EQUIVALENCE ASSESSMENT IN DIGITAL GOVERNMENT RESEARCH

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I. INTRODUCTION

Available methods of translation validation include the bilingual approach (Yang 1980), the back-translation approach (Brislin 1980), and the field pre-testing approach (Brislin 1973). The method chosen for this research is adapted from Brislin's method for two reasons. First, after reviewing several validation studies of translation in cross-cultural studies, he suggested that back-translation, compared with other techniques, is more appropriate for cross-cultural translation.

Second, Hulin (1987) has suggested that other methods, such as the bilingual method, are questionable. He contended that bilingual individuals have a tendency to adopt some concepts and values of the culture of the second language that they have mastered and thus the use of bilinguals as test subjects may represent a separate population whose response cannot be generalized to a monolingual population.

II. Method

2.1. Subject Matter Experts

Two groups of experts were recruited: a group of four experts bilingual in English and Korean for performing translation, and another group of two bilingual translators for evaluating the quality of the translation. The qualifications of the six bilingual experts were: 1) previous experience in translating written materials including social scientific materials and psychometric concepts from English to Korean and from Korean to English and 2) life experience of five or more years in both American and Korean cultures. The specific tasks to be accomplished by the group of four bilingual experts were to translate each item from English to Korean and back-translate the Korean version into English. The other two bilingual experts were assistant professors with Ph.D. degrees in organizational behavior and psychological measurement from universities in the United States. Their task was to determine whether the measures that the bilingual experts back-translated into English were semantically equivalent to the original English version of those measures.

Figure 1. Authorities Consulted in Translating the Research Instrument

Name	Qualifications
1. Ms. Myungwon, Choi	• M.A. from Graduate School for Interpretation and Translation, Hankuk University of Foreign Studies Fellowship Program Coordinator at Korean Foundation
2. Mr. Hyouk-Keun, Kim	• B.A. from Seoul National University (Linguistics) • M.A. from Carnegie-Mellon University • Ph.D. Candidate at Georgetown University (Computational Linguistics)
3. Mr. Seung-Ho, Lee, Ph.D	• B.A. from Hankuk University of Foreign Studies (English) • M.A. from State University of New York at Albany • Ph.D. from State Univeristy of New York at Albany (Political Science)
4. Mr. Ha-Young, Byun	• B.A from Chungnam University (English) • M.A. from University of Pennsylvania • Ph.D candidate at University of Pennsylvania (Urban Planning)
5. Mr. Je-Sang Kang, Ph.D	• Assistant Professor • B.A. from Hanyang University (English) • M.A. from State University of New York at Albany • Ph.D. from New York University (Organizational Behavior)
6. Mr. Chang-Won, Lee, Ph.D	• Assistant Professor • B.A from Hankuk University of Foreign Studies • M.A from State University of New York at Albany • Ph.D. from State University of New York at Albany (Organizational Behavior)

2.2. The Translation Process

Following a model developed by Brislin (1980), the translation process was divided into 4 steps: 1) English-Korean translation, 2) blind back-translation, 3) review by bilingual committee, and 4) testing by an independent panel. The overall process is described in Figure 6.

2.2.1. English-Korean Translation

After the author converted the items to a digital government context, the first step in the translation and validation process was to produce a preliminary translation of the instrument from source language to target language. Brislin (1980) emphasized that the translator must be truly bilingual and sufficiently educated to have knowledge of the specific subject language required. As noted previously, the experts who had translated 1) previous experience in translating written materials from English to Korean and from Korean to English, including translation of social scientific materials and psychometric concepts, and 2) life experience of five or more years in both American and Korean cultures. Two translators were used in order to eliminate biases that might exist if one individual did the translation. Their task was to generate a translation that was as close as possible in structure and format to the English version (Brislin 1980), while at the same time being attentive to the cultural uniqueness of Korean population. Each of the translators first independently translated the 35-items into Korean (including the instructions, items, and response formats). They then met to resolve discrepancies between their translations and to synthesize a single Korean version of each item.
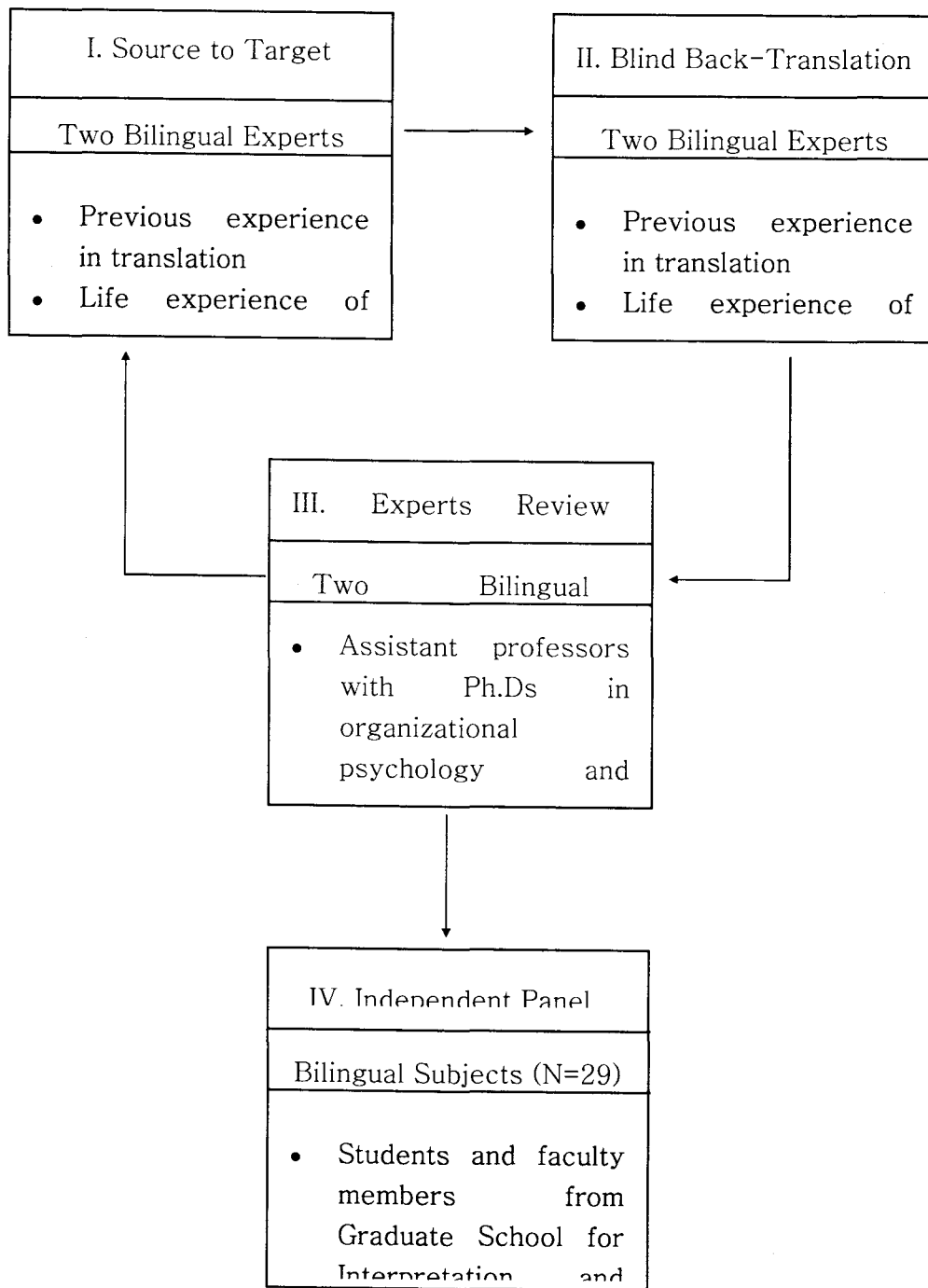
2.2.2. Blind Back-Translation

The second step in the process was a back-translation of the Korean translations into English. Back-translation is specifically designed to test the consistency between the statements in their original and target languages. To perform such a test, the target language statements are translated back into the source language by bilingual experts who have not seen the original statements in the source language (Brislin 1980).

Two bilingual experts with qualifications equivalent to those of the experts who did the original translation were recruited to translate the synthesized Korean items into English. Two back-translators were used to eliminate biases which might exist if one individual did the back-translation. These two experts did not see the original English versions or consult with the original translators. They were shown only the Korean versions of the statements which they were to translate.

Each translator first independently back-translated the Korean versions into English (including the instructions, items, and

response formats). The two then met to discuss differences in their versions and to arrive at a synthesized back-translation.

Figure 2. Translation and Validation Process

I. Source to Target
Two Bilingual Experts
• Previous experience in translation • Life experience of

II. Blind Back-Translation
Two Bilingual Experts
• Previous experience in translation • Life experience of

III. Experts Review
Two Bilingual
• Assistant professors with Ph.Ds in organizational psychology and

IV. Independent Panel
Bilingual Subjects (N=29)
• Students and faculty members from Graduate School for Interpretation and

2.2.3. Review by Bilingual Expert Committee

The third stage of the translation process was a comparison of the original and back-translated English versions by another pair of bilingual experts.

The two experts recruited both have Ph.Ds. in organizational behavior and psychological measurement from major U.S. universities. They were independently provided with both the original and the back-translated versions, and asked to determine whether the different versions had the same meanings. For each item, the bilingual experts were asked to rate the comparability of the two versions on a Likert scale ranging from 1 (extremely comparable) through 4 (moderately comparable) to 7 (not at all comparable), where comparability was defined as the formal similarity of words, phrases, and sentences. If the average comparability score between two judges was less than 3.5, the translation was categorized as equivalent and if the average score was higher than 3.5, it was categorized as not equivalent. Twenty-five out of 35 items were judged to be equivalent English/Korean-Korean/English translations. The remaining 10 items were in need of further attention. These 10 were discussed among the four translators in order to synthesize an alternative Korean translation for each unit. They were then back-translated into English. The comparability of the new back-translation was rated by the bilingual committee, and four items were still rated different (see Figure 7). These items were corrected as much as was possible by the bilingual experts. Thus, a set of 31 semantically equivalent and four semantically approximate items were produced in both English and Korean.

Figure 3. The Four Most Discrepant Items

Original Wording	Best Back-Translation
In the Flow Measure Q_1 When using the Digital Government, I felt in control.	Q_1 I controlled the Digital Government.
Q_2 I felt I had no control over my interaction with the Digital Government.	Q_2 I could not control my use of the Digital Government.

Q_4 When using the Digital Government, I thought about other things.	Q_4 When using the Digital Government, I could not concentrate on the computer.
In the EUCS Measure	
Q_{16} The Digital Government provided sufficient information.	Q_{16} The Digital Government provided a bare sufficiency of information.

2.2.4. Independent Panel Testing

The final stage in the validation process was testing with an independent bilingual panel. Twenty-nine bilingual graduate students from the Graduate School for Interpretation and Translation, Hankuk University of Foreign Studies were recruited. The participants were not asked to express attitudes toward the digital government, but rather to rate the validity of the back-translation process. Figure shows the results of their evaluation. For example, the two versions of item 1 (original and back-translated) were considered by the participants to be very comparable in language. The minimum discrepancy Likert score for item 1 is 1. The maximum discrepancy score is 4 and average discrepancy score is 2.34 with standard deviation 0.72. This shows that among the 29 field test subjects there was a strong consensus on the consistency of the back-translated item and the original item.

Test results, however, must be taken with some caution. Some scores indicating high discrepancy are based on individual biases. For example, some scores might indicate discrepancies between words "interaction" and "access" in item 2 because the word "access" may be understood to have as a slightly different meaning from the word "interaction." Nevertheless, the mean of 1.86 and standard deviation of 1.19 indicate that there is a strong consensus among the test subjects that the translation is accurate, and we consider the maximum score, 7 to be an outlier. Because outliers did appear in several locations, the responses were investigated to see if an outlier pattern existed. It was found that the outliers were spread randomly across the raters.

Figure 4. Independent Panel Test Results For Survey Items: Original Version, Back-Translated Version, and Comparability Rating

Original Item	Back-Translated Version	N	Mean ± SD	Min.	Max.
1. Does the system provide the precise information you need?	1. The Digital Government provided the exact information necessary.	29	1.59 ± 0.78	1	4
2. Does the information content meet your needs?	2. The information itself satisfied my needs.	29	1.65 ± 0.93	1	4
3. Does the system provide reports that seem to be just about exactly what you need?	3. The search result was almost exactly the thing I needed.	29	1.72 ± 0.95	1	5
4. Does the system provide sufficient information?	4. The Digital Government provided plenty of information.	29	1.93 ± 1.13	1	5
5. Is the system accurate?	5. The information supplied by the Digital Government was accurate.	29	1.93 ± 0.98	1	5
6. Are you satisfied with the accuracy of the system?	6. I was satisfied with the degree of accuracy of the information provided by the Digital Government program.	29	2.03 ± 1.32	1	6
7. Do you think the output is	7. The information produced was	29	1.86 ± 1.43	1	7

presented in a useful format?	presented in an useful manner.				
8. Is the information clear?	8. The information was clear.	29	1.97 ± 1.15	1	6
9. Is the system user-friendly?	9. The Digital Government was readily controllable.	29	1.62 ± 1.21	1	7
10. Is the system easy to use	10. The Digital Government was easy to use.	29	1.69 ± 0.85	1	6
11. Do you get the information you need in time?	11. The information was produced in a timely manner.	29	1.48 ± 0.83	1	4
12. Does the system provide up-to-date information?	12. The Digital Government provided up-to-date information.	29	1.76 ± 1.02	1	5
13. When using Lotus 1-2-3, I felt in control.	13. I was confident in using the Digital Government.	29	2.34 ± .72	1	4
14. I felt I had no control over my interaction with Lotus 1-2-3.	14. I could not control the activities involved in accessing the Digital Government.	29	1.86 ± 1.19	1	7
15. Lotus 1-2-3 allowed me to control the computer interaction.	15. When using the Digital Government, I was able to control all aspects of my access to the computer.	29	2.07 ± 1 .33	1	7

16. When using Lotus 1-2-3, I thought about other things.	16. When using the Digital Government, I thought about other things.	29	1.93 ± 1.13	1	6
17. When using Lotus 1-2-3, I was aware of distractions.	17. When I used the Digital Government, I was aware that it did not have my undivided attention.	29	2.48 ± 1.15	1	5
18. When using Lotus 1-2-3, I was totally absorbed in what I was doing	18. I was continually and completely interested while I used the Digital Government.	29	1.55 ± 0.74	1	4
19. Using Lotus 1-2-3 excited my curiosity.	19. The Digital Government triggered my curiosity.	29	1.59 ± 0.87	1	5
20. Interacting with Lotus 1-2-3 made me curious.	20. Communicating with the Digital Government produced curiosity.	29	1.38 ± 0.56	1	3
21. Using Lotus 1-2-3 aroused my imagination.	21. Using the Digital Government triggered my imagination.	29	1.59 ± 0.78	1	4
22. Using Lotus 1-2-3 bored me.	22. Using the Digital Government bored me.	29	1.93 ± 1.28	1	7
23. Using Lotus 1-2-3 was intrinsically	23. The Digital Government is	29	1.89 ± 0.67	1	4

interesting.	inherently interesting.				
24. Lotus 1-2-3 was fun for me to use.	24. It was very enjoyable to use the Digital Government.	29	1.69 ± 1.76	1	3
25. How do you feel about the MIS organization in terms of its ability to meet the information needs of your area of responsibility?	25. I feel the Digital Government is able to meet my information needs in my area of interest.	29	1.97 ± 1.21	1	6
26. How do you feel about the MIS group in terms of its ability to meet the requirements of all users they serve, i.e. the organization?	26. I feel the Digital Government is able to meet the requirements of all users it serves.	29	2.24 ± 1.24	1	7
27. How do you feel about the efficiency of the MIS group in your organization?	27. I feel the Digital Government is efficient.	29	1.31 ± 0.54	1	3
28. How do you feel about the effectiveness of the MIS group in your organization?	28. I feel the Digital Government is effective.	29	1.38 ± 0.56	1	3

Using the data in Figure 8, a one-sample t-test was performed to investigate whether the group of 29 scores as a whole were significantly comparable. As Figure 9 indicates, the group of 29 bilingual graduate students as a whole showed an average of 1.698 on translation comparability scores, which is significantly different from 3.5 (no comparability) with a probability of p = .0001.

Figure 5. One-Sample t-Test: Translation Comparability

Translation Comparability t-Test : 29 Bilingual Graduate Students
    One-Sample t-Test: Translation Comparability

DF:	Sample:	Mean:	Pop. Mean:	t Value:	Prob. (2-tail)
27	29	1.698	3.5	31.56	.0001

III. Conclusion

Although it was concluded that Brislin's (1980) back-translation method produced a Korean instrument as semantically equivalent as possible to the English instrument, there are some problems with the method. From discussions with the bilingual experts and the notes they kept during the translation process, it was evident that some differences in language were so fundamental that alteration of statements from source to target languages was inevitable, and that this alteration would at times lead to low equivalence ratings by the bilinguals and in the independent panel test. Nevertheless, considering the sharp differences between modes of expression in the two languages, the translators' notes indicate that they were able to take into account cultural and linguistic differences without making drastic alterations to most of the English items.

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