

Before we present the experiments carried out in the case study and the triangulation, we should mention that most of the participants are Brazilians. Therefore, discourse evidence collected from them was produced originally in Portuguese. In the presentation that follows, we have translated Portuguese material into English and defined a code to refer them to the original version (included in Appendix B). So, each statement presented in this work is referred by an index, for example, (I-01). The absence of an index means that the statement was originally collected in English (from a non-Brazilian participant). Because English was not a native language in such cases, either, there are occasional grammar and style mistakes that we have not corrected, unless they compromise the understanding of the participant’s discourse when taken out of its original context.

Furthermore, metaphors have changed their names over time (see Chapter 4, Section 4.2). We decided to present results using current CVM nomenclature as presented in Chapter 4, Section 4.1): *domestic traveler*, *observer at a distance*, *guided tour visitor*, *foreigner with translator* and *foreigner without translator* metaphor.

5.2.

Case Study: Re-designing the AVIS website

AVIS is a company that “operates one of the world's leading car rental brands, providing business and leisure customers with a wide range of services at more than 2,100 locations in the United States, Canada, Australia, New Zealand, Latin America and the Caribbean region” (text extracted from

<http://www.avis.com/> in January 3, 2011). Avis has a USA-based Global website with more than 50 localized versions for countries around the world. They have customized interfaces for each particular audience, as is the case for the USA, Israel and China, for instance (see Figure 27, Figure 28 and Figure 29).

The screenshot shows the Avis website's reservation interface. At the top, there's a red header with the 'AVIS' logo and navigation links: 'Login', 'Register Now', 'Country / Language', and 'Customer Service'. Below this is a secondary navigation bar with 'Reservations', 'Locations', 'Deals', and 'Cars & Services', along with a search bar. The main content area is titled 'Make a Reservation' and includes tabs for 'View / Modify / Cancel', 'Get a Receipt', and 'Car in the Shop?'. The form fields are organized into sections: 'DATE & TIME' with pick-up and return date/time selectors; 'LOCATION' with a pick-up location input field and checkboxes for 'Returning to same location' and 'Resident of United States (USA)'; and 'OPTIONAL INFO' with fields for 'Wizard Number', 'Last Name', and 'Avis Worldwide Discount (AWD) Number or Rate Code'. A 'CONTINUE' button is positioned at the bottom of the form. To the right of the form is a large image of a silver Chevrolet Camaro with the text 'ALL NEW CAMARO Available exclusively at Avis.' Below the form, there are three promotional banners: 'Our Best Offers!' featuring 'Great Savings' (e.g., '\$35 Off a Weekly Rental'), 'Rental Health Day', and 'Shop Used Cars at Great Prices'; and 'Never Get Lost Again!' promoting 'where2' GPS rentals with limited-time offers.

Figure 27: AVIS website in the USA (<http://www.avis.com>, last accessed on January 3, 2011).

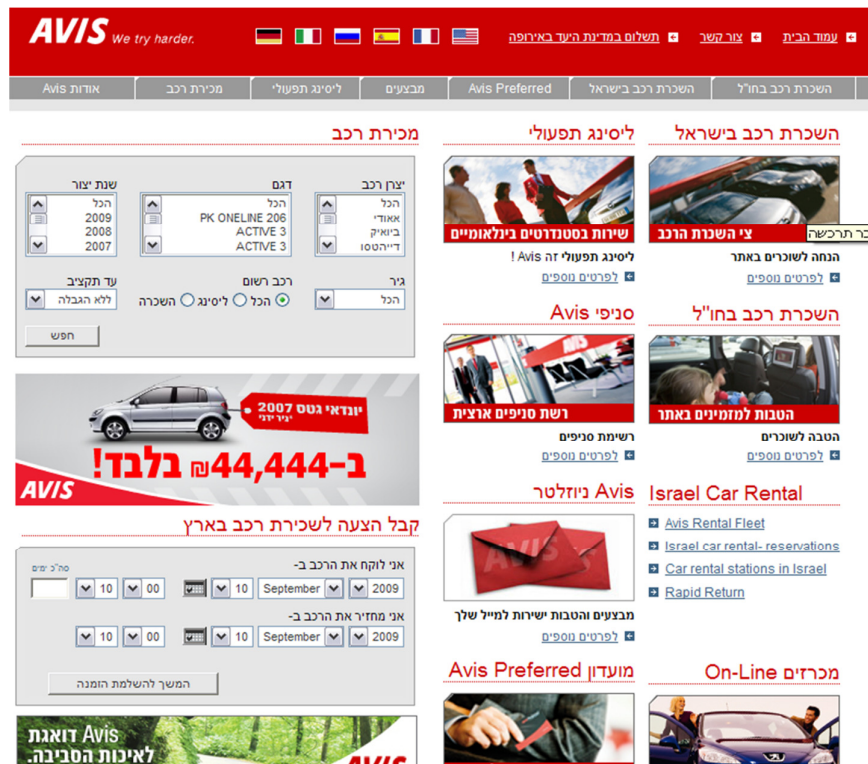


Figure 28: AVIS website in Israel (<http://www.avis.co.il/>), last accessed on January 3, 2011).



Figure 29: AVIS website in China (<http://www.avischina.com/>), last accessed on January 3, 2011).

In all of them customers (users) can make, view, modify, and cancel car rental reservations. Some of the websites also offer convenience services, such as vehicle delivery coordinated with flight destinations, chauffeur drives, etc. We focus, however, on a very specific task, namely “making a rental car reservation” (see the task model in Figure 30).

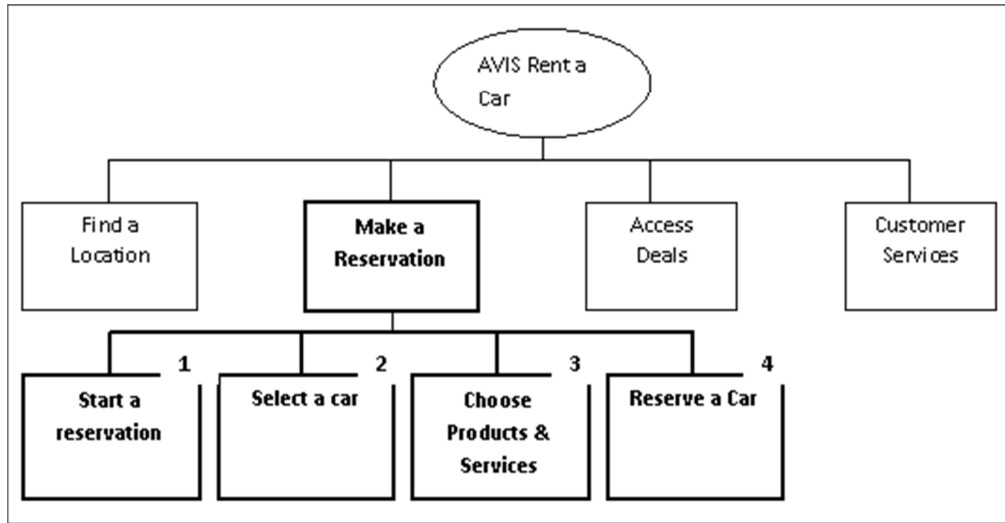


Figure 30: The structure of the task model for making a car reservation in the AVIS website.

5.2.1.

Step One – Cultural Viewpoint Metaphors at design time

As already mentioned, the purpose of this step was to analyze the designers’ understanding and use of CVM in a re-design activity, as well as the metaphors’ potential for informing and improving the design of cross-cultural applications.

5.2.1.1.

Participants

This step involved six HCI designers with good knowledge level in HCI, reading fluency in English, and different cross-cultural experience among them. They had different nationalities and/or lived in different foreign countries:

- P1.1: A Brazilian who has worked and studied in England for 18 months.
- P1.2: A Mexican national.
- P1.3: A Brazilian and Israeli (dual nationality) national who has worked and studied for 6 years in Israel, but lives in Brazil.
- P1.4: A Brazilian national.

- P1.5: A Brazilian national who has studied in USA for a year and worked in Canada (Québec) for 6 years.
- P1.6: A Brazilian who has studied and worked in Canada (Toronto) for 3 years.

Four sessions (with P1.1, P1.3, P1.4 e P1.5) were run at the Department of Informatics at PUC-Rio and lasted about 120 minutes. The following activities were conducted:

- The researcher presented the experiment goals and collected the participant's consent (see Appendix C – Informed Consent Term).
- The participant filled out a questionnaire (see Appendix C – Questionnaire) answering detailed questions about his or her experience abroad, as well as his or her experience with HCI design.
- The researcher introduced the CVM's version 1 (see Table 9) in tutorial form.
- The participant generated redesign alternatives for the AVIS website following a scenario of use and requirements presented in Section 5.2.1.2 (see Appendix C – Scenario).
- The researcher carried out a post-test interview with the participant.

Two experiment sessions (with P1.2 and P1.6) were conducted remotely, and included the following activities:

- The participant manifested his/her consent to participate (after reading the Informed consent term II – see Appendix C).
- The participant filled out a questionnaire (see Appendix C – Questionnaire) answering detailed questions about his or her experience abroad, as well as his or her experience with HCI design.
- The participant watched a video with a tutorial introduction (concepts and examples) to the CVM's version 1 (see Table 9).
- The researcher called the participant for a brief chat session to address the participant's questions and doubts regarding CVM concepts and examples.
- The participant generated spontaneous redesign alternatives for the AVIS website following a scenario of use and requirements presented in Section 5.2.1.2 (See Appendix C- Scenario).
- The researcher carried out a computer-mediated post-test interview with the participant.

As described in the ‘Informed Consent Term’, the researcher was available throughout the experiment (conducted remotely) for asynchronous and synchronous communication.

In both session settings, the post-test interview aimed at collecting discourse evidence regarding the designers’ perceptions, comments, and explanations about: (i) their design alternatives; (ii) the design process, i.e., how the proposed metaphors helped them in thinking and reflecting about the interaction design; (iii) what they found easy or difficult to do; and, (iv) what they learned with the experiment.

5.2.1.2. Experiment Scenario

In the scenario we used for this experiment (see Appendix C), the participant supposedly works in a project to re-design the AVIS website . AVIS wants to minimize problems that their customers have been facing when they rent a car in a foreign country. The problems stem from cultural differences that play a role when driving a car. Hence the re-design goal. The participant’s task is to propose re-design alternatives to improve cross-cultural contact by communicating cultural diversity guided by the cultural viewpoint metaphors. The target user they should have in mind is an American residing in the USA, who makes a car reservation on the AVIS website and chooses a foreign country location for the car pick-up. This location depends on each participant’s cultural background (see Table 11).

Id	Nationality	Participants’ Cultural background explored in the experiment scenario	Targeted User: an American residing in the USA who chooses...
P1.1	Brazilian	Studying and working in England	<u>London</u> for the car pick-up.
P1.2	Mexican	Living in Mexico	<u>Mexico City</u> for the car pick-up.
P1.3	Brazilian and Israeli	Studying and working in Israel	<u>Israel</u> for the car pick-up.
P1.4	Brazilian	Living in Brazil	<u>Brazil</u> for the car pick-up.
P1.5	Brazilian	Studying and working in Montreal, Canada	<u>Montreal, Canada</u> for the car pick-up.
P1.6	Brazilian	Studying and working in Toronto, Canada	<u>Toronto, Canada</u> for the car pick-up.

Table 11: Participants' cultural background and corresponding targeted user.

As explained in Chapter 4 (see Section 4.1) CVM are not meant to elicit the cultural content and variables, but only to design communication about it. The cultural content that can be used in metacommunication, that is, the linguistic and domain-dependent cultural variables and their values are elicited using other resources. So, participants also received a cultural information checklist with cultural variables that should be considered regarding the tasks and information present in the system. For example, the list included the minimum legal age to drive, the units of measurement, the cultural meaning of ‘near’ and ‘far’, the meaning of ‘economy car’, road conventions, etc. Although in this research we consider cultural variables as attribute-value pairs, the participants received only the attributes’ *name*. Choosing which *values* should be used in each pair was part of the participants’ task.

Although participants were invited to represent their solutions through handmade mockups, P1.3 and P1.5 decided to represent theirs in the form of a “to do list”, which was the equivalent of design principles and requirements that they would follow in their design (See Appendix C – Handmade Mockups P1.3). All participants were introduced to the whole set of metaphors in the tutorial, but we encouraged them to use only three of them (the *observer at a distance*, the *guided tour visitor* and the *foreigner with translator* metaphor). So, each participant designed 3 (three) alternatives. We did so because these metaphors help designers to explore different levels of progressive cultural approximation (see Chapter 4 – Section 4.1 for details).

5.2.1.3. Analysis Process

The intra-participant analysis of empirical design evidence (the mockups and the participants’ discourse) was done in two steps. First, we inspected the kinds of signs used in mockups as explained in methodology (see Section 5.1).

As a second stage, the post-test interviews were transcribed and preliminary categories were identified by applying discourse analysis techniques (Nicolaci-da-Costa *et al.*, 2001). These categories were not defined *a priori*; they emerged from participants’ discourse. So, we compared results from handmade mockups

analysis and discourse analysis, in order to refine our interpretation and conclusions about the evidence.

Finally, the inter-participant analysis produced a set of categories of analysis which are part of the contributions of this research. We analyzed successively and iteratively the results from intra-participant analysis aiming at identifying recurrent categories between the participants and seeking a higher level of abstraction for the categories.

5.2.1.4. Results

In this section we present the main results from Step One, i.e., CVM at design time. The main categories of analysis emerging from our interpretation are: (i) difficulties in understanding the CVM; (ii) evidence of the epistemic nature of CVM; and (iii) evidence that metaphors help designers to communicate cultural diversity.

The category (i) is more practical and helped us to improve the CVM description, names and examples; the others (ii and iii) belong to a different nature, which led us to a scientific and theoretical exploration.

5.2.1.4.1. Difficulties in understanding the CVM

When learning a new concept, people always have doubts and misunderstandings. So, our analysis focused on items that we think are *not* just a matter of first-time-encounter fuzziness. Namely, there is evidence of difficulties with understanding CVM due to a lack of clarity in defining the metaphors and the cultural approximation continuum. The *guided tour visitor* metaphor, for instance, should lead designers to elaborate metacommunication by contrasting the user's own culture with the visited culture. However, it was not expressed in the alternatives proposed by either P1.1 or P1.3. Neither was it apparent in their mockups. P1.3, for example, said:

I01- P1.3: *"In the guided tour visitor, I would inform the average of miles per hour that each car covers, as well as the size of the car. The car details contain this information, but I would include the mileage per hour because it is*

what the guy is used to seeing. He understands the speed in miles per hour and the size of the tank in gallons, because there [in Israel] it is the same as in Brazil, i.e., km/hour and liter."

Although P1.3 was using the *guided tour visitor* metaphor to design an appropriate interface for an American going to Israel, she expressed the cultural variable 'average speed' using the *domestic traveler* metaphor. In order to avoid this we included the word 'contrast' in this metaphor definition (see Chapter 4).

P1.6's question also shows that the main feature of this metaphor (the contrast between two cultures) was not clear:

I02- P1.6: *"In relation to speed limits and ages, for example, in which metaphors the Canadian and American values would appear and be confronted with besides the measurement units themselves?"*

Some of the difficulty in discriminating between the metaphors helped us realize that the metaphors' description and examples should explicitly inform distinctions and main features more explicitly. P1.3, for instance, felt the lack of examples to help him understand differences between the *observer at a distance* and *foreigner with translator* metaphors.

I03- P1.3: *"I found it difficult to understand the differences between the two metaphors [observer at a distance and foreigner with translator], and it would be very helpful to have examples of the two to be able to distinguish between this and that case."*

P1.4 also found it difficult to see the difference between the *observer at a distance* and *guided tour visitor* metaphor:

I04- P1.4: *"I find that these two metaphors [observer at a distance and guided tour visitor] are very close to each other. This one [guided tour visitor] stands out more than this [foreigner with translator]. To be able to stress this here and illustrate the culture of the other and bring about an experience... I think one thing is mixed up with the other and that, perhaps, it should not be like that, but rather a thing mingling into the other. But it is rather difficult to separate one from the other."*

P1.5's point of view, in turn, was certainly different from the others. But it called our attention to a very important issue. In this participant's view, the continuum of cultural approximation represents "where the user is" (or could be) "positioned" in face of the other culture. Consequently (in his opinion), the farther

the distance from the user to the foreign culture, the greater the amount of explanations and scaffolds that should be offered to the user.

I05- P1.5: *"If the guy is farther apart, then you have to explain this further, isn't it?" "Then, I must make it clearer why he is farther apart."*

However, as explained in Chapter 4 (Section 4.1) CVM express five distinct perspectives along a *continuum* of cultural approximation established with reference to the user's own native culture. Designers can make decisions about whether and how it is appropriate to expose the users to content from other cultures while interacting with a cross-cultural system. As an *observer at a distance*, for instance, the user will have a telescopic vision of the visited culture.

So, unlike what P1.5 thought, the metaphors' intended effect on the expression of design has to do with cross-cultural contact, i.e., how the user gets in touch with material from another culture. It may be one or more of the following possibilities: cultural isolation, cultural mediation or cultural immersion. Figure 5 in Section 4.1, shows for each metaphor how much the amount of help and scaffolds vary in relation to cultural approximation or regression, and not in relation to "where the user is positioned" as suggested by P1.5.

In sum, this category of analysis led us to technical results which helped us to rethink the metaphors' definition, the nomenclature, how to distinguish them more clearly, and how to explain the continuum of cultural approximation. Chapter 4, Section 4.2 (metaphors' evolution) explains that firstly these findings led us to change only the metaphors' names. For instance, the current *domestic traveler* metaphor was called before the changing as *located at home metaphor*. After the empirical pilot experiment sessions, however, we found evidence that the names' changes were not enough to avoid misunderstandings between metaphors, so, we refined the metaphors' names and descriptions and elaborated a unique tutorial example to explain CVM.

As anticipated in the opening of this section, though, the next two categories of analysis led us to truly new knowledge about cross-cultural HCI design.

5.2.1.4.2.

Evidence of the epistemic nature of CVM

By *epistemic* we mean that it can generate new knowledge, not only in factual terms but also at more abstract and conceptual levels. We reached this conclusion based on four specific subcategories of meanings related exactly to how the metaphors led participants into thinking and reflecting about the problem and to respond to difficulties in the re-design activity: (i) a mapping of the design space; (ii) an exploration of communicative effects achieved by articulating cultural variables with different metaphors; (iii) an increased awareness of the designers' own cultural biases and gaps; and, (iv) a kind of *mirror effect*, when designers placed themselves in the role of recipients of their own design communication.

About the first subcategory, CVM guided the participants throughout the re-design process, helping them to focus on culture and to map out the problem space.

I06- P1.1: *"I was completed guided by the metaphors". "When I got mixed up with this metaphor, I saw this continuous scale, and I put myself closer to this one here." "The continuum, the separation of the metaphors reminded me of the differences."*

I07- P1.2: *"When I sketched I just tried to take in mind the explanation of the metaphor, and to map the 'real world' scenario in my head to a 'GUI' representation". "They make me aware about which information can be brought to users in order to help them to adequate their mental models about the workflow."*

I08- P1.3: *"I identified more which questions depend on the culture, which to not. I dropped the ones that do not depend on the culture. Right there I saw and understood that that were things to be eliminated and things to be added." "Then it helped me to understand the problem and to know where I want to arrive."*

I09- P1.4: *"The moment I am aware of these [cultural] differences, wow! I must think about them."*

Second, CVM helped designers to reflect on how to model cultural variables according to each metaphor while elaborating metacommunication. P1.1, for

instance, realized that cultural variables generate different levels of difficulty in design:

I10- P1.1: *"The variables of unit of measurement and volume are the most trivial to treat your metaphors. It's a piece of cake! Now, the meaning of the economic car is an important aspect and more difficult than the one I made for the foreigner with translator metaphor and used it a lot. And the question about the minimum age to drive a car as a rule of business, [same with] the use of the driver's license."*

P1.2, in turn, realized that the communication of cultural diversity by promoting cross-cultural contact may require new forms of representation.

I11- P1.2: *"these experiences involve other kind of senses, so the visual representation could be no so effective [as] to hit and impregnate user with the relevant aspects of the cultural values that [the] designer wants to communicate". The 'addendum' information should be presented according the workflow or interaction with the interface in a non obtrusive way, because its information is to support, not to bother"*

Third, difficulties in manipulating cultural variables led participants to face new challenges or problems in cross-cultural design and to look for solutions. So, with this experiment we found evidence that CVM do have the epistemic value of eliciting factors that the designers do not know and can find out how to solve those problems. P1.1, for instance, had difficulties with the cultural variable 'the meaning of economy car'.

I12- P1.1: *"In relation to the sizes of the compact cars and so on [...] I remember the following: how would the system be from the point of view of a British? I would have to give the point of view of the Americans. Would it be possible that the Americans think of the car size in the same way as the British? And this question had to be seen from the British point of view. I did not know that, I had no idea."*

P1.1 also had problems to deal with the cultural variable 'language'. Since his targeted user was as American who chooses London for car pick-up, English is the language spoken on both places. The metaphors encouraged P1.1 to think about language as a cultural variable, so he pondered about how users would feel regarding cultural differences in language in this case.

I13- P1.1: *“The fact that both these cultures speak the same language [...], because when it comes to the question of the subtitle, how would that subtitle be written in British English? We look at the question of the variables of measurement, or currency [...], but, sometimes, I did not know whether I was providing a subtitle or not. If I were doing that from Portuguese into English, it would be much easier.”*

The re-design process with CVM led P1.1, P1.3, and P1.4 to consider issues they had ignored until then.

I14- P1.1: *“If I had not followed the metaphors, I do not know how I could have thought about that. I think I would not have had the concern I had. And that’s for sure. I think that they are promising to make people conscious of cultural issues.”*

I15- P1.2: *“me, as a designer, should take in count that other cultures might interact with my interface so I should somehow, maybe at low level, to [make available] some information/interaction capabilities to these foreign users. I must identify what part of the content or interaction flows can be differently instanced by culture”*

I16- P1.3: *“How can we speak of the Israeli culture within the context of the American practice? Certainly, if I had not heard about these metaphors, I would have had difficulty in doing [the activity proposed in the scene] because I would not have been aware of the problem!”*

I17- P1.4: *“This helped me be better informed that he is closer [to the other culture]. And this is very important because all the site has to be able to inform where he is, to inform him of the context.”*

As explained in Chapter 4 (Section 4.1), CVM are not meant to elicit the cultural content and variables, but only to design communication about it. However, participants identified their own lack of knowledge about car rentals as a possible problem.

I18- P1.1: *“The fact that I have lived in England makes it easier for me to understand a little about the car rental system over there, because I have already rented a car there. But only a little, because I had only 1 or 2 experiences with car rental there, which was not much. Up to that point, I was not able to see the cultural differences between the Americans and the British and when I came here to choose a car, I went on being incapable of identifying these differences.”*

I19- P1.6: *"I was not aware of the age limits to get a driving license."*

Other participants, in turn, explained that they did not use a specific cultural variable because they did not know how to express them in the interface.

I20- P1.4: *"The meaning of near and far away, I do not know how to express."*

Cultural gaps experienced by some of the participants actually helped us to confirm the epistemic potential of CVM in bringing out to the participants aspects of their own knowledge and perceptions regarding other cultures. At least two of them (P1.1 and P1.5) decided to seek for knowledge in another website:

I21- P1.1: *"I tried to get tips from the same AVIS shop which were made for the British, theoretically following the rules of the country and see how I could transpose that for the American rules."*

I22- P1.5: *"Thinking about what would be different for the Canadians, I opened a car rental site from Quebec, which was right there beside that site, to see how they offered their cars for rent, I found their site worse than that of AVIS's. But you can understand a little about the question of the language. The first language offered by them is English."*

Finally, CVM led designers to put themselves more clearly in the role of recipients of the metacommunication (the users).

I23- P1.1: *"How would the system be from the point of view of the British? I would have to give the point of view of the Americans. Would the Americans think of the size of the car in the same way the British think? And this question had to be in the British way."*

I24- P1.2: *"Actually, I was considering myself as a "gringo" who's looking for a car rent in Mexico. Yeah, I realize the point is how the Mexican culture is presented."*

I25-P1.3: *"I imagined the scene that you describe. I imagined that a friend was going to Israel and would have to rent a car, I imagined that, then, it would help him to understand the questions and to be explanatory and bring curiosities from that country."*

Until now we presented evidence that our metaphors helped designers to map out the problem space, to realize that culture is part of a communication process, and that as such it deserves attention. From now on, we present evidence

of how CVM helped designers to elaborate the metacommunication of a cross-cultural system.

5.2.1.4.3.

Evidence that metaphors help designers to communicate cultural diversity

Firstly, the participants tried to identify which cultural variables should be included and then followed CVM concepts to start the re-design process. P1.3 and P1.5, for instance, inspected all interaction paths to find out which cultural variables were already expressed and which ones could be added.

I26- P1.3: *“First of all, I would like to understand what was necessary for the first screen. Then, I began to ask myself if such things were relevant for the Americans and for Israel. Apart from the relevance of asking about such things.”* [...] *“For example, car insurance is not a cultural variable, a child’s seat, I do not know. So, some things I could not change because they are already included in the price of the car and so on. But what called my attention are the things that have a cultural connotation and that may be different.”*

I27- P1.5: *“At first, I raised the variables that the system is offering in each part. The interactive elements, the opportunities of interaction. After that, I still had another step, another opportunity, wherever there was one missing. And after thinking... there, for each one [variable] what the metaphors apply.”*

Secondly, they reviewed the CVM concepts available in a table with metaphors names, description and examples to decide how to start the re-design itself. This table (see Appendix C) was the CVM’s version 1 presented in Chapter 4 (section 4.2 – Table 9).

I28- P1.3: *“First of all, I went there to see what it was like [on the current website]. Then I came here [to the metaphor table] read these concepts again and thought I would begin by the observer at a distance.”*

Thirdly, the participants made decisions about content and expression. P1.2, P1.3 and P1.4, for instance, explained in the post-test interview that they explored specific types of signs and resources (images, videos, maps, color, and so on) to express culture or cultural differences.

I29- P1.2: *“In the guided tour I consider information should be richer, that’s why I proposed the management of videos through a navigation strip. This*

consideration was because videos support explanations through time via narrative, and you can hit users with more information that can be interiorized in a more intuitive way than static information (because there's a history in the video not a mere fact as in the observer at a distance). In simple words, when you are touristic guide you point the relevant features about the foreign culture, so videos is in some way the adequate type to talk about the foreign culture".

I30- P1.3: *"Instead of showing a list where the guy writes where he wants to go, it would be better to have a small map containing such places so that, when he passed the mouse over them, those places would be highlighted and then he would have a notion of the country, of the country's map."*

I31- P1.4: *"I would not use the same color as that of the rest of the site. I would use a different color. I would put a flag of the city or of the country to make it stand out... To send the message that you are in Rio de Janeiro, you see? You can already see things of Rio de Janeiro. If he changes city, he would see everything different."*

I32- P1.4: *"But there would also be the average speed limit of the city, of the roads, also showing the image of a speedometer, because the grading of miles and kilometers is totally different. Here, there is also the option to change into miles."*

P1.1, in turn, explained how *guided tour visitor* concepts helped him to elaborate metacommunication which avoid breakdowns in communication

I33- P1.1: *"Then, in order that he [the user] is not forced to keep giving the information of his credit card so as to be able to go on, the system acts as a guide explaining to him: '- look, to make a reservation in the United Kingdom you need to have an account with AVIS and show your credit card'".*

Participants' mockups (see Appendix C) also gave us clues about how the metaphors were expressed. Likewise the participants' rhetoric clarified their strategy for defining how to communicate content using each metaphor. The following statements and mockups' images illustrate how P1.1 and P1.2, for instance, elaborated the metacommunication message:

Participant P1.1 examples:

P1.1 started the process sketching a re-design alternative guided by foreigner with translator metaphor (see Figure 31). He followed the strategy of

expressing cultural variables with this metaphor in the same way a British website does (<http://www.avis.co.uk/>), but with ‘tips’:

I34- P1.1: “Then, I chose to put the size and the values that the British site used with the caption that the American would like to see. As he is driving a rented car in UK, then British cars would appear. And when you look for details of the car, I came until here to be able to use all variables. Both the car consumption and the capacity of the tank would appear in liters, that, if I’m not mistaken, it is what is used in Britain.”

Figure 31 shows how P1.1 associated a tip in parentheses to each car size classification in this alternative.

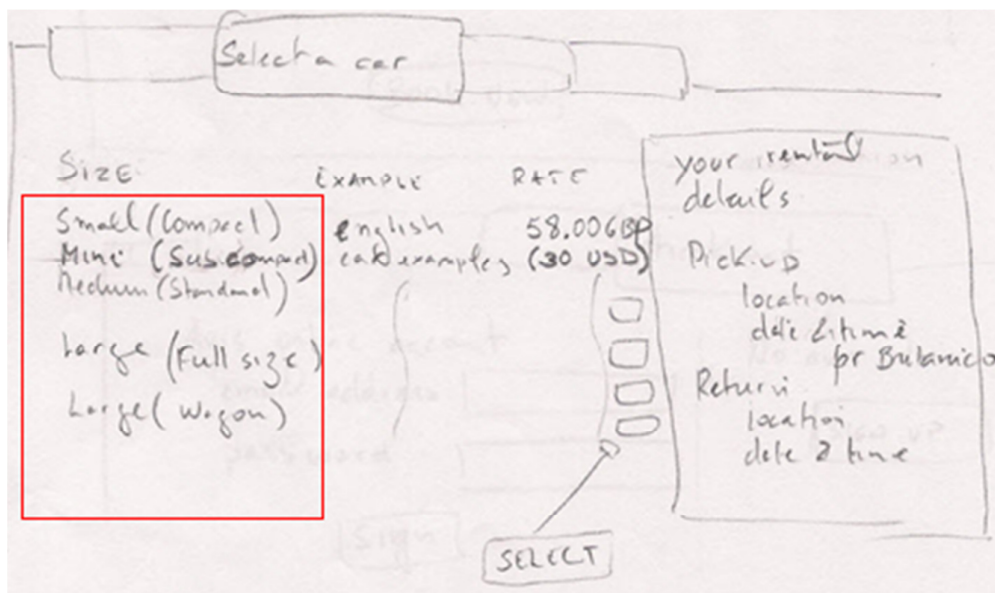


Figure 31: P1.1's mockup guided by *Foreigner with translator* metaphor: ‘Select a car’ webpage.

With the *guided tour visitor* metaphor, P1.1 used the strategy of guiding the user with tips (see Figure 32).

I35- P1.1: “As in the ‘foreigner with translation’, the designer does it the way it is done abroad, which makes the guy submitted to the procedure used abroad. Here [in guided tour visitor] I keep imagining that there is someone helping him, a culture guide. Then, in order that he is not forced to keep giving the information of his credit card so as to be able to go on, the system acts as a guide explaining to him: ‘- look, to make a reservation in the United Kingdom you need to have an account with AVIS and show your credit card’, I am

presupposing that there is a difference in the way the rental is done in the USA and in Britain and I am explaining that right from the start.”

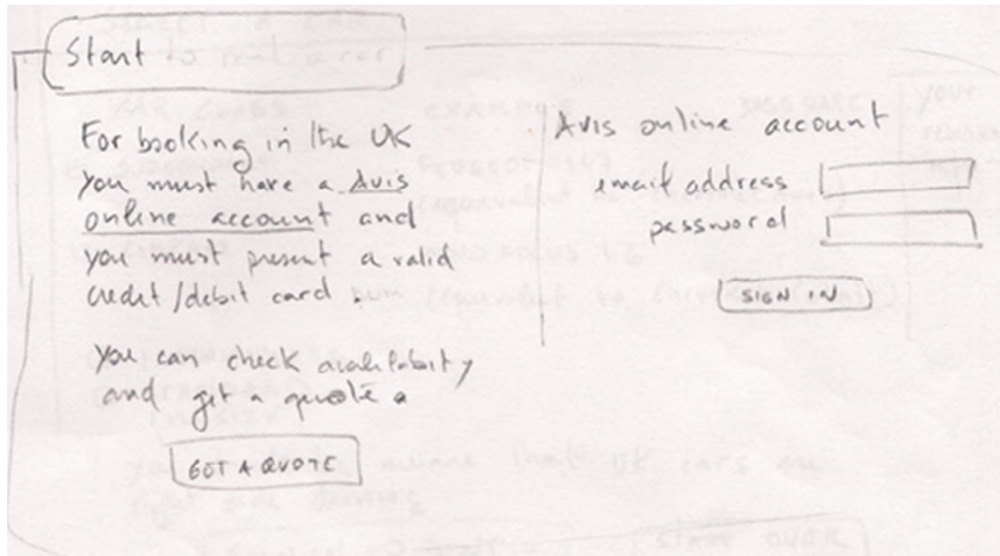


Figure 32: P1.1's mockup with *Guided tour visitor* metaphor: 'Home page'.

P1.1, also followed the strategy of contrasting the visited culture with users' culture (see Figure 33).

I36- P1.1: *"And then, after he chooses the car and puts the dates and the place, is that the information about the car is shown and, in truth, the novelty shown here is that the classes that I kept the same as those of the American standard. But in the examples of cars, the cars are British cars, those you will find there, in London, but he gives the equivalent of an American car for him [the American user] to have an idea. It would exactly be the car, that this car is equivalent to such Chevrolet car..."*

In our interpretation, P1.1 discourse about this alternative demonstrates that his choice of using or not cultural variables from the American or British culture was a conscious one. Figure 33 shows how P1.1 contrasted the British car models to American models.

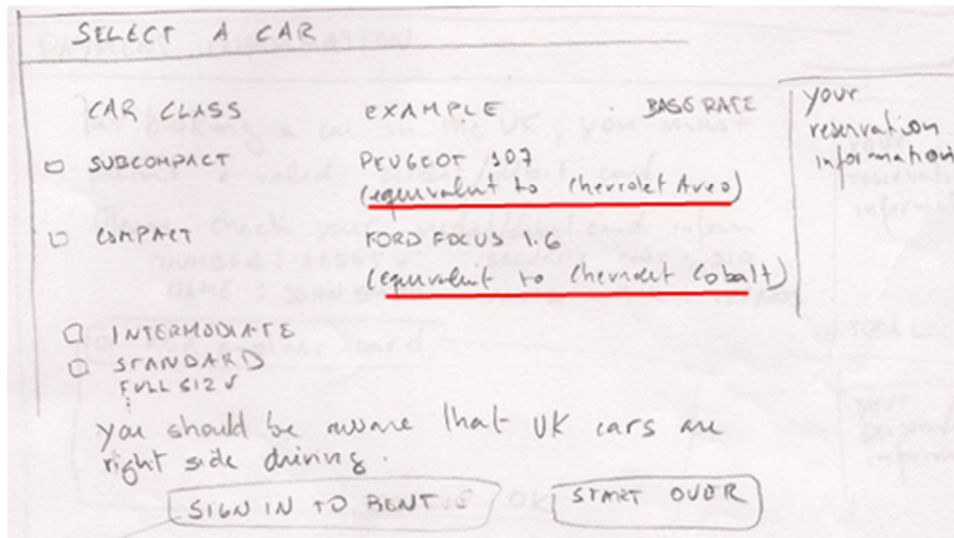


Figure 33: P1.1's mockup with *Guided tour visitor* metaphor: 'Select a car' webpage.

With the *observer at a distance* metaphor, P1.1 explained which strategy should be followed, but he did not sketch it:

I37- P1.1: “For the ‘observer at a distance’, I considered that the site had been made by an American, so, I had to think that it is closer to the ‘domestic traveler’. Well, if it is like the domestic traveler, then, that site [avis.com] is made for the Americans and I want to change it only a little to give it a touch of British culture. But it is only a touch, as far as I understood the metaphor. So, if I am going to give it a touch, I would change it very little. What would I change? Then, on screen 2, the value of the currency would always be in American dollars, nothing would be shown about the British pattern, the same for the date. The touch of information that I would give about the British culture, would be the additional information about the side of the steering wheel.”

Participant P1.2 examples

Regarding the alternative proposed by P1.2 guided by *observer at a distance* metaphor (see Figure 34), he said:

I38- P1.2: “work with the *observer at a distance* metaphor was the easiest and comfortable way to solve it because you can practically bring users whatever you want in form of information chunks”.



Figure 34: P1.2's mockup guided by *Observer at a distance* metaphor: 'Home page'.

Figure 35 shows how P1.2 grouped relevant information in a 'Do you know' section about some cultural variables as the minimum legal age to drive, speed limits and driving rules and conventions. P1.2 tried to “*represent it in a pleasant and the less possible non-obtrusive way*”.

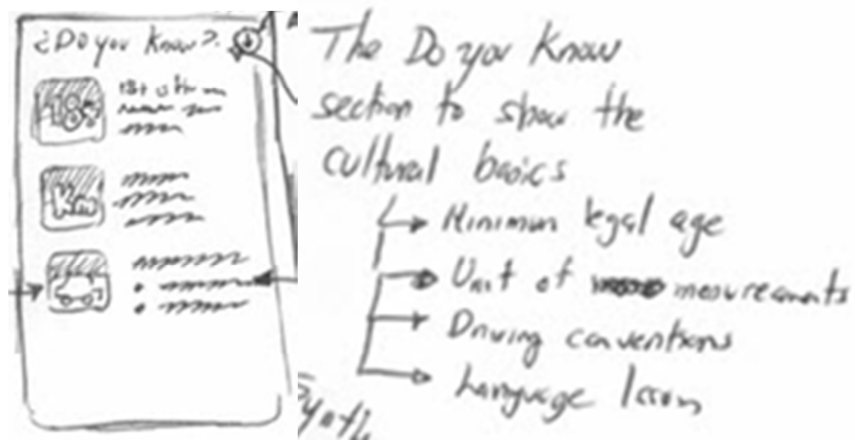


Figure 35: P1.2's mockup guided by *Observer at a distance* metaphor: 'Do you Know section'.

With the *guided tour visitor* metaphor, P1.2 explored other types of signs to explain the other culture to the user.

I39- P1.2: *“the second case is to detect the core cultural aspects that are involve with a particular variable. Therefore you can construct the “history” for explaining. The “fingering” is equivalent to remark what is important through the narrative. In the videos examples, that would involve zooms, particular fragments of narration, clarity on movements, cultural gestures, landscape features, etc.”*

Then, in the first screen P1.2 offered opportunities for cross-cultural contact through cultural videos associated with driving rules and conventions (See Figure 36) and in the second screen the meaning of a comfortable car in Mexico (see Figure 37).

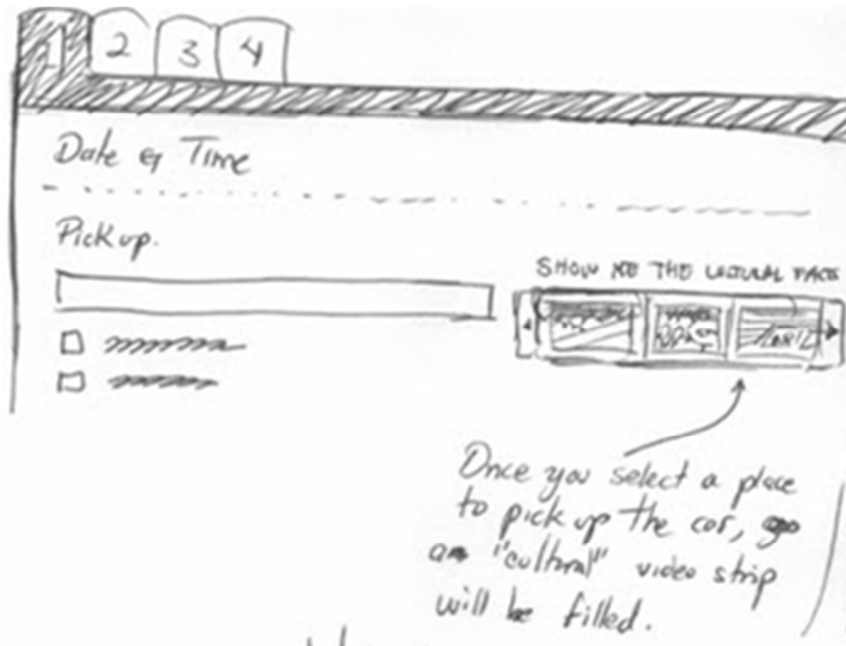


Figure 36: P1.2's Mockup with the *Guided tour visitor* metaphor: 'Home page'.

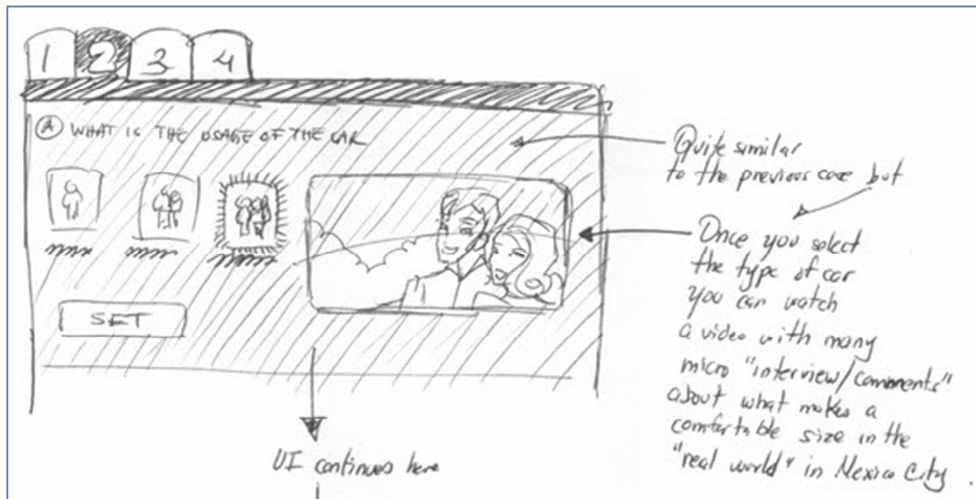


Figure 37: P1.2's Mockup to Guided tour visitor metaphor: 'Select a car' page.

With the foreign with translation metaphor concepts P1.2 understood that the user will be in touch with an unfamiliar environment, because the interface is actually for Mexicans, but he is concerned with the interface's usability (see Figure 38).

I40- P1.2: "In the third case, it's all about looking the better for the foreign user. Then, the current user is confronted with an odd interface. However, it's expected certain level of understanding under the assumption the interfaces is usable and the gap between designer and user's semiosis is minimal."

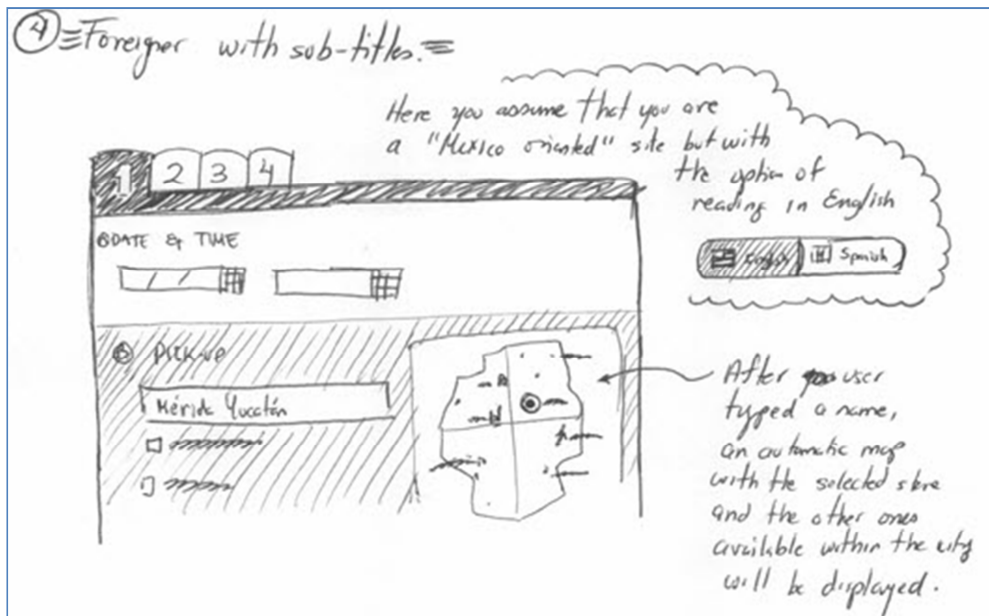


Figure 38: P1.2's Mockup guided by Foreigner with translator metaphor: 'Home' page.

Actually, Mexicans already know about driving rules and conventions, the meaning of a comfortable car in Mexico, the minimum legal age to drive, the speed limits and so on. So, guided by this metaphor, P1.2 did not offer any guide or extra explanations in this alternative, only the option of reading it in English.

5.2.1.4.4. Summary of results

Step One was carried out to assess the epistemic potential of CVM when designers use them to create redesign alternatives; and the HCI designers' and evaluators' understanding and use of CVM. Evidence collected in Step One pointed out that: (i) CVM should be improved to minimize difficulties in understanding the fundamental concepts associated with it; (ii) CVM achieve considerable epistemic effect on cross-cultural design process; and, (iii) CVM help designers in organization communication about their intent of promoting intercultural contact.

Difficulties in understanding the CVM led us to improve them to suit perceived needs more appropriately. The definitions and metaphors' evolution (see Sections 4.1 and 4.2, respectively) presented in Chapter 4, already reflect the following initiatives: elaboration of a unique and tutorial example for all the metaphors (with a hypothetical website for cooking recipes); creation of a practical *how-to* guide for those interested in applying the metaphors; revision of design metacommunication features for each metaphor to emphasize the differences between the metaphors; revision of metaphors' names. The revised CVM (version 3) were used in Step Two (see Section 5.2.2)

The epistemic nature of CVM were also confirmed as they guided designers throughout the re-design process, since they help designers focus on culture and to map out the problem with the epistemic value of helping designers in understanding, conceptualizing, and reflecting on design goals.

CVM also allow designers to think about the communication process of culture while they make decisions about how to express cultural variables. The adoption of each metaphor entails different effects (cultural isolation, cultural mediation or cultural immersion) and organization of the interactive discourse. So, designers realize that the design space was substantially expanded once they had

to choose between five different metaphors to guide their interpretations and decisions.

Further evidence collected in this experiment (as shown in Section 5.2.1.4) revealed that challenges in manipulating cultural variables lead designers to: think about distinctions that they were not aware of or would not necessarily bring to bear in cross-cultural design; and, find out how to solve these challenges. Hence, the CVM's epistemic value of bringing out the designers' cultural gaps and awakening designers' awareness about some implications of cultural diversity in cross-cultural design.

Finally, results show evidence that metaphors help designers to communicate cultural diversity. By exploring alternative cultural perspectives and communicating those through interaction re-design process, designers made decisions about content and expression. The participants' rhetoric and mockups reveal the CVM's generator power. The participants were far beyond merely copying or reproducing the examples provided in the tutorial (for another domain). Instead, they clearly explored other types of signs to communicate the foreign culture to the user. Even when designers faced difficulties due to cultural gaps, the evidence collected in this experiment showed us that CVM help them to cross the bridge, i.e., they help designers to re-elaborate an interactive discourse to communicate cultural diversity.

5.2.2.

Step Two - Cultural Viewpoint Metaphors at evaluation time

The purpose of this step was to evaluate the potential of cultural viewpoint metaphors as an inspection tool for early formative HCI evaluation at redesign time. The following research question guided our investigation: "Can CVM help HCI evaluators at focusing the inspection on cultural issues? How?"

In Step One, each designer proposed three re-design alternatives by sketching handmade mockups for each of the following metaphors: the *observer at a distance*, the *guided tour visitor* and the *foreigner with translator*. We, then, selected two sets of alternatives (from P1.2 and P1.4) to see how HCI evaluators interpret designs produced using CVM. The selection criterion was the richness of

the drawings regarding evidence of metaphors and opportunities for intercultural contact.

Although we selected two sets of mockups, the pilot tests showed us that only one set of alternatives per participant would be enough to answer our research question. Furthermore, we found out that the experiment became too long, since each set of alternatives implies a specific scenario of inspection and evaluation questionnaire.

We reproduced the handmade mockups from P1.2 and P1.4 (see Appendix C) with Balsamiq¹⁹. Balsamiq mockups had the advantage of standardizing the visual quality of designs and factoring out judgment that might be influenced by the designers' ability to draw nice sketches. Figure 39 and Figure 40, respectively, show an example of a handmade and its Balsamiq mockup.

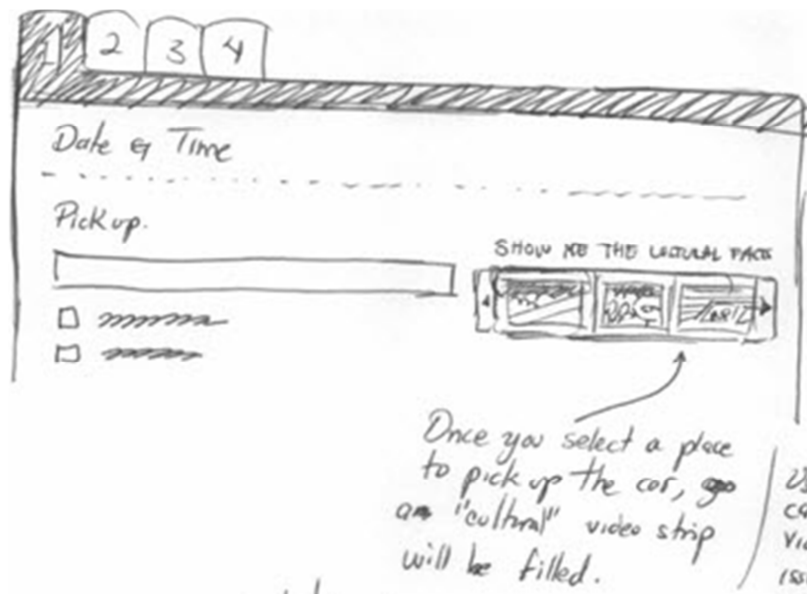


Figure 39: P1.2's Handmade mockup.

¹⁹ Balsamiq is a mockup tool.

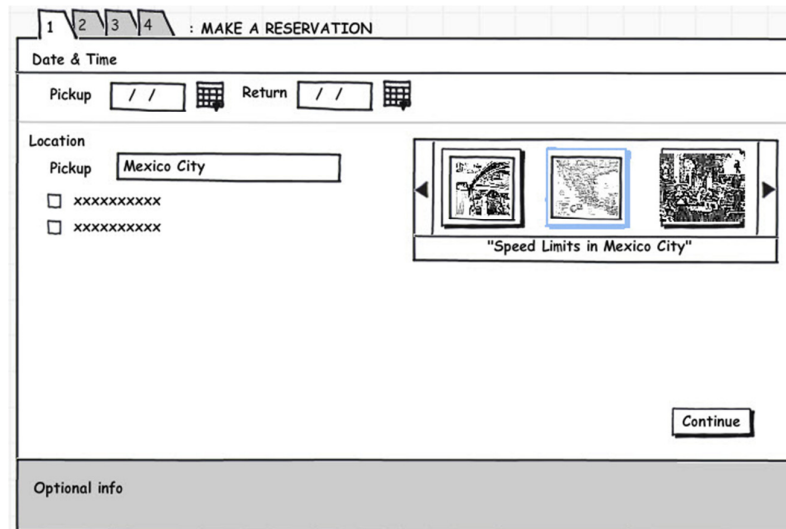


Figure 40: P1.2' Balsamiq mockup.

Balsamiq software lets us generate click-through mockups. For each group of sketches elaborated by a designer, we produced a Balsamiq interactive version. So, we created 3 (three) Balsamiq interactive versions for each designer. Each one addresses a specific metaphor: the *observer at a distance*, the *guided tour visitor* or *foreigner with translator*.

5.2.2.1. Participants

Step Two involved 4 (four) nationals of the same country (Brazil). All of them (P2.1, P2.2, P2.3, and P2.4) have good experience in HCI and reading fluency in English. P2.1, P2.2, and P2.3 have further professional experience in HCI projects.

This experiment was all run at the Department of Informatics at PUC-Rio and lasted 150 minutes approximately. The participants' consent to the realization of the experiment (see Appendix D – Informed Consent Term) and questionnaire (see Appendix D – Questionnaire) were collected by e-mail.

The questionnaire included questions about their experience abroad and their professional (or other) practice with HCI evaluation. Although having lived or worked abroad was not a recruitment requirement, we asked questions about this topic to have a complete profile of the participants.

After the researcher presented the experiment goals, the following activities were conducted:

- The researcher introduced the CVM's version 3 (see Table 10, in Section 4.2) in tutorial form.
- The participant inspected one set of Balsamiq mockups originated from Step One following a scenario of use (see Appendix D – Scenario) and using the cultural viewpoint metaphors.
- The researcher carried out a post-test interview.

5.2.2.2. Experiment Scenario

In the scenario we used for this experiment (see Appendix D), the participant works in a project to re-design the Avis website. So, his or her goal is to evaluate a set of alternatives (from P1.2 or P1.4) elaborated in the previous step (Step One, re-design activity) by taking into consideration that designers tried to use one metaphor predominantly in each alternative. They also should keep in mind that designers had the explicit design intent of *promoting* different levels of awareness about cultural diversity among users in this rent-a-car domain.

The set of re-design alternatives were randomly distributed to participants as presented in Table 12. P2.1 and P2.2 evaluated the set of alternatives proposed by P1.2 (a Mexican designer), so their inspection scenario considered that an American residing in the USA chooses Mexico City for the car pick-up. P2.3 and P2.4, in turn, evaluated the set of alternatives proposed by P1.4 (a Brazilian designer), so their inspection scenario considered that an American residing in the USA who chooses a city in Brazil for the car pick-up.

Id	Nationality	Alternatives proposed by...	Inspection Scenario : an American residing in the USA chooses a place in...
P2.1	Brazilian	P1.2 (Mexican designer)	<u>Mexico</u> for the car pick-up.
P2.2	Brazilian	P1.2 (Mexican designer)	<u>Mexico</u> for the car pick-up.
P2.3	Brazilian	P1.4 (Brazilian designer)	<u>Brazil</u> for the car pick-up.
P2.4	Brazilian	P1.4 (Brazilian designer)	<u>Brazil</u> for the car pick-up.

Table 12: The distribution of alternatives and scenario among participants.

In order to avoid distractions by possible interaction problems in manipulating Balsamiq software by participants, we produced videos with a hypothetical user interacting with the click-through Balsamiq mockups. So, each evaluator could focus on what was really important: the evaluation activity. Figure 41 shows how videos were given to evaluators.



Figure 41: Videos of click-through Balsamiq mockups.

The participants were, then, invited to answer 3 (three) evaluation questionnaires (A, B, and C) regarding each interaction video throughout the inspection activity to record the evaluation result. The questionnaire's goal was, actually, twofold. First, we intended to guide the evaluators throughout the inspection by asking questions about the fundamentals of CVM, i.e., the cultural variables and the metacommunication features. The evaluator, then, had to answer which cultural variables can be traced through the “interface” and which interface elements were used to communicate cultural differences to report evidence of a specific metaphor.

Second, we wanted to capture, in the questionnaire, the evaluators' preliminary interpretation about the metacommunication quality regarding the design intent of *promoting* intercultural contact with cultural diversity.

After the evaluation activity, participants reported verbally the evaluation process as the researcher conducted the post-test interview. This stage aimed at collecting mainly: (i) the evaluators' discourse about their evaluation results; (ii) the evaluation process, i.e., how the proposed metaphors helped them (if at all) in focusing and reflecting about the quality of metacommunication; (iii) what they found easy or difficult to do; and, (iv) what evaluators have learned with the experiment.

5.2.2.3. Analysis Process

The empirical data collected in this step (evaluation questionnaires and post-test interviews) were analyzed with the same discourse analysis technique applied in Step One (see Section 5.2.1.3). So, this process generated a set of categories of analysis which are also part of the results of this research.

5.2.2.4. Results

In this section we present the main results from Step Two, i.e., CVM at evaluation time. The main categories of analysis from our interpretation during the analysis process are: (i) evidence of the epistemic nature of CVM at evaluation time; (ii) evidence that metaphors help designers to inspect and evaluate the communicability of cultural diversity; and, (iii) difficulties faced during the evaluation process.

5.2.2.4.1. Evidence of the epistemic nature of CVM at evaluation time

The epistemic nature of CVM could also be traced at evaluation time by analyzing categories of meanings. The analysis showed that CVM helped evaluators in: (i) interpreting their findings throughout the inspection; (ii) realizing that cross-cultural content and HCI design may be addressed separately at design time; and, (iii) reflecting about communicative strategies and new possibilities in cross-cultural HCI re-design.

Participants like P2.2, P2.3, and P2.4 explained how CVM guided their interpretation during inspection, since CVM organized the problem space.

I41- P2.3: *“Oh, yes! Because [the metaphors] guided me to the type of interpretation that I would make about the signs [...]. They helped me like that, because it called my attention to this other class of signs and also guided me to the types of interpretation I would make.”*

I42- P2.3: *“The metaphors called my attention to which the cultural signs are, I interpreted these signs according to the metaphors: if they inform, compare and only transcribe into another language, into another culture. It helped me a lot in this sense.”*

I43- P2.4: *“I started to think to myself and got mixed up. If you organize your thoughts [...] from what you see to what the user gained with that in terms of contact, then these [the metaphors and the evaluation questionnaire] certainly do help. If your intention is to promote intercultural contact, then, the metaphors and the questionnaire help.”*

I44- P2.2: *“If you did not give me anything, nothing of the kind, and sat me here in front of the computer and said: Evaluate! The result would not be as rich*

as that that came out, because you gave me a tool for me to reflect, you did not throw me here and said: Evaluate! This helped me to reflect about the cultural questions.”

The participants’ cultural gap regarding the scenario where an American residing in the USA chooses a place in Mexico (for P2.1 and P2.2) or Brazil (for P2.3 and P2.4), also led the participants to improve their knowledge about cross-cultural content and HCI design segmentation at design time. Participants realized that cross-cultural HCI designers should have a kind of ‘awareness’ about cultural diversity, although it is not necessary to know all of the existing differences.

I45- P2.1: *“So, I think I should know, at least, a little of each one of the cultures to be able to answer this question 3 [question 3 from evaluation questionnaire asks to classify if the variable was presented in culture A or B].”*

I46- P2.2: *“This will make a difference on the evaluation. I do not belong to culture A or B, I am from culture C. This factor also has to see which impact it will have on the evaluation too, doesn’t it? Because this domain was simple, but there may be a more complicated domain and another domain where he does not see that there is a metacommunication there, because he does not know either culture A or B, but how will he see that that is a metacommunication? This has to be taken into consideration.”*

I47- P2.3: *“Then the knowledge that a person has of the domain and a little of the cultures may make this type of evaluation more or less difficult. Then, about this case in particular, I could not even identify if it is one or the other, because I do not know much about the Brazilian culture. There, it is more by the domain and not by the culture. I do not know the domain and the culture of the Americans. I think these two things may influence the analyses and so, to know the difference between the problem of my knowledge and the problem of the interface demands that the evaluator be more attentive to this type of thing.”*

However, participants realized that this cultural gap is part of the problem and not a deficiency of CVM.

I48- P2.3: *“I think the difficulties, the negative points, I think that it is inherent to the problem itself, which is to evaluate a thing that involves different cultures and that the evaluator does not know, which I do not know whether it is a problem more difficult than that of the knowledge of the dominion Because in the dominion, things are more explicit and in the culture, things are more implicit,*

which is the more tacit knowledge. People do and act simply because they are used to doing so, since they were children, but they are never aware of that fact. I think that the tacit knowledge of the culture is even worse than to know the dominion. I think that the greatest difficulty is this one, but I think it is of the problem and not of the method.”

HCI formative evaluation focused on cross-cultural issues with CVM led some evaluators to think as if they were designers. P2.3, for instance, reflected about different ways to communicate cultural diversity through metacommunication:

I49- P2.3: *“Like having to click on a link to open another window [with cultural information]. To have a window where only the information is shown and to have another window to see the differences and the comparison. And to get out of one to go to another in some extra work to do this, and then the user goes there only if he wants to.”*

Back to the evaluator’s role, P2.3 reflected about which metaphor is most appropriate in terms of cost benefit:

I50- P2.3: *“Is it really worth to make this difference [contrast], because in this case, you spend more time both to do it and for the user to observe it. Is it really worth to notice this difference, is it that significant? Or it would be enough to inform about the cultural issues and he [the user], if he wants to, goes after it a little more? By other means, I would leave the difference on demand, you begin giving information and the difference remains on demand [...] I think it helped me think about this type of thing, it really did, and called my attention to these things, for those that did not know anything about this, like myself, and to have these references about what to think, is extremely useful.”*

For P2.1, the very concept of five cultural viewpoint metaphors opens up different cross-cultural possibilities in cross-cultural HCI design and evaluation:

I51- P2.1: *“I found it very interesting to divide these metaphors, to have this vision, rather than to be only in his culture or in ours, to have these intermediary levels, it is much better than to have it only in his culture or in mine.”*

Finally, participants reflected on how metaphors can help them to address solutions for the HCI re-design. P2.1, for instance, claim that CVM can help to identify the specific portion to be re-designed:

I52- P2.1: *“The fact that they are well defined helps me to detect this difference even more when I am comparing one that is of one type to the other that is of another type. For example, in one redesign, I could see that if I had... [if] my first system were system A [in one specific metaphor] and I wanted that it were of type C, I would already know what I had to tackle there, I know this is a characteristic of that spot and I can change it for this one. So, I think that it can help me in this way.”*

Concluding, with this category of analysis we collected evidence that CVM not only helped participants “to wake up” about cultural issues and implications in HCI design process. CVM concepts and dimensions (cultural variables, metacommunication features) guided participants in the interpretation process throughout the evaluation activity.

5.2.2.4.2.Evidence that metaphors help designers to inspect and evaluate the communicability of cultural diversity

HCI evaluation methods usually focus on a specific quality of use: usability (del Gado and Nielsen, 1986), communicability (de Souza, 2005a), culturability (Barber and Badre, 1998), accessibility (Lazar *et al.*, 2004; Stephanidis *et al.*, 1998) and so on. Our challenge here was to see whether CVM help (if at all) evaluators to focus on the communicability of cultural issues.

According to participants, the evaluation process was reached throughout 3 (three) activities. First, participants identified which cultural variables were used by designers:

I53- P2.3: *“First of all, I identified if it was a cultural variable, if it mentioned anything about the culture and then I made the analysis of what the designer was talking about that variable. I did this one by one.”*

Second, they tried to classify to which culture those variables belonged or not.

I54- P2.1: *“I know that for me, 18+ is not something from my culture, so I imagine that it can be from some of those cultures [American and Mexican]. For example, in USA, over 16 years, you can drive, then, if it is showing ‘over 18’, it is because this is in Mexico.”*

I55- P2.3: *“In the last one, in C [foreigner with translator], although it is written in English, he used R\$ and not BRL. I would rather have it as it is in English, I would rather use BRL. And then he used R\$, because he is thinking about the local currency, only the content of that culture translated. But I would also translate the currency for the name in the other language. But it remains Real, I would change only that, but I do not know if I would change a perspective.”*

I56- P2.2: *“[To check] if the variable is in the perspective of the user or of the other culture makes a difference to evaluate the project. [It helps] not because it is in the metaphor 1, 2, 3 or 5. What makes the difference [is to check] if it is in this or in that perspective, if it is contrasting or not.”*

Third, participants inspected and evaluated how cultural variables were communicated: by comparing, contrasting, informing, and so on. The comparison between the three alternatives was important at this stage.

I57- P2.1: *This is the video from guided tour visitor, so, here, I expected to see that [metaphor which compares] to see the two things. Although it appears in the user’s language, he is showing me a measurement unit which is not his [of the user] and also there is no information here. I found that the first video was more guided tour visitor than the observer at a distance, and this video more observer at a distance than guided tour visitor. This because there [in the first video] I saw more comparisons”.*

I58- P2.2: *“[During the inspection] I kept looking at the contrast, because here this possible characteristic stood out for me. I kept looking where [the designer] was using this contrast technique.”*

I59- P2.3: *“I analyzed the interface, saw that he talked explicitly about information, about another culture, ‘local info’ [for example]. And there, there is information in this other culture that I did not have in mine, i.e., mine, considering myself as an American, you see? There was no information for the American user, and, I noticed that this was information from a different culture. I began to analyze if he only informed, if he compared, if he informed in the user’s culture or that of another culture.”*

P2.1 and P2.4, for instance, said that the possibility of comparing five cultural perspectives also helped them:

I60- P2.1: *“I found it very interesting to have the division between the 1 and 5, so that we can focus our work and evaluate, have that comparison, because, otherwise, it would be only 0 or 1. [...]. I found it very cool to have this in mind to make the comparison. I liked it, I found it very interesting.”*

I61- P2.4: *“And when you are evaluating, knowing that these [cultural] variables exist, you are, I’m not saying, directing your thought to one or another [metaphor], but you know that there is a variation.”*

Additionally, the comparison between the alternatives led P2.1 to identify relevant issues:

I62- P2.1: *“As each metaphor has its own specific characteristic, they are very different from each other, for example, in this last one [foreigner with translator], one of the things I saw in the 1st [video], the 2nd [video] and when I saw the 3rd video... I was looking for the question of measurement unit, which appears on the other videos, I did not see it. I would know if it is foreigner with translation if I saw it in the Mexican culture there, that it would be there, in the culture. Then, in this way, as I did not see this, then, this could be saying that there is something relevant missing in this interface.”*

This last evidence confirmed the benefits of comparing alternatives, because it may lead evaluators to give meaning to the absence of something in one design alternative that was present in another alternative.

Results regarding evidence that metaphors help designers to inspect and evaluate the communicability of cultural diversity are based on specific subcategories of meanings evidenced in the participants’ discourse: (i) a focus on the communicability of cultural issues throughout the evaluation process; (ii) a mapping of the interface; (iii) a naming and framing of participants’ findings in light of CVM.

Regarding the focus on communicability of cultural issues throughout the evaluation process, P2.2 and P2.3, said that CVM helped them.

I63- P2.2: *“I did not even look to see if it was the best solution in terms of interface itself, I looked only at the cultural question.”*

I64- P2.3: *“I think it did focus. As I said before, I had difficulty to go back to analyze the questions of interaction and of task. I was so interested, so stuck in the culture, that the interaction part [was left out] [...]. It is different when you*

analyze the interaction problem [and analyze the problem with questions] of the culture. And I managed to focus on the culture of this experiment now. [...].”

CVM also helped evaluators to map the interface. P2.1, for instance, said that he could tag the interface as the Communicability Evaluation Method (CEM) of Semiotic Engineering does.

I65 -P2.1: *“I found it interesting to help me understand this part here, which is here, as if it were really those tags, I am going to go to the interface and I am going to put those tags there and, at the end, I will see if it is more like one or more like the other. I want it to be 2 [observer at a distance], then I will get whatever there is of 3 [guided tour visitor] here to change. I found it very cool because, then, I can map my interface in this way. I found it very interesting, and super positive.”*

P2.3, in turn, said that with the inspection activity proposed by using CVM, he realized that interface elements regarding cultural issues could be grouped as a specific class of signs.

I66- P23: *“As you asked me to make an inspection thinking of communicability, I was inspired by [the methods of Semiotic Engineering Evaluation], which is to analyze the signs. But, for me, this here is another class of signs because you are interested in another part of communicability.”*

Meanwhile, P2.3 reflected about how to detect communicative breakdowns:

I67- P23: *“In order to answer this question [from the evaluation questionnaire] I think that there is something missing, in terms of communication rupture. Where does this communication fail here? Then, if I had this objective, which is this metaphor, if I had the objective of communicating the comparison, why didn't I make the comparison correctly? “If he wanted to follow this metaphor, did he follow it or not? If it was that one, did he follow it or not?”*

It is noteworthy that another participant (P2.4), in his turn, recognized a specific communicative breakdown in the foreigner with translator alternative, which actually opens up opportunities for future work to evaluate the impact of CVM with users.

I68- P2.4: *“By the time I got to option C, when I saw the AVIS Brasil flag, and Brasil written with an S, then I immediately thought: this is going to be total immersion, but the language was English, then, I thought, Ah!, then it is the foreigner with translator', most definitely. But, then, I think it is a*

metacommunication mistake, but not a mistake of the metaphor. You sort of expect if. Both myself, as an evaluator and, in this case, as the user. You sort of expect that you are in this metaphor but you are not. Beginning with the language, it would have to be in the other culture, but it is in English.”

Finally, evaluators interpreted their findings in light of CVM. Although P2.3 said they identified the differences between alternatives by just interpreting the interface signs with metaphors concepts, evidence suggests that concepts and examples of metaphors and questions from the evaluation questionnaire guided the evaluation.

I69- P2.4: *“The questions [from the questionnaires] help you think. And there, there is no way out, you end up coming here [to the metaphors table]. We can see, i.e., that, in the end, we end up learning the idea of the metaphors. Just by looking and analyzing them you already identify which metaphor the designer wanted to follow.”*

With CVM, participants could name the object of inspection.

I70- P2.4: *“When I got to option C, when I saw “the AVIS Brasil flag, and Brasil written with an S, then I immediately thought: this is going to be total immersion, but the language was English, then, I thought, Ah!, then it is the foreigner with translator’, most definitely.”*

I71- P2.1: *“I found that the first video was more ‘guided tour visitor’ than the ‘observer at a distance’, and this video more ‘observer at a distance’ than ‘guided tour visitor’. This because there [in the first video], I saw more comparisons”.*

Concluding, the discourse analysis with the category presented in this section revealed that all participants agreed that CVM helped them to focus on cross-cultural issues and that the evaluation activity by interpreting their findings in light of CVM was pleasant and interesting.

5.2.2.4.3. Difficulties faced during evaluation process

Although evidence does not suggest relevant difficulties in understanding the idea of CVM, this category of analysis led us to some issues that should be better explained to facilitate the evaluation process: the design intent; the evaluation object (expression or content); and the differences between interface

element, cultural practice, and cultural variable. Furthermore, participants had difficulties to conclude the evaluation process.

Regarding the design goal, some participants said they did not know how to say what is right or wrong because the scenario did not tell them the specific design intent.

I72- P2.2: *“In the foreigner with translator, I felt myself much more inside Mexico. This made sense here. But would it be that my contractor wished to create this sensation, or would it be that he wanted an observer at a distance?”*

I73-P2.3: *“My complaint is because I do not know what to consider right or wrong. I do not know if it is the ‘domestic traveler’, if it is good or bad, I do not know which it was”.*

For, P2.1, in turn, the object of evaluation was not clear, she did not know whether she had to inspect and evaluate interface signs as expressions, or as what they represent (content).

I74- P2.1: *“I know that, for me, ‘18+’ is not something from my culture, so I imagine that it could be from some of those cultures [American and Mexican]. I imagine that it is used in the USA, because I have already seen something like that there, on other sites, in other things, but I do not know how it is done in Mexico” [...]. “Then, you wanted me to see, not exactly the sign of the interface, but what it wants to represent?”*

Regarding the differences between interface element and cultural variable, we realized that they should be clarified and exemplified. In the proposed scenario of Step Two we just presented the cultural variables that were used by designers in Step One. Such was the case of language, the minimum legal age to drive, speed limits, drivers’ license use and conditions. However, we should explain that the interface elements are the interface signs, i.e., everything at the interface that represents something to someone, for instance, an image, the interface color, a text, a word, and so on. P2.2 and P2.4, for instance, had difficulties to understand the differences between those concepts.

I75- P2.2: *“Cultural practice, cultural variable, design element which represent, which emphasize cultural differences. The names are very similar, so I got lost. Here, she is talking about the interface, about the concept, about the culture. I had to think to be able to answer. “What is variable and what is*

interface element? It is difficult to see what it is to place as a variable here, what is to place as an interface element.”

I76- P2.4: “I was somewhat in doubt about what a cultural variable was. If it was a theme, a general topic or if it was a point in....[interface]. Sometimes, I was almost pointing at the site, you see? I know that it is not that. But I managed to get organized. For example, the cultural variable I called it laws and then, that way I could place which were the laws of the local culture, which were presented there, you see? Then, like behavior, there is an example. I think behavior is a cultural variable, and there it was one of the things I was in doubt about.”

Besides that, some evaluators had difficulties to conclude the evaluation, since they felt a lack of scaffold to help them at concluding whether the design intent had been reached or not.

I77- P2.3: “I think that there was something missing to support me in my judgment of value. I managed to see if there is a sign or not. You know those things about communication rupture, of mistake. You told me like that: Interpret in this way! Now, what is the problem in this interpretation? I could not do it. I did not even think about this type of thing, I did not make a judgment of value about that. I only identified if it communicates or does not communicate. I did not make any judgment of value about that. Then, I think that a part of judgment of value is missing. I do not know if it is something like rupture in communication, I do not know. Something in this sense, to support this judgment.”

I78- P2.3: “Because I find that, in terms of evaluation method, I think I can do the data collecting and a good part of the interpretation, and then, what is missing in the interpretation is the judgment of values and how I go on about my vision of that re-project.”

I79- P2.3: “I think that there is something missing in terms of communication rupture. Where does this communication fail here? Then, if I had this objective, which is this metaphor, if I had the objective of communicating the comparison, why didn't I make the comparison correctly?”

I80- P2.4: “But there was a failure, such as, you said that it is observer at a distance, but [there was no place to say] what is your evaluation regarding the use of the metaphor for his design? Something more direct, like this. In the end, we make it here, but there is no explicit question, there is nothing saying you really used ... in the end it is here. So much so, that I found that... I was expecting

this question. I tried to make this here inside [in the evaluation questionnaire]. To explain that.”

Despite all the difficulties CVM helped them to say which alternative is more appropriate in the scenario.

I81- P2.1: *“A [alternative] ‘B’ [is guided tour visitor]. I would put the ‘B’ [alternative] with some things from ‘A’ [observer at a distance]. But, this way, if I had to choose one of the three, I would choose ‘B’ the way it is but if I could change something, I would put some things of ‘A’ in ‘B’”. “I thought that the 2nd made the comparisons, it left the user in his culture, but, at the same time, it was there comparing and showing other things even in a more interesting form.”*

I82- P2.4: *“Certainly, it was ‘B’, I even justified it there. When you work with comparison, when you show it, it is an even richer form of you knowing it.”*

And participants could reflect about the general benefits of CVM at evaluation and design time of cross-cultural applications. P2.2, for instance, recognized the importance of naming the problem.

I83- P2.2: *“Perhaps, to sum up, to give a final opinion, to close the analysis, to name all that I was saying [the metaphors are good].”*

I84- P2.3: *“I think they stimulate [the metaphors], they may stimulate, they have the potential to stimulate at various levels, at different levels, because they are different.”*

I85- P2.4: *“If you think: the promotion of interchange is more inclusive, but if you think: there are levels, and I do not know if level is a good word, but, after all, there is a scale there, isn’t it? Certainly, knowing that there are these variables and having the notion of such variable, you will manage to evaluate this here. There is no way out, perhaps if I did not have any of these metaphors and you came to me and showed each one of them [the alternatives]. And if you came to me and said: Do you think that the designer is succeeding in promoting the contact? Maybe I could say yes, here, and there, no. It would be a question of my good sense. But, as I have a reference, I think that I can answer that with more propriety.”*

Most categories of meaning presented here are not related to difficulties in understanding the idea of CVM (as the category Difficulties of Step One). Instead, they indicate some issues to be improved to facilitate the evaluation process. The main issue is the lack of scaffolds to help evaluators in concluding the evaluation

process. Evidence showed, for instance, that the evaluation questionnaire could be improved by including a specific question or section about the quality of designer-to-user metacommunication.

5.2.2.4.4. Summary of results

This empirical study was carried out to assess the potential of CVM at evaluation time. In this step, as mentioned earlier, participants inspected interaction videos with Balsamiq mockups from Step One (see Section 5.2.1). The collected evidence suggests that, despite the difficulties faced by evaluators throughout the evaluation process, CVM has an epistemic effect at evaluation time and led HCI practitioners to evaluate five different communicate strategies to promote cross-cultural contact.

The epistemic nature of CVM was manifested once again as the participants told us what they reflected on, what they learned, how they dealt with the challenges, and so on. Evidence showed that CVM helped evaluators in interpreting their findings with inspection, realizing that cross-cultural content and HCI design may be segmented at design time and reflecting on communicative strategies and new possibilities in cross-cultural HCI re-design.

Regarding the potential of CVM to help evaluators to inspect and evaluate the communicability of cultural diversity, Step Two showed that metaphors concepts and examples and the evaluation questionnaire helped evaluators to inspect the alternatives in a systematic way. So, the participants were guided by CVM and they were able to focus on the communicability of cultural issues by: identifying interface elements and respective cultural variables; classifying them in the culture to which they belong; and inspecting which cultural perspective was used to communicate the cultural variables.

Also, evaluators interpreted their findings in light of CVM. Concepts and examples of metaphors and questions from the evaluation questionnaire guided the evaluation process.

Difficulties faced during the evaluation process gave us practical results to improve the CVM documents and scaffolds. Evidence helped us to realize that the designers' intent of promoting intercultural contact should be more detailed,

because evaluators should know what was really expected by designers and customers. So, in order to avoid difficulties during the evaluation process the scenario should have other ingredients such as the design goal. Some evaluators also had difficulties to conclude the evaluation, since they felt a lack of scaffolds to help them.

5.2.3. Case Study Results Analysis and Synthesis

A case study with the Avis website was carried out to assess the comprehension of CVM by HCI designers and evaluators and the potential of CVM in designing and evaluating cross-cultural applications. We aimed at investigating how HCI practitioners would appropriate CVM concepts when thinking about cross-cultural design and how CVM helped them to organize the problem space.

Results from the experiments, which composed this two-step case study, were complementary, since both of them evidenced the epistemic effect of CVM on cross-cultural design and evaluation process. With CVM, participants were guided throughout a re-design process, since they help them to focus on culture, to map out the problem and to interpret their findings.

Furthermore, this case study showed the CVM epistemic potential of leading participants to see two things that come together in cross-cultural HCI applications at interaction time, but may be segmented at design time: cultural content elicitation and metacommunication message elaboration. Participants have learned this throughout this process, since CVM concepts helped them in: (1) understanding that culture is part of the metacommunication process that happens in HCI; (2) reflecting about five different ways of communicating culture; and (3) thinking about which effects the adoption of each metaphor entails in the organization of the interactive discourse.

In conclusion, the five metaphors were then not used directly to produce the answer to the problem, but we have evidence that the participants improved their own understanding of the problem, explored their implications, generated alternative solutions, evaluated them against each other and that CVM helped them to name and frame the problem.

In addition to finding a way to organize the research space on cross-cultural HCI, we also captured evidence and tips from the experiment in the context of HCI evaluation on how to turn CVM operational to support cross-cultural design and evaluation.

5.3. Triangulation

The results generated by the case study with the Avis website (see Section 5.2) can only be considered new knowledge in the HCI discipline after validation. Following qualitative research methods (Creswell, 2009; Denzin and Lincoln, 2000), we adopted validation procedures and criteria to triangulate these results.

So, another experiment with CVM at evaluation time was carried out in another domain of activity. While the case study was focused on a rental car domain, this experiment used the football domain of the Fédération Internationale de Football Association website© (www.fifa.com)²⁰. This website was not elaborated with CVM, and it is clearly a cross-cultural application that could be re-designed to promote cross-cultural contact.

After a pilot session to check the methodology and to refine the experiment itself, we recruited two participants. They should have good experience in HCI evaluation and reading fluency in English. The two participants, separately, listened to a tutorial introducing the CVM's version 3 (see Table 10, in Section 4.2) (with concepts and examples) and then inspected the FIFA website following the proposed scenario for this experiment and using CVM as a guide. We also made a brief individual post-test interview with participants about the experiment.

The empirical evidence from this experiment was the participants' *discourse* about the evaluation process and results, as well as the participants' impressions and opinions expressed during the post-test interview. This data was then analyzed with the same discourse analysis techniques (Nicolaci-da-Costa *et al.*, 2001) used in the case study with the AVIS website.

We validate the research findings by triangulating the categories presented in Section 5.2 with the results of this experiment (see Figure 42).

²⁰ From now on we will refer to it in abbreviated form as “the FIFA website”.

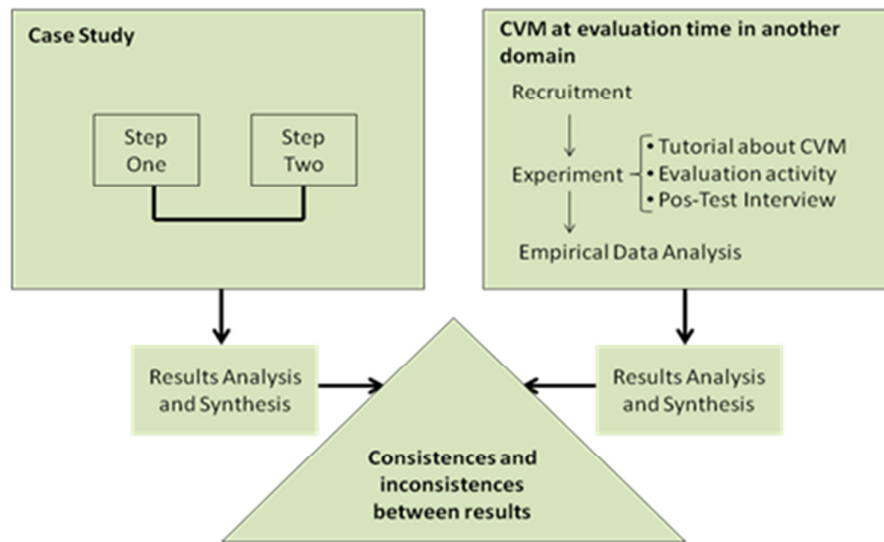


Figure 42: Exogenous triangulation: CVM at evaluation time.

The triangulation process (Creswell, 2009) was concluded by looking for consistencies and inconsistencies of categories emerging in another domain. It is, therefore, an instance of triangulation with exogenous source, run after the primary categories of analysis had been identified in the case study.

5.3.1. Evaluating the FIFA website with CVM

The International Federation of Association Football, commonly known by the acronym FIFA, “is the international governing body of association football, futsal and beach football. With 208 associations affiliated to FIFA today, world football's governing body has rightly been dubbed the ‘United Nations of Football’” (text extracted from <http://www.fifa.com/> on February 8, 2011). FIFA has a huge responsibility to reach out and touch the world, using football as a symbol of hope and integration with the following mission: “Develop the game, touch the world, build a better future”.

The official site of FIFA presents news, national associations, competitions, results, fixtures, development and so on. With the aim of “touching the world”, it has six languages such as English, French, German, Spanish, Arabic, and Portuguese. Each version offers service for its users, with all of FIFA.com's current features translated into one language. As well as reading the latest news, interviews and features on the site, people can also sign-up to the FIFA.com Club,

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a service which allows football fans from all over the world to communicate with each other, play games, and also comment on the website's articles. Figure 43 and Figure 44 are examples of FIFA website in English and Arabic, respectively.

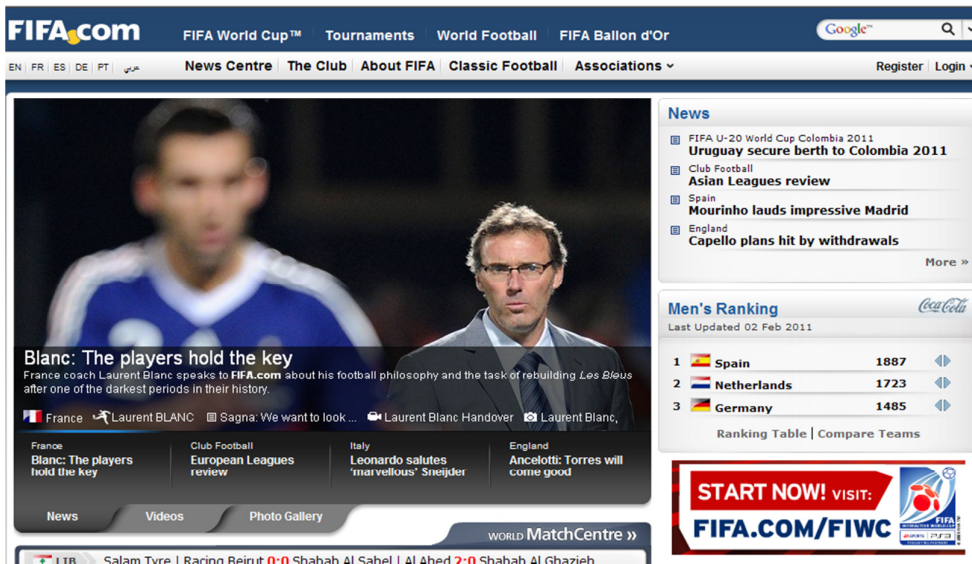


Figure 43: FIFA website in English (<http://www.fifa.com/index.html?language=en>).



Figure 44: FIFA website in Arabic (<http://ar.fifa.com/index.html?language=ar>).

5.3.1.1. Participants

This study involved 2 (two) nationals of the same country (Brazil). P3.1 and P3.2 have good experience in HCI and fluency in English for reading. This experiment was all run at the Department of Informatics at PUC-Rio and lasted

about 150 minutes approximately. The participants' consent to the realization of the experiment (see Appendix E – Informed Consent Term) and the questionnaire (see Appendix E – Questionnaire) were collect by e-mail.

The questionnaire has the same questions of the Case Study (Step Two – section 5.2.2.1): about their experience abroad and in HCI evaluation. After the researcher presented the experiment goals, the following activities were conducted:

- The researcher introduced the CVM's version 3 (see Table 10, in Section 4.2) in tutorial form.
- The participant inspected a portion of the FIFA website following a scenario of use (see Appendix E – Scenario) guided by the cultural viewpoint metaphors and an evaluation questionnaire (see Appendix E – Evaluation Questionnaire).
- The researcher carried out a post-test interview.

5.3.1.2. Experiment Scenario

In the scenario we used for this experiment (see Appendix E), the participant was hired to work in an HCI evaluation of the FIFA website. The participant's goal was to evaluate the metacommunication quality (communicability) of the 2010 FIFA World Cup South Africa's portion. They also should keep in mind that designers had the explicit design intent of *promoting* intercultural contact with cultural diversity in football domain, despite not having used the CVM.

The participant also received a cultural information list with some relevant cultural variables in the football domain: units of measurement, flag colors, language, geography (location, climate, distances, and so on), population, fans (preferences, features), how much the World Cup is important for the Host Country, history of football in the Host Country (influences, awards, participation in last World Cups), tourism (accommodation, transportation, and so on).



Figure 45: 2010 FIFA World Cup South Africa's portion of FIFA website (<http://www.pt.fifa.com/worldcup/archive/southafrica2010>).

P3.1 and P3.2, then, evaluated the World Cup's portion in Portuguese (see Figure 45) by considering the following inspection scenario:

"A Brazilian wants to know everything about South Africa: where and with whom Brazil played and so on. He wants to learn new things about this country he hasn't known yet: South Africa. From the first page of <http://pt.FIFA.com> he chooses the FIFA World Cup's option. First, the 'Destination' link, where there is the Host Cities, Stadiums and South Africa A-Z's option. He, then, chooses Teams' link."

The participants were, finally, invited to answer the evaluation questionnaire (See Appendix E) throughout the inspection activity to record the evaluation result. After the evaluation activity, participants reported verbally the evaluation process as the researcher conducted the post-test interview.

The post-test interview goal was the same of the Case Study, Step Two (see Section 5.2.2). However, the evaluation questionnaire was a little bit different, since evidence from Step Two showed that it could be improved to facilitate the evaluation process (see Section 5.2.2.4.3). We did not aim at solving all the difficulties faced at evaluation process with these changes, but to take the opportunity to improve the currently available scaffolds.

So, instead of questions about which cultural variables were used by designers, we asked participants to fill a table while they inspected the interface with the following information: where (the page, section or interface option) they found something related to a cultural variable (available in the cultural variable list about football domain); which interface element was used to express the cultural variable; and the cultural variable itself.

Regarding the lack of scaffolds to help evaluators at concluding the evaluation process, we included one question at the end of the questionnaire to motivate evaluators to think about the quality of designer-to-user metacommunication.

5.3.1.3. Analysis Process

The empirical data collected in this step (evaluation questionnaires and post-test interviews) were analyzed with the same discourse analysis technique applied in Step One (see Section 5.2.1.3). The difference between this analysis process and the one carried out in the Case Study is that here the analysis was carried out in light of the categories originated from Avis Rent a Car Case study, and there the categories were not defined *a priori*; they emerged from the participants' discourse.

5.3.1.4. Results

We analyzed the collected data from this experiment with the following categories originated in the case study (see Section 5.2): evidence of the epistemic nature of CVM; evidence that metaphors help designers to inspect and evaluate the communicability of cultural diversity; and difficulties faced during evaluation process.

5.3.1.4.1. Evidence of the epistemic nature of CVM

Regarding the epistemic nature of CVM, the following subcategories of meanings emerged from the case study were used in this analysis: (i) a mapping of

the problem space; (ii) an increased awareness of the designers' own cultural biases and gaps; (iii) a kind of *mirror effect*, when participants placed themselves in the role of recipients of design communication; (iv) a reflection about cross-cultural content and HCI design; and, (v) a reflection on communicative strategies and new possibilities in cross-cultural redesign.

About the first subcategory, CVM guided participants while they were thinking about the communication process of culture. P3.1, for instance, said that without CVM he would think only about language, because CVM help him to map the problem by comparing cultural variables:

I86- P3.1: *"I think that without the metaphors, I would only look at the language and, seeing them here, I tried to see the question of the language, of the cultural practice and of the metaphor part. Without the metaphors I would not see the question of the units of measurement or if the statistics of the game are shown according to the Brazilian culture or not. I mean, I think that I would not see all this, I would see more the question of the language. And also, I would not see the question of the idea of guided tour visitor: it is there, in the culture of South Africa, but more adapted for the Brazilian visitor, in this case."*

I87- P3.1: *"I think this is very positive because it gives you a guide about what you have to evaluate and already gives you a position to say whether the site is more for this side or for that side. If we did not have that, we would not know, for sure, as the site would be behaving itself as a whole."*

P3.2 also reflected how the continuum of cultural approximation can help her to understand the problem.

I88- P3.2: *"For you, to see... this part of the interface went from where to where? You can see this jump [in the continuum]. Am I always jumping to this place? Do I ever go back? For you to have this vision of what happened to the traveler in this trip, let's say like this. I think that that continuum is interesting."*

Second, cultural gaps experienced by participants showed the epistemic potential of CVM in bringing out to the participants aspects of their own knowledge and perceptions regarding other cultures. P3.2, for instance, reflected about how to deal with different cultures involved in a cross-cultural application:

I89- P3.2: *"What many times I had to stop a little to think is, as we are talking about culture, I was thinking: It's me, a Brazilian, trying to understand the culture. OK. Then, if I am speaking of South Africa, of places I do not know what*

they are, but it is South Africa, but I am just going into the profile of another team, would it be of the culture of that team or not? Then, I was sort of in doubt about that, you see?"

I90- P2.3: *"In truth, as I am dealing with various countries, in which culture I would be inserted? Would it be that of the place where the World Cup, the event, took place, or would it be in the culture, if I were in the profile of a country, would it be of that country?"*

This participant, then, decided to consider that she could think in terms of her culture (Brazilian) and other cultures:

I91- P3.2: *"Because I interpreted it this way: my culture and other cultures, independently of whatever they may be [if American, British, African]."*

For P3.1 he should compare FIFA.com with other websites to see whether the interface was communicating culture or not, because of his own cultural biases and gaps:

I92- P3.1: *"This other side, I think it has to do with you comparing it with other sites made for other cultures. As I was only there, I was sort of not knowing very well if the parts of the interface had to do with the culture or not."*

Third, we captured the epistemic nature of CVM when P3.2 realized that, by evaluating the website in the light of CVM, she can put herself in the role of user to understand which strategy was used to communicate culture:

I93- P3.2: *"The metaphors are very associated with the user, with what is in his experience or trying to have that experience, you see? Then even in a situation in which you want either something deeper or something shallower of the user's experience, you are always considering that which he passed in the utilization of that site. This is what I found interesting, because all metaphors are associated with a specific person. So, it is much depended on the experience he has, how comfortably or not the user will really manage to have that relation, be it at whatever level it is found in other cultures."*

Fourth, the HCI evaluation with CVM revealed other possible perspectives to communicate culture.

I94- P2.3: *"In truth, as I am dealing with various countries, in which culture I would be inserted? Would it be that of the place where the World Cup, the event, took place, or would it be in the culture, if I were in the profile of a country, would it be of that country?"*

The different levels of cross-cultural contact were, then, realized by P3.2 when she reflected about the traveler role proposed by CVM to users:

I95- P3.2: *“I think it is interesting because you put yourself a little in that continuum of cultural approximation... because it is a role, isn't it? The role of the traveler. Then you even place yourself in that role, and then here am I, lost, needing a hand to pull me up. Then, in another place you say: I am comfortable here, I am at peace here... I think it is even a state, but it is the situation you find yourself in at a given moment.”*

I96- P3.2: *“To put myself in the place of the traveler within the metaphors, to manage to fit there at the moment of interaction, I think it does help.”*

I97- P3.2: *“I was trying, really putting myself in the traveler's shoes, trying to fit in the options of the continuum, inside the visitor's grading.”*

Finally, the epistemic effect was also evidenced when P3.1, for instance, realized that culture is also communicated by metacommunication.

I98- P3.1: *“At the beginning I looked at the interface as a whole, but later on I tried to get to the cultural part. As far as I saw, this cultural part has more to do with the content than with the interface itself, than with presentation, than with how it is laid out, then, I was more tempted to go to this part of the content.”*

P3.1 and P3.2's background in Semiotic Engineering led them to link the inspection with CVM with evaluation methods of this theory. P3.2, for instance, said:

I99- P3.2: *“I got things of communicability here which, maybe remained only there, in the Communicability Evaluation Method, but, when I saw, from the start, this level of domestic traveler and observer at a distance, I imagined if the metaphor had any relation to these tags which are interconnected to the location of the person, I kept imagining that.”*

CVM, then, led participants reflected not only on the evaluation of FIFA itself, but also on how to apply knowledge acquired in this activity in other situations.

5.3.1.4.2. Evidence that metaphors help designers to inspect and evaluate the communicability of cultural diversity

This category of analysis is based on the following subcategories of meanings: (i) a focus on communicability of cultural issues throughout the evaluation process; (ii) a mapping of the interface; (iii) a naming and framing of the participants' findings in light of CVM.

With the first subcategory we saw that participants (such as P3.2) realized the importance of cultural variables to focus on cultural issues, since CVM operated on how cultural variables are communicated through interface.

I100- P3.2: *"This question of the variables, for instance. You remain focused on what you are observing."*

I101- P3.2: *"These concepts [of the metaphors] are really necessary, if I did not have these concepts, I would not have this type of... [attitude]: to put myself in the place of the traveler within the metaphors, to manage to fit there at the moment of interaction, I think it does help."*

With the second sub-category we found out that two participants realized that sometimes the metaphors were not related to a specific point, but sometimes it could be identified in the whole interactive process.

I102- P3.2: *"Because, sometimes, the situation that I saw was something ample isn't it? It was the whole section, the whole area, it did not have an element of interface. Maybe it was the whole experience as a whole."*

P3.1 and P3.2 also suggested how to detect communicability breakdowns with CVM by using tags to map the interface.

I103-P3.1: *"A characteristic of some metaphors has to do with a tag. Something similar to the CEM [Communicability Evaluation Method], not that it is equal, but something that already gives you an idea of, for instance, repetitive things or that have similar characteristics, which may be a tag or something like that, that says that it is comparison, that it is a text, that it is comparative narrative, that it is guided tour visitor."*

P3.2 imagined that we may create a relation between CVM and CEM.

I104-P3.2: *"I imagined it as a complement to CEM, but from a different perspective."*

Regarding the third subcategory, P3.2, for instance, was able to name the inspection findings with CVM concepts:

I105- P3.2: *“Within the option ‘hospitality’, if you could classify it in that continuum, I was at the observer at a distance, I think that the greatest part of my interaction was in the observer at a distance. [...] It is the observer at a distance because this is the question of the culture to appear for the user as information and not as experience. I think this is put very strongly here. It gives me a lot of information. It talks about what I need, but it does not put much of the experience there.”*

Furthermore they were able to explain the communicability breakdowns with CVM. P3.2, for instance, firstly explains the interactive path where she found out the problem:

I106-P3.2: *“In the destination part, there is the part of hospitality. I thought he was going to tell me about the people, how the relations are, if the city is a business center, if it is a residential area, this area is like this or like that. But, no! He throws me onto a link that is as if it were more focused on tourism, you see? He gives me a package telling me how I go, going to such games. But, I wanted to know what the people over there are like, and then he sends me, and still sends me to a site all in English. And then, I have a problem there that he talks about a shopping card, which he puts it in Euro there.”*

P3.2, then, used CVM's concepts to explain what happened:

I107-P3.2: *“So, if the person does not know English, then he/she remains ‘without translation’, there he/she was completely lost. The funny thing is that the link, on the page I am at, in Portuguese is ‘Hospitalidade’, then I went there to “hospitalidade”, expecting one thing and finding another in another language. There I did not feel a foreigner without translation because I know the language, but if it were a language I did not know, I would really feel like a foreigner without translation.”*

P3.2, then, reflected on how metaphors can help her to address solutions for the HCI re-design. She thought about how to change the cross-cultural contact level from *observer at a distance* to *guided tour visitor*:

I108- P3.2: *“So, perhaps he could play a little, even make comparisons between Brazil and South Africa. Perhaps he even used his own language, writing in the South African language and sort of translating into Portuguese, so that you*

could start to know the language more or less, knowing the language, knowing the way people speak. Maybe, introducing and mixing these elements, and, then, perhaps, it would be more a thing of experience than simply of information.”

I108a- P3.2: *“I think it would be a nice feature [the contrast], as we sometimes hear, right: the guy is the 'Pele of South Africa'. Trying to make such comparisons ... then this becomes clear. So, if the guy is the 'Pelé of South Africa' then he is the player of South Africa team”.*

In addition to understand the metaphors concepts, this category showed that participants used these concepts to name their findings and to reflect on possible alternatives to communicate the very idea of cultural diversity.

5.3.1.4.3. Difficulties faced during evaluation process

With this category of analysis we looked for issues that should be better explained and which scaffolds should be provided to facilitate the evaluation process. Difficulties faced by participants are evidence that the evaluation object should be better explained, since P3.1, for instance, said that in the first moment he did not know what should be inspected.

I109- P3.1: *“At the beginning I looked at the interface as a whole, but later on I tried to get to the cultural part. As far as I saw, this cultural part has more to do with the content than with the interface itself, than with presentation, than with how it is laid out, then, I was more tempted to go to this part of the content”*

P3.1, in turn, said that cultural variables helped him, but he felt a lack of scaffolds to identify cultural variables in the interface:

I110- P3.1: *“Which elements may characterize the observer at a distance? This is not very clear, but you go on observing and go on trying to find them out. Which characteristics, which texts, which videos, which images, characterize more one metaphor and less the other?”*

P3.1 also had difficulties to finish the evaluation and to give his opinion about the communicability of cultural issues.

I111- P3.1: *“How am I to describe this to say how is it that this fits here, for example, in 'foreigner with translator’?”*

I111a- P3.1: *“[I found it difficult] to produce what I see. How will I show that indication [of the presence of metaphors] so that whoever is reading my*

evaluation can understand it? Because I think that leaving it opens, each one will report the indication in the way he or she wants to. I miss some way to formalize this.”

Additionally, two participants said that they have difficulties to say and to point out the area in the websites where there is a sign or a text or a group of things that communicate culture.

I112- P3.2: *“Perhaps I had difficulty in indicating the location of what I am marking, isn’t it? Because, sometimes, the situation that I saw was something ample, isn’t it? It was the whole section, the whole area, it did not have an element of interface. Maybe it was the whole experience as a whole. Perhaps I felt difficulty in this, isn’t it? In marking this point.”*

After having presented results from the FIFA Experiment we are able to conclude, in the next section, the exogenous triangulation by identifying the presence or absence of consistent meanings with results identified in the Case Study (see details in Section 5.2) contrasted with those identified with the FIFA website.

5.3.2.

Exogenous Triangulation: contrasting findings from the Case Study and the FIFA experiment

The evidence collected in the case study suggests that: CVM have an epistemic effect on the cross-cultural HCI design and evaluation processes and CVM help participants in organizing and evaluating communication about cultural diversity. We also collected evidence that CVM should be improved to avoid difficulties in understanding their concepts and difficulties faced throughout evaluation process.

Unlike what happened in Step One, participants did not have difficulties in understanding CVM concepts in the FIFA Experiment. In our interpretation it may be caused by improvements we have done in CVM descriptions and examples (as described in Chapter 4, Section 4.2). However, participants also had difficulties to understand what the evaluation object was and to conclude the evaluation process as happened with participants of Step Two.

In both cases (Case Study - Step Two and FIFA Experiment) some participants were confused or commented that they did not know whether they

had to inspect the interface signs as expressions or as what they represent (content). The presence of these evidences suggests that we have to elaborate concrete examples in different domains to explore the idea of communicating culture by exploring the three elements of communication: intent, content, and expression

Regarding difficulties to conclude the evaluation process, we found out different reasons in the Case Study and the FIFA experiment. In the case study, although participants identified the dominant metaphor, they said that they did not know how to say what was right or wrong because the scenario did not tell them the specific design intent.

In the FIFA experiment, in turn, participants had difficulties to point out in which area there was an intent to communicate culture. In our interpretation it happened at least for two reasons. First, because sometimes there is not a specific sign communicating culture, but a set of signs and interactive paths. Second, in this experiment participants did not have 3 redesign alternatives to compare (as in the case study), because the current website was used as the evaluation object. So, they did not have something to compare with, which usually may be useful to explain the benefits of an alternative. For example, it may lead evaluators to give meaning to the absence of something in one design alternative that was present in another alternative.

Interestingly, in the FIFA experiment, participants not only commented about the lack of scaffolds to help them, but they suggested that CVM may be used as a complement of CEM for further investigations of communicability breakdowns or hits in the communication of culture.

Regarding the epistemic effect on cross-cultural design and evaluation, we found consistent evidence that CVM guided participants while they were thinking about the communication process of culture in both experiments. All participants liked having the metaphors concepts and the continuum of cultural approximation to help them mapping the problem and to learn and think about different levels of intercultural contact.

Furthermore, through this process participants got in touch with their culturally determined assumptions turning cultural differences into a topic of reflection. Also, CVM led participants to reflect on their own position in the process of evaluating cross-cultural systems.

We also found consistency in results from all experiments that CVM do help HCI practitioners to organize and evaluate communication about cultural diversity. However, the challenging of focus on cultural issues throughout the evaluation became more evident in the FIFA experiment, since by evaluating a real website an evaluator may interact and inspect the interface deeply, which may lead them to face usability problems, for example, easily. Nevertheless, even knowing that this challenge was not generated by the metaphors, because they are inherent to the HCI evaluation process, evidence from the FIFA experiment confirmed that CVM concepts helped them focus on culture.

As presented above, we did not find any inconsistency due to the fact that experiments involved different domains (rental cars and football), but because the case study has used mockups and FIFA Experiment has used a real website. For instance, in Step One we collected evidence that participants thought about how CVM may help them to avoid breakdowns in communication. In Step Two they reflected about how to detect communicative breakdowns and to recognize a potential communicative breakdown throughout the evaluation. In the FIFA Experiment, in turn, they found samples of communicative breakdown and they were able to explain the communicability breakdowns.

Furthermore, in the FIFA experiment, participants imagined that we may create a complementary relationship between CVM and CEM by detecting communicability breakdowns with CVM by using tags to map the interface. So, the results from all experiments regarding communicability breakdowns are consistent, but the triangulation gave us the opportunity to see this question more deeply and with a new perspective.

We conclude that the result of triangulation showed consistency of our research and scientifically validates the results found in Case Study with the Avis website. In next chapter we discuss the value of our approach in the Semiotic Engineering account of HCI and in cross-cultural HCI research.