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AN EXPLORATIVE STUDY OF LOCALISATION AND INTERNATIONALISATION OF WEB SITES Linda Lim,  
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**ABSTRACT** This paper reports on an explorative study investigating the impacts of culture on web site design and usability, in terms of localisation and internationalisation. The study considers cultural differences among people in terms of race, language, and religion. Localisation/internationalisation of web sites addresses issues concerning the development of effective web sites for specific cultural groups or for a general population of users. This paper describes the methodology adopted in the project to study these issues and reports on the results of a pilot study phase. **KEYWORDS** Culture, Web Site Design, Usability, Localisation, Internationalisation.

**1. INTRODUCTION** The aim of this study was to investigate how to design web sites to suit various cultures. The study addressed two broad factors associated with design and usability: (i) culture, which involves the consideration of race, language and religion; and (ii) localization/internationalisation of web sites, which includes aspects that may be relevant to cultural considerations, i.e. text elements, web interface elements and web design elements. The overall research question is: Are there differences in usability of web sites for users from different cultures? This research builds on the first author's previous research (Lim, 1999) which focused on the impact of culture, personal style (cognitive style, personality, mood and gender) and other individual attributes (age, computer experience and disabilities) on people's preferences for different aspects of interaction design. Relevant research has been undertaken by Evers and Day (1997) and Evers (2001) who investigated the role of culture in interface acceptance and cultural aspects of interface understanding. Other research has been undertaken by Murrell (1998), Stander (1998), Yeo (2003), and Kralisch, Yeo and Nurfauza (2006). This paper describes a pilot study undertaken to explore the efficacy of the research design and methodology, and the subsequent improvements for a much larger research study that is currently being completed.

**2. METHODOLOGY** **2.1 Design** The study measured the impact of end users' culture on web site design and usability via user preferences concerning localisation and internationalisation of web sites. The type of web site used was a virtual restaurant, which was selected as food is a daily consumption item and it interweaves richly with different cultures. Three versions of the prototype of a virtual restaurant web site were developed: (i) an Australian version (Australian English); (ii) a Chinese version (Mandarin); and (iii) an International version (American English). These languages were chosen because the cultures are quite different and because of availability of Australian and Chinese students at Murdoch University. The study involved an experiment which required participants to visit two of the three different versions of the web site and engage in various tasks, e.g. ordering a meal. Participants were required to use Mozilla Firefox to ensure uniformity in

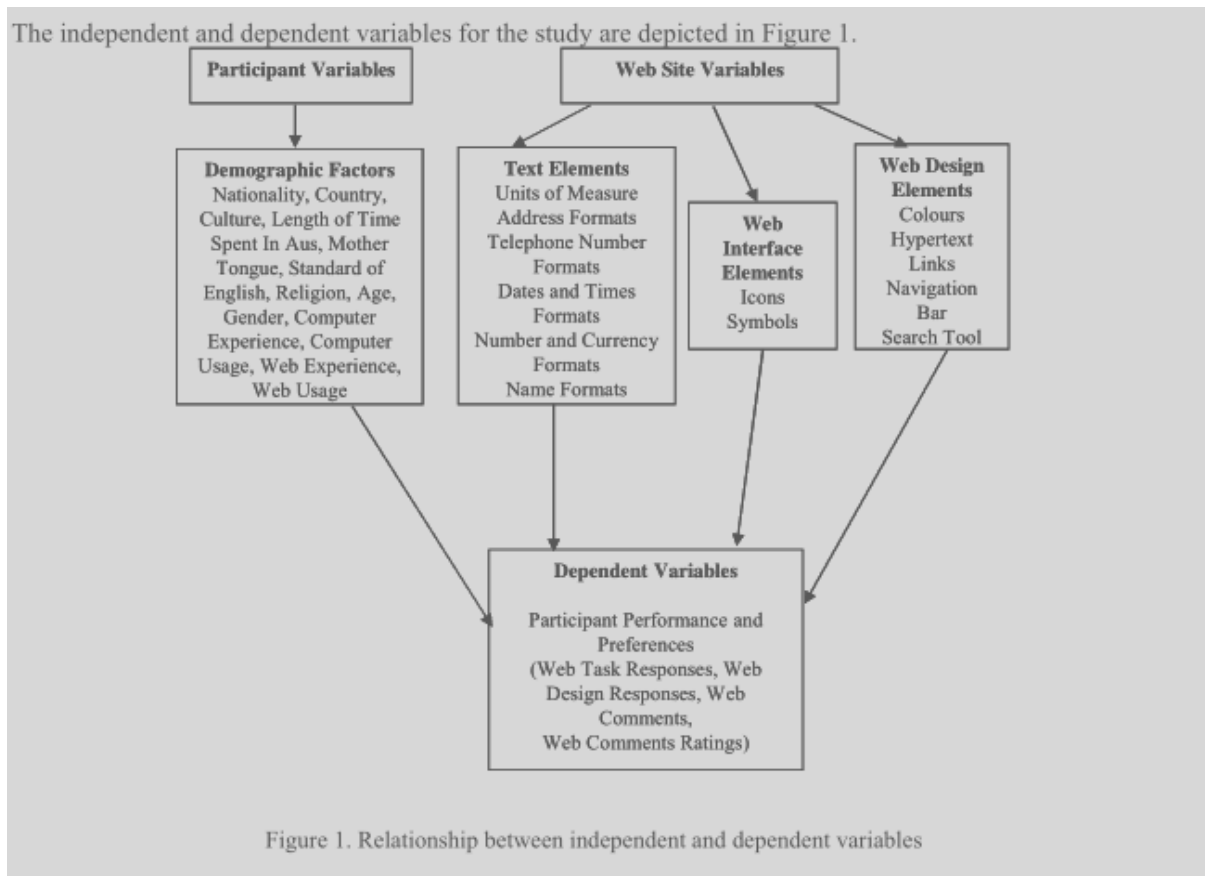
display. Based on their preferred language response, each participant was assigned to one of three treatment groups (Table 1).

Table 1. Experimental web site versions used by treatment groups

	Australian Web Site	Chinese Web Site	International Web Site
Group 1 (Australian participants)	✓		✓
Group 2 (Chinese participants)		✓	✓
Group 3 (International participants)	✓		✓

On completion of the tasks, participants were required to respond to a questionnaire related to usability aspects of the tasks, as well as providing demographic background information. Post-study interviews were conducted to further determine the improvements required to make the prototype web sites suitable for the larger study. These interviews were conducted by a variety of methods (face-to-face, telephone, MSN messenger, email).

## 2.2 Variables



## 2.3 Participants

There were 29 participants (14 Australians; 9 Chinese; 6 International) from various Australian and international locations (Perth, Melbourne, New Zealand, Singapore, China, Sweden and USA). There

were 15 males and 14 females and all were over the age of 18. Participants were provided with a URL to the experimental web site via email or an advertisement handout. Before commencing, a formal consent was obtained from each participant, in line with the Murdoch University Ethics Committee project approval.

## 2.4 Data Analysis

Data analysis methods included both quantitative and qualitative approaches. The quantitative data analysis used a two stage approach. Stage 1 included descriptive statistics, the use of means, paired t-tests and correlation coefficient on responses from web site design questions (using Excel). Stage 2 involved analysis of contingency tables, factor analysis, one-way ANOVA and chi-square (using SPSS). The analysis process included the reduction of data complexity. An example of this reduction relates to the Religion variable. Although there were seven alternative responses for Religion (Buddhism, Christianity, Hinduism, Islam, Judaism, None, Other), these were collapsed into five alternatives (Buddhism, Christianity, Islam, None, Other) as there were no responses to Hinduism and Judaism. The qualitative analysis involved a content analysis to determine specific themes in response to open-ended questions related to web sites and tasks. The data were then analysed in Excel using scenario-based evaluation.

## 3. RESULTS

The research question aims to discover the differences in the usability of web sites for users from different cultures. The comparative findings for the three groups from the quantitative analysis are listed in Table 2.

Table 2. Comparison of web design responses (%)

(1) Australian & International web sites; (2) International & Chinese web sites; (3) Chinese & International web sites

Survey Item	Group 1 (Australian)			Group 2 (Chinese)			Group 3 (International)											
	Australian web site			Chinese web site			International web site											
	D	N	A	D	N	A	D	N	A									
D1	21	14	64	7	7	86	0	0	100	0	22	78	0	0	100	0	0	100
D2	14	14	71	7	7	86	0	11	89	0	11	89	33	0	67	17	0	83
D3	14	57	29	14	50	36	0	11	89	0	0	100	17	17	67	0	33	67
D4	7	0	93	7	0	93	0	11	89	0	11	89	0	0	100	0	0	100
D5	7	14	79	7	7	86	0	11	89	0	0	100	0	0	100	0	50	50
D6	7	14	79	14	14	71	0	11	89	0	0	100	17	17	67	33	0	67
D7	7	21	71	7	21	71	0	22	78	0	0	100	17	17	67	17	17	67
D8	29	7	64	7	21	71	0	0	100	0	0	100	0	17	83	17	0	83

Key: D: did not agree; N: neutral; A: agree

Survey items:

D1 The navigation bar is instructive in guiding me to the information I need in the web site.

D2. The hypertext links are clear in directing me to the information I need in the web site.

D3 The search tool is helpful when finding information I need in the web site.

D4 The language used in the web site facilitates navigation through the web site.

D5 The use of icons in the web site is easy to understand.

D6 The use of icons in the web site brings about expected actions.

D7 The ability to choose colours to suit my preference makes visiting the web site a pleasant experience.

D8 The use of symbols in the web site assisted me when completing the tasks assigned.

The results indicate some differences between levels of agreement with the survey items for different web site versions. Group 1 (Australian) participants surprisingly gave equivalent or more positive responses to the International version than the Australian version except for item D6 (“the use of icons brings about expected actions”). Group 2 (Chinese) also generally favored the International version apart from item D1 (“the navigation bar is instructive in guiding me”). Group 3 (International) participants had similar responses to both versions viewed, except that they preferred the links (D2 “links are clear in directing me”) in the Australian version and strongly preferred the icons (D5 “icons easy to understand”) in the International version.

One-way ANOVA statistical tests indicated that, for this data set, age, computer experience, computer usage and web usage have no association with usability assessments of the navigation bar, hypertext links, search tool, icons, colours and symbols in both the localised and internationalised versions of the web site. However, there was an association between web experience and icons (D5) ( $F(10,18) = 2.687$   $p < 0.05$   $Sig = 0.033$ ) in the localised version of the web site. There was also an association between years living in Australia and icons (D5) ( $F(9,16) = 2.967$   $p < 0.05$   $Sig = 0.028$ ) in the internationalised version of the web site. There was another association between years living in Australia and expected actions (D6) ( $F(9,16) = 2.836$   $p < 0.05$   $Sig = 0.033$ ) in the internationalised version of the web site. The following are the results from the qualitative data analysis. The main problems that participants found were inadequate instructions, ambiguous labels on icons, and non-intuitive navigation. As a result, some participants did not assess the second assigned web site. The main concerns reported by each group follow:

1. Australian Group

Almost half of the Australian participants (43%) experienced confusion in following instructions in the Australian web site. Whereas some (21%) were satisfied with the process of ordering meals and found the application innovative, almost one-third (29%) found the menus were frustrating and only a few (7%) felt that the web site was simple and easy to follow. Some (14%) felt that the terms on buttons were confusing and menus were frustrating on the International web site, and indicated that they could not identify significant differences between the two versions of the web site. However, they considered the approach was a creative way to design a web site. More than two-thirds (71%) preferred the Australian version of the web site.

2. Chinese Group

More than two-thirds of the Chinese participants (67%) made generally positive comments about the design of the Chinese web site version. About one-third (33%) felt that the design was not what people expect nowadays while some (22%) indicated that the web site was clear and useful, especially the links. Few (11%) indicated that the symbols and icons brought about expected actions. Some suggested that dark red would be a more attractive colour for Chinese. More than half of the Chinese participants (56%) said that the International web site was very clear and attractive. About one-third (33%) indicated that the International version was very easy to use whereas some (22%) said that there was a lack of consistency.

### 3. International Group

More than two-thirds of the International participants (67%) felt that the whole International web site was fairly cumbersome to use although, overall, the web site design is attractive and unique as it allows users to customise their meals. Half of the participants (50%) said that the International version was easy to use, however, more than two-thirds of the International participants (67%) felt that the Australian web site was easier to use. About one-third (33%) indicated that the interface design of the Australian version was better (with more symbols), however, they did not notice much difference between the two web site versions.

### 4. IMPROVEMENTS

Based on the pilot study results, the web site prototypes were revised for the main study. More instructions for participants were required to reduce the chance of “missing out” the second web site version and to guide participants through the sequence of tasks. Improved instructions were thus provided on the web site for the main study (e.g. a link leading to a set of instructions was added). The differences among Australian, Chinese and International web site versions in terms of theme, navigation bar, hypertext links, search tool, language, icons, colours and symbols were made more distinct. For example, icons were modified to dark blue with white Australian English captions. Other revisions of the web sites included easier navigation, larger symbols, shorter symbol descriptions, separate search tool from the restaurant information (including ingredient search), enabling browsing of the different food categories from every page, enabling ordering of the “Appetizers” category, use of “Home” instead of “Welcome” for main page, and use of a mock-up of personal information required from users in the booking section and improvement in some Chinese words (e.g. cun chu for “save” instead of xu ji).

### 5. MAIN STUDY

A total of 301 participants (99 Australians; 98 Chinese; 104 International) were recruited from within and outside Australia for the main study. All were above the age of 18, with 197 males and 104 females. Because of the recruitment method, it was not possible to achieve gender-balance. None of the participants recruited for the Pilot Study was used again in the main study, which was conducted over a period of five months. The main study utilised the same experimental design (Table 1), with revised materials and procedures. No post-study interviews were conducted. The method of quantitative data analysis utilised the same two stage approach as the pilot study. Initial results indicate significant differences in responses to the three different web site versions by participants from the different cultural groups. Data analysis is continuing.

### 6. CONCLUSION

This paper describes the pilot study undertaken to further understand the factors contributing to localisation and internationalisation of web sites and to test the methodology to be applied in the main study. The results from the pilot study indicate that the procedures and materials were suitable for the main study, following specific

modifications, although the results are only indicative due to the small number of participants in each group. The findings of the main study will appear in a later publication.

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