Paralingual Web Design and Trust in E-Government

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ABSTRACT

150 words or less.

Keywords: e-government; paralingual; trust; Web design

INTRODUCTION

Electronic government (e-government) is the use of Information and Communication Technologies (ICT), including the Internet, by government organizations to facilitate providing information and services to their constituents. E-government websites provide everything from basic information about governmental bodies and issues, to online services such as registering vehicles and applying for employment and for permits. More recent e-government services include e-consultation, which is citizen participation and response to forthcoming consultations and decisions on matters of public interest (Jadu, 2005). The impetus to implement e-government can be attributed to cost control and improved service to citizens. Another driver is government’s growing awareness of the need to attain more democratic governance (Coleman and Gotze, 2001; OECD, 2001), coupled with a widespread public interest in the potential
of ICT to empower citizens and to increase government accountability and transparency (Hart-Teeter, 2003). An example is the United States E-Government initiative targets use of improved Internet-based technology to make it easier for citizens and businesses to interact with the government, save taxpayer dollars, and streamline citizen-to-government communications (USOMB, 2005). These many drivers make it likely that e-government will be a lasting ICT application leading e-government system designers to look for tools and methodologies that will ensure their acceptance and use by the intended users.

This article introduces one such potential design methodology, paralingual web design, and uses an experiment to test this design methodology to see if it has potential for improving system acceptance and success. Paralingual is a web design methodology for presenting information in more than one language. Paralingual web design involves placing content in the desired languages but instead of having separate pages for each language as is common in a bi or multilingual web design, the bi or multilingual content is placed side by side on the same page. The inspiration for this article is the trend towards localization in ecommerce systems and a concern that there may be a localization issue for e-government when the target population is bi or multilingual. Localization is defined by the Localization Industry Standards Association (LISA, 2008) as the process of modifying specific products or services for specific markets. In the case of e-government this involves tailoring e-government web sites to fit the constituent market and in the case of a constituent market that speaks more than one language, allowing for these multiple languages. The concern driving this experiment is that there may be a trust issue affecting the success/adoptive of e-government should these systems fail to take into account the bi or multilingual aspects of their constituents.

A premise of information systems, IS, is that for an IS to be successful the intended system users must “use” the system where Rai et al. (2001) consider “use” to be the consumption of the outputs of the IS by the users as measured in terms such as frequency of use, amount of time of use, numbers of access to the IS, usage pattern, etc. General thinking is that the more an IS is used, the more successful the IS. Two of the more widely accepted IS success/acceptance models, the DeLone and McLean (1992 and 2003) IS Success Model and the Davis (1989) Technology Acceptance Model, TAM, incorporate “use” as a measure of success (DeLone and McLean) or successful adoption (TAM) through constructs such as Intent to Use, Perceived Usefulness, and Perceived Ease of Use.

Several authors (Gefen, et al., 2002; Tan, et al., 2005, Tan, et al., 2008, Warkentin, et al., 2002) suggest that use of e-government is influenced by the trust that potential users have with e-government. This article hypothesizes that this trust in e-government, and thus subsequent use, can be increased in bi and multi lingual societies by using paralingual web design. This allows readers who are bilingual to easily see both versions and readily determine if the same information is being said in each version. It is expected that trust will be increased through this citizen validation process.

The contribution of this research is showing designers of e-government web pages how the web pages can be designed to improve trust in a bi-lingual constituency. While this research did not test this design approach in a multi-lingual environment it is expected this design can also be applied to e-government web pages for these constituencies.

LITERATURE REVIEW

This article draws from three main bodies of literature, the trust, paralingual, and IS acceptance/success literatures. These literatures are summarized below and provide the theoretical foundation for the article. The trust literature is presented first as it provides the issue of concern for the article. The paralingual literature is second to provide the background for why the proposed design methodology is a good solution.
for the trust issue. The IS acceptance/success literature is provided third as it helps provide the framing for the experiment.

Trust can be defined as “the subjective assessment of one party [trustor] that another party [trustee] will perform a particular transaction according to his or her confident expectations, in an environment characterized by uncertainty” (Ba and Pavlou, 2002, p. 245.) For e-government this means users trusting that the e-government service is providing correct information, that data will be protected, and that transactions will be conducted in a secure manner and recorded appropriately.

Trust in government has historically been problematic in the United States of America as constituent citizens are known to have a high level of distrust in their governing bodies. Trust in government has been declining for more than three decades and has been the topic of a substantial amount of research in political science (Levi and Stoker, 2000; Hibbing and Theiss-Morse, 2002). In the state of California, a recent study exposed an unexpectedly high level of distrust in government by California citizens. During 2004, a series of dialog-oriented seminars were held by Viewpoint Learning in various locations in California. One of the seven major findings of the study was that an underlying issue was profound mistrust of government and elected officials. Furthermore, this mistrust was more intense and persistent than expected, outstripping the levels that have been measured by polls and focus groups (Rosell, Gantwerk, and Furth, 2005).

In addition to the trust issues above, there are known issues with trust in e-government websites. This is clearly the effect of the general mistrust by citizens in their government bodies, as mentioned previously. The principal reason given for mistrust of the Web is an artifact of the internet itself. Namely, the internet is now perceived to be beyond the control of the hosts and providers in terms of security and trust. Despite the use of lock icons, digital signatures, passwords, privacy policy statements, and other security techniques, internet users feel that hosts and providers have lost control of the digital data transport medium as well as the software infrastructure that supports it, impeding the growth of e-government (Mercuri, 2005.) To counter this, the International Telecommunication Union (ITU) is providing support for national e-government projects including enhancing security and trust in the use of public networks (Khalil-babnet, 2005).

Improving trust in government and e-government is a critical issue. In the study by Viewpoint Learning, citizens voiced a strong desire to find constructive solutions to problems facing the state (Rosell, Gantwerk, and Furth, 2005). In a geographical area with a high proportion of bilingual speakers, usage of e-government websites may be improved in the same way as has been shown effective in electronic commerce (ecommerce). That is, with regard to language issues, researchers have found that customers are far more likely to buy products and services from Web sites in their own language, even if they can read English well. Furthermore, attention to site visitors’ needs should be an important consideration in Web design because such attention can help a site build trust with customers (Schneider, 2003). Gassert (2004) suggests building trust through knowledge by using ICT for better education and information. Additionally, LaVoy (2001) supports the use of e-government as a way of improving trust by improving accountability. Finally, Gefen, et al. (2002) view trust in government as the main driver for e-government adoption. Their analysis show data privacy concerns create the biggest barrier to adoption of e-government. While this form of e-government service, online tax service, consists of real transactions, the trust issue dealt with in this research comes even before citizens attempt such transactions. Namely, the citizens must be given a reason to simply trust in the information that is on a government website.

One of the earliest known examples of written multi-language information is the Rosetta Stone. According to Wikipedia (2006a), this archaeological artifact is a granite stone with writing in three different written scripts dated to about 200 BCE (Before Common Era,
essentially the same as BC). It contains Greek, Demotic Egyptian, and Egyptian hieroglyphics. The message in the three scripts is the same and is a decree by the Egyptian ruler Ptolemy V regarding taxes and temple construction. The purpose of having the message written in three languages adjacent to each other was to solve a difficult linguistic problem.

A contemporary example of multi-language dissemination of important information is a requirement in the California Labor Code about employers posting worker information in English and Spanish. According to the Labor Code, several important documents, such as the Notice of Workers Compensation Coverage, must be posted in Spanish and English whenever there are employees of Spanish descent (California Labor Code, 2006). There are similar requirements regarding Minimum Wage, Pregnancy Disability Leave and the California Family Rights Act (OSHA4LESS.COM, 2006).

The term “paralingual” is used to define the layout of information using two sets of text in different languages on the same page, such as in a web page. The term was coined as an extension of the word “bilingual.” Para is a Greek prefix that means beside, near, or alongside (Wikipedia, 2006). Therefore, paralingual refers to two languages adjacent to each other on the same page. Paralingual web pages are almost non-existent on the Web. Although many websites are now multi-language websites, the common layout for these websites is to separate the languages to separate pages. This commonality is reflected in the standards on localization (LISA, 2008.). This localization can be found in e-government. Cunliffe et al (2002) reports a case study of developing a bilingual website in English and Welsh for users in Wales. This study focused on website design for just two languages and recognized that there are many bilingual areas in the world (Cunliffe et al, 2002). One of the most important aspects of designing for bilingual website content is to provide rich interconnectivity between materials in the two languages (Cunliffe et al, 2002). While not the main focus of the study, Cunliffe, et al. (2002) does discuss the options for placement of two languages on the same page.

Paralingual web design is expected to affect e-government use two ways: increased use due to increased trust and possible decrease in use due to impacts on ease of use and usefulness. As discussed above it is expected to help improve trust. The two models mentioned in the Introduction help to predict the probable impact of paralingual web design. TAM was developed by Davis (1989) as an explanation of the general case determinants of computer acceptance that are capable of explaining user behavior across a broad range of systems, technologies, and user populations. The model includes use as a determinant but indicates that use is determined by ease of use and perceived usefulness, attitude, and intention to use (see Figure 1). TAM is a derivative of Fishbein and Ajzen’s (1975) Theory of Reasoned Action (TRA) model. TRA focuses on situation specific personal beliefs and attitudes, and the effects of the beliefs of others who can influence the individual. The fundamental premise of TRA is that individuals will adopt a specific behavior if they perceive it will lead to positive outcomes (Compeau and Higgins, 2001).

Figure 1. Technology acceptance model (Davis, 1989)
However, adoption is also influenced by two factors, Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness reflects that an individual’s perception of usefulness influences their intention to use the technology primarily through the creation of a positive attitude. This is consistent with the TRA, which holds that attitude (an individual’s positive or negative feelings about performing a behavior) influence behavioral intention. Geffen, et al. (2002) found that trust impacts Perceived Usefulness with increased trust improving Perceived Usefulness. Perceived Ease of Use reflects the user’s assessment of how easy a system is to learn and use. TAM includes ease of use as a separate belief construct based on the concept of self-efficacy (an individual’s judgment of his/her ability to organize and execute tasks necessary to perform a behavior). Ultimately, TAM predicts that if paralingual web design can improve trust with the users while not reducing perceptions of ease of use or usefulness then it can be expected that paralingual web design will be accepted by users.

DeLone and McLean (2003) revision of the IS Success Model also helps predict the impact of paralingual web design. This is a causation model that implies that system quality, information quality, and service quality will lead to increased use or increased intent to use which will lead to benefits and success of the system (see Figure 2.) The intent to use construct is important for this article as it is similar to the ease of use and usefulness constructs from TAM, especially when intent to use is operationalized using the Perceived Benefit Model (Thompson, Higgins, and Howell, 1991). Additionally, trust is reflected in the information quality dimension as users must be able to trust the information in the system for there to be quality. Paralingual web design provides the trust in the information quality and aids in perceived usefulness in intent to use. Ultimately, the IS Success Model predicts that improved trust will help improve information quality which will increase intent to use/actual use leading to benefits and system success.

The conclusion from the literature review is that Paralingual web design may be a design tool that will support building trust in content and process by e-government users. As mentioned earlier, Geffen, et al. (2002) consider this essential for e-government adoption as it support perceived usefulness. The only concern is an impact to perceived ease of use resulting in the experiment design discussed in the next section.

Figure 2. DeLone and McLean’s (2003) Revisited IS success model
RESEARCH METHODOLOGY

This study sought to determine whether paralingual website design can improve trust in e-government websites while maintaining ease of use and usefulness for both the reader and the provider government. In a bi or multilingual environment, the ability to communicate concepts across diverse cultures and languages has become increasingly important, especially when issues of trust are involved. Further, e-government has rapidly increased in usage, making it even more essential for web designers to conscientiously strive to ensure that concepts have the same meaning across cultures. This study focuses on paralingual issues in a highly bilingual populated location in the United States, that of San Diego and Tijuana, with a total combined population of over 5 million as of 2004 and over 64 million annual border crossings. The subject municipality is National City, a city of 54,260 (2000 census) located approximately 10 miles from the United States border with Mexico. The municipality population is 60% Hispanic/Latino (all or part), 39% white (all or part), and 30% other (all or part where other includes Asian, Hawaiian/Pacific Islander, Black, and American Indian) (Note that the sum is greater than 100% due to respondents reporting belonging to more than one race) (National City, 2008). Actual percentage of English-Spanish bilingual residents is not reported but is understood to be large. The subject municipality was selected because of its expected bilingual population and its willingness to participate in the experiment. It should be noted that simply because the municipality population is heavily Hispanic or Latino does not mean that the local language is predominately Spanish. This is a US city and the citizens are US citizens. English is the majority language spoken in National City as evidenced by the National City website being in English only. However, due to its proximity to the border and its large Hispanic/Latino population it is reasonable to assume there is a substantial bilingual population.

To create the experiment, three informational web pages were converted to paralingual format consisting of English and Spanish text placed horizontally adjacent to each other. Informational pages were chosen as the National City website is primarily informational and does not perform any financial transactions. This is considered acceptable as the majority of e-government websites in 2004 were informational rather than financial transaction focused (ICMA, 2004). Translation of the English content in the original selected web pages was performed taking into account the following:

- Variations in the style and vocabulary of Spanish. A style to reflect the local style was chosen. This style is mostly Mexican in its structure and vocabulary, so these were kept in perspective at all times.
- The level of writing was kept at approximately a high school level of comprehension (the same as the English version).
- The Spanish translation was written to conform strictly to correct language structure, syntax, and spelling. This is demonstrated by the correct application of diacritical marks, such as accents, tildes, and umlauts.

The translation task was performed by a native Spanish speaker with professional training and experience as a translator. The translated content was then evaluated and modified by a Spanish language professor with a specialization in translation studies.

A survey was generated using survey monkey to gauge the opinions of visitors to the experimental web pages. The survey consisted of eight items. Items 1-4 dealt with demographics of the respondents and were asked at the request of National City:

1. What is your age range? (18-24, 25-34, 35-44, 45-54, 55-64, 65 or over)
2. Are you a resident of National City? (Yes, No)
3. What language or languages do you use for communication (speaking, reading, writing)? (English only, Spanish only, mostly English with some Spanish, about half
4. Have you visited the National City official website before now? (Yes, No)

Items 5 and 6 operationalized trust. Item 5 queries improved trust due to the information on the web page while item 6 queries improved trust due to the paralingual format. Two items were used to ensure that improvement in trust was due to paralingual format and not to just reading the information (both use a 7 point Likert scale with 1 being Strongly Disagree and 7 being Strongly Agree):

5. Please respond to this statement: I have a greater trust now than before in my understanding of the National City website.
6. Please respond to this statement: I have a greater trust now than before in the information on the National City website because it is in English and Spanish side by side.

The seventh item was also asked at the request of National City and queried how aware the respondent was of the multilingual nature of National City:

7. Are you aware that other residents in National City speak more than one language? (Yes, No, Not sure)

The final item operationalized ease of use and usefulness by querying perceptions of site readability. Only readability is measured as no transactions are performed with the paralingual web sites:

8. Please respond to this statement: It was easy for me to read the pages with English and Spanish next to each other: (No, it was very difficult, No, it was somewhat difficult, It was neither difficult nor easy, Yes, it was somewhat easy, Yes, it was very easy)

Municipality officials encouraged participation by constituents and residents in the vicinity through a series of bilingual public announcements encouraging individuals to visit the modified web pages and to complete a brief survey documenting their opinions on the website. The respondents to the survey had the choice of filling out the survey in English or Spanish, presumably selecting their primary language of communication. The respondents who answered the online surveys represent a portion of web users who visited the National City website and chose to view at least one of the paralingual pages. This constitutes a self-selected sample. The visitors to the website may have been responding to one of the various methods of advertisement of the research, or may have been incidental visitors to the website who then decided to follow a link from the home page to one of the paralingual pages. While there are problems with self selected samples, it is acceptable for this experiment as the goal was to get real users to respond to the web pages and the inherent difficulties in recruiting a random sample on a public web page. Data was collected over a three month period with 133 responses being collected. Data were grouped based on the respondent’s answer to the question asked about the respondent’s primary language for communication. The range of response choices was from “English only” to “Spanish only”; an additional choice was “some other combination of languages.” In order to generate analytical results that are more representative of the language component of the sample data, the English sample data included only those who indicated “English only,” “Mostly English,” or “some other combination of languages.” The Spanish sample data included those that indicated “Spanish only,” “mostly Spanish,” or “half English and half Spanish.” This resulted in 97 English responses and 36 Spanish responses.

Statistical data analysis was used to analyze the collected data. Beatty (2000), Siegel (1956), McClave, Benson, and Sincich (2008), Jaccard and Becker (1990), and others have stressed the importance of selecting appropriate statistical procedures that correspond to the methods used
to assign numerical values, as well as the type and level of data being analyzed. Since the questionnaires employed in the current study are based on a traditional Likert format, with anchor points ranging from “strongly disagree” to “strongly agree,” nonparametric statistics were deemed appropriate. The nonparametric tools used include the Mann-Whitney U test, the Wilcoxon T test, and Spearman’s rho. The Mann-Whitney U test is an appropriate tool for comparing central tendencies between independent responses to Question 5 and 6 across the two language groups, while the Wilcoxon matched pairs T test is an appropriate tool for comparing central tendencies across the matched pairs of data. With regard to tests of association, Spearman’s rho is an appropriate measure for examining the correlation between matched responses to Questions 5 and 6 within each language group. When deemed appropriate and meaningful, means and standard deviations have been calculated for various data sets as well. All statistical tests were performed via SPSS and validated using other software. All results are reported in the format recommended by Jaccard and Becker (1990).

All collected surveys were used for the analysis. There was no exclusion or limitation of surveys based on any criteria. However, it should be noted that some respondents did not fill out all survey questions. For example, a small portion of both English and Spanish respondents did not fill out the second half of the surveys. Thus, the data used in different components of the analysis consist of different sample sizes, depending on the questions being examined. The software used for these analytical tests accounted for the missing data and thus calculated test values based only on the number of questions actually answered.

RESULTS AND DISCUSSION

For all tests, the alpha value was chosen to be $\alpha = 0.05$. For ease and uniformity of comparison between all tests, the $z$ value will be used. For the chosen $\alpha = 0.05$ and 2-tailed tests, the critical $z$ value is $z = \pm 1.96$.

Mann-Whitney U on Grouping by Language Choice

The Mann-Whitney U test was used to compare the central tendencies of responses to item 5: I have a greater trust now than before in my understanding of the National City website, based on the 97 English-based responses and the 36 Spanish-based responses. This item was designed to measure differences between respondents’ improvement of trust in their understanding of the information on the paralingual page only. The Mann-Whitney U and its corresponding $z$-value (-1.907) resulted in no statistical difference in perceptions between the English and Spanish respondents.

A second Mann-Whitney U test was used to compare the central tendencies of responses to item 6: I have a greater trust now than before because it is in English and Spanish side by side, again based on the 97 English-based responses and the 36 Spanish-based responses. This item was designed to measure differences between the respondents’ improvement of trust in regard to the information on the paralingual page, based on having the information in the two languages on the same page. This test yielded a $z$-value of -4.406 ($p < .01$), indicating that there were significant differences between the responses of the English and Spanish respondents with regard to this question.

These results partially support the hypothesis that use of paralingual web pages will increase trust in the page content and government sponsor. Since trust levels are different only when the paralingual information is considered, and the Spanish respondents showed higher medians than the English respondents in both items 5 and 6, the Spanish respondents show an increased level of trust based on the paralingual content.
Wilcoxon T Test on Grouping by Language Choice

The Wilcoxon matched-pairs T test was used to compare the central tendencies on data sets similar to those tested with the Mann-Whitney U test, items 5 and 6. The calculated z value for English items 5 and 6 is $z = -3.188$. This indicates that there is a statistical difference in the means of the answers to each item. For Spanish items 5 and 6, the calculated z value is $z = -1.034$ and we fail to reject the null hypothesis, therefore we conclude that there is no statistical difference in the means of the answers to each item.

This result seems to indicate that Spanish speakers improved their trust because the text was in Spanish, this does not necessarily support that a paralingual web design is necessary to improve trust and that simply being bi-lingual in some format will increase trust of the minority speakers.

Spearman’s rho on Grouping by Language Choice

Spearman’s rho was used to examine the relationship between responses on English item 5 (n=97) and 6 (n=97) to determine how well the English respondents’ answers correlated between the two items regarding trust. The test measures the level of correlation between these two items. The two-tailed test yielded $\rho = 0.504$ ($p < .01$), which was statistically significant.

Spearman’s rho was also calculated for Spanish items 5 (n=36) and 6 (n=36). The calculated correlation, $\rho = 0.563$ ($p<.01$), is significant for a 2-tailed test as calculated by SPSS.

Spearman’s rho was performed to see the degree of correlation between items 5 and 6 in each group. The rho value for English items 5 and 6 is 0.504, so the correlation is “significant”. For Spanish items 5 and 6 the rho value is 0.563, also significant. Thus each of the two groups answered consistently in the trust questions.

Readability Reflecting Ease of Use and Usefulness of the Paralingual Web Pages

Item 8 of the survey is a measure of the readability as reflecting ease of use and usefulness of the paralingual pages. The choices for responses had a range of five from “it was very difficult” to “it was very easy.” The percentages of the English respondents (n=97) who answered “it was somewhat easy” or “it was very easy” is 61.3 % and the percentage of Spanish respondents (n=36) answering similarly is 85.7%. This is interpreted to imply that having the page in paralingual format did not diminish readability and thus ease of use and usefulness, important to predicting acceptance of paralingual web pages by users. However, it is also implied that English respondents were more likely to find an impact to ease of use and usefulness. This may suggest that these respondents will be less accepting of a change to paralingual format as they perceive paralingual format to be less useful.

Alternative Analytical Calculations

Performing nonparametric tests is the appropriate method for analysis of ordinal data. These results have been shown in the previous section. However, means and standard deviations are more commonly understood and therefore used more commonly to describe data. Table 1 is a summary of the means and standard deviations for items 5, 6, and 8.

CONCLUSION

This article is primarily intended to provide evidence to support government decision makers, e-government researchers, and e-government web designers in applying paralingual web page design for improving trust in government in regions where there is a high proportion of bilingual residents. An experiment was performed to test the hypothesis that paralingual
web design will improve trust in the content of the e-government web page without significantly affecting ease of use and usefulness. This hypothesis was confirmed, but not quite as expected. It was found that the paralingual format improved trust for the minority speaker but not the majority speaker. Upon reflection this is an expected finding.

An additional finding with respect to ease of use and usefulness was noted. It was found that in general respondents did not find the paralingual format hard to read, however, it was noted that the majority speakers (English) were less enthusiastic than the minority (Spanish) speakers about the paralingual web design. This finding has implications for the adoption of paralingual web design in that it may show that there will be resistance to adoption of a paralingual web approach by the majority speakers. The implication to policy makers is that there needs to be additional research done with respect of citizen attitudes towards bilingual government prior to implementing a paralingual web strategy. This is particularly important in different regions of the United States where it could be expected that the generally favorable bilingual acceptance attitudes found in California may not exist.

The conclusion of this article is that paralingual web design is useful for e-government in areas with significant bilingual populations. However, there are limitations to this approach as it appears that there is a risk of backlash and rejection from the majority speaking population. The implication for policy makers is that paralingual web design should be used when there are known trust issues between majority and minority speakers that translate into trust issues with government and e-government initiatives.

**Limitations**

This experiment has a small sample with limited items testing improved trust and ease of use and usefulness. The conclusion that paralingual web design improved trust for the minority Spanish speakers is supported by the statistical analysis but it cannot be totally discounted that trust may have been increased simply because the content was in Spanish. Additionally, this experiment only looked at informational web pages and the conclusions may not apply to financial or other transactional web pages. Finally, only one city was looked at, one minority language used (Spanish,) and the sample population was self selected meaning that the results may not be reflective of all populations, cultures, and languages.

**Areas for Future Research**

There are several areas for future research of which the first are those areas that address the limitations to this research. This includes further studies using other languages and locations; obtaining a large sample size; and using transaction based web pages in addition to informational pages. It is expected that there may be ease of use and usefulness issues associated with paralingual web design used for transactional web pages which could affect adoption of the pages and requiring that the trust improvement from paralingual web design be balanced against ease of use and usefulness.

An additional area for future research is in using paralingual web design in a multilingual context.

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**Table 1. Means and standard deviations of survey data**

<table>
<thead>
<tr>
<th>Item</th>
<th>Value Range</th>
<th>English: Mean/StdDev</th>
<th>Spanish: Mean/StdDev</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1 - 7</td>
<td>4.2209/1.785</td>
<td>4.8182/1.286</td>
</tr>
<tr>
<td>6</td>
<td>1 - 7</td>
<td>3.5930/1.811</td>
<td>5.0606/1.540</td>
</tr>
<tr>
<td>8</td>
<td>1 - 5</td>
<td>3.88/1.259</td>
<td>4.366/0.994</td>
</tr>
</tbody>
</table>
environment. In this case multilingual implies more than two languages and is a topic of relevance in many countries in Europe and Asia (Finland and Switzerland are two examples). While there are historical examples of multilingual designs, none are in web page layouts (the Rosetta Stone is an example of a three language representation). Given the limitations on screen areas, especially for mobile and/or handheld devices, a paralingual web design involving three or more languages may not be practical or may induce substantial ease of use and usefulness issues. Research needs to be done to see if this is a practical approach or if more traditional approaches of having multiple versions of the same web page each in a different language is a preferable approach.

A final area for future research is in e-government policy. The conclusion that majority speakers may resist paralingual implementations is very important to policy makers. Research into what factors may influence majority speakers to accept and adopt paralingual implementations or which factors may influence majority speakers to reject paralingual implementations is critical to policy makers for crafting appropriate e-government strategies and policies. It is expected that paralingual web design will only be appropriate in regions where there is significant lack of trust by the minority speakers but this needs to be confirmed.

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Roy H. Segovia was born and raised in Dallas, Texas. He received his BSEE from Rice University in Houston, Texas. He lived more than 20 years in the southern California region, mostly in San Diego where he worked for a number of technology companies. He also became involved in the Latino communities of the border region of San Diego and Tijuana. In 2002 he started in the MBA program at San Diego State University with a focus on entrepreneurship and bilingual communications on the world wide Web. He completed the MBA program and his research on “paralingual” websites for government in August of 2006. He is currently living in the Silicon Valley area of California and is working on various technology projects, including further use of paralingual pages for government agencies.

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