Japanese elderly and computers in the workplace

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H. Umemuro, Japanese elderly and computers in the workplace (Keynote Address), Gerontechnology 2002;2(1): 63 - 67. As computers are rapidly introduced into workplaces, elderly people might have difficulty adapting to the new work environments. In addition to natural changes with age, factors such as cultural and linguistic differences may also make it challenging for older generation adults. This paper aims to examine these factors and propose possible interventions, citing experiences Japanese elderly might have. The factors discussed include the cognitive demand in handling a huge number of Japanese characters on computers, the demand to learn concepts and terms developed in regions with different languages, and difficulties in learning applications designed based on different work cultures. The discussions may seem to be specific to Japanese, however they may also apply to other societies with different languages and cultural backgrounds, and also to the design of computer systems that must support a wide variety of users.

Key Words: multilingual, multicultural, user interface, user diversity, training

As information technology is rapidly introduced into workplaces, there is an increasing demand for workers of all generations to acquire the necessary skills to do various tasks with computers. Among the generations in the work force, elderly people are often considered to have more difficulty adapting to new technologies. The factors generally known to hinder elderly people from adopting computers are natural declines in physical and cognitive abilities[1] and mental reluctance to learn new technology.

In addition to these physical and mental factors, elderly people may also have other kinds of difficulties due to social factors such as difference in cultures and languages. Most modern computer systems have been designed and developed primarily in North America and Europe, where cultures are relatively similar, and English or other Roman-alphabetic languages are spoken. In other regions of the world where the social backgrounds are different from these countries, users, especially older people, may experience additional difficulties in learning and using computers. These factors include different character sets, concepts, and terms of computers developed in other languages, and differences in ways of working.

The purpose of this paper is to illustrate the difficulties Japanese elderly might have when adopting information technology, and to discuss factors arising due to the differences in language and culture from the countries in which computers have been primarily developed. Some possible interventions are also discussed. The discussions in this paper may appear specific to Japan, however they may also be relevant to other countries that have different languages and different cultural backgrounds, especially other Asian countries, and also to the designers of computer systems that must support a wide variety of users.

HANDLING JAPANESE CHARACTERS ON COMPUTERS

The first and major problem for Japanese elderly is the handling of Japanese characters on computers. The number of characters computers have to handle to process the Japanese language is as many as six thousand[2]. Because of the huge number of characters used in the language, it is almost impossible to input all characters directly from "keyboards" with a limited number of keys. This makes the input of Japanese characters difficult, especially for elderly people.

Japanese language can be expressed in three different levels, or forms. The first and most fundamental expression is using Chinese (Kanji) characters along with sound (Kana) characters. Japanese language is usually written in this form. The total number of Chinese characters is said to be about 50 thousand, six thousand of which are frequently used[3]. Every Chinese character has its own meanings and sounds, while a number of Chinese characters may share the same sound. Thus, it is often impossible to identify one Chinese character, i.e. the meaning of a word, based only on its sound.

Sound characters alone can be used to express Japanese language, although it is not usual because most of the semantics held by the Chinese characters will be lost. Sound characters are only for expressing sounds; each character has a unique sound, but has no meaning itself. There are only 48 basic sound characters with some extensions, systematically organized in a standard table form. This standard table is popular among all generations of Japanese because it has been used to teach children in Japanese elementary schools.

Finally, Japanese characters can also be expressed using the Roman alphabet. Any sound in Japanese can be expressed as one vowel or a combination of a consonant and a vowel. This expression, called Roman characters expression, has a one-to-one mapping to sound characters.
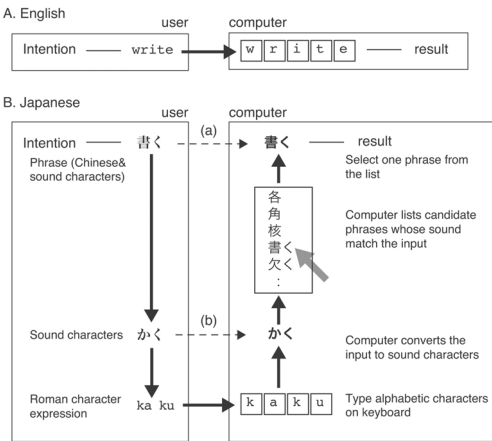
Among a number of methods to input

Figure 1. Comparison of input processes of English and Japanese using standard (QWERTY) keyboards. A: Words from languages using the Roman alphabet can be input directly with the standard keyboard. B: Japanese sentences need to be converted into Roman character expression before they are typed in and then converted back to Japanese expression.
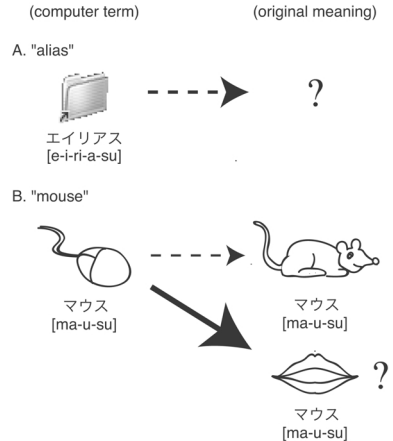

Figure 2. Examples of computer terms for which it might be difficult for Japanese elderly to understand the original meanings. A: As the original meaning of the term 'alias' is not commonly known, it would be perceived as merely a 'strange' word. B: The term 'mouse' may be associated with a wrong word and that may prevent correct understanding of the original meaning of the term.

Japanese using computer keyboards, most of the popular and widely accepted methods make use of the conversion between these three expressions of Japanese. In order to input Japanese using alphabetic keyboards, those methods require users to convert their intended Japanese sentences first into sounds, then into Roman characters expression. As shown in Figure 1, this conversion demands a certain amount of cognitive processing, which may interfere with the process of producing the text, compared with typing Western languages using Roman alphabets. Although most younger Japanese users are well accustomed to these kinds of methods, the cognitive demand can be significant for older users. Furthermore, the fact that a large proportion of Japanese older generations over 60 today are not familiar with typewriter (QWERTY) keyboards might make the typing process even more demanding.

One possible intervention could be the direct input of characters (dashed arrow (a) in Figure 1). However, the huge number of Chinese characters makes it very difficult to implement such direct input of all Japanese characters. (There have been, though, a few implementations of this idea using 'table-size' keyboards[3-4]).

Another possible solution would be using the set of sound characters (dashed arrow (b) in Figure 1). Because the number of sound characters is limited, it is feasible to design a keyboard or software keyboard for this character set. Umemuro[5] used a software keyboard with a touchscreen for the input of sound characters, and investigated whether this alternative method would influence the attitude of older adults toward computers. The results showed that all 16 participants with no or very limited computer experience were able to use the touchscreen computer even after a short training period of two hours, and there could be seen significant positive changes in participants' attitudes after the exposure to this touchscreen computer.

Other potential interventions include handwriting recognition[6], input methods with reduced keys (e.g. chord keyboard and T-9 method), and voice recognition. However, the large number of characters still makes it very challenging to apply these technologies to a satisfactory extent.

CONCEPTS AND TERMS DEVELOPED IN FOREIGN LANGUAGES

The second problem affecting older Japanese users is related to terminology. Learning to use a computer requires understanding a number of basic computing terms and concepts. Although most of the concepts and terms used in modern computers are analogous to those used in real life and thus expressed in plain language, the majority of the Japanese elderly population today does not speak English or other foreign languages, and are not familiar with even those simple words. This means they have to learn both concepts and terms as new things, without knowing the original word meanings (Figure 2, panel A).

Furthermore, the way some foreign words are introduced into Japanese is complicating the situation. In many cases foreign words have been introduced into the Japanese language system, not expressed in their original character sets (e.g. Roman alphabet) but by using sound characters that sound "similar" to the originals. However, because of the limited variation of Japanese sounds, some foreign sounds are not expressed correctly. For example, the 'th' sound in English is expressed as 's' or 'z' in Japanese, thus 'mouse' and 'mouth' cannot be distinguished when expressed in Japanese sound characters. As a result, one might associate computer terms with wrong words, leading to more confusion when trying to understand certain concepts (Figure 2, panel B). Though Japanese elderly may not speak English, they might know some foreign words that have been introduced into the Japanese language. Thus, they are more likely to be confused by this than younger generations who are more familiar with English.

There can be two kinds of interventions for this problem; one is to change either the labels of the concepts or the concepts themselves, to ones that make more sense to older Japanese users. One effort that may be taken is changing the expressions in menus and commands from sound character expressions of foreign words to Japanese words that represent the original meanings, although this might be costly and may even cause confusion among younger users who have already become accustomed to them. Another possibility is carefully designed training methods. Training for elderly users should take sufficient time to not only to teach unfamiliar terms, but also to help them understand the concepts behind them, or at least to teach the corresponding Japanese terms.

DIFFERENT CULTURE OF WORKING

The last factor to be discussed is the difference in culture or ways of working, between the countries where applications have been designed and where they are used. The applications are presumably designed based on the work model or method the designers have assumed. If the work model assumed while an application was developed is different from that of the users, they may have difficulty in understanding how the application would behave based on their own work experience; they have to learn not only about the application but also about the new, unfamiliar work method underlying it.

One simple example of such a difference can be found in e-mail systems. In America, circulating memos within offices has been a very common way to keep colleagues informed, or even to discuss and make decisions. The design of primitive e-mail systems, primarily developed in UNIX environments, seems to be based on those memo forms, with 'To:', 'From:', 'Date:', and 'Subject:' headers. On the other hand in Japan, as handling memos has not been as popular as in the United States, e-mail is often explained to beginners using an analogy to postcards or letters. Thus completing the 'To:' field is taught as putting the addressee's name and address, rather than somebody's name. The 'Subject:' and 'CC:' fields are even more difficult to understand using that analogy.

Again, there can be two kinds of interventions; one is to change the design concepts of applications themselves toward ones that more closely match the Japanese work culture. This may require the customization or even redesign of an application. Another is to design training programs that not only teach the operations of the applications but also introduce the work methods or cultural backgrounds on which the applications were designed.

CONCLUSION

This paper discussed three factors that might make it difficult for Japanese elderly to adapt to using modern computers. These factors arise due to the different language and culture of the societies where modern computers have been primarily designed, and they should be considered in addition to the factors commonly associated with the elderly such as the decline of physical and cognitive abilities.

As mentioned earlier, the development of modern computer design has primarily taken place in North America and Europe. Although computers have been introduced to Asian countries including Japan, and the societies have accepted them, there exist some difficulties for older users as discussed in this paper. In the very near future, as more of the world participates in the information society, the elderly population of these countries which may have different language and cultural backgrounds, must be considered. When considering effective interventions, there should be a major decision on the general direction or strategy: 'assimilation' or 'diversification'. Although an 'assimilation' strategy may be effective and efficient for younger generations of newer participants, it should be noted that it may also leave their older counterparts behind.

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