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It is easy to see that developing websites to be used by people who speak different languages or come from different cultural backgrounds can be a difficult challenge. It would be useful to have guidelines or models that will help design, create and evaluate websites for multicultural/cross-cultural use. There is growing literature on cross-cultural software and website design, both for "objective" features of cultural differences (such as the scripts and fonts people use, date formats, and the like) and for "subjective" features of cultural differences (such as how people react to color, the "busyness" of a website, and so forth). This paper attempts to describe some of the models being presented as useful for managing the "subjective" aspects of cross-cultural website design. Among the most important models being developed are *cultural dimension (*n-*factor)* models, *cultural marker* models, *cultural* behavior models and models based on *Activity Theory*. We also discuss some evidence that culture is not as crucial to successful website design as one might imagine.

*Cultural Dimension (*N-*factor) Models*

Cultural dimension models seek to measure different cultures on a number of cultural variables or factors. A pioneer in this research (at least as applied to cross-cultural business communication is Edward Hall [9]. According to Hoft [11], Hall presents a four factor model, in which cultures are measured on:

1. High vs. Low speed of messages,
2. High vs. low context,
3. Spatial distance,

4. Polychromatic (“multi-tasking”) vs. mono-chromatic (“single tasking”) approach to time.

Hofstede [10] created a five factor cultural model, which is perhaps the most cited in cross-cultural web design papers. His five factors are:

1. Power distance
2. Uncertainty avoidance
3. Masculinity vs. Femininity (perhaps Assertiveness vs. Tenderness).
4. Individualism vs. Collectivism.
5. Time Orientation (orientation to past, present and future).

Ford and Gelderblom [6] did an empirical study of these five factors, and found no significant differences on human performance (speed, accuracy, satisfaction) between groups differing in four of these five factors (there were not enough data to test time orientation). They point out the difficulty of analysis of this kind. For example, websites with high uncertainty avoidance ratings may increase speed and accuracy *just because* uncertainty is avoided, not because there is a better match with culture. As a second example, they point out the difficulty of measuring the factors, and whether their binary measurements (high uncertainty avoidance vs. low uncertainty avoidance, for example) adequately reflect underlying continua. Gould et. al [8] applied the Hofstede model to a comparison of a pair of US college and bookstore websites. Marcus [15-17] has been an influential champion of Hofstede’s model.

Trompenaars [26] presents a seven factor model. According to Hoft [11], these factors are grouped into three major ways of solving problems:

1. Problems that arise from our relationship with other people,
    a. Universalism vs. particularism
    b. Individualism vs. collectivism

    c. Neutral vs. emotional

    d. Specific vs. diffuse

    e. Achievement vs. ascription

2. Problems that come from the passage of time

    a. Attitudes to time

3. Problems that relate to the environment

    a. Attitudes to the environment

Khaslavsky [14] created a nine factor model combining Hall's, Hofstede's and Trompenaar's models. These factors are:

1. *Speed of message*, which is the "speed at which people decode and act on messages" (from Hall)

2. *Context* or the "amount of information that is in a given communication as a function of the context in which it occurs" (from Hall).

3. *Personal space* (from Hall).

4. *Time*, or "linear, one thing at a time, monochronic" vs. "simultaneous, concurrent, polychronic" (from Hall).

5. *Power distance*, or "how subordinates respond to power and authority" (from Hofstede).

6. *Collectivism vs. Individualism* or loyalty to group vs. loyalty to one's self (from Hofstede).

7. *Uncertainty avoidance* (from Hofstede).

8. *Diffuse vs. specific*, the "separation of business and personal relationships" (from Trompenaars).

9. *Particularism vs. universalism* or "rule-based vs. relationship-based behavior" (from Trompenaars).

Evers and Day [5] tested a cultural dimension model based on Hoft in a questionnaire-based study of Indonesian, Chinese and "dominant cultural homogeneity" Australian subjects. Statistically significant differences between Indonesian and Chinese groups occurred, which could not be ascribed to the model, because Indonesians and Chinese have similar characteristics; further, "that [the] Asians [in this study] prefer to instruct computers using detailed commands, see uncertainty as threatening, and prefer text-based rather than symbolic interfaces is not what one would expect from the orthodox intercultural literature."

Cultural Marker Models

Another approach is to say that different cultures will prefer different *signs* or cultural symbols. Badre calls these cultural *markers*. Cultural markers are "interface design elements and features that are prevalent, and possibly preferred, within a particular cultural group [1]." Some initial studies in how cultural markers affect website usability have been done. In a small study (that did not produce any statistically significant results), Sheppard and Scholtz [22] looked at how "Arab" and "U.S." users might perform better on websites that have cultural markers more prevalent in their own cultures. Sun [24] ran a very exploratory study (no statistically significant results, only three test subjects, each one representing a different culture, all students living abroad in the US) suggesting users prefer websites with cultural markers from their own cultures. Juric, Kim and Kuljis [13] apply a checklist of cultural markers to 40 UK and Korean websites, and find anecdotal evidence for differences.

Another term for these signs is *cultural attractors*, as described by Smith, et al [23]. They define attractors as:

> the interface design elements of the website that reflect the signs and their meanings to match the expectations of the local culture. The cultural attractors typically comprise of: colours, colour combinations, banner adverts, trust signs, use of metaphor, language cues, navigation controls and similar visual elements that together create a `look and feel' to match the cultural expectations of the users for that particular domain (p. 64).

The sign-based models sometimes come as a result of the difficulty of operationalizing the factor models.

Cultural differences in on-line behaviors

Chau, et. al [3] provide a four-factor model based on different on-line behaviors of website users in their study of the differences between US and Hong Kong use. Their four factors are:

1. Social communication (meeting new people, chat, joining a group)
2. E-commerce (buying, selling, advertising, making money)
3. Hobby (entertainment, playing games, listening to music)
4. Information search (product, educational and employment information).

In a relatively large scale study (over 250 subjects in the US and Hong Kong) hey discovered differences between US and Hong Kong uses; for example, in their study Hong Kong users tend to use the Web for social communication more than US users. They suggest that paying attention to these differences in use may be important: for example, an e-commerce site targeted towards Hong Kong users may be more used in if provided opportunities for social communication.

Activity Theory

Activity Theory is socio-cultural theory of human activity, based on the ideas of Vygotsky and Lenot'ev. The basic model describes *Subjects* attempting to achieve

Objects (goals) via activities; these activities are mediated with tools done in accordance with rules and divisions of labor in the midst of a community. Mwanza, for example, has recently attempted to operationalize Activity Theory for HCI [18, 19]. "Culture," in this case is used in the sociological or anthropological sense of organized human behavior, rather than (say) just ethnic culture *per se*, and stresses the social aspects of activity (see, for example, [28]). Mwanza describes her Activity-Oriented Design Method (AODM), a design methodology based on Activity Theory. It comprises several tools, including a eight step model for identifying system components (subjects, objects, activities, etc.); and how these can be used for design and evaluation. Another focus of Activity Theory is to identify the *contradictions* that obtain in human activity; for example, Mwanza describes how the evaluation of workers in one system studied was tied to the (relative) number of problems solved, which provided disincentives for workers to co-operate with other workers in mentoring and problem solving.

The use of Activity Theory in HCI is relatively new. As an example of how Activity Theory has been applied, Uden and Willis [27] describe how they used Activity Theory to build an information kiosk in Singapore. Gobbin [7] suggests Activity Theory is particularly useful for HCI research because Activity Theory "takes into account social and cultural interactions in the organizational, developmental and learning aspects of human activity and IT tool user adaptation."

Against cultural models

Some studies suggest that factors other than culture drive differences in attitudinal and behavioral responses to websites. For example, an international Wharton Virtual Test Market study [2] indicated that how much individual users used the web for product information search is the most important predictor of on-line buying behavior (not demographics), and that factors relating to "the wireless lifestyle" (*e.g.*, how long and how often they use the Web) explain 77% of who makes online purchase decisions. It may also that demographic factors, such as age, gender or specific location, will prove more important factors to consider than cultural factors.

Other overview articles

Hoft [11] wrote an influential chapter in del Galdo and Nielsen's *International User Interfaces* [4] on "Developing a Cultural Model," in which she reviews various models of cross-cultural communication including the models of Hall, Hofstede and Trompenaars.

Honold [12] provides a timeline of how research on "cross-cultural usability engineering" has changed. In the first phase (1975-1988) classical ergonomic research was applied to non-Western countries. In phase two (1990-1995), practical solutions of user-interface design for non-Western markets became critical. In phase three (1996-1998, when the article was written), the need for a underlying theory of cross-cultural usability engineering was recognized. Two of the standard books on international user interface design—Nielsen's 1990 *Designing User Interfaces for International Use* [20] and del Galdo and Nielsen's 1996 *International User Interfaces* [4]—predate the widespread diffusion of the World Wide Web. Thus, they focus on ways to display non-Western scripts and stand alone programs.

Sun [25] describes many models in his attempt to unify "engineering views" of cultural usability with "humanist views." In the end, he uses a modified version of Hall's "circuit of culture" with general and ethnic cultural factors. Yeo [29] makes the good point that usability evaluations themselves will be culturally bound; so, for example, subjects in a usability evaluation made lie in order to allow the designer to "save face." Plocher, Garg and Chestnut [21] provide a general overview, and make strong claims that *culture* affects *user characteristics* which in turn affect choices in *user interface design*.

Summary

Interest in cultural dimension models for website design come out of the general need for models for cross-cultural software development; this, in turn, came out of interest in cross-cultural business communication in general. The cultural dimension models seem more aimed at a *description of culture* than as a *prescription for best website communication practices*. The studies done to try to evaluate or apply the cultural dimension models in website design have thus been inconclusive at best. For example, the Malaysia-US comparison in [8] is instructive. Among other things, the authors claim

the Malaysian educational website contains links on the home page to website administration because of the "high power distance" of Malaysian culture (that is, Malaysian culture is hierarchical). But this does little to explain why a US education website (in a "low power distance" culture) might have such a link anyway, or why the home page for the Malaysian university cited has become much more "low power distance" since the article was first published. Until more data is presented showing a greater robustness of the cultural dimension theories and their relevance to website design, these theories are mostly useful for telling "just so" stories about website practice.

Activity Theory may provide useful guidelines for cross-cultural website design, although it is perhaps too early to tell. It is likely, however, that its roots in Marxist theory and the generally anti-capitalist, anti-American viewpoints of its practitioners will limit its usefulness for creating business websites. I suspect, too, that practitioners of Activity Theory may tend to be more interested in the further development of Activity Theory than of improving website practices. Still, I think that the process model described by Activity Theory may prove useful.

I have only cited one study on cultural differences in on-line behaviors, and it is too early to tell how useful this approach will turn out to be. It is certainly important to consider demographic and "objective cultural" factors in cross-cultural website design. I suspect that these factors will provide the most important suggestions for best practices. Getting people familiar with using the Internet, providing websites in the language people want to use, making it easy to do things on the Web in general—these and other factors will drive increasing acceptance of the web across cultures.

It should be stated that most multi-cultural websites will be created by corporations and other large organizations wanting to provide web services in multiple countries and cultures. Typically, these organizations have a (global) brand image they want to promote, and thus, for example, country or culture-specific websites for HP may need to look more like each other (promoting the HP brand) than like other sites in the same country or culture. For these organizations, "global content" may outweigh "local

content" by a large margin, and this is another strong factor in cross-cultural website design.

Still, it would be foolish to ignore cultural factors. Of the cultural models presented, I believe that the cultural markers approach shows the most promise. The elements of website design are relatively well understood: layout, colors, images, fonts, etc. In addition to their intended meaning and usability, it is useful to ask what cultural messages these markers provide, with a goal of ensuring they provide a cultural attractiveness or neutrality rather than cultural repulsion. Again, this approach is still very young, and initial studies are not very supportive. Perhaps researchers should be looking at expanding the taxonomy of cultural markers and the potential messages they have. In any case, it seems likely that evaluation of websites for cross-cultural usability or appropriateness can proceed by identifying the markers on a website, identifying the stakeholders associated with the website, and asking what cultural messages those markers contain for the stakeholders, and what the consequences of those messages are.

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