Towards Exploring Web Interface Sign Ontology: A User Study

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Abstract. The smallest elements of web user interface (UI) like navigation links, buttons, icons, labels, thumbnails, symbols, etc. are defined in this paper as interface signs.The term Ontology is referred to the set of concepts and skills a user should own in order to understand the meaning of an interface sign. Designer should aware of web interface sign ontology to design user-intuitive web interface signs to get an idea what kind of presupposed knowledge end users hold to interpret the web interface signs. The objective of this research is to reveal the set ontologies available in web UI and the complexity associated with different ontological signs to interpret the meaning of web interface sign from semiotics perspective. Towards achieving the research goals a user study was replicated with 26 participants. So far, a preliminary analysis has performed on 13 participants' data and reports the preliminary outcomes in this work-in-progress paper.

Keywords: Semiotics, web usability, user interface design, web sign ontology.

1 Introduction

The content and functions of web applications are usually directed by interface signs to provide the system's logic to the end users. For instance, (i) to access the admission information, a prospective student should click on 'Admissions' sign of a university website, (ii) to submit an online application form a user should click on the 'Submit' button, and the like. Designing intuitive interface signs is vital to achieve the goal of communicability, user satisfaction, learn ability, effective and efficient use, etc… i.e., the usability standards of web applications[1],[2],[3],[4],[5]. The interface sign design principles are semiotics by nature as semiotics is considered as the doctrine of signs [6]. A complete definition of semiotics can be defined as "the study of signs, signification, and signifying systems" [7]. Speroni [2] defined the term 'ontology' as the set of concepts and skills that a user should own for understanding the referential meaning of an interface sign. From the users' perspective, ontology is the knowledge or concepts that are needed to understand and properly interpret the meaning of an interface sign. From the designers' perspective, it is the knowledge or concepts presupposed and pointed by an interface sign. UI designers need to know what kind of

C. Stephanidis (Ed.): Posters, Part I, HCII 2013, CCIS 373, pp. 41–45, 2013.

presupposed knowledge end users hold to interpret web interface signs. For example, if a sign 'inbox' in email application is designed well in terms of representation, position, etc. but if a user don't know the concept it refers to then this sign will not make any sense to him/her to interpret its meaning. The set of ontologies to interpret interface signs lead designers to understand the paradigm of users' interpretations of interface signs. Again, the concept of interpretation complexities associated to different ontological signs help a designer to design user-intuitive interface signs. According to Speroni [2], the most common ontologies used in many websites are: Inter Locutor/Institution Ontology, Internet Ontology, Website Ontology, Commonsense Ontology, Web Domain Ontology, Topic Ontology, and Context Ontology. Speroni's [2] concept and definition of Ontology are used as background theory in this paper. Speroni [2] presents these ontologies as an example list of most common ontologies used in information intensive web UI. He also stated that the set of ontologies might be varying depending on different websites. Again a number of studies were conducted to observe the interpretation complexity associated to each of these ontologies for different websites, for instance [8], [9], [10], [11]. These studies were conducted mainly by expert inspection. Therefore, few important issues raise such as (i) what kind of ontologies may exist web user interfaces in general, rather than only in information intensive web user interfaces, (ii) how much complexity are associated with different ontological signs, (iii) what kind of ontological signs are comparatively more intuitive to interpret, and the like. Therefore two questions for this research are formulated as which ontologies are available in web user interfaces in general? How interpretation difficulties are associated to each ontological signs to interpret the meaning of interface signs?

2 Research Method

A user study following a semi structured user interview research method was conducted to attain the research objective. The fundamental objective of this study was to reveal the factors of users' interpretations of interface signs. However, the scope of this paper is limited to a specific objective, which is a part of the fundamental objective. Indeed, the objective of this study is to find the set of ontologies in web UI and the interpretation complexities associated to each ontological signs. The study was replicated with 26student participants at usability test laboratory in Finland.A total 72 Interface signs were selected from user interfaces of two web application domains (online calendar and email application) and two web domains (university and museum websites). Selected interface signs were presented them in a different form (i.e., sign without context and with context). Participants were not allowed to click on the signs, they were only supposed to response to a number of questions for each interface sign such as what could be the referential meaning of this sign?Why do you think this (user's response for the first question) as the meaning of this sign? How much complicacy or difficulty do you feel to interpret this sign (score: 1(very easy) – 7(extremely difficult))? How certain or confident are you that you are right in your interpretation (score: 1(very low) – 7(very high))? The methodology is discussed more comprehensively in [13].

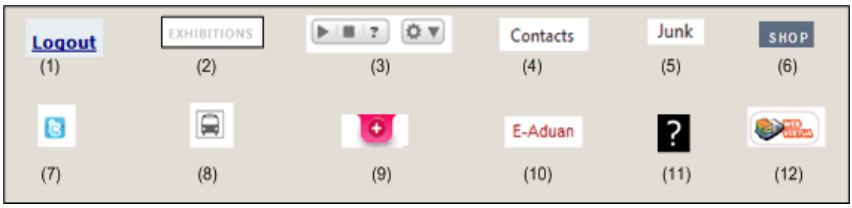

Fig. 1. A list of example interface signs selected for this user test

3 Preliminary Results and Conclusions

So far, data for the 13 test-participants are transcribed, summarized and synthesized. The preliminary results observed that the following ontologies are available in web user interfaces in general:

1. Internet Ontology – this ontology refers to the knowledge of the world of web, web browsing and its concepts and conventions. For instance, as a basis of interpreting the 'Logout' sign (no. 1 in Figure 1) a user responses as "…All kind of web application has this sign. Underline refers to hyperlink since the 19s internet…" That means the user uses his internet ontology to interpret this sign and the 'Logout' sign is belonged to internet ontology.
2. System's Real World Ontology - this ontology refers to the knowledge of the system's real world, its functionalities and concepts. For instance, a user never visit museum websites but experienced (visited) real world museum. He interprets the sign 'Exhibition' (no. 2 in Figure 1) properly based on his museum's real world ontology.
3. Computer Ontology - the knowledge concerning the world of computer and computer uses. This mainly concerns the web interface signs which are common in computer OS and applications (e.g., windows OS, MS word, etc.). For instance, a user interprets the sign number 3 in Figure 1 based on his familiarity with windows media player.
4. Mobile Ontology - the knowledge concerning the world of mobile and mobile application uses. This mainly concerns the web interface signs which are common in mobile phones and also in mobile applications. For instance, a user interprets the 'Contact' sign (no. 3 in Figure 1) based on his familiarity with mobile phone uses.
5. Web Domain Ontology - the knowledge concerning the web interface signs which are specific enough to a particular web domain (e.g., educational web domain, email application domain, etc.). For instance, as a basis of interpreting the 'Junk' sign (no. 5 in Figure 1) a user responses as "my previous knowledge of using email application". That means the user uses his web domain ontology to interpret this sign and the 'Junk' sign is belonged to the web domain ontology.
6. Common-Sense/Background Ontology- the knowledge concerning concepts belonging to common background of users and uses common sense. For instance, as a basis of interpreting the 'Shop' sign (no. 6 in Figure 1) a user responses as"…interpret based on the word meaning…" That means the user uses his

commonsense or background ontology to interpret this sign and the 'Shop' sign is belonged to the commonsense or background ontology.

7. Institutional/Organizational Ontology - the knowledge concerning the web interface signs that refer to the world of the institution or organization that won that website or application. For instance, a user interprets the meaning of 'Twitter' sign (no. 7 in Figure 1) as he is familiar with the twitter. The 'Twitter' sign is belonged to the institutional/organizational ontology.
8. Real World Ontology - this ontology refers to the knowledge of the real world experiences and concepts. For instance, a user interprets the meaning of 'Bus' sign (no. 8 in Figure 1) in a museum website since he is familiar with the bus sign in real life at every bus stops.
9. Cultural/Environmental Ontology - the knowledge concerning the web interface signs which are specific enough to a particular cultural or environmental context. For instance, a user interprets the meaning of 'red color plus' sign (no. 9 in Figure 1) as a museum hospital or medical help centre at museum based on her experience in a specific country context, where red color plus sign refers to the hospital or medical help. The actual meaning of this sign was to expand a menu list in a museum website.
10. Website Ontology - the knowledge concerning the web interface signs which are specific enough to a particular website, e.g., a specific sign could be used in a university website to represent the departments and this could be intuitively understandable only to the users who are familiar with this particular website. For instance, as a basis of interpreting the 'E-aduan' sign (no. 1 in Figure 1) a user responses as"…I never seen this word before…".The user was unable to interpret this sign due to the lack of his knowledge of website ontology as he never visits the websites that hold this sign.
11. Topic Ontology - the knowledge concerning the particular subject or topic the website talks about. For instance, '?' (No. 11 in Figure 1) is actually stands for providing information about a topic (an exhibition) in spy museum. A user knows that this sign stands for providing information about a topic but he failed to understand the topic properly. One of the reasons for this was the lack of familiarity with this topic (topic ontology) to interpret its meaning properly.

It is important to mention here that the ontology number 1, 5-7, 10 and 11 were stated by Speroni in [2]. Preliminary results also observed that the level of complexity experienced in interpreting the meaning of interface signs varied depending on different ontological signs.To interpret the meaning of interface signs properly end user experiences comparatively-

- Higher level of difficulty with signs belongs to Website Ontology.
- Above average level of difficulty with signs belong to Institutional/Organizational Ontology, Cultural/Environmental Ontology, and Topic Ontology.
- Average level of difficulty with signs belongs to System's Real World Ontology, Web Domain Ontology, and Real World Ontology.
- Lower level of difficulty with signs belongs to Internet Ontology, Computer Ontology, Mobile Ontology, and Common Sense / Background Ontology.

An interface sign may belong to multiple ontologies rather than sign ontology. In other word, a user may use multiple ontologies to interpret an interface signs. For instant, a user interprets the 'Web Virtua' sign (no. 12 in Figure 1) by using website ontology, cultural/environment ontology and web domain ontology, i.e., this sign belong to multiple ontologies. Further research is needed to observe the interpretation complexities for interface signs that belongs to multiple ontologies or interpreted by using multiple ontologies.

However, this work-in-progress paper reports the preliminary outcomes, where half of the test-participants data were considered. Author is intended to conduct a rigorous analysis considering the complete set of study data to provide a complete set of web interface sign ontology and the complexity associated with different ontological signs to interpret the meaning of web interface sign will depict more evidently.

References

1. DeSouze, C.S.: The Semiotic Engineering of Human-Computer Interaction. The MIT Press, Cambridge (2005)
2. Speroni, M.: Mastering the Semiotics of Information-Intensive Web Interfaces. Unpublished doctoral dissertation, Faculty of Communication Sciences, University of Lugano, Switzerland (2006)
3. Islam, M.N.: A Systematic Literature Review of Semiotics Perception in User Interfaces. Journal of Systems and Information Technology (JSIT) 15(1), 45–77 (2013)
4. Islam, M.N., Tetard, F.: Integrating Semiotics Perception in Usability Testing to Improve Usability Evaluation. In: Garcia-Ruiz, M.A. (ed.) Cases on Usability Engineering: Design and Development of Digital Products, pp. 145–169. IGI Global, USA (2013)
5. Islam, M.N.: A Semiotics Perspective to Web Usability: An Empirical case Study. In: IADIS Interfaces and Human Computer Interaction 2011, pp. 19–28. IADIS (2011)
6. Peirce, C.S.: Collected Writings (8 Vols.). Hartshorne, C., Weiss, P., Burks, A. (eds.), vol. 1-8. Harvard University Press (1931-1952)
7. Robert, S., Robert, B., Sandy, F.L.: New Vocabularies in Film Semiotics: Structuralism, Post-Structuralism and Beyond. Taylor & Francis, London (1992)
8. Islam, M.N., Ali, M., Al-Mamun, A., Islam, M.: Semiotics Explorations on Designing the Information Intensive Web Interfaces. International Arab Journal of Information Technology 7(1), 45–54 (2010)
9. Islam, M.N.: Semiotics of the Web Interface: Analysis and Guidelines. Journal of Computer Science and Technology (JCS&T) 8(3), 166–167 (2008)
10. Islam, M.N.: Towards Designing Users' Intuitive Web Interface. In: 6th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS 2012), pp. 513–518. IEEE Computer Society (2012)
11. Islam, M.N.: Semiotics Perception towards Designing Users' Intuitive Web User Interface: A Study on Web Sign Redesign. In: Rahman, H., Mesquita, A., Ramos, I., Pernici, B. (eds.) MCIS 2012. LNBIP, vol. 129, pp. 139–155. Springer, Heidelberg (2012)
12. Stanton, N.S., Young, M.S.: A guide to methodology in Ergonomics. Taylor & Francis, UK (1999)
13. Islam, M.N.: Towards determinants of user-intuitive web interface signs. In: Marcus, A. (ed.) DUXU/HCII 2013, Part I. LNCS, vol. 8012, pp. 84–93. Springer, Heidelberg (2013)