Comprehensibility of universal healthcare symbols for wayfinding in healthcare facilities

Seunghae Lee [a,*], Sibel Seda Dazkir [b], Hae Sun Paik [c], Aykut Coskun [d]

[a] Oregon State University, 327 Milam OSU, Corvallis, OR 97330, USA
[b] Georgia Southern University, School of Human Ecology, P.O. Box 8057, 1110 IT Drive, Statesboro, GA 30458, USA
[c] Land & Housing Institute, Korea Land & Housing Corporation, 462-2 Jeonmin-Dong, Yuseong-Gu, 305-731 Daejeon, Republic of Korea
[d] Department of Industrial Design, Middle East Technical University, Dumlupinar Bulv., Universiteler Mah. No: 1, 06800 Cankaya, Ankara, Turkey

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ABSTRACT

Healthcare facilities are often complex and overwhelming for visitors, and wayfinding in healthcare facilities can be challenging. As there is an increasing number of global citizens who travel to seek medical care in another country, it is critical to make wayfinding easy for visitors who are not familiar with the language in a foreign country. Among many wayfinding aids, symbols are helpful for those visitors who have limited ability to understand written language. This study tested universal healthcare symbols in the United States, South Korea, and Turkey to compare the comprehension of symbols cross-country and identify predictors of the correct comprehension. To explore statistically significant relationships between symbol comprehension and countries, Pearson's Chi-square tests, logistic regression, and ANOVA were conducted. The test results showed that ten symbols among 14 tested have significant relationship with countries. Results of this study demonstrate that symbol comprehension can be varied significantly in different countries.

1. Introduction

A graphic symbol is defined by the International Organization for Standards (ISO-2227:2007) as a visually perceptible figure with a particular meaning used to transmit information independently of language (ISO, 2007). With this research, we tested the comprehension of some existing healthcare graphical symbols in three different countries: the United States, South Korea, and Turkey. Testing the comprehension of the healthcare signs that are used in settings such as hospitals to aid wayfinding for patients and families is critical to signage development that is comprehensible to international users. Furthermore, testing those signs internationally is necessary for developing standardized, universal signs.

Developing universal signs will allow people from different cultural and linguistic backgrounds to easily find their way in hospitals and improve their experience in those settings. As the recent development and advancements in technology, communication, and transportation have expedited globalization, global integration has brought the world closer. The medical industry is not an exception to this trend. Patients from less developed countries have traveled to developed countries to receive better quality medical care as long as they can afford. The medical industry has witnessed patients who travel to the opposite direction. In other words, less wealthy patients from developed countries traveling to seek affordable medical care (Herrick, 2007). The globalization in healthcare industry may cause confusion and miscommunication as patients and their families may experience difficulties from cultural differences. In the era of increased globalization, developing universal signs will make it easier for people traveling internationally to reach quality care in hospital settings. In addition to international patients, members of minority populations who do not speak the major or the official language of that country and illiterate people would have difficulty finding their way in complex public environments such as hospitals.

Signs are very helpful for wayfinding, and effective wayfinding systems are critical in unfamiliar environments. It is indicated in the existing body of literature that public information signs in healthcare facilities need standardization (Gakopoulos, 2009; Hablamos Juntos, 2003a, b; Rousek and Hallbeck, 2011). Thus, there is a need for international testing of those signs. This study focuses on healthcare symbol designs that may help patients who have different cultural and language backgrounds. The results from this study will benefit healthcare facility planners and managers to

* Corresponding author. Tel.: + 1 541 737 5952.
E-mail address: Seunghae.Lee@oregonstate.edu (S. Lee).

provide a better facility user experience through easy navigation for global citizens.

1.1. Signs and symbols

Many people visit healthcare settings in their times of stress and uncertainty while searching for healing. Lahood and Brink (2010) explained that "lighting, color, finish materials, furniture, and wayfinding are key design elements that define how comfort and aesthetics can play various roles in the overall hospital aesthetic" (p. 23). Wayfinding can be defined as spatial problem solving (Arthur and Passini, 1992). It requires intellectual abilities including decision making, decision executing, and information processing. Among many wayfinding aids, signage is considered to be a critical component to help in wayfinding. Sounds (words) and images (symbols) are two basic ways to communicate. While people can communicate complex ideas effectively with words, signs are used across language barriers (Wyman and Berger, 2005). Signs carry words, symbols, or both. Signs direct people to destinations to which they desire to go. Settings such as hospitals are visited by people of diverse backgrounds. Therefore, it is crucial that the signage is designed to be comprehended universally (Salmi, 2007).

However, because signs are not interactive communication tools, people cannot ask questions when they do not understand them clearly. Thus, it is important that the messages on signs are easily understood without any further explanation and clarification (Carpman and Grant, 1993). People can navigate through hospital space easily when signs and pictograms are legible and can be clearly, quickly, and easily understandable (Gakopoulos, 2009).

Kendler (2012) highlighted the role of abstraction in signage design, as it simplifies the message and speeds up the cognitive process of comprehending the meaning by communicating the most important aspects of the referent. Simple, abstract line drawings are less distracting than a realistic representation of the referent. However, as Olmstead (1999) indicated, understanding the meaning of such abstract symbols depends on the viewer's familiarity with culturally learned symbols. Cultural differences between the sender and receiver of signs can cause misinterpretation (Olmstead, 1999).

Cowgill and Bolek (2003) suggested that a graphic symbol should utilize the essential facts about the referent, that the design of the sign should be uniform throughout the graphic and graphic system, that the symbols should be visually simple, that silhouette or side views should be preferred since they are easier to understand compared to frontal views, and that a symbol should be designed to be distinct from other signs to prevent confusion.

Foster and Afzalnia (2005) also highlighted a lack of studies on signage comprehension that report international data. In their study, they found agreement on a single variant across three different countries, supporting the fact that international general principles can be applied to symbol standardization. However, they also found lower levels of comprehensibility in Iran compared to Korea and the U.K., signifying the importance of gathering cross-cultural data. Olmstead (1994) collected data in the U.S., Japan, and China to test 41 symbols for seven health-care referents. She found that five symbols were estimated highly both in the U.S. and China, suggesting that universal symbols for healthcare facilities have potential to be understood in a cross-cultural fashion.

1.2. International symbols for healthcare facilities

With the influence of increased interests in globalization, the use of symbols to communicate with people of different cultural and linguistic backgrounds has become more important in recent decades. Using pictograms would be helpful in countries with high illiteracy rates or with immigrant or minority populations who cannot speak the major language of that country. In addition to communicating the referent to a diverse population of visitors, healthcare settings facilitate graphic symbols to avoid wayfinding problems that are due to the technical terms used on signs (Olmstead, 1999). Too often, medical and technical terms are not understood by patients and visitors (Carpman and Grant, 1993).

Foster and Afzalnia (2005) noted that even though symbols are useful for communicating with people with different languages, the existence of many different symbols for any specific referent can be confusing. Public information signs for healthcare facilities have been used sporadically, and there has been a lack of research on their standardization (Olmstead, 1999).

Pooaviah (reported in Gakopoulos, 2009) conducted a case study on signage systems in five hospital settings in Bombay, India. India has 1600 dialects and 14 major languages, and the education level of the population varies (Gakopoulos, 2009). The numeric signage systems used in the hospitals at the time of the study caused difficulty in wayfinding, and people ended up waiting in the wrong line for a long period of time. Such confusions can be prevented by replacing the numerical signage system with pictogram-based signage.

Healthcare signs should be intuitive, but their meanings still need to be explained to the public via distributing booklets to schools, organizations, and communities (Gakopoulos, 2009). Cowgill and Bolek (2003) also claimed that a symbol's meaning can be taught or learned. Standards Australia tested the effectiveness of nine healthcare symbols, and results showed that respondents' comprehension increased by twelve percent for the second test (Cowgill and Bolek, 2003).

However, Brugger (1999) claimed that symbols can be misinterpreted across cultures. Foster and Afzalnia (2005) explained that the differences found in cross-cultural data would depend on the "cultural specificity of the symbol or referent." A form that has a specific meaning or association with a specific object or person according to a cultural group may not denote or connote the same meaning in another cultural group. According to Foster and Afzalnia (2005), it is difficult to conclude whether or not a symbol interpretation can be culturally limited because it depends on the symbol.

This study focused on some existing healthcare symbols and tested its comprehensibility in three different countries in order to find out if people who live in different countries understand healthcare symbols with the same level of comprehensibility.

2. Method

2.1. Participants

This study employed the stratified sampling technique to select survey participants. The population was first segmented into mutually exclusive sub-groups by age and gender. In the sample, there were three age groups: 18–30, 31–50, and over 50 years of age. In addition, there were two gender groups: male and female. Participants were recruited in three countries among natives of each country: U. S., South Korea, and Turkey. These three countries are considered to represent three distinct cultures including Western, Eastern, and Middle-Eastern. Each age group from each of the three countries included 20 respondents with 10 male and 10 female participants. A convenient sample of a total of 180 consumers participated in the study.

2.2. Procedure

The oral consent of the participants was granted prior to their participation in the study, and the purpose of the study and experimental procedures were explained to each of them. Each respondent also completed a self-report sheet that was adapted