

Cross-Cultural Understanding of the Dual Structure of Metaphorical Icons: An Explorative Study with French and Turkish Users on an E-Learning Site

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Abstract. Research on the cross-cultural understanding of different interface aspects is an area of growing interest in human-computer interaction discipline. This paper mainly investigates the influence of culture on understanding metaphors in graphical user interfaces. Considering the dual coded structure of compound metaphorical icons which is composed of two major units: image and label, this study evaluates the main hypothesis that understanding of graphical and textual elements of the metaphors differs due to the real world and language experiences of the users. An empirical study on a French e-learning site - based on a spatial “Campus” metaphor- was conducted with 68 Turkish and French students. The study applied a multi-method approach including data collection instruments like questionnaires for understanding of metaphorical icons and interview. Findings do suggest differences in understanding across the two cultural groups and provide an in-depth analysis on the process of cross-cultural understanding of metaphors by focusing on the metaphorical inconsistencies

Keywords: Metaphor, icon, culture, understanding, user interfaces.

1 Introduction

Metaphors are the core idioms of the contemporary graphical user interfaces (GUI) and have an important role in helping users interact with computer systems, since they carry the experiences of the real world to the interactive media. However, every culture shares different experiences and values [1]. On Internet their members may not share the knowledge of the contexts in which the intended meanings of metaphors are rooted and this can produce difficulties in understanding during system interaction. Users may easily be frustrated by a culturally inappropriate metaphorical interface, because it would not represent their view of the real world. This lack of familiarity would easily lead to frustration and finally, rejection of the interface.

Previous studies showed that the experience with the physical world around users and experience with language are both rooted in culture and may affect the individual’s understanding [2, 3]. However, there is not much empirical study investigating

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the cross-cultural understanding of the metaphors. In this context, our study aims to evaluate the hypothesis that the understanding of graphical and textual elements of the metaphors differ due to the real world and language experiences of the users. The study also aims to provide an insight on the process of cross-cultural understanding of metaphors for the researchers and practitioners who work on cross-cultural issues in the area of human-computer interaction (HCI) by focusing on the possible inconsistencies. The remainder of this paper consists of a review of relevant literature. Afterwards, the methodology of the study will be explained followed by a discussion of the results and conclusion

2 Theoretical Background

2.1 Metaphors and Cross-Cultural Research on Metaphors in HCI

Lakoff and Johnson asserted that the metaphors are used to define our relationship with the physical environment and create a context of communication [1]. A metaphor utilizes familiar concepts or attributes from a source domain to provide insights about a target domain by an interpretation on similarities and differences between the source concepts and the target. Kittay [4] pointed out to the interaction of these similarities and differences and claimed that this interaction creates internal tension, which seems important in understanding metaphors. Lakoff and Johnson [1] called this interaction as the “recursive refinement process” and suggested that this interactive process plays a major role in reshaping an individual’s understanding of the metaphor. Through this interaction, Kittay [4] categorized properties of target as having either affinity or contrast. Properties of the target, which are appropriate to intent and context, display affinity, while properties that do not appear to match intent and context display contrast [5]. An optimal interaction should exhibit high degrees of affinity, which are consonant with the experiences of our users or acceptable levels of contrast that encourages users to reinterpret and reconstruct [6] their understanding of the intended function. Over-estimation of this interaction results in the frustration of the users in two ways. “Alty and Knott identify two major kinds of confounding metaphors: metaphorical inconsistencies, where the interface function is not consistent with the metaphor and conceptual baggage, where the user is led by the metaphor’s presence to believe he or she can do something that the product cannot accomplish” [5]. Cates [5] divide metaphors in technology-based learning products into two classes: underlying (or primary) metaphors and auxiliary (or secondary) metaphors. An underlying metaphor is the principal or first metaphor employed whereas an auxiliary metaphor is a subsequent metaphor employed by the product. Cates [5] stated that such an interaction also occurs between underlying and auxiliary metaphors.

Metaphor is a very popular but also a debated issue in the area of HCI. Though the fundamental role of metaphor in communication, interaction, learning, teaching and cognition is acknowledged by many studies [7], there are also other researchers, who reject the metaphor-based design approach in interfaces by referring to their limitations [8]. There are several studies, which aimed to develop guidelines for selecting and implementing metaphors for user interfaces [5, 9] whereas some other researches tried to extend the desktop metaphor into new prototypes [10]. Despite the vast literature on interface metaphors, there are only a few studies in the literature, which investigated the

cross-cultural understanding and use of interface metaphors [2][11]. These researches pointed out to the complexity of intercultural understanding process and emphasized the need for further empirical research with diverse cultural groups on the perception and understanding of interfaces and metaphors. Focusing mainly on the understanding of metaphorical icons at both the levels of graphics and text, this study attempts to provide contributing findings for cross-cultural usability and design by presenting an analysis of the metaphorical inconsistencies caused by cultural differences.

2.2 Language and the Dual Structure of Metaphorical Icon: Image vs. Text

“Paivio [12] argued that much of our cognitive “knowledge” is actually dual coded” [5]. He claimed that this knowledge exists in related forms in both the semantic and imaginal systems and any representational theory must accommodate this dual functionality. These systems can operate both separately and cooperatively. As the properties of source and target are considered in the recursive refinement process, spread of activation occurs in both systems. Pavio [13] claimed that metaphor might be a particularly effective way of stimulating interaction between the semantic and imaginal systems. The dual structure of metaphorical icons with image and label seems to stimulate this interaction. In this context, Cates [5] highlighted the importance of dual coding: “If dual coding plays a major role in the operation of our cognitive processes, users cannot easily separate the image from the related verbal label, nor can they isolate themselves from the associated spread of activation that occurs naturally when they are exposed to either verbal labels or images.”

There have been several studies investigating the effects of images versus text on understanding and learning [14]. Paivio [15] has claimed that text and graphics together may be more elective than pure graphics. Blackwell [16] claimed that connecting any concrete image with text information can increase recall through dual coding. Kacmar and Carey [17] have shown that text and graphics together improve performance. The studies showed that image and label items of the icons may be both effective on understanding. Therefore, it is probable that language experience and perfection level may influence metaphor understanding. Evers [18] describes metaphors as good examples of the inter-relationship between language and culture in interface design. Evers [2] also argued that the cross-cultural understanding of the textual design items in interfaces are influenced by the experience of the users with the language used in the interface. Kukulska-Hulme [3] also pointed out to the importance of language in understanding the metaphor as a whole. She claimed that recognition of the graphical element of a metaphorical icon might not be enough to lead the user to an explicit meaning. The user should be familiar with the language used in the label and with the context the label roots in.

3 Research Methodology

“Culture is always a collective phenomenon, because it is at least partly shared with people who live or lived within the same social environment, which is where it is learned” [19]. It is difficult to measure culture and its effects, but ‘cultural variables’ such as those developed by Hofstede [19] can be used to classify and evaluate different cultural groups.

In this study, Hofstede's definition of culture is adopted. Evers' study [2] has showed that users' understanding of icons was influenced by their understanding of what a graphic was associated with or what a label meant to them. In order to analyze the participants' understanding of these metaphorical icons in detail, it was considered advantageous to decompose the icons and investigate the graphical and textual items separately. Below are the two research questions:

Research question 1: Do users' physical experience within the real world influence their understanding of graphical elements of metaphorical icons?

Research question 2: Does the experience of users with the official language of a website and other languages affect their understanding of textual elements of metaphorical icons?

This qualitative study with ethnographic aspects is based on a multi-method approach, which consists of questionnaires for the understanding of metaphorical icons and a semi-structured debriefing interview. The open-ended questionnaires were adapted and developed from the questionnaires used in the study of Evers [2] and provided feedback on the cross-cultural understanding of the graphical and textual elements of the metaphorical icons separately. Final structured debriefing interview provided complementary findings. Cross-cultural findings were mainly evaluated qualitatively with simple complementary quantitative data.

The national cultures included in this research were French and Turkish. Cultural value orientations for two cultural groups proposed by Hofstede [19] indicate that there is a significant difference between the two groups especially at the "individualism/collectivism" variable. Turkish culture reveals collectivist aspects whereas French culture reveals individualist aspects. "Individualism and collectivism variable" describes the way in which cultures perceive the role of the individual in a group. In this study, it is expected that the findings should reflect this difference. The lack of cross-cultural usability research on Turkish and French culture was also one of the important reasons for the choice of this group. Each group consisted of 17 men and 17 women, aged between 21-24, who were students in the communication faculties in France and Turkey at the 3rd or 4th grade with an average computer and Internet experience. All the Turkish participants could speak advanced level of French certified by DALF language qualification of the French government.



Fig. 1. (a) ACOLAD Homepage (b) Navigation bar (c) "Foyer" page

An e-learning site was chosen for the study, because educational institutions, which offer distance learning to students globally, are mostly faced with challenge of cultural diversity. Our research site was “Apprentissage COLlaboratif A Distance” (ACOLAD) which was the official e-learning site of Louis Pasteur University in Strasbourg, France. By referring to the metaphor taxonomy of Cates [5] ACOLAD was based on an underlying spatial “Campus” metaphor including auxiliary metaphors like “Bureau”, “Foyer”, “Amphitheatre”, “Groupes”, “Seminaire”. Mostly valuing the student initiative, ACOLAD enabled collaborative group study as well as synchronous and asynchronous communication. The study was focused mainly on the homepage (Figure 1a) and “Foyer” page (Figure 1c) of the ACOLAD web site.

4 Results

4.1 Understanding the Underlying “Campus” Metaphor

In the first questionnaire, the main page of the ACOLAD was shown to the participants and they were asked to answer the questions by mainly focusing on the main navigation bar, which included different metaphorical icons that provided access to the sub pages. Each icon in the navigation bar (Figure 1b) was in the form of architectural plans of different spaces in the virtual campus like “Bureau” and “Amphitheatre”, which were also auxiliary metaphors of the system. The questions first asked the participants what ACOLAD reminded them of and what they thought they might be able to do in such a place. “Bureau”, “Seminaire”, “Amphitheatre”, “Foyer” and “Groupes” icons were marked with numbers and the users were asked to make potential associations by considering the possible functions of the marked icons. All the associations were aggregated into categories by the researchers by referring to the content of the information manual proposed by the developers of ACOLAD. The findings showed that users understand the underlying spatial “Campus” metaphor of ACOLAD by associating it to the places that they are familiar and to their experiences within those places. Having their education in similar buildings, both groups were able to understand the “Campus” metaphor presented in ACOLAD. Cultural differences were mostly found in the understanding of auxiliary metaphors like “Seminaire”, “Groupes” and “Foyer”. It was found that French participants could easily understand these metaphors. Moreover, French participants could suggest detailed functions for these metaphors. In the interview, they also stated that these interfaces seemed very similar with the spaces in their universities and this familiarity was evaluated as one of the best aspects of the website. These findings showed that the auxiliary metaphors employed within the “Campus” metaphor were really consistent with the French culture. However, the findings on the understanding of Turkish group revealed some metaphorical inconsistencies. It was found that the Turkish participants had some difficulties in understanding the intended meaning proposed by these metaphors. Turkish participants had problems in associating the icons like “Groupes” and “Foyer” with their real world counterparts, as they were not very familiar with such education methods and such spaces in their universities.

Similar inconsistencies were found between the underlying “Campus” metaphor and one of the auxiliary metaphors: “Bureau”. “Bureau” was designed as a private

feature that enabled the students in ACOLAD to organize their schedules, projects, seminars, etc. However, neither the Turkish group nor the French group had private rooms in their universities. Therefore, “Bureau” metaphor did not overlap with the experience of the real world and resulted in inconsistency. Both groups associated the interface with ‘administration offices’ as the decoration of the “Bureau” in the interface resembled so. Even though, the idea of a “private study room” in the context of e-learning seemed functional, the proposed “Bureau” metaphor displayed excess amount of contrasts that caused misunderstanding.

4.2 Understanding the Underlying “Campus” Metaphor with labels

After having completed the first questionnaire, the participants were enabled to examine the labels of the icons in the navigation bar (which were active on roll-over) and they were again asked to answer the same questions in order to investigate the influence of text on understanding. It was found that the information in textual form in the labels either consolidated the meaning users got through the graphical elements of the metaphors or caused frustration. It was obvious that most of the users could recognize the icons easier with labels, which overlapped with the related literature. However, it was found that the textual content of the icons were more effective on the understanding of the French group. Having seen that the labels confirmed the functions they proposed at the evaluation of the graphical elements, they proposed more detailed functions about ACOLAD. At this point, it is thought that the French participants benefited from the fact that the official language of the site was their native language. This statement was supported with the findings of Turkish participants, which showed that the Turkish group placed more importance on graphics in trying to understand a compound metaphorical icon. The frequency of the answers given was found to diminish when they failed to understand the labels of the icons. In such cases of failure, it was observed that Turkish participants started to interrogate their experience with French language and subsequently loose their self-confidence about their expertise on French. Moreover, in the debriefing interview some of the Turkish participants expressed the need for different language options for the site.

The experience of the users with other languages was also considered as a reason that influences the interest of the users towards the textual elements. The findings from the background questionnaire showed that French participants could speak more languages than the Turkish participants.

4.3 Understanding the Auxiliary “Foyer” Metaphor

In the third questionnaire, the “Foyer” page (Figure 1c) including diverse metaphorical icons without the labels was shown to the participants and they were asked what “Foyer” reminded them of and what they thought they might be able to do in such a place. What the “Foyer” page reminded participants without the labels seemed to overlap with the findings of the evaluation in the previous stages. Both the Turkish group and the French group associated the interface with ‘extra-curricular activities’. Besides, Turkish participants also made associations with the familiar spaces in their universities like ‘canteen or cafeteria’. The proposed activities displayed significant differences across two groups. Turkish participants evaluated the interface as a free

and relaxing place in which users can ‘chat and have fun’. However, by referring to the exact experiences in a typical foyer in French universities, French participants proposed functions like ‘discussion’ and ‘relaxing’. It was evident that the “Foyer” metaphor was culturally appropriate for the French group with aspects reflecting the daily university life in French universities.

4.4 Understanding the Auxiliary “Foyer” Metaphor with Labels

The last questionnaire was a replicate of the third one, but this time the participants were enabled to examine the labels in the “Foyer” page that were active on roll-over. When the replies were analyzed, it was found that the findings overlapped with the ones from the evaluation of the graphical elements. The findings on the understanding of the compound metaphorical icons (combined with graphics and text) in the “Foyer” interface provided us the possibility to discuss the potential metaphorical inconsistencies that can occur in cross-cultural interfaces. “Foyer” was directly associated with social activities and a university canteen by the Turkish group and this led to expectations of familiar activities. However, the insistent accent by several icons on the function of “discussion” in “Foyer” caused frustration and rejection of the interface. Features in the “Foyer” like “Bar” was not also much familiar for the Turkish group and this unfamiliarity was found to be another reason for the rejection. In the interview, Turkish group evaluated ACOLAD as a web site, which is really far away from satisfying the expectations for a real university. This metaphorical inconsistency was caused because of the excessive tension created between the source function (which is synchronous and asynchronous communication in an e-learning website) and the target (which is the “Foyer” interface) employed to convey that meaning (Figure 2).

On the other hand, it was found that too much affinity with the metaphors could influence understanding negatively and result in conceptual baggage for the users. At the graphical level, the “Foyer” metaphor was observed to be very familiar for the French group. However, when they were asked to state possible activities that can be realized in this place, it was interesting to see that some of the participants proposed activities like ‘smoking, having a cup of coffee and eating’, which seemed to overestimate the metaphor. The excessive affinity of the metaphor with its counterpart in the real world caused such an interpretation. The weak tension between the source function “e-learning” and the target “Foyer” caused conceptual baggage for the participants and led them by the metaphor’s presence to expect that they could do something that the interface cannot accomplish. Though in theory, “Foyer” metaphor seemed very suitable for the French group, it was found to be confounding in practice.

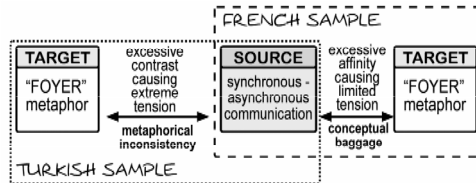


Fig. 2. How “Foyer” metaphor can be confounding for both cultural groups

Findings also revealed that the interaction between the graphical and textual elements of a metaphorical icon had an impact on cross-cultural understanding. For example the interaction between “round table and chairs” icon in the “Foyer” and its label “discussion” can be evaluated as consistent and reasonable. However, this interaction led to different cross-cultural interpretations. This interaction was culturally consistent for the French group, as French culture highly valued the free individualistic expression of opinions in discussions, but for the Turkish group, which prioritizes collectivism rather than individualistic initiative, it was found to be inconsistent and confounding. Therefore, if the image had a label like “chat” which is culturally familiar for the Turkish group, this would lead to the reinterpretation and reconstruction of the understanding of the intended function, but the label “discussion” increases the tension between the source and target by displaying excessive contrasts, which resulted in the inconsistency of the metaphor (Figure 3). The preference of the label “discussion” for the Target 1 instead of the label “chat” in Target 2 impedes the accurate understanding for the Turkish group.

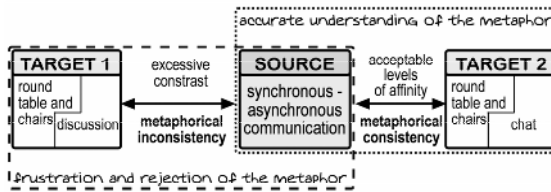


Fig. 3. The influence of the interaction between the image and text components of “discussion” icon in “Foyer” on the understanding of Turkish group

5 Conclusion

Findings of this study do suggest differences in understanding of the metaphors across the two cultural groups involved. It was found that users’ physical experience with the real world influence their understanding of graphical elements of metaphorical icons and hence, of the overall interface. Users understand the visual spatial metaphors by associating them to the places that they are familiar and to their experiences within those places. Findings also showed that the experience of users with the language used in a website and other languages affect their understanding of textual elements of metaphorical icons. This finding points out to the importance of cultural localization at both graphical and textual levels of interface design.

The results also enabled an in-depth analysis on understanding of the compound metaphorical icons (combined with graphics and text) and provided us the possibility to explore the potential metaphorical inconsistencies that can occur in cross-cultural interfaces. Findings on metaphorical inconsistencies led to following implications for the selection of suitable metaphors for cross-cultural user interfaces:

Designers should develop suitable metaphors, which can present acceptable levels of affinity and contrast and thus can create an optimal interaction or tension between the source function and target.

Culturally appropriate interface metaphors match the real world experience of the culture and produce acceptable levels of affinity between the source and target, which causes a creative tension. These consistent metaphors enable the reconstruction of the meaning and lead to an accurate cultural understanding of the intended function.

Interface metaphors that do not fit to the real world experience of the users produce excessive contrasts between the source function and the target, which causes an extreme tension. These metaphorical inconsistencies impede accurate understanding and may bring out the rejection of the interface and user frustration as well.

Excessive familiarity with the metaphor can easily result in conceptual baggage for the users. The excessive affinity of the metaphor with its counterpart in the real world can lead the users to take metaphor too literally, which mostly causes misconceptions. The weak tension between the source function and target can make the users by the metaphor's presence to expect that they could do something that the interface cannot accomplish. Such metaphors tend to limit the functionality of the interface to that of the physical analog and thus impede maximum utilization of the capabilities of the system.

The recognition of the graphical element of a metaphorical icon is not enough for the user to develop an overall understanding. Metaphorical icons are dual coded in structure and the interaction between the graphical and textual elements of a metaphorical icon has also an impact on cross-cultural understanding. Being a major part of the target of the metaphor, labels have different connotations due to the cultural contexts in which they are rooted and therefore convey varying meaning. The user should be familiar with the language of the label and with the context the label roots in. Textual content of the icons enhance the understanding of the users who are native speakers of the official language of the web site used. Those users can grasp the intended meaning and develop deeper analysis on the functionality of the system easily. In a metaphorical icon, the target should be composed by the image and label in such a way that they should work cooperatively to stimulate the creative tension in-between and convey the intended meaning.

Similarly, an optimal interaction should also be created between the underlying metaphor and auxiliary metaphors used within a cross-cultural interface. The auxiliary metaphors employed under a culturally appropriate underlying metaphor should be consonant enough to avoid drawbacks that can cause mismatches and misunderstanding.

Considering the lack of cross-cultural usability research on Turkish and French culture, this study also contributed to the relevant literature by providing findings on these cultural profiles. In order to establish new culture-specific patterns in interface and metaphor understanding, further empirical studies with larger user groups from diverse cultures should be conducted.

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