

## **Localization of Web Design: An Empirical Comparison of German, Japanese, and U.S. Website Characteristics**

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## Abstract

*To explore issues of user interface design and experience, including culturally preferred design elements, a study was conducted analyzing sites in Germany, Japan, and the U.S. (30 municipal sites in each country). Design elements considered are use of symbols and graphics, color preferences, site features (links, maps, search functions, page layout), language and content. Significant modal differences were found in each of the listed categories. Outcomes from the study are used to discuss future research directions in the areas of experience design and localization.*

## Introduction

Web visitors and shoppers increasingly represent a multicultural community. Of approximately 215 million current global Internet users, 57.4 percent designate English as their primary language with the U.S. accounting for 66 percent of e-revenues. In 2003, this share decreased to 39 percent as other regions expanded their Internet activities, including buying online (International Data Corporation). Despite these shifting figures and anticipated large numbers of Web users from diverse cultures, to date little research has systematically examined Web preferences of users related to a variety of online design characteristics. In this paper, eight site elements are examined related to local preferences in a sample of users from Germany, Japan, and the United States. Of interest is not only if differences exist in these three populations, but also the degree of difference between these culturally diverse groups. The implications of this research are important as an exploratory step for how various elements of Web design must be considered in the context of culture. In addition, there are implications for accessibility of increasingly larger non-English speaking populations to the Internet. It is expected that when Web sites are appropriate and culturally sensitive, then users will have increased access to content and enhanced user experiences.

### **Localization and Internationalization**

Localization is the process of adapting a product or service to a particular language, culture, and desired local "look-and-feel." In localizing a product, in addition to idiomatic language translation, such details as time zones, currency, local color sensitivities, product or service names, gender roles, and geographic examples must all be considered. A successfully localized service or product is one that appears to have been developed within the local culture. When web design is not culturally sensitive, there is the potential for exclusion of countries and populations based on accessibility to information that is not culturally appropriate.

The goal of localizing user interfaces is to provide a "technologically, linguistically and culturally neutral platform from which to launch global e-commerce initiatives while allowing a framework that incorporates local content and functionality" (Shannon, 2000). More simply put, this involves "enhancing the site to fit the target users at different locales" (Alvarez, Kasday, and Steven, 1998; Lagon, 2000). Visual design aids the viewer in establishing a system to structure information. This structure is created by use of icons, symbols, or other navigational tools (Pullman, 1998). Winn and Beck (2002) describe the "persuasive power of design elements on an e-commerce web site", and offer a set of guidelines to Web designers based on elements such as navigation or optimal presentation of information as they appeal to user's logic, emotions and credibility. With the number of online consumers on the Web steadily increasing, there are both social and business reasons to seek a better understanding of user preferences related to experience design elements.

Internationalization and accessibility are acknowledged as important issues for e-business, however current studies have focused only on specific cases, businesses or cultures (Alvarez, Kasday, and Steven, 1998; Lagon, 2000). In addition, many books on Web design provide technical approaches, "but an approach to website design from a comprehensive communication perspective is missing" (van der Geest and Spyriadakis, 2000; Spyriadakis, 2000). Simon (2001) began to address the issue of a communication based approach by using conceptualizations of website satisfaction and perception. In a Web environment, satisfaction relates to "stickiness" (Holland and Menzel-Baker, 2001), and refers to "the sum of all the web site qualities that induce visitors to remain at the web site rather than move to another site" (p. 37). Perception is defined as the degree to which participants feel the site is appropriate for their home country based on three key variables of media perception – social presence (i.e. transmission of information rich in socio-economic content), communication effectiveness, and communication interface.

## **Culturability**

As defined by Barber and Badre (1998), ‘culturability’ is the merging of culture and usability and represents a relationship between design elements and culture. Badre (2000:2) outlines,

“Cultural usability is a term we use to emphasize the importance of the relationship between culture and usability in WWW design...Color, spatial organization, fonts, shapes, icons, and metaphors, geography, language, flags, sounds, and motion contribute to the design and content of a Web page, which directly affects the way that a user interacts with the site.”

Attention to culturability also includes how pictorial information is presented and organized, preferences for text versus graphics, directionality for how the language is written (i.e. right to left), help features, and navigation tools, among others (Marcus and Guttman, 1999). An underlying premise is that when site visitors are more comfortable with design and usability features they will be more likely to experience satisfaction and revisit the site.

Badre (2000) and Barber and Badre (2001) examine the effect of cross cultural interface design orientation on Web user performance. Overall, Badre tested whether there are design elements (which are referred to as ‘cultural markers’) that are repeated in different cultures. Results indicate there are some design elements that are culturally specific, and these specific elements are related in some groups to native users’ performance and preferences. Sun’s (2001) exploratory study examining cultural markers, focused on language, pictures and graphics, colors, and page layout and found culture to be an important design consideration that increases usability of multilingual Web pages. Of interest, when cultural markers conflict with usability, some users prefer usability to cultural sensitive interface design.

Some work in the area of design and culture has used Hofstede’s dimensions<sup>1</sup> to compare user reactions from different countries on preferences for design characteristics such as color or screen images (Del Galdo and Nielson, 1996; Marcus and Gould, 2000). Del Galdo and Nielson (1996) demonstrate that color and screen design directions have various psychological and social associations in different cultures, and that diverse users have different concepts of screen usage. Cheskin (2000) surveyed respondents in the U.S., Latin America, and Brazil and provides descriptive statistics on select items related to the use of personal information and privacy

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<sup>1</sup> It is expected most readers are familiar with Hofstede’s cultural categorizations and therefore details of this work will not be elaborated here. However, for more information on this topic refer to Hofstede (1980), Dawar et al (1996), or to Simon (2001) who provides an excellent overview of Hofstede’s dimensions in a compressed format.

issues. Based on the small amount of research to date on this topic, users from different cultures appear to have different design characteristic preferences.

### **Website Design Characteristics**

To effectively engage the user, elements of website usability come into play that contribute positively to the user experience. Perhaps Fogg and his associates at the Stanford Persuasive Technology Lab present one of the most compelling pieces of information about the importance of design. As part of large-scale study Fogg et al. (2002) found nearly half of all consumers responding in a survey (46.1 percent) assessed credibility of sites based on overall visual design of the site. In this instance credibility refers to believability and perceived quality and relates to trustworthiness and level of expertise (Fogg and Tseng, 1999; Fogg et al, 2002).

As use of the Internet as a tool for business evolves, there is increased necessity to recognize and address issues beyond easily quantifiable factors of utility and performance. Winograd anticipated this shift as early as 1996 and stated, “[D]esigning for the full range of human experience may well be the theme for the next generation of discourse about software design.” (p. 111) Building trust on the Web will require user interface characteristics appropriate for more discerning and culturally diverse audiences (Fernandes, 1995; Marcus and Gould, 2000). At present there are still significant problems in this area. Lee, Kim and Moon (2000) note that, “the performance ambiguity of service exchanges in Internet shopping stems largely from the characteristic of the customer interfaces.” As a result, there is increased importance to develop methods, techniques and strategies that focus more effectively on issues of user-centered design (Picard, 1998). Careful consideration of the user experience through consistent use of language, careful explanation, clarity of process and action all address issues of user preference, individual choice, and cultural difference.

In the present research these are key components based on the literature that merit attention in a cultural context as they relate to general design and localization issues. These are elaborated below, along with the hypotheses for testing that guide the research.

*Language* - One aspect of culture that is distinctive is language. Language is the building block from which users gain information from a website. Although there is considerable research on communication and culture, due to the newness of the Internet, it is much less clear how language functions on the Web. However, to be accessible websites must be available in the language of users. Quality of translation is an issue. To

internationalize, Web pages will have more than one language version (Dempsey and Sussman, 1999). In a study (Robbins and Stylianou, 2003) in which global corporate websites were examined 100% of Latin and Asian sites had translation capability, compared to only 7% of Anglo sites (including Canada and the U.S.). Also important are more specific characteristics of language presentation such as headlines, point form, paragraphs, and presentation of characters (i.e. right to left versus left to right).

*Hypothesis 1:* Representation of language and script will vary across cultures, including stylistic elements (headlines, paragraph, character presentation etc.)

*Layout* – Layout and menu design has been central to research on information retrieval systems (Yu and Roh, 2002). Appropriate design layout provides Web visitors with a contextual and structural model for understanding and accessing information, and provides a communication “bridge” between the user and the system (Ibid). In this study, layout refers to placement of banners, menu placement, or search functions.

Specific orientations and page placement vary by culture (Barber and Badre, 2001). For example, France has a centered orientation, suggesting that features on a French site would most likely be centered on the page. Pictorial information is presented and organized for scanning on a display can be related to the script direction of the user’s first language (Marcus and Gould, 2000). Sun (2001) outlines that a user from a low context culture such as Germany would prefer a logical and structured layout. Users from high context cultures are expected to have a strong preference for visuals. This work suggests that banner placement, menu placement of other layout characteristics may differ across cultures.

*Hypothesis 2:* Different preferences for website layout and spatial features will exist in different cultures.

*Symbols* – Symbols are an important element denoting culture (Marcus and Gould, 2000). Symbols vary and may represent a wide range of features from currency to time (Fernandes, 1995). Symbols are “metaphors” denoting actions of the user (Barber and Badre, 2001). Marcus and Gould argue that cultures with lower tolerance for ambiguity would prefer the certainty of text to the ambiguity of symbols.

*Hypothesis 3:* Symbols will vary by type and degree of use across cultures.

*Content and Structure* – According to Huizingh (2000), content refers to information, features or services offered in the Web site and represents another form of communication between the user and the site. Hall’s (1990) work on informational content may provide some clues for how communication operates in

cyberspace across cultures. According to Hall, “high context or low context refers to the amount of information that is in a given communication as a function of the context in which it occurs” (p. 229). In a high context culture, information is part of a contextual understanding and is implicit, while in low context cultures information is conveyed explicitly. In Hall’s framework, Germany is a very low context culture in which messages are aimed to be complete, clear, and precise. In comparison, Japan is a high context culture and messages are multilevel and implicit. The United States is on the lower side of a mid context culture (Beamer and Varner, 2001).

Based on whether communication styles are more explicit or implicit, it would be expected there are different cultural preferences for online interaction (i.e. online, email, telephone). High context cultures would be expected to prefer more personal forms of communication such as the telephone. Although very little research has been conducted in this realm, Robbins and Styliou (2002) found significant differences in preference to use email between Nordic groups (100%) and Japanese (80% preferred email).

In this research various components of interaction and structure include help function availability, type of help available (online, email, telephone), index features, site map features, and use of commercial banner ads. Also of interest is the amount of page layout devoted to commercial advertising, Web contents, and graphics.

*Hypothesis 4: Content and structural characteristics of websites will vary depending on culture.*

*Navigation* – In general, design effort has been focused on improving ease and speed of navigation (Yu and Roh, 2002). Without a clear and facilitated path to information, users become lost within the Web structure (Bernard, 2002). In this study, navigation refers to number and type of navigation tools, menu format, type of links and search capabilities.

Marcus and Gould (2000) contend that navigation will be impacted by culture. Users from cultures who “feel anxiety about uncertain or unknown matters” (p. 39) would prefer “navigation schemes intended to prevent users from becoming lost” (p. 41). Simon (2001) considers navigation and site interaction as part of the communication interface. These include actions by the user to effectively use the channel. In a study examining various design attributes, Simon discovered that Europeans and North Americans similarly desire changes to navigation on the sites to enhance movement, while making the site simpler to use. Alternately, Asian/Latin and South Americans desire navigation aids to change the appearance of the site without particular concern for

movement. In other work by Sun (2001), users expect links in the navigation bar to be arranged in alphabetical order.

*Hypothesis 5:* Preferences for navigation and search capabilities will differ across cultures.

*Hypothesis 6:* The number of external links, and the functionality of links will differ across cultures.

*Multimedia* - Multimedia is another factor researchers have examined related to culture. Marcus and Gould (2000) found site examples that suggest strong use of graphics and multimedia is more likely when the Web designer is from a culture that values material goods and is more assertive. The characteristic of valuing material objects and assertiveness is in close alignment to Hofstede's dimension of masculinity. Multimedia elements might include streaming video, sound, or animation. In the context of the current research, Japan is the most masculine focused society, followed by Germany and the U.S. who are very similar using Hofstede's scales.

*Hypothesis 7:* Preferences for multimedia elements and the extent of multimedia use differ across cultures.

*Color* - Several examples of color preferences related to culture exist in the literature (Barber and Badre, 2001; Simon, 2001). Based on the work of Boor and Russo (1993), Barber and Badre list several colors and their connotations in various cultures. Red, for example, means happiness in China, but danger in the U.S. Simon's (2001) research found that Asians prefer "less bright colors" while Europeans and North American prefer "lighter/brighter colors with more images to make the sites appear more 'modern'" (p. 31). When applied to Web design, color may impact the user's expectations about navigation, content and links, as well as overall satisfaction (Barber and Badre, 2001).

*Hypothesis 8:* The use of certain colors will vary depending on the culture.

## **Methodology**

During phase one of the research two focus group sessions were conducted to inform development of the survey instrument. Both groups were comprised of members of the academic community and members from industry. Individuals involved in the focus groups had wide experience in the areas of website design, localization, computer science, international culture, and management. Discussion in the groups focused on previous research in the area of localization and design characteristics. Members were asked to identify website



characteristics that could be easily compared and assessed by researchers. Once ideas were generated, the focus group members discussed general categories. Results from the focus groups determined eight categories of site characteristics for consideration in the research: language, layout, symbols, content and structure, navigation, links, multimedia, and colors.

Based on initial results from the focus groups, the next phase of the research was focused on the design of an instrument to measure website characteristics. The general categories and specific characteristics that were identified by the focus groups were then written into question format in a survey template.<sup>2</sup>

### *Culture Categories*

The culture categories used in this study are based on national culture and are operationalized using websites from Germany, Japan, and the United States. These countries were chosen as they represent very diverse cultural characteristics as determined by Hofstede (1980).<sup>3</sup> Refer to Table 1. An additional consideration is that each country provided access to at least 30 municipal sites each that could be used in the study. Hence the total sample size is 90 websites.

Table 1: Country Cultural Dimensions

<b>Country Dimension</b>	<b>Germany</b>	<b>Japan</b>	<b>United States</b>
Power Distance	Low (35)	Med (54)	Low (40)
Uncertainty Avoidance	Med (65)	Very high (92)	Low (46)
Masculine	Med (66)	Very High (95)	Med (62)
Individualism	Med (67)	Low (46)	Very high (91)

Sites of the government genre were chosen (similar to Barber and Badre 1998). Local municipal sites provided a large enough sample size for each country. In addition, the sites are not influenced by factors external to the organization (such as foreign partners or parent companies from other cultures). It is expected designers who belong to the local culture created the municipal sites. Sample sites were chosen based on population size and site availability, with 30 cities having the highest populations examined first. If a city did not have a

<sup>2</sup> The survey instrument is available from the researchers on request.

<sup>3</sup> For many years Hofstede's work has been used in research concerning cultural comparisons. More recently researchers have examined Internet behavior using Hofstede's dimensions related to consumer trust (Jarvenpaa et al. 1999) and perception and satisfaction levels of websites related to gender and culture (Simon (2001).

municipal website, then the city with the next lowest population was examined. Municipal sites used in this research were found using the Munisource Database (Smeltzer, 2000: available: <http://www.munisource.org>). Sites are rated based on established protocol in the language of the country where the municipal site resides.

### *Variables*

As already discussed, variables were categorized into 8 general characteristics (factors) based on results of the focus groups. Factors were given 0 (not present) or 1 (present) for categorical questions. For example, if the site had headlines, the researcher gave a 1 for that category. Two categories for color and page use were assessed using raw percentages. Colors were matched to a color wheel and assigned a numerical value to represent the designated color. The percentages of the page were measured using the Cool Ruler application tool. This tool allows the researcher to measure the page and the sections of the page. The section of the page with a certain color was then divided by the total page size to determine the percentage.

A sub-sample of the chosen websites was pre-tested by three judges. The pretest ratings were compared for scoring consistency. Inconsistencies were discussed to resolve points of ambiguity and disagreement. Results for factors that were not the same were examined and differences between researcher opinions were discussed until consensus was reached. Each judge then reviewed 30 websites. Due to language considerations, the sites were non-overlapping, and each judge reviewed 30 sites from one country only. Ratings were sorted by nation. Each national group was then compared using cross tabulation to see if there were modal differences in attributes.

## **Results**

The results for each category of variables are displayed below. The data presented is the actual count for each variable. More specifically, the tables illustrate the number of sites that had the variable present. All country cells have a maximum possible value of 30 (N=90). There are no missing values.

As noted in Table 2, Hypothesis 1 was supported. Language and script appear to vary across cultures. All three writing style variables (headlines, point form and paragraph), are significantly different between the three countries. Japanese have a strong preference for point form as evidenced in all the sites. Paragraph format is used almost twice as much in Germany as in the U.S. As might be expected, language was written top to bottom in all German and U.S. sites, and 50% in Japanese sites. Both Germany and Japan have greater

availability of translation than the U.S. Given the U.S. has a multicultural population, it is surprising only three U.S. sites support languages other than English; while 90% of the Japanese sites support other languages. However, results show all three countries use multiple language styles.

Table 2: Language

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Translation available	19	27	3	16.3	40.14	2	.000
Headlines	24	29	18	23.7	12.14	2	.002
Point form	20	30	23	24.3	11.46	2	.003
Paragraph	26	17	14	19	11.20	2	.004
Left to right	30	30	30	30	-	-	-
Top to bottom	30	15	30	25	36.00	2	.000

In general support of Hypothesis 2, websites created by different cultures have different layout and spatial features. As outlined in Table 3 differences exist between countries with regard to page orientation and banner location. The Japanese show a much higher occurrence of banners on the top and left. The U.S. and Germany place menus on the left and bottom of the page. Another interesting result is that Japanese banners are usually static. Japanese and German sites use frames 6 times more often than U.S. sites.

Table 3: Layout

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Banners of left	1	9	2	4.0	10.96	2	.004
Banners on Right	6	5	6	5.7	0.14	2	.930
Banners on bottom	6	5	3	4.7	1.18	2	.553
Banners on top	3	11	1	5.0	13.44	2	.001
Banner middle of page	3	4	1	2.7	1.92	2	.383
Static banner	5	20	8	11.0	18.09	2	.000
Use of Frames	18	17	3	12.7	19.22	2	.000
Menus on left	23	12	21	18.7	9.74	2	.008
Menu on right	8	4	8	6.4	2.06	2	.358
Menu on bottom	12	5	17	11.3	10.31	2	.006
Menu on top	15	12	12	13.0	0.81	2	.665
Search top left	6	3	3	4.0	1.73	2	.421
Search middle left	1	4	7	4.0	5.19	2	.075
Search bottom left	5	1	2	2.7	3.57	2	.168

Results of the symbols category in Table 4 lend strong support for Hypothesis 3. Culturally specific symbols are used to a greater extent in Japan and Germany than the U.S. Specifically, over 90 percent of Japanese sites use Asian characters, currency, and other culturally specific symbols. The German sites also used culturally specific symbols (90%), and only 23% of the sites use symbols that are easily recognized by the North American rater. In all three countries passive pictures such as maps are used on all sites.

Table 4: Symbols

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Use of local or culturally specific symbols	27	29	0	18.7	74.40	2	.000
Asian Symbols	0	29	0	9.7	85.57	2	.000
Passive Pictures (i.e. maps)	30	30	30	30	-	-	-
Symbols for currency	7	27	2	12	48.61	2	.000
Easily understood	7	29	15	17	33.67	2	.000

Hypothesis 4 was also supported in that content and structural characteristics of websites vary across the three cultures examined. Site maps were examined for how content was organized, and all except two U.S. sites use content categories to create site segments. Two U.S. sites use a geographic structure (i.e. the site was organized by city district). Ninety percent of U.S. sites have email support available compared to 50% each for Germany and Japan. Two thirds of Japanese sites provide telephone numbers for help, while in Germany only one site provides this information. “Live chat” help or user sign in are rarely used in any of the sites. Refer to Table 5.

Table 5: Content/Structure

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Help functions available	18	19	26	21.0	6.03	2	.049
Help online	6	11	26	14.3	28.95	2	.000
Help via email	15	15	27	19.0	13.78	2	.001
Help via telephone	1	20	13	11.3	26.19	2	.000
Help in live chat	2	0	1	1.0	2.07	2	.355
Is there a user sign-in	0	4	1	1.7	5.51	2	.064
Index features	9	25	7	13.7	26.16	2	.000
Site map features	5	11	7	7.7	3.27	2	.195
Commercial banner ad	11	10	2	7.7	8.53	2	.014

Also related to content and structure and in support of Hypothesis 4, page layout by percentage of content (refer to Table 6) differs by culture. Japanese sites have the highest percentage of content (71%), compared to U.S. (28%) and German sites (20%). Similarities are shown for the amount of navigation space. Although municipal sites are not typically created for revenue generation, all sites contained some advertising. Given that advertising was present, it is surprising that it was allocated a very small percentage of the page.

Table 6: Page layout by Percentage

Percentage of page used for:	Germany	Japan	US
Commercial advertising	2.5	1.9	0.5
Navigation	17.5	12.6	18.6
Content	20	71.1	28.43
Graphics	25	15.1	18.03

Hypothesis 5 was supported. As demonstrated in Table 7 there are preferences for different navigation and search capabilities across Germany, Japan and the U.S. Japan is twice as likely to prefer symbolic navigation tools than is Germany or the U.S. Preferences for vertical and horizontal menus are statistically significant. Germany and Japan use a “return to home” button twice as much as the U.S. sites. In German and Japanese sites, search was available in other languages, while this was not evidenced once in the U.S. sites.

Table 7: Navigation

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Navigation tool symbolic (non-text)	7	15	5	9	8.89	2	.012
Drop down menus	6	12	8	8.7	3.03	2	.220
Vertical menus	25	30	24	26.3	6.42	2	.040
Horizontal menus	21	28	21	23.3	6.30	2	.043
Return to home button	21	22	10	17.7	12.21	2	.002
Keyword Search	25	17	24	22	6.48	2	.039
Search available in other languages	4	8	0	4	9.23	2	.010

Related to navigation are the types of hyperlinks used. Refer to Table 8. In support of Hypothesis 6 the number of external links and the functionality of links differ across cultures. External links are used in almost all Japanese sites, compared to only two thirds of U.S. and German sites. Japan uses symbols for links significantly more than in Germany and the U.S. Also interesting to note is the high number of Japanese sites where the links change color once they are used. Germany is relatively low in this category.

Table 8: Links

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Internal Links	29	30	29	29.3	1.02	2	.600
External Links	20	28	21	23.0	7.08	2	.029
Symbols used for links	5	18	8	10.3	13.68	2	.001
Text Links	30	30	29	29.7	2.02	2	.364
Changes Color	12	26	22	20	15.60	2	.000

Related to Hypothesis 7 there is little support for diverse preferences for multimedia elements and the use of multimedia across cultures. As outlined in Table 9, animation is the only element showing significant differences in use between countries. Two thirds of German and Japanese sites use animation compared to only one third of U.S. sites. The use of multimedia, streaming video or sound does not differ significantly across cultures. In fact, streaming video and sound are seldom used.

Table 9: Multimedia

Variable	Actual Count			Expected Count	Chi-square	Degrees of Freedom	Sig. Level
	Germany	Japan	US				
Use multimedia	21	19	13	17.7	4.77	2	.092
Streaming Video	3	4	5	4	0.58	2	.749
Sound	0	2	2	1.3	2.09	2	.351
Animation	21	20	9	16.7	11.97	2	.003

In support of Hypothesis 8 there is considerable variation related to the use of color. For example Japanese use the color red twice as much as do Germans or Americans, although in all cases the percentages remain small. Of interest, Japan sites use other colors such as yellow, green, blue or purple more than the expected use of a large percentage of red.

Alternately, some similarities prevail. An interesting result of the color analysis is that 67 sites (74.4%) used white for background. The next most used background was grey (8.9%). For links most preferred colors were blue (35.6%), bluish purple (12.2%), and black (11.1%). In general, German sites use a limited range of colors such as shades of blue and purple, as well as white.

Table 10: Colors

Color	Percentage of the page:		
	Germany	Japan	U.S.
Red	0.5	1.03	0.47
Orange	0	0.3	0.37
Ochre	0	0.27	0.7
Sunflower	0	1.67	2.33
Yellow	0	5.8	3.33
Light Green	0	5.0	2.03
Green	0	1.6	0.37
Teal	0	1.87	4.37
Blue	10	5.37	1.3
Dark Purple	2.5	1.43	3.73
Bluish Purple	20	4.37	2.2
Merlot	0	0.43	1.1
White	32.5	56.07	59.77
Grey	0	10.4	5.4
Black	0	2.83	3.43

## **Discussion and Conclusions**

### *Cultural Characteristics and Design*

Several researchers have presented the importance of the relationship between design and user perceptions. Yoon (2002) and Simon (2001) found that design issues are integral to user *satisfaction* of a website. Lee, Kim and Moon (2000) note ambiguity of service exchanges in Internet shopping stem largely from characteristics of design and user interfaces.

Although there is increased research interest in culturally preferred design elements, there are few studies that systematically investigate such preferences across cultures. This is an important area for research, if as Robbins and Stylianou (2002:205) suggest “[D]eveloping an effective multinational Internet presence requires designing web sites that operate in a diverse multicultural environment. Globally accessible websites likewise have the potential to inform, and include, various nations around the world in large scale information sharing in order to reduce any exclusion effects. This research has been an initial contribution related to the design characteristics, and hence preferences that prevail in Germany, Japan and the U.S. Results of the investigation demonstrate there are significant website design differences between the three countries examined. All hypotheses were supported, with the exception of partial support for Hypothesis 3 concerning layout, and Hypothesis 7 concerning multimedia elements. In this last instance only use of animation was statistically significant across cultures.

To consider the results more specifically, various items of interest are highlighted. Related to Hypothesis 1 it is noted that Germany and Japan use translation capability more than in the U.S. If as Robbins and Stylianou (2002) point out, restricted use of language results in limited information about content, then absence of translation also means absence of accessibility to a wide range of Web users. This should be of concern to Web developers who aim to provide access to a diverse online population.

Hypotheses 2 throughout 7 address issues of design. In support of Marcus and Gould (2000), Fernandes (1995) and others, the Web requires interface characteristics suitable for culturally diverse audiences. Various preferences exist between Germany, Japan and the U.S. for placement of banners and menus. There also exist differences for the medium through which web visitors prefer communication. Of note, the U.S. has greater presence of email support than in Germany or Japan. One possible explanation for this difference is that Japan is considered a high context culture, where additional information beyond a written format is preferred. Germany is



considered a very low context culture. Such cultural preferences may also partially explain the higher incidence of index features in Japan (25) compared to German (9) and U.S. sites (7). Likewise there is evidence of different preferences for navigation and search capabilities, and links. Navigation appropriate to cultures is important in order to avoid what Bernard (2002) refers to as “disorientation” when users make navigational errors when searching for information. Related to multimedia, it is somewhat surprising that streaming video and sound were used on few sites in all three countries. This may change in the future as speed and capability for downloading large media files increases. Rather surprising, some of the stereotyped expectations for color preferences were not evident. For example according to Boor and Russo (1993) white is a color that implies death in Japan. Despite this, along with Germany and the U.S. white is used to a large extent as a background color.

In sum, this research provides statistically significant evidence to support other work that design preferences differ across cultures. This finding likewise supports a general call for localization of Web content, and provides some directions related to specific cultural preferences in web design. As numerous researchers point out, localization goes far beyond translation to include layout, symbols, navigation, and the use of color. The information provided in this investigation provided some clues to web designers and web managers as to how to create culturally appropriate sites. Further, it would be expected that in the e-business domain, appropriate website design contribute to development of online customer trust, loyalty, and satisfaction (Cyr and Trevor-Smith, 2002; Gommans et al, 2001; Simon, 2001; Yoon, 2002). As such, appropriate design across cultures also has potential for commercial advantage.

#### *Research Limitations*

It should be noted there are some limitations to the research. Although many of the variables illustrate significant differences, some of the results of the study may be influenced by other factors. First, the sample is limited to three countries. Ideally, research of this nature should be conducted with an expanded sample of participants in a larger number of countries. Second, municipal sites were chosen in order to avoid product or company branding effects. It was expected sites developed within a country are less contaminated by external designers or design characteristics. However, the use of municipal sites may limit generalizability of the data to other contexts such as corporate sites. Third, although municipal sites are expected to maximize in-country design elements, it is possible that pre-packaged solutions or web page templates are used to create the sites.

Templates contain layout, navigation, color, and font characteristics pre-selected for the user. If this did in fact occur, then this practice may limit variability of “pure” results across cultures.

#### *Future Research Directions*

The research results imply various avenues for further investigation. Given the study was relatively small, there is merit in conducting larger scale studies that consider how web design features differ in a larger sample, across a greater selection of country locations.

Apart from website assessment, the complexity of culture suggests multiple channels for data assessment in order to understand how design operates across culture at a deeper level. This suggests a combination of interviews and usability studies to better determine how design operates.

Also of interest, is how various design issues result in trust for the user. Hoffman and Novack (1997) and Koufaris (2002) refer to “flow” as a characteristic of consumer behavior in computer mediated environments, and imply a well-designed site will arouse a user’s sensory and cognitive curiosity. Most recently, Koufaris (2002) applied flow theory to online consumer behavior to examine emotional and cognitive responses when visiting an online store. Results proved that product involvement, web skills, value-added search mechanisms, and challenges (to perform to best of user’s ability and “stretching” user capabilities) led to shopping enjoyment, and ultimately to intention to return to the site. These findings suggest the user experience is a complex combination of reactions that includes engagement as well as more concrete usability functions. However, how this deeper level of engagement through design features differs across cultural dimensions is unexplored. Further, greater flow would be expected to result in greater trust and e-loyalty.

Once a better understanding of design characteristics is established in specific cultures, extension of this research may be applied in various ways. For instance appropriate design across cultures has application to feature design and software for mobile devices or automobile computerized systems. Not only will design be significant related to user accessibility, but localization practices will have financial viability as well.

## References

- Alvarez, M. G., Kasday, L. & Todd, S. (1998). How we made the Web site international and accessible: A case study. Conference Proceedings. Available: <http://www.research.att.com/conf/hfweb/proceedings/alvarez/>
- Badre, A.N. (2000). The effects of cross cultural interface design orientation on world wide web user performance. GVE Research Technical Reports. Available: <http://www.cc.gatech.edu/gvu/reports/2001/abstracts/01-03.html>.
- Barber, W., & Badre, A.N. (2001). Culturability: The merging of culture and usability. Available: <http://www.research.att.com/conf/hfweb/proceedings/barber/index.html>.
- Beamer, L. & Varner, I. (2001). Intercultural Communication in the Global Workplace. Boston: McGraw-Hill.
- Bernard, M. (2002). Criteria for optimal web design (designing for usability). Available: <http://psychology.wichita.edu/optimalweb/print.htm>
- Boor, S., & Russo, P. (1993). How fluent is your interface? Designing for international users. INTERCHI '93, April, 346.
- Cheskin Research Group. (1999). eCommerce trust study. Available: <http://www.cheskin.com/think/studies/ecomtrust.html>.
- Cyr, D. & Trevor-Smith, H. (2002). "Building e-Loyalty across cultures and organizational boundaries". In N. Paulsen & T. Hernes (Eds.). *Managing Boundaries in Organizations: Multiple Perspectives*. London: Palgrave (McMillan).
- Del Galdo, E., & Neilson, J. (1996). *International user interfaces*. John Wiley & Sons, New York.
- Dempsey, G. & Sussman, R. (1999). A hands-on guide for multilingual websites. *World Trade*, Irvine, 68-70.
- Dawar, N., Parker, P. & Price, L. (1996). A cross-cultural study of interpersonal information exchange. *Journal of International Business Studies*, Third quarter, 497-516.
- Fernandes, T. (1995). *Global User Interface Design*. Chi '95 Mosaic of Creativity, May.
- Fogg, B.J., Soohoo, C., & Danielson, D. (2002). How people evaluate a web site's credibility? Results from a larger study. Persuasive Technology Lab, Stanford University.
- Fogg, B.J., & Tseng, S. (1999). Credibility and computing technology. *Communications of the ACM*, 14(5), 39-87.
- Gommans, M., Krishan, K.S., & Scheddold, K.B. (2001). From brand loyalty to e-loyalty: A conceptual framework. *Journal of Economic and Social Research*, 3(1), 43-58.
- Hall, E. & Hall, M. (1990). *Understanding cultural differences*. ME: Intercultural Press.
- Hofstede, G. H. (1984). *Culture's consequences: International differences in work-related values*. Beverly Hills, CA: Sage Publications.
- Hofstede, G. H. (1980). *Culture's consequences*. Beverly Hills, CA: Sage Publications.
- Hoffman, D.L. & Novak, T.P.. (1997). A new marketing paradigm for electronic commerce. *The Information Society, Special Issue on Electronic Commerce*, 13 (Jan-Mar.), 43-54.
- Holland, J., & Baker, S.M. (2001). Customer participation in creating site brand loyalty. *Journal of Interactive Marketing*, 15(4), 34-45.
- Huizingh, E. (2000). The content and design of web sites: an empirical study. *Information and Management*. 37, 123-134.
- Jarvenpaa, S. L., Tractinsky, N, Saarinen, L. & Vitale, M. (1999). Consumer trust in an Internet store: A cross-cultural validation. *Journal of Computer Mediated Communication* 5 (2). Available: <http://www.ascusc.org/jcmc/vol5/issue2/jarvenpaa.html>.
- Koufaris, M. (2002). Applying the technology acceptance model and flow theory to online consumer behavior. *Information Systems Research*, 13(2), 205-223.
- Lagon, O. (2000). Culturally correct site design. *Web Techniques*, 5(9), 49-51.
- Lee, J., Kim, J. & Moon, J.. (2000). What makes Internet users visit cyber stores again? Key design factors for customer loyalty. *Proceedings of the CHI 2000 conference on Human factors in computing systems*.
- Marcus, A., & Gould, E.W. (2000). Cultural dimensions and global web user-interface design. *Interactions*, July/August, 33-46.
- Picard, R. (1998). *Affective Computing*. Cambridge, Massachusetts: MIT Press.
- Pullman, C. (1998). Some things change. American Institute of Graphic Arts. Available: <http://www.aigany.org/ideas/features/pullman.html>.

- Robbins, S.S. & Stylianou, A.C. (2002). Global corporate web sites: an empirical investigation of content and design. *Information and Management*, 40, 205-212.
- Shannon, P. (2000). Including language in your global strategy for B2B e-commerce. *World Trade*, 13(9), 66-68.
- Simon, S.J. (2001). The impact of culture and gender on web sites: An empirical study. *The Data Base for Advances in Information Systems*, 32 (1), 18-37.
- Smeltzer, D. (2000). Munisource.org Database. Available: <http://www.munisource.org>
- Spyriadakis, J. H. (2000). Guidelines for authoring comprehensible Web pages and evaluating their success. *Technical Communication*, 47(3), 359-382.
- Sun, H. (2001). Building a culturally-competent corporate web site: An explanatory study of cultural markers in multilingual web design. SIGDOC '01, October 21-24, 95-102.
- van der Geest, T. & Spyriadakis, J.. (2000). Developing heuristics for Web Communication: An introduction to this special issue. *Technical Communication*, 47(3), 301-310.
- Winn, W., & Beck, K. (2000). The persuasive power of design elements on an e-commerce web site. *Technical Communication*, 49 (1), 17-35.
- Winograd, T. (1996). *Bringing Design to Software*. New York: Addison-Wesley.
- Yoon, S. (2002). The antecedents and consequences of trust in online-purchase decisions. *Journal of Interactive Marketing*, 16 (2), 47-63.
- Yu, B. & Roh, S. (2002). The effects of menu design on information-seeking performance and user's attitude on the web. *Journal of the American Society for Information Science and Technology*, 53(11), 923-933.