Journal of International and Intercultural Communication
Vol. 2, No. 2, May 2009, pp. 107–138

Routledge
Taylor & Francis Group

Assessing Cultural Differences in Translations: A Semantic Network Analysis of the Universal Declaration of Human Rights

Kyounghee Kwon, George A. Barnett & Hao Chen

Intercultural communication, in many cases, is cross-lingual communication. Effective cross-lingual communication requires successful translation processes. Translation quality involves two factors, the technical and the linguistic. Focusing on the influence of language factor, this study demonstrates the application of semantic network analysis and spatial modeling to examine translation equivalence. The examined texts are seven different linguistic versions of the Universal Declaration of Human Rights (six official languages and Korean). The results suggest that translations are roughly equivalent but with subtle differences reflective of each language's cultural predispositions. The paper concludes by discussing the importance of translation and language issues for intercultural communication.

Keywords: Translation; Cultural Difference; Semantic Network Analysis; Spatial Modeling; Language

Language is the main channel through which people convey and transmit thought. Meaning is embedded in and produced with language. However, in the process of intercultural communication, most cases are "cross-lingual" and shared understanding is limited by differences between languages.

In cross-lingual communication, translation is a necessary step to reach mutual understanding (Palmer & Barnett, 1984). Translation quality, which can be evaluated through examining translation equivalence, is affected by two factors: a technical

Kyounghee Kwon is a Doctoral Student in the Department of Communication, State University of New York at Buffalo. George A. Barnett is a Professor in the Department of Communication, State University of New York at Buffalo. Hao Chen is affiliated with the Department of Communication, State University of New York at Buffalo. Correspondence to: Kyonghee Kwon, Department of Communication, State University of New York at Buffalo, 359 Baldy Hall, Buffalo, NY 14260, USA. Email: kkwon3@buffalo.edu

ISSN 1751-3057 (print)/ISSN 1751-3065 (online)
DOI: 10.1080/17513050902759488

factor and a language or cultural factor (Brislin, 1970). While quality deteriorated by technical issues can be complemented by translators' expertise, translatability between the original and target language is more fundamental in that limitation is embedded in language and culture. Since solutions for the improvement of technical problems are more tangible, many translation studies have been predisposed to examine technical factors. On the other hand, the cultural or linguistic factors have been discussed superficially. This has led to a paucity of empirical examinations.

This study explores how language influences shared understanding of translation-based intercultural communication. Specifically, it examines the extent of semantic equivalence across multiple translations of a single document. As far as semantic equivalence implies translatability between languages, assessing semantic equivalence is related to how language influences the construction of the world view of members within a linguistic community.

The Sapir-Whorf hypothesis (Whorf, 1941) argues that particular features of a language are hard to precisely translate into other languages. Rather than adopting the anthropological or linguistic approach, however, this article approaches the issue of translatability through the perspective of cognitive processes and semantic networks. In a cognitive process, syntactic and semantic elements embedded in a translated text become "external stimuli to activate knowledge sedimented in our memory" (Wilss, 1990, p. 19). Cognitive processes derived from distinct semantic structures result in unique mappings of text as a whole, creating the possibility to differently understand the translated document that is supposed to convey the same meaning as the original text. The purpose of exploring semantic equivalence among multiple translations in this study is not just to suggest a practical guideline for how to increase technical accuracy of translation but to show to what extent mutual understanding is reached and where differences are inherent across separate languages.

The materials for this study are seven translation versions of the Universal Declaration of Human Rights (UDHR): Arabic, Chinese, English, French, Korean, Russian, and Spanish. This document is an appropriate material for three reasons. One, the UDHR is regarded as a cornerstone for establishing cross-cultural human rights standards (Morsink, 1999). Two, translations of the UDHR were done using accepted procedures, reducing the impact of technical factors on translation quality. Three, it is the most widely translated document following the Bible.

Given translation is "a vital means of communication between language bound cultures" (Barnett, Palmer, & Al-Deen, 1984, p. 660), semantic equivalence among translations of the UDHR is worthy of examination to see where there is shared interpretation of the UDHR among linguistic groups and where there is not. As meanings are produced under the "practical-world context" as well as under the "specific linguistic context" (Nida, 1959/1975a, p. 7), translatability of language is related to the discussion of cultural relativism surrounding the UDHR (e.g., Bielefeldt, 1995; Donnelly, 1984; Perry, 1997) in that language is inseparable from culture.

Before examining the influence of cultural factors on translation quality of the UDHR, the article first discusses the issue of translation quality aligning with the contentious notion of universalism of the UDHR. Then, it differentiates the two intervening factors in the translation procedures: technical versus cultural factors. Discussion of these factors will also incorporate the context surrounding the UDHR.

Issue of Translation Regarding the Universality of the UDHR

The universality of the UDHR has been discussed through various perspectives. While most literature discusses it through the historical (e.g., Carozza, 2003; Morsink, 1999; Waltz, 2001, 2002, 2004), political (e.g., Arat, 2006; Rawls, 1993; Risse, 1999; Speed & Collier, 2000) or cultural (e.g., Bielefeldt, 1995; Donnelly, 1984; Perry, 1997) perspectives, the influence of language diversity, despite being a representative product of culture, has not been actively addressed.

Language translation is directly related to shared understanding across cultures. Translation is a particularly crucial issue regarding international documents that need to be interpreted the same among separate nations. In most cases, international governmental organizations draft basic texts in English (Snell-Hornby, 2000). Drafted texts are translated into other official languages then into other languages as needed. In the case of the UDHR, the original document adopted and proclaimed in *General Assembly Resolution 217 A (III) of 10 December 1948* includes English, French and Spanish versions (Office of the High Commissioner for Human Rights, n.d.). The UDHR has been translated into over 300 different languages.

Although drafted in English, it is uncertain if an international document is predisposed toward the cultural values of the English speaking community. The language of international organizations is "International English as lingua franca" used by nonnative speakers (Snell-Hornby, 2000). It is distinguished from native English. Thus, it is hard to assert that International English gives the superiority to "English-ed" values. The raw materials have to be translated in native speakers' English as well as other languages (Snell-Hornby, 2000). Considering the use of English vocabulary and grammar, however, translation into other languages may be less equivalent than when translated into native English.

According to Weissbrodt and Hallendorff (1999), the process of selecting each word for the translation of the UDHR is a scrutinized procedure requiring translators with shared "technical, legal and cultural knowledge" (Snell-Hornby, 2000, p. 25). As a "cross-cultural exchange" (Venuti, 1998), translation of international documents including the UDHR require detailed quality assessment. However, there is a lack of research examining translation quality. Doise, Spin, and Clemence (1999) studied the cross-cultural understanding of the UDHR given the inconsistent attitude of individuals and cultural groups toward the set of rights and individual and governmental efficacy in respecting the UDHR. Their study examined cross-national differences in conceiving the efficacy of respecting or violating the UDHR rather than assessing different understandings resulting from translation. In analyzing the quality

of translation, semantic and conceptual equivalence has to be compared among translated texts (Barnett et al., 1984).

Factors Influencing Translation Quality: The UDHR Case

Currently, the UDHR has been translated into more than 300 languages through collaboration among international organizations and translators. Most translations are accessible on the official website of the UDHR (http://www.unhchr.ch/udhr), which identifies where each language source is acquired. For example, the original source of the Korean version of the UDHR is from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the Chinese version is from the United Nations Department of Public Information (UNDPI). In addition, the official website of the UDHR is open to individual translators around the world for the revision or adding of a translation.

Unlike many other materials for translation such as technical manuals or survey questionnaires, the UDHR as an international legal document is hardly ever revised. In addition, concepts included in the UDHR such as *equality*, *right*, or *dignity*, hold a relatively high level of abstractness compared to wordings found in technical documents. Therefore, existing methods that use a technical document as a target material are not effective tools for assessment of the translation of the UDHR.

Technical Factors Influencing Translation Quality

Technical problems of translation are derived from the conditions of source material. Complexity of the content, topic area, word choice, length of sentence, and sentence construction can influence the translation quality (Brislin, 1970). In order to reduce technical problems of UN documents, the Documentation Division[1] under the Department for General Assembly and Conference Management "provides reference and terminology services for authors, drafters, editors, interpreters, translators and verbatim reporters" (Department for General Assembly and Conference Management, n.d.).

Other sources of technical problems are translators' personal traits and qualifications. The best translation requires a translator's comprehension of the source language and creativity to convert the text into the target language based on linguistic, extralinguistic and situational knowledge (Hartmann, 1990; Wilss, 1990). When the text to be translated is not merely technical material, translation quality may depend heavily on translators' expertise. Translators' expertise does not seem to be problematic regarding the translation process in the United Nations, since they must be equipped with strong qualifications. Minimum qualifications require translators to know at least three of the six official UN languages and have work experience as a translator, experience living abroad, and years of documentation training. Also, they must hold at least a bachelor's degree. Many have master's degrees or a JD.[2]

The majority of translation studies that focus on technical improvements are oriented toward documents such as survey questionnaires, tests for cross-cultural or

national research or education (e.g., Brislin, 1970; Ervin & Bower, 1952; Hambleton, 2001; Lin, Chen, & Chiu, 2005; Maxwell, 1996; Van de Vijver & Hambleton, 1996). Van de Vijver and Hambleton specifically define the translation problem of survey instruments as "item bias." Item bias refers to misunderstanding caused by translation inaccuracy due to poor wording, inaccurate translation, or the inappropriateness of item content.

Three methods have been used in order to examine translation quality: (1) knowledge criteria, (2) performance testing, and (3) meaning equivalence examination (Brislin, 1970; Sinaiko & Brislin, 1973). Knowledge testing regards translation as equivalent if people give equivalent answers to questions related to the target material after reading the translated version. For example, Sireci and Berberoglu (2000) evaluated the equivalence of survey instruments between English and Turkish by evaluating responses from bilinguals. The Differential Item Functioning (DIF) methodology utilized in their study examines the equivalence of translation on the item level and finds specifically less-equivalent items that could not be easily found when examining the overall instrument. Performance testing refers to a method of examining translation quality by evaluating performance completion after reading the translated manual. For knowledge or performance testing to be utilized, information, response, or physical movement should be derived from a target source (Brislin, 1970). Therefore, application of these methods is limited to technical materials whose contents lead to concrete information or action. For a legal document such as the UDHR, knowledge testing and performance testing are difficult to apply.

Another way to assess translation quality is to examine meaning equivalence. Back-translation is a widely used method (Brislin, 1970; Ervin & Bower, 1952). Back-translation employs at least two bilinguals. One person translates the original text into the target language and the other translates the second text back into the original language, producing a back-translated text. Then, the original, translated, and back-translated texts are compared. Sometimes, the procedure is conducted by a committee, employing multiple translators (Brislin, 1970). Translation by a committee is helpful when there is construct bias, for example lexical incompatibility (Lin et al., 2005).

Successful application of back-translation requires several preconditions such as a straightforward writing style, original text open to revision, and similar structure between original and target language (Brislin, 1970). However, the preconditions for back-translation are not met for UN documents. Legal documents produced by the UN frequently involve abstract terms. Also, once completed, the original text is seldom open for revision. In addition, the target languages are the organization's six official languages and *all* current world languages, most of which are not structurally similar.

Language and Systemic Factors Influencing Semantic Equivalence

Brislin (1970) discusses that a function of target language influences translation quality and difference of language structure influences translation equivalence. Since "there are no exact correspondences between related words in different languages,"

absolute accuracy in translation is impossible (Nida, 1959/1975a, p. 5). Therefore, translation quality has to be examined in terms of the degree of equivalence, rather than simply assessing "accurate" or "inaccurate."

Nida (1959/1975b) indicates four problems of correspondence between different languages: (1) "the nonexistence of a term in the receptor language but with an equivalent function being performed by another referent"; (2) "the existence of the referent in the receptor language, but with a different function from what it has in the source language"; (3) "the nonexistence of the referent in the receptor language and no other referent with a parallel function"; and (4) "necessity of syntactic adjustments in transference of a message" (pp. 44–45). Ervin and Bower (1952) also point out a fundamental issue of translatability, indicating that lexical meanings (e.g., absence of objective referent, difference of richness in homonyms, difficulties caused by affective and figurative meanings, untranslatable concepts), grammatical meanings (e.g., difference in syntactical requirements, stylistic factors), and cultural context (e.g., adding courtesy phrase) influence translation quality.

Van de Vijver and Hambleton (1996) define the influence of language factors in translation quality of survey instrument as "construct bias." Related with the different lexical implication of a concept under a different cultural context, construct bias is produced when a concept used in a text (survey instrument) shows "non-negligible discrepancy across cultures" (p. 90). Van de Vijver and Hambleton provide the example of the concept "filial piety," which can have different conceptualizations and lead to different behavior among cultural groups.

Translation studies that connect translation quality with the issue of cognitive processes recognize that the gap in cognitive processes between two cultures is a critical obstacle to accomplish complete equivalence. Gommlich (1997) points out that even the well-trained professional translator's work may not be satisfactory regarding the "general linguistic aspect of the text" (p. 57). Gommlich states:

> Searching for an explanation for such inappropriate use of non-specialized linguistic elements, I came to the conclusion that [translators] must have had either comprehension problems with the L1 text, in that they had identified concepts or meanings [other than those that should not be identified], or that they were unable to select linguistic features from the reservoir of L2 items that would successfully cover the L1 concepts they were projecting for an L2 audience ... it is possible that [imperfect linguistic aspect of translation] might be indicative of an underlying cognitive rift involving the different text worlds of L1 and L2. (p. 58)

Although Gommlich's (1997) discussion is indicative of the significant influence of the language system, it focuses on the relationship exclusively on the source text, translator, and target text (process 1 in Figure 1). Discussions do not extend to the impact of the "different text worlds" on readers' understanding. The examination of semantic equivalence through a network approach not only embraces both the lexical and syntactic aspects of language but also considers readers' cognitive processing of a text, assuming that the semantic structure of each language represents the process of understanding each translated text (process 2 in Figure 1).

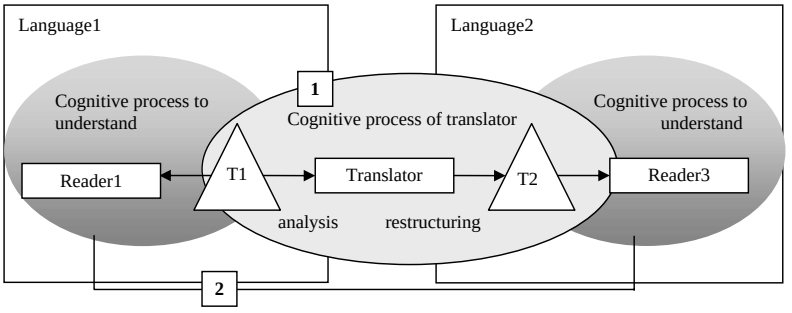

Figure 1. Cognitive process involved in translation/understanding.

Research Questions and Methods

The current study focuses on the influence of language factors on translation equivalence. Two general concerns underlie the present study. One, are the translations of the UDHR equivalent? Two, does the semantic structure of the UDHR show discrepancy across translations? If so, where are the significant differences?

For this examination, this study applies semantic network analysis and spatial modeling. As a method for computerized content analysis, the semantic network approach has been used to supplement limitations of traditional human-coded content analysis, such as the lack of reliability and the crude categorization of analytic framework (Danowski, 1993; Doerfel & Barnett, 1999; Krippendorff, 2004; Tian & Stewart, 2005; Woelfel & Stoyanoff, 2000). Semantic networks have also extended their application to the analysis of shared interpretation among community and organizational members, bridging the gap between individual perceptions and social influence (Jang & Barnett, 1994; Monge & Contractor, 2003). Semantic network analysis is useful to reveal subtle but consequential distinctions across texts (Rice & Danowski, 1993).

While many semantic network studies are based on sociosemantic networks, assuming that a social response results in shaping semantic relationship (Carley, 1997), the current study exclusively focuses on word relationships within the text. In other words, differences in semantic relationships are the result of differences in utilization and arrangement of words, not discrepancies in respondents' interpretation. Unlike sociosemantic networks analysis, this study assumes that different social responses could be due to semantic differences in a text. Text-based semantic networks analysis enables a more objective examination of translation equivalence than previous methods that are based on socially generated interpretations from respondents (e.g., Barnett et al., 1984; Brislin, 1970; Palmer & Barnett, 1984; Sireci & Berberoglu, 2000).

As translation equivalence can be examined through the similarity of semantic networks among each version, differences displayed in the semantic networks imply less equivalent translation. The study first determines if the semantic networks of each translation can be evaluated as equivalent as a whole through correlation

analyses: QAP[3] and Spearman's rank order correlation. The study assumes that high correlations among these semantic networks indicate greater equivalence between translations. Accordingly, the research question about the translation equivalence follows:

RQ1: Do the semantic networks of the UDHR show strong relations across different translations?

Beyond the examination of the overall equivalence among translations, it is also important to determine which words lead to the specific differences. These words are the concepts that may cause distorted translations or represent different cultural perspectives. Therefore, this study focuses on determining the concepts that show significant discrepancies in centrality and relations with other concepts across each semantic network. As an important structural attribute of a network, the centrality measure identifies the location and the importance of a word in relation with other words in the network (Freeman, 1979; Wasserman & Faust, 1994). Centrality is measured by the relationships or connections among concepts. In semantic networks, concepts with high centralities are identified as the important concepts composing the tenet of the text.

Many previous translation studies have used frequency of word occurrences as the criterion for comparison. Counting the frequency of occurrences does not consider the relations among the concepts. However, structural or relational properties are the essential attributes in the centrality measure of the semantic networks. The relational property, therefore, provides the centrality measure with explanatory advantages in analyzing semantic equivalences. Given the importance of the centrality measure, the second and third research questions follow:

RQ2: Are there differences in concept centralities in the semantic network of each translation?

RQ3: If there are differences, what are these concepts?

Semantic relationships can also be examined through spatial modeling of meaning. Spatial modeling has been widely used in attitude and cognitive change studies (e.g., Dinauer & Fink, 2005; Fink, Monahan, & Kaplowitz, 1989; Kaplowitz & Fink, 1988; Woelfel & Saltiel, 1988). The assumption of spatial modeling is that distances among concepts are represented in a spatial coordinate system (Dinauer & Fink, 2005). While spatial modeling of attitude or cognitions is based on psychological distances, the model of meaning examined in this study derives concepts distances from semantic structures. Prior research has shown the usefulness of spatial modeling not only for cognitive or attitudinal structures but also for semantic structure of concepts (Barnett et al., 1984). Spatial modeling of meaning has also been justified by Osgood, Suci, and Tannenbaum (1957), Barnett (1977), and Woelfel and Fink (1980). They argue that the meanings of concepts are created in relation to other concepts and the meaning domain is inherently multidimensional. Spatial modeling starts with a multidimensional space which is constructed through multidimensional scaling (MDS).

Like multidimensional scaling, spatial modeling is based on measures of distances or dissimilarities among objects (Woelfel & Fink, 1980, p. 62). Therefore, spatial modeling to examine translations equivalence requires the conversion of semantic networks into distance matrices that indicate dissimilarities among words. Distance matrices are the source for creating spatial coordinate systems. Once multidimensional spaces for each language are acquired based on the created coordinates, these spaces are compared to assess similarity or dissimilarity to one another.

One problem arising from the comparison of multiple multidimensional spaces is the arbitrary orientation of each space. This may be ameliorated by rotating the spaces to best fit to one another (Cliff, 1966; Hsieh, 2005; Woelfel & Barnett, 1992). In this study, the averages of the resulting distances are the representation of the dissimilarity between pairs of the semantic networks (languages) of the translated UDHR. The matrix composed of the mean distances is finally used for the visualization of the final result in the multidimensional spaces.

While centrality analyses show from which particular concepts the differences are derived, the multidimensional scaling renders a generalized explanation about the difference among languages. Accordingly, a related research question is posited:

RQ4: How are the similarity and dissimilarity among languages represented in the multidimensional space?

Research Procedures

Semantic Network Analysis

In current study, semantic networks of Arabic, Chinese, English, French, Korean, Russian, and Spanish versions of the UDHR are generated out of word co-occurrences (Danowski, 1993). In the measurement of co-occurrences, "defining word-pair link strength as the number of times each word occurs with another, every possible word pair has an occurrence distribution, whose values can range from zero on up" (Danowski, 1993, p. 197). Word pairs within a window can be given the connection weight either equally regardless of the distance or proportionally to how close the words are (Danowski, 1993). The software WORDLINK (Danowski, 1993) adopts the co-occurrence model.

This study, however, used the ZIPF software (Elbirt, 2006) for multilanguage analysis. Although the algorithm of ZIPF is based on the co-occurrence model similar to WORDLINK, the advantage of ZIPF is its ability to perform multilingual analysis. ZIPF creates two different matrices: a distance matrix and a binary matrix. In the distance matrix, the pairs are given different scores from 0 to 1 depending on the distance among the words in a window. On the other hand, the binary matrix, in which every word-pair within a window is considered as having the same strength ("1"), creates less-sensitive co-occurrence results than the distance matrix. In cross-language context, the distance matrix can produce inconsistent co-occurrence results between two languages not because of semantic or pragmatic issues but because of

the dissimilar syntactic or grammatical structures. Since the study examines cross-language issues emerging from word usages, sensitive results from different grammatical arrangement should be minimized. Accordingly, this study uses the binary matrix.

The first step in the study was the revision of the texts. Specifically, parts of speech such as suffix, pronoun, conjunction, and connectives were removed, tense and transitive verbs were adjusted and different forms of the same word were unified into an original form of the word. Although the original forms might be different between each language due to the grammatical difference, the change of form did not distort the meaning of words. In addition, through preliminary analysis, some words are modified to reduce the error. Specifically, the symbols *the United Nations*, *General Assembly*, *Member State*, and *human rights* were regarded as one word. Spaces between these words were deleted. Also, the words *equal/equality*, *free/freedom*, *social/society*, *all/every*, and *country/nation/national/state* were regarded as the same words. The title and each article number were also removed. Table 1 shows the example of the revisions of English and Korean texts.

This procedure was manually performed by bilinguals. According to Bhatia and Ritchie (2006) bilingual is a person who can produce complete and meaningful communication in a second language through reading, writing, listening, and speaking. The Chinese, French, Korean, Spanish, and Russian were revised by the bilinguals who use the languages as their first languages. The Arabic and English were revised by those who use these languages as their second languages. The bilinguals were recruited on campus through interpersonal connections. The Chinese, French, English, Russian, and Korean bilinguals were graduate students in the Communication department. The Spanish bilingual was a graduate student majoring in Education. The Arabic bilingual was a senior undergraduate student in Communication.

The second step was to create the co-occurrence matrices using ZIPF. The 40 most frequent words were retained for further analysis. The created matrices were then run through UCINET (Borgatti, Everett, & Freeman, 2002). UCINET creates maps of networks that visually display the relationships among words and calculates the centralities of each word. Various measurements of centrality such as degree, betweenness, closeness, information, and eigenvector describe "actor location" or "actor prominence" in a network (Wasserman & Faust, 1994). The current study adopts eigenvector centrality as a criterion measurement.[4] High centrality implies the central position of a word in a network. In this study, words with high centrality can be understood as the concepts representing the principal prepositions of the UDHR. The difference of a word's centrality across translations demonstrates its discrepant usage in each translation.

The third step was to examine the similarity through correlation analyses. Since both QAP and Spearman correlation allow the analyses only with the concepts that commonly appeared across the seven documents, new matrices with the words common to all translations were created. The matrices were used for QAP in UCINET and the centralities of these words were calculated from UCINET. Their ranks were

Table 1 Example of Text Revision.

	English	Korean
Original	Preamble Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world, Whereas disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind, and the advent of a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want has been proclaimed as the highest aspiration of the common people,	전 문 모든 인류 구성원의 천부의 존엄성과 동등하고 양도할 수 없는 권리를 인정하는 것이 세계의 자유 , 정의 및 평화의 기초이며 , 인권에 대한 무시와 경멸이 인류의 양심을 격분시키는 만행을 초래하였으며 , 인간이 언론과 신앙의 자유, 그리고 공포와 결핍으로부터의 자유를 누릴 수 있는 세계의 도래가 모든 사람들의 지고한 열망으로서 천명되어 왔으며,
After Adjustment	recognition inherent dignity equal inalienable right all member human family foundation free justice peace world disregard contempt humanrights result barbarous act outrage conscience mankind advent world human enjoy freedom speech belief free fear want proclaim high aspire common people	모든 인류 구성원 천부 존엄성 동등 양도 권리 인정 세계 자유 정의 평화 기초 인권 무시 경멸 인류 양심 격분 만행 초래 인간 언론 신앙 자유 공포 결핍 자유 누릴 세계 도래 모든 사람 지고한 열망 천명

used for the Spearman analysis. Unique words were not included in this analysis since the corresponding cells in different languages do not exist. Thus, the correlations overstate the equivalence between the pairs of languages.

Spatial Modeling

To further explore the systematic differences among the languages, spatial modeling was applied. The final comparison among seven semantic networks was based on the multidimensional scaling with the mean distances among the translations. The procedures to acquire the numeric values of mean distances were as follows.

The first step was to create coordinate systems from each of the co-occurrence matrices. The conversion of a co-occurrence matrix to a distance matrix was performed by subtracting the co-occurrence value in each cell from the maximum co-occurrences value: The larger a cell's co-occurrence, the closer the distance between concepts i and j. Then, the coordinates were generated from these distance matrices and used to locate the concepts in multidimensional space. The Galileo program (Barnett, Wigand,

Harrison, Woelfel, & Cohen, 1981; Woelfel & Fink, 1980) was used to generate seven multidimensional spaces, one for each translation.

In the second step, these seven spaces were compared to determine which concepts showed the greatest disparities among the multiple multidimensional spaces. Measuring the disparity of a word or symbol between two or more multidimensional spaces requires the rotation procedure. Researchers used "Galilean rotation solution" (Woelfel & Barnett, 1992; Woelfel & Fink, 1980; Woelfel, Holmes, & Kincaid, 1988), being aware of the limitations of the typical rotation solution, procrustean rotation (Cliff, 1966; Schönemann, 1966). According to Woelfel and Barnett (1992), the procrustean solution does not distinguish theoretically stable objects from the unconstrained or manipulated objects. The Galilean rotation sets a new reference frame comprising only stable objects that are assumed as invariant across multiple sets of data, and uses only the axes of these stable objects to minimize the "difference function," which is an underlying mathematical principle when rotating multi-dimensional configurations (Woelfel et al., 1988).

When the coordinate systems of multiple spatial datasets are compared, the result acquired through the procrustean solution can sometimes mislead the interpretation by obscuring the underlying processes. Indeed, Woelfel and Barnett's (1992) study of clock movement showed how the results of multidimensional scaling with the absence of theoretically stable objects became problematic. Specifically, when the time change was visualized in the multidimensional space with a procrustean rotation, there were significant movements of the time markers on the clock face (3, 6, 9, 12), which must be fixed in theory, as well as the hour, minute and second hands, thus making the movement of clock by time change hard to interpret. In contrast, when the rotation was conducted with Galileo, the result showed only the movement of the hands. The time markers remained motionless. Their trajectories were much closer to the clock movement.

Another advantage of using the Galilean rotation is that it does not forcefully fit the non-Euclidean dimensions into the Euclidean space. The coordinate systems created from semantic networks in this study were complex, including imaginary dimensions that were represented by negative eigenvalues. Rather than attempting to fit the imaginary portion of the space into Euclidean space artifactually, the Galilean rotation performs the operation separately between the real and imaginary parts and then reassembles by joining the rotated real and imaginary components (Hsieh, 2005).

In the examination of translation equivalence through spatial modeling, the theoretical assumption is that, if the structures of the two translated documents were exactly equivalent, the positions of concepts would be identical between the multidimensional spaces. The distances of the same concepts between the spaces would be zero. Based on this assumption, researchers set the concepts that commonly appeared between a pair of languages as stable objects and used them as the best fit for the other concepts. Since the concepts that were not common within the word lists cannot be compared by the distance between the two spaces, they were set as free

Table 2 Result of QAP Correlation Analysis.

	English	Arabic	Chinese	French	Korean	Russian	Spanish
English	1.000						
Arabic	0.842	1.000					
Chinese	0.726	0.68	1.000				
French	0.513	0.472	0.411	1.000			
Korean	0.637	0.587	0.558	0.865	1.000		
Russian	0.831	0.864	0.633	0.600	0.678	1.000	
Spanish	0.601	0.592	0.478	0.931	0.898	0.728	1.000
Average	0.691	0.673	0.581	0.632	0.704	0.647	0.704

Note. For every translation, correlation is significant at the 0.01 level.

objects. The rotation procedures resulted in the distances of concepts between the two multidimensional spaces of the 21 pairs of semantic networks (languages).[5]

The final step was to average the distances between the concepts into the mean distances between each pair of languages. Researchers created a new matrix based on these mean distances and used it for positioning languages in a two-dimensional space.

Results

Results of the Correlation Analyses across Translations

After running ZIPF, the words were listed according to their frequency. The total numbers of words were 388 for English, 453 for Arabic, 437 for Chinese, 418 for French, 375 for Korean, 412 for Russian, and 418 for Spanish. From the total word lists, the 40 most frequent words in each translation were extracted. Then, the binary

Table 3 Result of Spearman's Rank Order Correlation (*rho*).

	English	Arabic	Chinese	French	Korean	Russian	Spanish
English	1.000						
	(40)						
Arabic	.683	1.000					
	(25)	(40)					
Chinese	.702	.698	1.000				
	(32)	(25)	(40)				
French	.743	.573	.656	1.000			
	(29)	(29)	(28)	(40)			
Korean	.736	.698	.819	.816	1.000		
	(29)	(24)	(29)	(30)	(40)		
Russian	.578	.675	.645	.591	.800	1.000	
	(25)	(23)	(26)	(27)	(27)	(40)	
Spanish	.648	.747	.679	.712	.792	.697	1.000
	(31)	(27)	(29)	(31)	(30)	(26)	(40)
Average	.682	.679	.700	.682	.777	.664	.713

Note. For every translation, correlation is significant at the 0.01 level. Number in brackets is the number of words commonly appearing between the two languages.

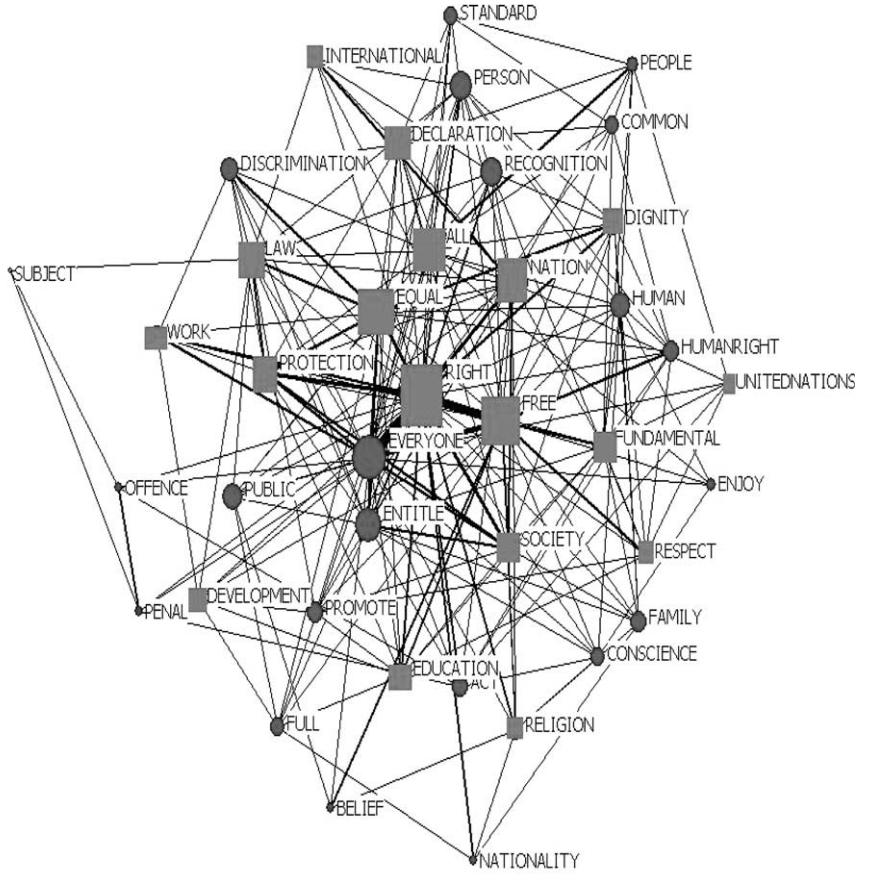

Figure 2. Network map of the English UDHR.

co-occurrence matrices were created for these 40 words. Based on the binary co-occurrences matrices, UCINET generated the centralities of each word (Table 4). The maps of semantic networks created based on the centralities display which concepts are centrally located and which concepts are linked to one another. The circle size of each word depends on the value of eigenvector centrality, meaning that the larger circle represents the more central concept. Lines in the maps show relationships between pairs of words: The thicker the line is the stronger the relationship between two words. Relationships represented by the linkages in the maps supplement the discussion of centrality results (Figures 2–8).

Centrality values and networks indicated that the words such as *right*, *every*, *person/people*, *human*, and *free/freedom* were the most centrally located concepts throughout all languages. They are linked to most other words directly. These words had the

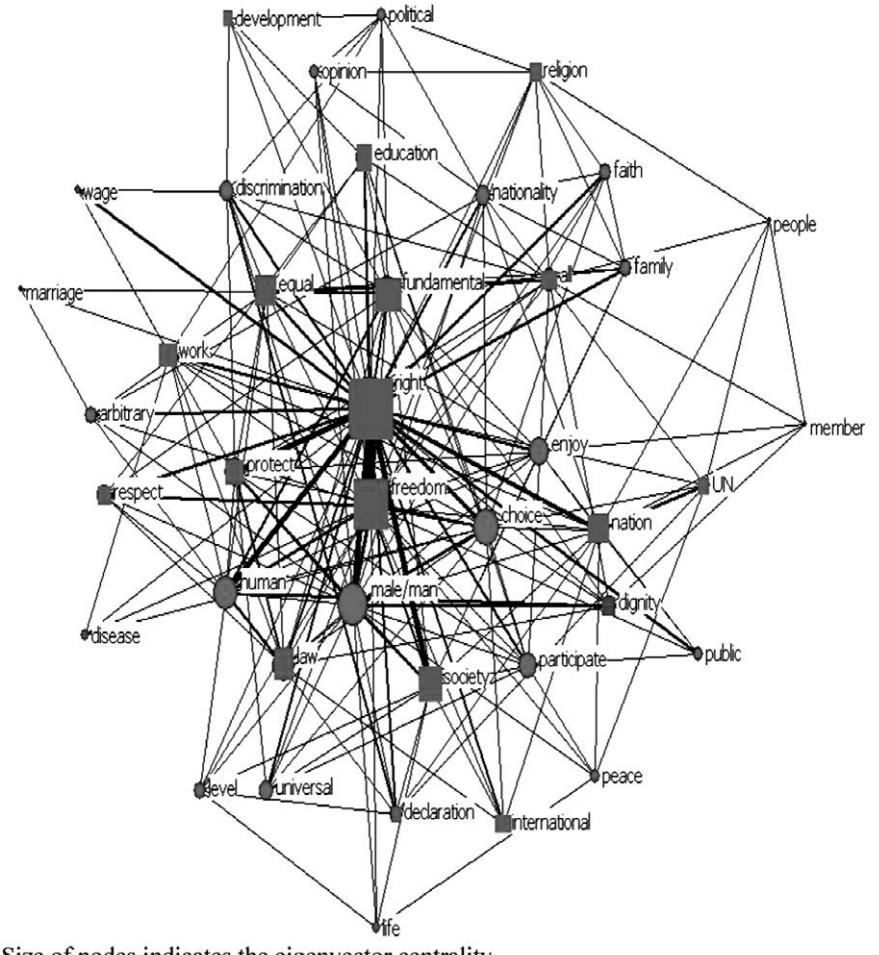

Figure 3. Network map of the Arabic UDHR.

highest centrality, representing the tenet of the text. Out of 40 most frequent words, only 18 words were common across all translations: *dignity*, *equal*, *rights*, *all*, *free*, *law*, *development*, *nation*, *UN*, *fundamental*, *society*, *respect*, *declaration*, *education*, *international*, *religion*, *protection*, and *work*. The number of words overlapping between two different translations ranged from 23 (Arabic and Russian) to 32 (English and Chinese; Table 3).

QAP correlations were conducted with these 18 common words (Table 2). The results revealed significant correlations among translations ($p < .01$). The correlation was the largest between French and Spanish ($r = .931$), relatively small between Chinese and French ($r = .411$), French and Arabic ($r = .472$), and Chinese and

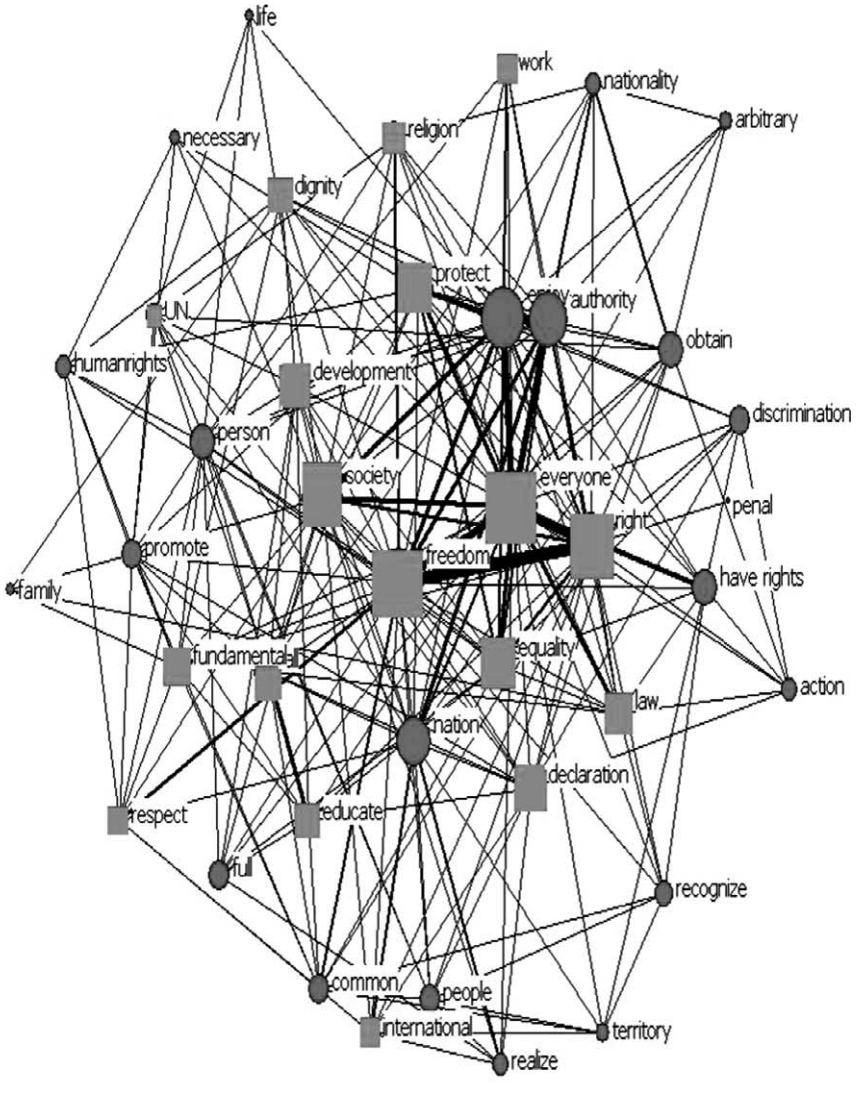

Figure 4. Network map of the Chinese UDHR.

Spanish ($r = .478$; Table 3). The average coefficient was the smallest for Chinese (0.581). The Spearman's correlations among eigenvector centralities were also significant ($p < .01$). The correlation was relatively low between Russian and English ($\rho = .578$), French and Russian ($\rho = .591$), and French and Arabic ($\rho = .573$).

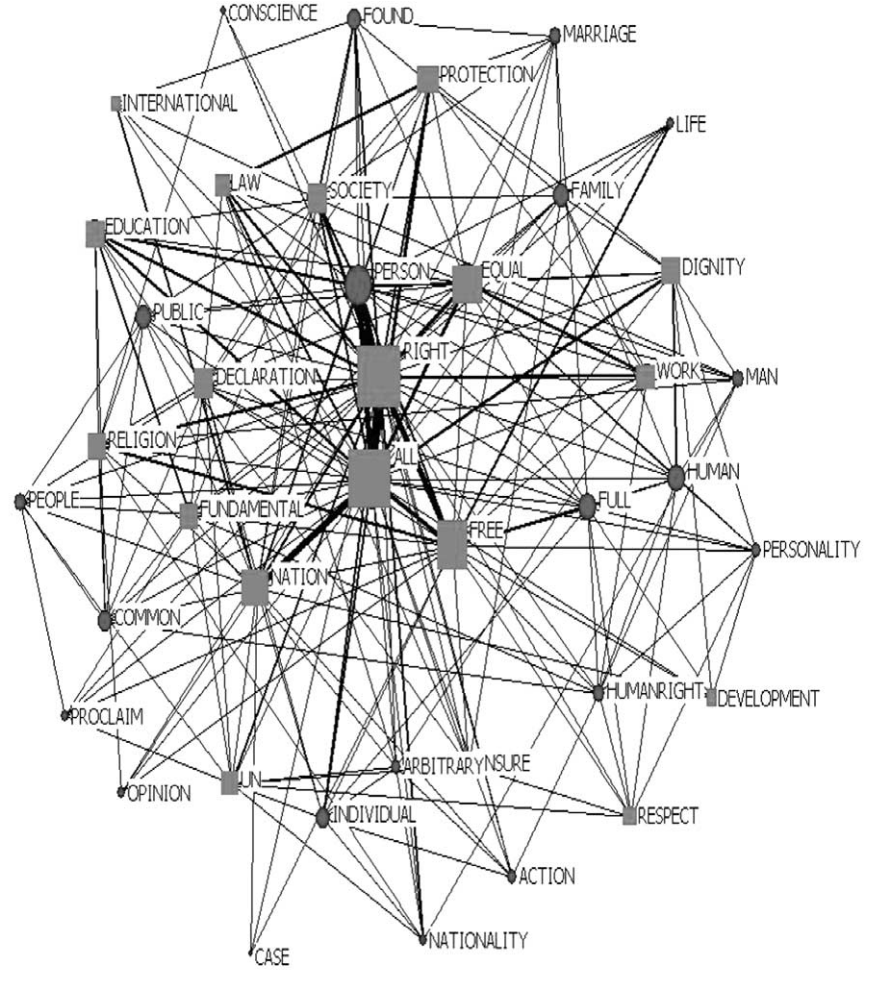

Figure 5. Network map of the French UDHR.

Although the coefficients were slightly different, significance revealed from QAP and the rank order correlations attests that the translations across seven languages are equivalent overall.

Comparison of Concept Centralities and Linkages across Translations

Although the correlation analyses revealed translations were equivalent overall, the analyses were restrained by using only common words. Words not included in the

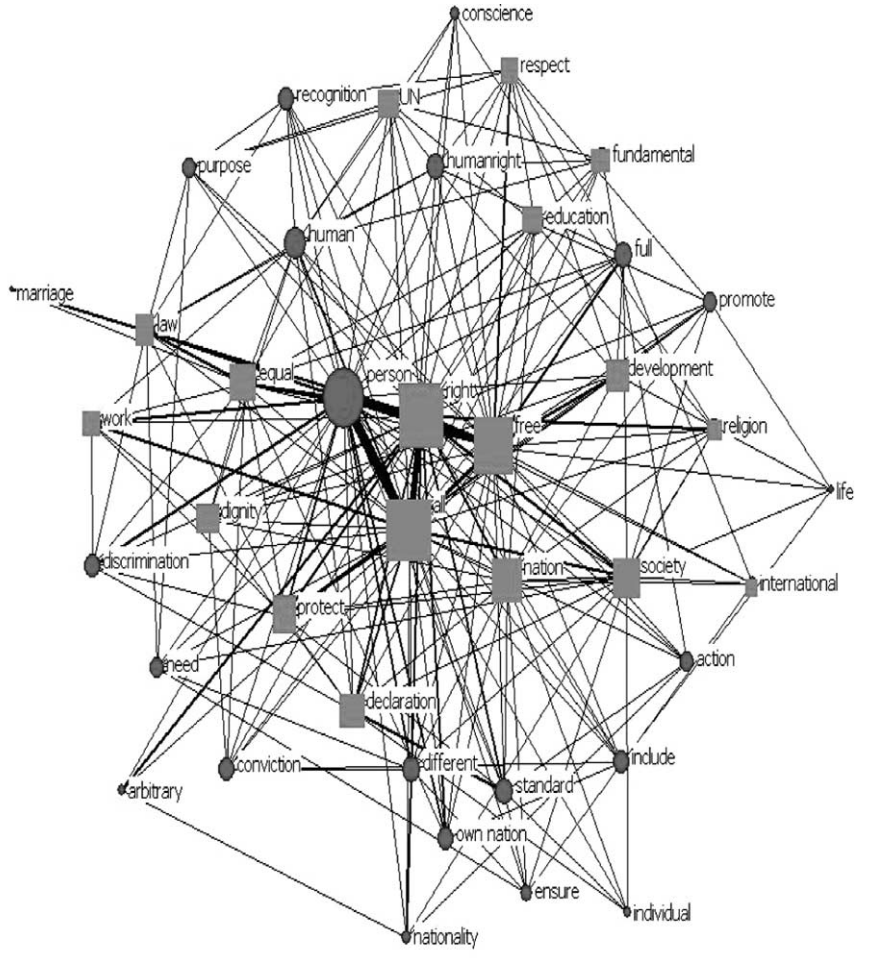

Figure 6. Network map of the Korean UDHR.

correlation analyses must be identified and determined if they display different centralities across translations. After excluding the common words, the others were determined to be worthy of assessment (bold words in Table 4).

Arabic displayed higher centrality for the word *fundamental* (eigenvector centrality = 30.31) and *law* (28.33) compared to other languages. Also, *faith* was a unique concept in the Arabic list, indicating that it is used widely in Arabic. On the other hand, the words *person* (not included in the list) and *people* (6.22) were relatively peripheral. Instead of these words, the term *man* (36.67) showed high

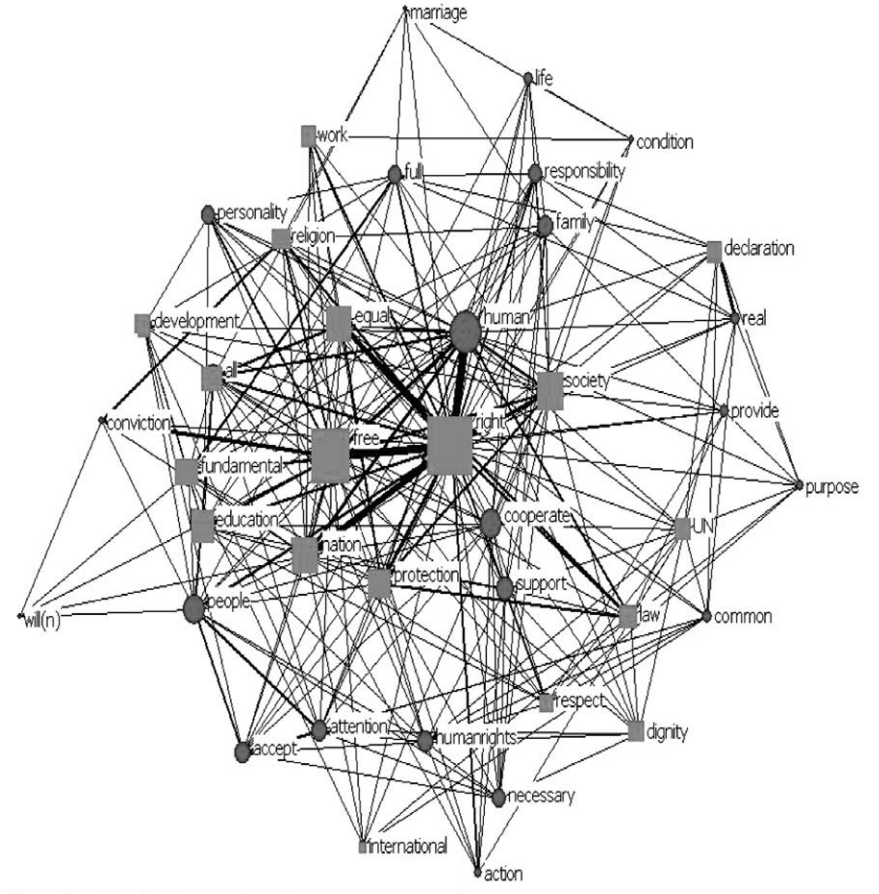

Figure 7. Network map of the Russian UDHR.

centrality in its usage compared to other languages. Specifically, English, Chinese, Korean, and Russian did not have *man* among the 40 most frequent words. The centrality for French and Spanish was 16.25 and 22.86 respectively, indicating that *man* is a more peripheral concept in their texts.

Also, the concept *all/every* and *full* in Arabic showed distinct usage; *full* was not included. The centrality of *all/every* in Arabic was only 21.57, while it was 32.30 in English, 22.42 in Chinese, 47.67 in French, 45.38 in Korean, and 34.75 in Spanish. Although *all/every* was peripheral in English, Chinese, and Spanish, they include the concept *everyone*, which was substitutable for the combination of words *all/every* and *person/people* or *human*, while Arabic did not have a substitute. The networks maps of all the other languages, including Russian, revealed relatively low centrality for *all/*

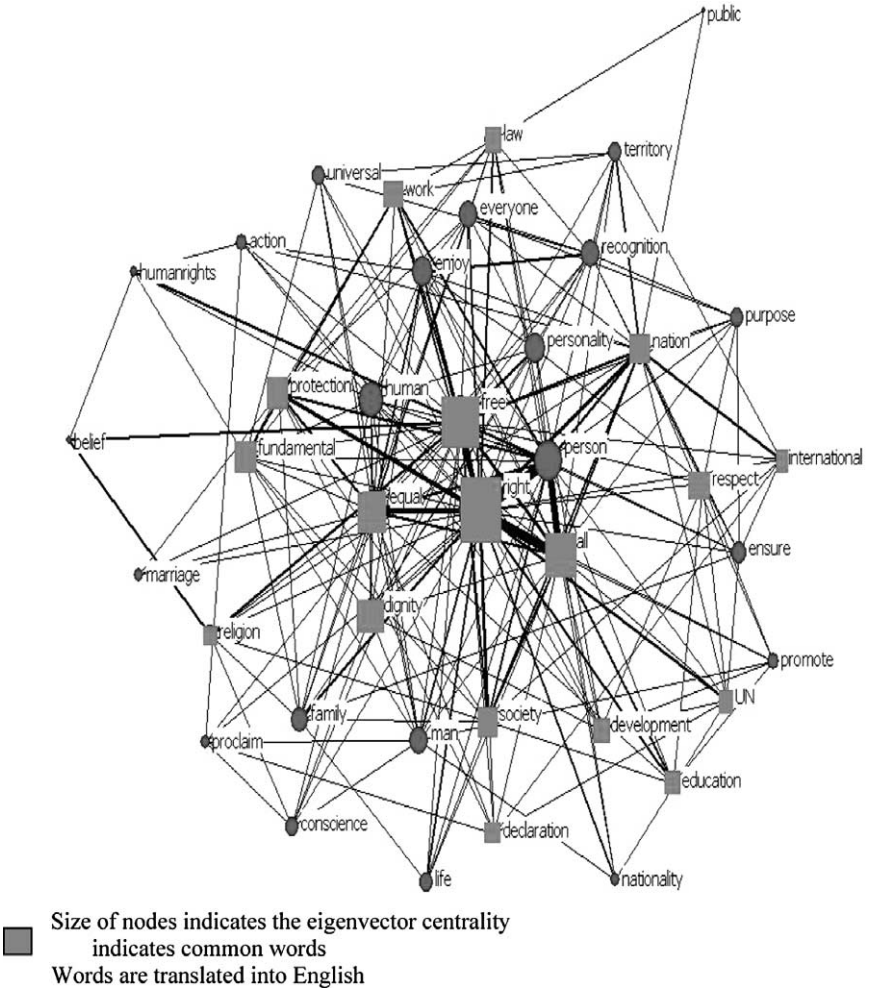

Figure 8. Network map of the Spanish UDHR.

every (23.62), conspicuously exhibit either the triangular connections among *rights*, *human* (or *person/people*), and *all/every* or the dyadic linkages between *everyone* and *rights*. However, the linkage of *all/every* is not connected to *rights* in the Arabic network (Figures 2–8).

In Chinese, the concept *everyone* had the highest centrality (43.60) followed by English (38.74) and Spanish (23.39). The centrality of the word *rights* (37.37) was relatively low in Chinese, compared to other languages: English (49.18), Arabic (54.43), French (51.14), Korean (47.19), Russian (48.99), and Spanish (50.55). However, there was a unique word meaning *have rights* (20.93) which replaced the word *rights* so that the low centrality of *rights* is not problematic. In Chinese, the word *enjoy* also retained the highest centrality (35.00). According to Figure 4, *enjoy* had relatively strong connections with the words *everyone*, *rights*, and *authority*,

indicating that the expression *have rights* was specified by the expression *enjoy rights*. The concept *authority* (36.76) appeared only in Chinese, with a strong connection to *enjoy* and *everyone*. The unique use of *authority* indicates Chinese's distinctive perspective toward the concept *authority* in relation with the notion of human rights. Another word showing high centrality in Chinese was *society/social* (33.63), followed by Russian (31.04). On the other hand, the centrality for the word *family* (6.99) was lower than other languages whose centralities were higher (>15.82).

In English, the word *entitle* (29.10) uniquely appeared with a strong tie with *everyone*. As a substitute for *rights*, *entitle* specifies the expression *having rights*. In addition, the English translation showed higher centrality for the word *law*. As the second highest following Arabic (28.33), *law* in English (26.75) had strong ties to *protection* and *equal* (Figure 2). Another distinct usage in English was in the centrality of the words *nation* and *nationality*. While the word *nation* had the highest centrality (35.07) across all languages examined, the word *nationality* had lower centrality (6.63) than in any other language. Considering that *nation*, *country*, *state*, and *national* were combined during the document revision, English usage of *nation* and *nationality* needs to be reconsidered if its use is to be distinguished from the other languages.

Russian did not include the singular form of words *person* or *individual* in its list. Instead, the word *people* (26.65) was more frequent than the other languages. Specifically, the centrality was only 12.23 for English, 6.22 for Arabic, 16.03 for Chinese, and 17.11 for French. The word was not included in the Korean and Spanish lists. In addition, Russian not only showed high centrality for *society* (31.40) but also identified words which connote the collectivity. These words were *provide* (14.90), *cooperate* (27.59), and *support* (22.54), all of which were not among the 40 most frequent words in the other languages. These words were linked to the word *rights* or *society* (Figure 7). Using the plural form of subject and collective verbs suggest cultural emphasis on social aspects of human rights.

In Korean, there was a unique word meaning *own nation* (16.97). Considering that the word *nation* also held a relatively high centrality (30.33), the notion of *nation* in Korean might be used more widely than in other languages. In contrast, the word *family* in Korean was not included among the 40 most frequent words. Considering its low centrality in Chinese (6.99), the usage of the concept *family* in Chinese and Korean was narrower and more particular compared to other languages.

In French, the centrality for the word *individual* (18.99) was high, followed by Korean (9.66). Other languages did not have *individual* in their word lists. In French, *individual* was linked to the word *rights*, *all*, *free*, *action*, and *nation*, indicating that the word *individual* was used as a substitute for *people*, *person* or *human* (Figure 5). The high centrality of *individual* indicates the emphasis on individual aspect of human rights in French.

Finally, Spanish showed higher centrality for the concept *dignity* (28.90) than other languages. The centrality for *dignity* was 19.15 in English, 18.27 in Arabic, 18.52 in Chinese, 21.73 in French, 22.71 in Korean, and 17.14 in Russian. Also, the concept *man/male* is relatively high (22.86) following Arabic. The centrality for the word *personality* was also high (24.52) compared to other languages.

Table 4 Centralities of 40 Most Frequent Words in Seven Translations.

ID	Word*	ENG	ARB	CHN	FRN	KOR	RUS	SPN
1	RECOGNITION	22.88		15.19		17.20		23.26
2	**DIGNITY**	19.53	18.27	18.52	21.73	22.71	17.14	**28.09**
3	EQUAL(ITY)	34.67	25.34	29.83	30.79	26.53	26.35	34.34
4	RIGHT	49.18	54.43	37.37	51.14	47.19	48.99	50.85
5	**ALL/EVERY**	32.30	**21.57**	22.42	**47.67**	45.38	**23.62**	34.75
6	HUMAN	21.37	30.67		22.66	24.96	36.61	29.80
7	**FAMILY**	15.82	15.98	**6.99**	**20.82**	**X**	19.92	19.85
8	FREE(DOM)	38.89	43.45	41.63	36.72	41.78	40.72	42.74
9	HUMANRIGHT	17.77	**X**	12.17	17.59	18.86	21.10	8.16
10	ACT	16.19		13.54		15.25	12.35	13.52
11	CONSCIENCE	15.31			9.82	11.74		14.35
12	**ENJOY**	10.90	24.63	**36.76**				25.53
13	BELIEF	7.99						4.61
14	COMMON	14.80		17.66	19.35		14.26	
15	**PEOPLE**	12.23	6.22	16.03	17.11		**26.65**	
16	**LAW**	**26.75**	**28.33**	23.53	16.38	19.82	19.63	20.73
17	PROMOTE	17.95		17.43		15.68		12.93
18	DEVELOPMENT	15.42	10.24	25.80	11.97	19.36	20.43	18.07
19	**NATION/state/country**	**35.07**	25.81	28.31	28.66	30.33	31.36	24.90
20	UNITEDNATIONS	9.71	12.77	13.18	19.46	18.48	19.44	15.87
21	**FUNDAMENTAL**	22.29	**30.31**	20.50	22.07	17.22	24.06	25.92
22	**PERSON**	23.57	**X**	20.82	33.06	44.99	**X**	34.47
23	**SOCIETY/social**	24.75	26.87	**35.00**	24.40	25.83	**31.04**	21.87
24	STANDARD	14.72				18.89		
25	RESPECT	15.33	18.30	14.93	13.97	17.46	19.36	18.66
26	**FULL**	14.27	**X**	16.44	23.51	20.07	19.61	
27	DECLARATION	25.78	16.69	25.39	24.83	23.59	13.96	15.74
28	EDUCATION	20.74	19.50	19.87	20.44	20.35	24.87	14.55
29	INTERNATIONAL	15.43	15.98	14.82	11.74	11.95	13.70	13.22
30	EVERYONE	38.74		43.60				23.39
31	**ENTITLE**	**29.10**						
32	RELIGION	16.14	15.38	19.53	21.42	15.73	18.28	14.94
33	SUBJECT	2.97						
34	DISCRIMINATION	19.39	18.34	16.75	24.83	16.62		
35	PROTECTION	27.14	26.30	26.33	21.59	23.54	27.26	21.84
36	PUBLIC	21.32	12.81		21.38			3.19
37	PENAL	7.99		2.68				
38	OFFENCE	7.99						
39	**NATIONALITY**	**6.63**	19.16	13.93	13.13	11.97		11.12
40	WORK	15.52	18.81	15.33	18.96	16.89	16.00	19.61
41	MEMBER		7.25					
42	PEACE		13.79					
43	**FAITH**		**16.45**					
44	LEVEL		16.47					
45	LIFE		10.32	7.58	13.07	8.02	14.11	14.32
46	OPINION		13.73		12.81			
47	POLITICAL		13.56					
48	CHOICE		33.72					
49	**MAN/MALE**		**36.67**		16.25			**22.86**
50	ARBITRARY		16.31	10.70	15.35	10.03		
51	UNIVERSAL		18.31					15.02
52	MARRIAGE		7.22		15.67	4.94	9.25	10.48
53	PARTICIPATE		22.07					

Table 4 (*Continued*)

ID	Word*	ENG	ARB	CHN	FRN	KOR	RUS	SPN
54	DISEASE		11.31					
55	WAGE		8.86					
56	**AUTHORITY**			**33.63**				
57	REALIZE			12.87				
58	NECESSARY			9.64		15.42	18.53	
59	TERRITORY			11.22				14.56
60	**HAVE RIGHTS**			**20.93**				
61	OBTAIN			21.36				
62	PROCLAIM				13.40			11.21
63	ENSURE				15.70	13.07		18.17
64	**INDIVIDUAL**				**18.99**	9.66		
65	FOUND				18.21			
66	PERSONALITY				15.60		18.86	24.52
67	CASE				8.04			
68	**CONVICTION**					**17.73**	**11.40**	
69	**OWN NATION**					**16.97**		
70	INCLUDE					16.92		
71	DIFFERENT					18.89		
72	PURPOSE					14.91	12.19	15.74
73	ATTENTION						21.19	
74	ACCEPT						20.61	
74	**WILL(N)**						**8.75**	
75	**PROVIDE**						**14.90**	
76	**COOPERATE**						**27.59**	
77	**SUPPORT**						**22.54**	
78	CONDITION						11.37	
79	**RESPONSIBILITY**						**17.89**	
80	REAL						13.96	
	Number of unique words	3	9	4	2	3	9	0

* Words are translated into English; words are listed by the order of appearance in the text; bold denotes those words worthy of assessment.

In sum, the overall translation quality of the UDHR is relatively equivalent according to the correlation analyses. However, the analysis of word centralities demonstrates subtle differences in the usage of words throughout different languages. The relationships among concepts displayed in network maps supplements the explanation of differences across translations. The words showing different centralities are not the specialized or professional terms but commonly utilized words. For example, words such as *man*, *individual*, *people*, *nation*, *law*, *faith*, or *family* that showed different centralities are readily used in ordinary life. These words showing different centralities represent the different cultural values embedded in language.

Results of Spatial Modeling

While the centrality analyses showed the differences derived from the particular concepts, the spatial modeling revealed the generalized similarity and dissimilarity

Table 5 Mean Distance Matrix for Seven Translations.

	Arabic	Chinese	English	French	Korean	Russian	Spanish
Arabic	0.000						
Chinese	5.672	0.000					
English	5.815	1.684	0.000				
French	5.620	2.271	2.038	0.000			
Korean	6.150	2.202	2.179	1.820	0.000		
Russian	6.409	7.349	7.399	7.408	7.730	0.000	
Spanish	5.819	6.562	6.697	6.627	6.854	6.830	0.000

among the languages. Following the procedures described previously, the distance of each concept between the 21 pairs of rotated datasets[6] and the multidimensional space with the mean distance matrix (Table 5) resulted from Galileo.

The results revealed that the two-dimensional solution could provide effective interpretation. The visualization of the space (Figure 9) is based on the metric multidimensional scaling. The two dimensions account for 77.8% of the variance among the seven languages.[7] The two-dimensional space displayed a cluster of Chinese, English, Korean, and French in one corner of the space and Arabic, Russian, and Spanish spread from one another. The characteristics of each dimension were determined by analyzing results of the distance of each concept from the rotated datasets.

First, the concept *freedom* and *equality* in Russian, Spanish, and Arabic was distant from the cluster of four languages. *Freedom* in Russian was 13.223 units different from French; 11.296 English; 10.812 Chinese; and 11.747 from Korean. *Equality* was 10.950 units from French; 9.463 English; 10.387 Chinese; and 10.766 Korean. The discrepancies seen in Arabic and Spanish were also larger than the average distance of concepts. Considering that the position of another important word *rights* also showed a large difference between Arabic, Spanish, and Russian and the other languages, it may be inferred that *freedom* and *equality* as the elements of human rights characterizes the first dimension, which distinguishes Russian, Spanish, and Arabic from the rest of the languages. Russian places more emphasis on equality while the other languages emphasize freedom.

Whereas the first dimension differentiates languages according to what human rights are, the second dimension is characterized by who are the recipients of rights. Concepts such *as all/every*, *person*, *everyone*, and *man/male* showed a big discrepancy between Arabic and Spanish and the other languages. For example, in Arabic, the concept *all/every* was 9.235 units from Korean, and 7.298 from French; the concept *everyone* was 10.725 from English; and the *man/male* was 8.695 from Korean, 8.899 French, 9.087 Chinese, and 10.036 from Russian. In Spanish, the concept *all/every* was 12.653 from English, 11.655 Chinese, 15.797 French, 12.582 Korean, and 10.902 from Russian; the concept *person* moved 10.179 from Chinese, 10.300 English, and 22.198 from French; and *man/male* was 9.650 from Russian. Between Spanish and Arabic, there were also distances larger than the average for the concept *man/male* (8.327)

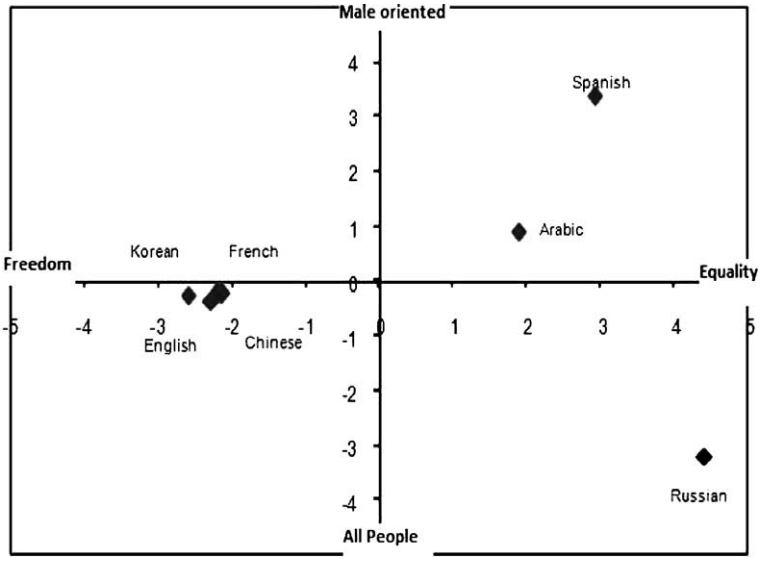

Figure 9. Two-multidimensional results of MDS among translations.

and *person* (14.842). To summarize, the second dimension is contingent on the subject who is supposed to have rights. For Spanish and Arabic males have these rights. For other languages, they apply to all people.

Summary of Findings and Limitations

Given the importance of the translation process as an intercultural issue, this study explored equivalence and discrepancies among seven translations of the UDHR. It attempted to show the systemic influence on translation quality rather than technical problems intervening in the translation processes. Based on semantic network analysis, subsequent correlation analyses, and spatial modeling, the study demonstrates that subtle differences exist in the translated documents, although they are technically sufficient to reach shared understanding.

The high correlations demonstrate that the translations of the UDHR are roughly equivalent leading to the mutual interpretation and understanding across different cultures. It indicates that the translation of the UDHR does not deteriorate shared understanding of the basic tenet of the document across different cultures. The high correlations throughout different languages may also be seen as the proof of what Laszlo (1973) argued, that cultural universality and absolute values do exist across cultures.

However, prior to concluding cultural universality, the equivalence of these seven languages needs to be seen in the context that they are global languages. They are used by large groups of people residing in the world's major cultures. In addition, except for Korean, six of the languages were the mother languages for at least one nation involved in the drafting of the UDHR. Therefore, the high correlations may be

an indication that the concepts comprising the UDHR have acquired consensus among cultures, allowing each language to embrace the expression of universalized values of human rights. If the study analyzed minority languages, the result might be different. For example, Cebuano is a native language of 20 millions in the Philippines. However, it is not an official language, used exclusively by the native speakers. If UDHR written in Cebuano were in the comparison, it could produce greater difference.

On the other hand, the results show subtle differences across languages. The study takes advantage of concepts' relational properties in distinguishing differences. The results of the centralities of several words across different languages supplement the argument that different cultures have distinct values. The interpretation of results was reinforced by examining word linkages displayed in the networks maps. For example, the high centrality of *man* in Arabic was understood as the substitute for the terms *person*, *individual*, *people*, or *everyone* through the comparison of word linkages across the networks of different languages. The interpretation of *entitle* in English and *enjoy* in Chinese also referred to their links to *rights* displayed in the maps. The spatial model also supports the existence of difference between languages through how each displays *equality* and *freedom* in relation to human rights, and which subject each language utilizes to define the targets of the UDHR. These differences may be due to either the effect of different meanings embedded in each concept or the effect of the different combination of words contingent on the availability of the alternative referents in the language.

Through the examination of semantic relationships and the spatial modeling of languages, the study found the possible influence of cultural values embedded in the languages: for example, the male-oriented language use in the Arabic and Spanish texts, the frequent use of the word *faith* in Arabic, the stress on individual's rights for French, the importance on the state of having rights for English and Chinese, the nation-oriented language use in Korean, and the collectivism in Chinese and Russian. These words may not deteriorate the overall interpretation of the UDHR but convey distinct cultural values. As Hofstede (2001) argues, "language is the most clearly recognizable part of culture" (p. 21), the different centralities in word use of the same document demonstrates that translation cannot be independent from cultural influence.

This study is not free from limitations. First, one should be aware of the potential researcher's bias. In this study, after the preliminary procedure, some important words, for example *all* and *every*, were combined following a researcher's decisions, while some remained uncombined, as in the case of the words *person* and *people*. These decisions depend on the researcher's purpose and insight rather than on an objective set of rules. Also, as Hofstede (2001) admits, the influence of the researcher's predisposed cultural values, pre-knowledge about language and culture cannot be completely neutral during text revision and the interpretation of the results. In particular, text revision is always a prerequisite for computer-aided text analysis including the semantic network analysis (Krippendorff, 2004). Restrained objectivity rising from the process of text adjustment always remains to some degree.

In addition, the assumption that the translations of the UDHR did not have technical problems should be questioned. The different centralities among words were considered as language issues that are intrinsic in the cultural differences. However, the assumption of befitting quality regarding technical factors is based on the general credibility toward the translation procedures done by the United Nations rather than empirical examination. Still it is equivocal if the technical and language factor can be distinguished from each other. The similarities and dissimilarities exposed in this study could be derived from translation processes that are not directly interpreted as intrinsic cultural values. Factors such as national political agendas at the time the document was translated or translators' own cultural backgrounds can be the sources of difference. Also, three original documents, the English, French, and Spanish versions, were proclaimed in the General Assembly Resolution. The document used as the original to be translated in Arabic, Chinese, Korean, and Russian could have made a difference. Unfortunately, the accessible translation resources did not clarify the original version on which translations were based.

Another limitation comes from the different procedures used to revise each document for analysis. For Spanish, English, Chinese, and Korean, the document adjustments were conducted in collaboration with researchers and bilinguals. Whenever bilinguals had a question during the revision, they could ask the researchers instantaneously. On the other hand, the revisions of the Arabic, French and Russian document were conducted solely by bilinguals. Although they were open to ask researchers via email if they had questions regarding the revision, Arabic, French, and Russian could have been less congruous with the research purpose than the revisions for Chinese, English, Korean, and Spanish. Moreover, the fluency of bilinguals was not consistent. Specifically, the Arabic bilingual was relatively less fluent than the others.

Future research is planned to further examine these theoretical and methodological issues. Other widely translated documents including versions of the Bible in diverse languages may be used to examine the role of cultural differences and cultural change (e.g., how the scriptures have changed over time) in the understanding of the text.

Implications and Conclusions

This article presented a method to examine quality of translation based upon the notion of equivalence among semantic networks. It took advantage of recent advances in computer-based content analysis and spatial modeling. It focused on the influence of the language factor to examine the equivalence of different versions of the United Nations' Universal Declaration of Human Rights. The results suggested that the translations were roughly equivalent but with subtle differences reflective of each language's culture.

Two distinctions in the declaration involved the notion of "freedom" versus "equality" and whether human rights applied to all people or only men. Given the treatment of women in parts of the world and the international verbal conflict over the issues as to whether human right was primarily concerned with individual

freedom or the equality of members of the collective, this is not a trivial point. These results indicate the difficulty of attempting to reach universal agreement among people from different linguistic or cultural groups even on topics where there is widespread recognition of their importance. Simply, there are idiosyncratic meanings, subtle differences based on culture, for the same referent. This suggests that there is no simple answer in the universal (Laszlo, 1973) versus relativist (Whorf, 1941) debate. Rather, the evidence points toward a complex answer, especially in terms of semantics. Communication between different cultural groups is possible, albeit with less than perfect fidelity.

The method presented here may be applied in those situations where there is need for accurate translations in which the actors must agree upon the meanings of the text: for example, in the negotiation of bilateral or multilateral treaties, contracts among trans-national organizations. Barnett et al. (1984) indicated how spatial modeling may be used to improve agreement of the meanings of translated texts. This article extended the previous research through the use of computer-based content analysis, which does not require multiple members of the linguistic group to provide interpretive data required to produce the spatial model. Thus, the accuracy of translation and the sources of the subtle distinctions between versions may be determined quickly and inexpensively during the actual production of the text. By removing these ambiguities and improving understanding in a timely manner future conflict can be avoided.

Notes

[1] "The Documentation Division comprises the Translation Services for the six official languages of the United Nations; the Editorial, Terminology and Reference Service; the German Translation Section; and the Contractual Translation Unit" (Department for General Assembly and Conference Management, n.d.). For more information, refer to the department's official website: http://www.un.org/Depts/DGACM/functions.html.

[2] See article about Carolyn Riding (Anonymous, 2003) and Samia Montasser's (2003) note.

[3] Quadratic Assignment Procedure (QAP) is used to examine the similarity between two matrices through measuring correlation of corresponding cells. The advantage of QAP analysis is that it enables direct tests of equivalence of two relational entities, retaining dyadic value of each cell, which is the product of row and column interdependence. The analysis tests the null hypothesis that two networks are uncorrelated. By a permutation procedure, referred to as the quadratic assignment procedure, one can determine the distribution of all possible correlations given the structures of the two matrices. See Krackhardt (1987).

[4] Eigenvector centrality is a more sophisticated version of the degree centrality (Freeman, 1979). While degree centrality considers only the number of connections or the sum of the strengths of the links a node has, eigenvector centrality acknowledges that the quality of connections should be regarded in addition to the quantity of connections (Newman, n.d.). The connection to the node which has higher centrality is given more weight in eigenvector centrality.

[5] There were 21 comparisons because there were seven different languages in this study. Thus, all possible combinations is equal to $(N(N-1)/2)$ where $N=7$.

[6] The coordinate matrices, rotated spaces, and the distance of each concept between the two datasets are not presented in this paper. However, they are available from the authors upon request.

[7] Adding 16% accounted for by the third dimension, 93.89% of variance was accounted for by the first three dimensions. Although it was not explicated in the article, the third dimension differentiates Arabic and Spanish.

References

Anonymous. (2003). French Major + Spanish, Minor = UN Translator. Retrieved February 10, 2007, from http://career.berkeley.edu/Article/030307b.stm

Arat, Z. F. K. (2006). Forging a global culture of human rights: Origins and prospects of the international bill of rights. *Human Rights Quarterly*, *28*, 416–437.

Barnett, G. A. (1977). Linguistic relativity: The role of the bilingual. In B. Ruben (Ed.), *Communication Yearbook 1* (pp. 397–414). New Brunswick, NJ: Transaction.

Barnett, G. A., Palmer, M. T., & Al-Deen, H. N. (1984). An examination of the use of multidimensional scaling to determine the accuracy of translation. In R. Bostrom (Ed.), *Communication Yearbook 8* (pp. 659–679). Beverly Hills, CA: Sage.

Barnett, G. A., Wigand, R. T., Harrison, R. P., Woelfel, J., & Cohen, A. A. (1981). Communication and cultural development: A multidimensional analysis. *Human Organization*, *40*, 330–337.

Bhatia, T. K., & Ritchie, W. C. (2006). *Handbook of bilingualism*. Oxford, UK: Blackwell.

Bielefeldt, H. (1995). Muslim voices in the Human Rights debate. *Human Rights Quarterly*, *17*, 587–617.

Borgatti, S., Everett, M., & Freeman, L. C. (2002). *UCINET: Network analysis software*. Columbia, SC: Analytic Technologies.

Brislin, R. W. (1970). Back-translation for cross cultural research. *Journal of Cross-Cultural Psychology*, *1*, 185–216.

Carley, K. M. (1997). Network text analysis: The network position of concepts. In C. W. Roberts (Ed.), *Text analysis for the social sciences* (pp. 79–100). Mahwah, NJ: Lawrence Erlbaum.

Carozza, P. G. (2003). From conquest to constitutions: Retrieving a Latin American tradition of the idea of human rights. *Human Rights Quarterly*, *25*, 281–313.

Cliff, N. (1966). Orthogonal rotation to congruence. *Psychometrika*, *31*, 33–42.

Danowski, J. A. (1993). Network analysis of message content. In W. D. Richards, Jr. & G. A. Barnett (Eds.), *Progress in communication sciences. Vol. 12* (pp. 197–220). Norwood, NJ: Albex.

Dinauer, L. D., & Fink, E. L. (2005). Inter-attitude structure and attitude dynamics: A comparison of the hierarchical and Galileo spatial-linkage models. *Human Communication Research*, *31*, 1–32.

Doerfel, M. L., & Barnett, G. A. (1999). A semantic network analysis of the International Communication Association. *Human Communication Research*, *25*, 589–603.

Doise, W., Spin, D., & Clemence, A. (1999). Human rights studied as social representations in a cross-national context. *European Journal of Social Psychology*, *29*, 1–29.

Donnelly, J. (1984). Cultural relativism and universal human rights. *Human Rights Quarterly*, *6*, 400–419.

Elbirt, B. (2006). Zipf 2.0 [Computer software]. Unpublished manual.

Ervin, S., & Bower, R. T. (1952). Translation problems in international surveys. *Public Opinion Quarterly*, *16*, 595–604.

Fink, E. L., Monahan, J. L., & Kaplowitz, S. A. (1989). A spatial model of the mere exposure effect. *Communication Research*, *16*, 746–769.

Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks*, *1*, 215–239.

Gommlich, K. (1997). Can translators learn two representational perspective? In J. H. Danks, G. M. Shreve, S. B. Fountain, & M. K. McBeath (Eds.), *Cognitive process in translation and interpretation, applied psychology. Vol. 3* (pp. 57–76). Thousand Oaks, CA: Sage.

Hambleton, R. K. (2001). The next generation of the ITC test translation and adaptation guidelines. *European Journal of Psychological Assessment*, *17*, 164–172.

Hartmann, R. R. K. (1990). The not so harmless drudgery of finding translation equivalents. *Language & Communication*, *10*, 47–55.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations* (2nd ed.). Thousand Oaks, CA: Sage.

Hsieh, R. J. C. (2005). *Comparison across the reference frame: Rotation of Galileo spaces with inconsistent objects. An example of comparison of use's perceptions and online legal policies.* Unpublished doctoral dissertation, State University of New York at Buffalo.

Jang, H., & Barnett, G. A. (1994). Cultural differences in organizational communication: A semantic network analysis. *Bulletin de Méthologie Sociologique*, *44*, 31–59.

Kaplowitz, S. A., & Fink, E. L. (1988). A spatial-linkage model of cognitive dynamics. In G. A. Barnett & J. Woelfel (Eds.), *Readings in the Galileo system: Theory, methods and applications* (pp. 117–147). Dubuque, IA: Kendall/Hunt.

Krackhardt, D. (1987). QAP partialling as a test of spuriousness. *Social Network*, *9*, 171–186.

Krippendorff, K. (2004). *Content analysis: An introduction to its methodology.* Thousand Oaks, CA: Sage.

Laszlo, E. (1973). A systems philosophy of human values. *Behavioral Science*, *18*, 250–259.

Lin, Y. H., Chen, C. Y., & Chiu, P. K. (2005). Cross cultural research and back-translation. *The Sport Journal*, *8*(4), 108–121. Retrieved February 7, 2007, from http://www.thesportjournal.org/article/cross-cultural-research-and-back-translation

Maxwell, B. (1996). Translation and cultural adaptation of the survey instruments. In M. O. Martin & D. L. Kelly (Eds.), *Third international mathematics and science study (TMISS) technical report: Vol. 1. Design and development.* Chestnut Hill, MA: Boston College. Retrieved February 8, 2007, from http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/25/e2/90.pdf.

Monge, P., & Contractor, N. (2003). *Theories of communication networks.* New York: Oxford University Press.

Montasser, S. (2003, May 29). *Becoming a UN translator.* Retrieved January, 2006, from http://listserv.linguistlist.org/cgi-bin/wa?A2=ind0305e&L=arabic-l&P=849

Morsink, J. (1999). *The universal declaration of human rights: Origins, drafting, and intent.* Philadelphia: University of Pennsylvania Press.

Newman, M. E. J. (n.d.). Mathematics of networks. In L. E. Blume & S. N. Durlauf (Eds.), *The new Palgrave encyclopedia of economics* (2nd ed.). Retrieved April 2, 2007, from http://www-personal.umich.edu/~mejn/pubs.html

Nida, E. A. (1975a). Analysis of meaning and dictionary making. In A. S. Dil (Ed.), *Language structure and translation* (pp. 1–23). Stanford, CA: Stanford University Press. (Reprinted from *International Journal of American Linguistics*, *24*, 279–292, 1959.)

Nida, E. A. (1975b). Principle of translation as exemplified by bible translating. In A. S. Dil (Ed.), *Language structure and translation* (pp. 24–46). Stanford, CA: Stanford University Press. (Reprinted from *On Translation*, pp. 11–31, by R. A. Brower, Ed., 1959, Cambridge, MA: Harvard University Press.)

Office of the High Commissioner for Human Rights. (n.d.). [Official website]. Retrieved March, 2007, from http://www.ohchr.org/english/law/.

Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning.* Urbana-Champaign, IL: University of Illinois Press.

Palmer, M. T., & Barnett, G. A. (1984). Using a spatial model to verify language translation. In W. B. Gudykunst & Y. Y. Kim (Eds.), *Methods for intercultural communication research* (pp. 129–146). Beverly Hills, CA: Sage.

Perry, M. J. (1997). Are human rights universal? The relativist challenge and related matters. *Human Rights Quarterly*, *19*, 461–509.

Rawls, J. (1993). The law of peoples. In S. Shute & S. Hurley (Eds.), *On human rights: The Oxford amnesty lectures* (pp. 68–71). New York: Basic Books.

Rice, R., & Danowski, J. A. (1993). Is it really just like a fancy answering machine? Comparing semantic networks of different types of voice mail users. *The Journal of Business Communication*, *30*, 369–397.

Risse, T. (1999). International norms and domestic change: Arguing and communicative behavior in the Human Rights area. *Politics & Society*, *27*, 529–559.

Schönemann, P. H. (1966). A generalized solution of the orthogonal procrustes problem. *Psychometrika*, *31*, 1–10.

Sinaiko, H. W., & Brislin, R. W. (1973). Evaluating language translations: Experiments on three assessment methods. *Journal of Applied Psychology*, *57*, 328–334.

Sireci, S. G., & Berberoglu, G. (2000). Using bilingual respondents to evaluate translated-adapted items. *Applied Measurement in Education*, *13*, 229–248.

Snell-Hornby, M. (2000). Communicating in the global village: On language, translation and cultural identity. In C. Schaffner (Ed.), *Translation in the global village* (pp. 11–28). Clevedon, UK: Multilingual Matters.

Speed, S., & Collier, J. F. (2000). Limiting indigenous autonomy in Chiapas, Mexico: The state government's use of human rights. *Human Rights Quarterly*, *22*, 877–905.

Tian, Y., & Stewart, C. M. (2005). Framing the SARS crisis: A computer-assisted text analysis of CNN and BBC online news reports of SARS. *Asian Journal of Communication*, *15*, 289–301.

United Nations, Department for General Assembly and Conference Management. (n.d.). *Functions of the department*. Retrieved January, 2006, from http://www.un.org/Depts/DGACM/functions.html

Universal Declaration of Human Rights. (n.d.). [Official website]. Retrieved January, 2006, from http://www.unhchr.ch/udhr/index.htm

Van de Vijver, F., & Hambleton, R. K. (1996). Translating tests: Some practical guidelines. *European Psychologist*, *1*, 89–99.

Venuti, L. (1998). *The scandals of translation: Towards an ethics of difference*. New York: Routledge.

Waltz, S. (2001). Universalizing human rights: The role of small states in the construction of the Universal Declaration of Human Rights. *Human Rights Quarterly*, *23*, 44–72.

Waltz, S. (2002). Reclaiming and rebuilding the history of Universal Declaration of Human Rights. *Third World Quarterly*, *23*(3), 437–448.

Waltz, S. (2004). Universal human rights: The contribution of Muslim state. *Human Rights Quarterly*, *26*, 799–844.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications*. New York: Cambridge University Press.

Weissbrodt, D., & Hallendorff, M. (1999). Travaux presparatoires of the Fair Trial Provision—article 8 to 11—of the Universal Declaration of Human Rights. *Human Rights Quarterly*, *21*, 1061–1096.

Whorf, B. L. (1941). The relation of habitual thought and behavior to language. In L. Sapir (Ed.), *Language, culture and personality: Essay in memory of Edward Sapir* (pp. 75–93). Menasha, WI: Sapir Memorial Publication Fund.

Wilss, W. (1990). Cognitive aspects of the translation process. *Language & Communication*, *10*(1), 19–36.

Woelfel, J., & Barnett, G. A. (1992). Procedures for controlling reference frame effects in the measurement of multidimensional processes. *Quality & Quantity*, *26*, 367–381.

Woelfel, J., & Fink, E. L. (1980). *The measurement of communication processes: Galileo theory and method*. New York: Academic Press.

Woelfel, J., Holmes, R., & Kincaid, D. L. (1988). Rotation to congruence for general Riemann surfaces under theoretical constraints. In G. A. Barnett & J. Woelfel (Eds.), *Readings in the Galileo system: Theory, methods and applications* (pp. 219–234). Dubuque, IA: Kendall/Hunt.

Woelfel, J., & Saltiel, J. (1988). Cognitive processes as motions in a multidimensional space. In G. A. Barnett & J. Woelfel (Eds.), *Readings in the Galileo system: Theory, methods and applications* (pp. 35–54). Dubuque, IA: Kendall/Hunt.

Woelfel, J., & Stoyanoff, N. (2000). CATPAC: A neural network for qualitative analysis of text. Paper included in the software CATPAC (version II). Buffalo, NY: Galileo Company.