In recent years, the occupational therapy literature has suggested an increasing involvement of occupational therapists in the application of knowledge and clinical techniques across different cultural groups (Demars, 1992; Evans & Salim, 1992; Jackson et al., 2000; Meadows, 1991). This phenomenon parallels a similar trend toward international research collaboration in other fields (Bullinger, Anderson, Cella, & Aaronson, 1993; Kim & Lim, 1999; Mathias, Fifer, & Patrick, 1994). When international or cross-cultural applications are involved in therapy or in research, one of the major problems that clinicians and researchers encounter is the translation of material from one language to another, a process that is impeded by linguistic and cultural differences (Brislin, Lonner, & Thorndike, 1973; Candell & Hulin, 1986). The exporting of measurement tools from one cultural group to another is a process that is particularly vulnerable to translation problems.

Unfortunately, the importance of rigorous translation procedures to address language and cultural differences often is overlooked in cross-cultural studies (Kim & Lim, 1999). A lack of rigor in translation of research instruments may adversely affect generalization of results beyond the culture of origin. Similarly, the applicability of clinical instruments beyond the culture of origin may be adversely affected if translation procedures are not rigorous. Although occupational therapists have begun to consider systematically the implications of cultural factors in treatment planning and implementation (Demars, 1992; Evans & Salim; 1992; Jackson et al., 2000), the occupational therapy literature has not addressed the importance of the translation process in generating meaningful clinical tools for use across cultures. This article identifies the key recommendations for generating a valid translation of an instrument, as discussed in the current cross-cultural research literature, and illustrates how one might apply these recommendations through a case example involving the translation of a clinical instrument, the Evaluation of Sensory Processing (ESP; Johnson-Ecker & Parham, 2000), from American English into Mandarin Chinese for use in Taiwan.

Current Recommendations for the Translation Process

The cross-cultural research literature indicates that generating a valid translation of an instrument is not a simple matter of...
directly translating from one language to another. Auchter and Stansfield (1997) illustrated the kinds of problems that may arise when constructing a translation of an instrument. In their study, a test of academic achievement was translated from American English (the source version) into Spanish (the target version) by professionally trained translators. For some test content, an equivalent meaning in translation was difficult to achieve because of idiomatic expressions used in the source version. For example, terms such as freedom rider have no equivalent in Spanish. On the other hand, some test contents could be translated easily from a linguistic perspective, but once translated, they fail to maintain the same function as in the target version. For instance, the words would and wood were used to test spelling ability in the source version. Literally translated into Spanish, these words are hubiera and madera, respectively, and, therefore, do not present the same spelling challenge as in the source version, although the literal translation was easy to achieve. In their study, it was necessary to make some modifications in the source version before translation so that the translated instrument would possess the same meaning and function as the source version.

According to cross-cultural researchers, inaccuracies in the translation process are common. If measures beyond direct translation are not taken to ensure validity, the translated instrument may not function as intended (Price & Oshima, 1998). Achieving equivalence between the source version and the target version of an instrument is critical in translation and involves not only linguistics, but also cultural considerations. Often, achieving literal equivalence in the target language fails to express the fundamental meaning of the source language. To avoid this problem, translators must be empathetic to the target culture. They must transform a cultural symbol in the source language into a cultural symbol in the target language that will evoke the same functional response (Bravo, Woodbury-Farina, Canino, & Rubio-Stipec, 1993; Brislin et al., 1973; Candell & Hulin, 1986; Mathias et al., 1994; Sechrest, Fay, & Zaidi, 1972; Ware et al., 1995; Werner & Campbell, 1970).

A common difficulty that occurs during the translation process is that the words in the source language have no equivalent words in the target language (Brislin et al., 1973). In addition, grammar and syntax vary enormously across languages and, therefore, pose problems in translation. Idiomatic expressions often can be translated literally but lose their original meaning in the process. When idioms are used in one language, they are never proper for direct, literal translation. However, idioms are so commonly used in daily life that completely avoiding them in writing instructions or items may produce a written instrument that is too pedantic for the general population in any culture. In situations where the source version of an instrument uses words, grammatical structures, or idiomatic expressions that are not translatable into the target language, the best way to achieve equivalence in translation is to translate the meaning instead of the literal words (Sechrest et al., 1972).

Cultural relevance is a critical issue in cross-cultural translation. Daily occupations, social relationships, beliefs, and contexts of daily life may diverge greatly across cultures, creating difficulties in translation. For example, in one translation study, an item in the English source version of a diagnostic interview schedule inquired about respondents’ “swimming in lakes.” However, this item was inappropriate for the target culture in Puerto Rico, where swimming in lakes generally is avoided for health reasons (Bravo et al., 1993). To deal with this kind of problem, translators should consider why the phrase or term is used in the source version and find an expression in the target language that captures essentially the same kind of experience in the target culture. They then need to reword the source version of the instrument before translation to reflect the nuances of the target culture in order to achieve equivalence of meaning (Brislin et al., 1973; Sechrest et al., 1972; Ware et al., 1995). Bravo et al. (1993) replaced the culturally inappropriate item of “swimming in lakes” with “swimming in the sea or rivers,” which was a more widely accepted behavior in Puerto Rico. Werner and Campbell (1970) use the term cultural translation to refer to this process of replacing words or phrases in the source language with phrases that are culturally appropriate for the target culture before translation from the source to the target language.

Although many researchers and clinicians use a simple process of direct translation from one language to another, most cross-cultural researchers consider a more rigorous process called back-translation to be superior (Brislin et al., 1973; Kim & Lim, 1999; Werner & Campbell, 1970). The back-translation method uses at least two bilingual translators who are familiar with the source and target languages. To begin the process of back-translation, a bilingual translator or group of translators makes an initial translation from the source version into the target version. Next, another bilingual translator or group translates this material back into the source language. These back-translators should not have had access to the original source version before conducting the back-translation. The back-translated version and the source version then are compared to check for equivalence of meaning. If the two versions are not identical, the back-translation process is repeated iteratively until no mistakes in meaning are found.

Use of a back-translation method does not eliminate the problems that are likely to arise from linguistic or cultural differences. Collaboration between experts in the two cultures or languages of interest is recommended in order to minimize cultural and linguistic biases. This process is known as decentering (Werner & Campbell, 1970). Decentering may reveal that some phrases in the source version are impossible to translate well into the target language because of cultural or language differences. In such cases, the source version needs to be revised to convey the original meaning or intent with different words so that the equivalent terms can be found in the target language. In the process of decentering, the source and the target versions are equally important, and both are open to revision for generating valid translation. Back-translation provides insight into the process of decentering (Brislin, 1970; Brislin et al., 1973; Sechrest et al., 1972; Werner & Campbell, 1970).

Because translators are usually from different subcultures (e.g., different educational levels) than the subjects for whom
the instrument is translated, undetected errors in translation may occur. Thus, adding a pretest is necessary even after a careful translation (Brislin, 1970; Brislin et al., 1973; Bullinger et al., 1993; Sechrest et al., 1972). In a pretest, persons representative of the population for whom the instrument is translated try out the instrument and give feedback to the instrument developers. Bullinger et al. (1993) suggested that a back-translation and a pretest are the minimal requirements for translating an instrument.

Case Example: Translating the Evaluation of Sensory Processing From English Into Chinese

This section provides an example of how to generate a valid translation of a questionnaire using rigorous translation methods. The instrument that was translated was the Evaluation of Sensory Processing (ESP), Research Version 3 (Parham, LaCroix, Johnson, Mailloux, & Roley, 1997). This questionnaire asks parents to describe their child's behavior by responding to 184 items in Likert-scale format. Items are grouped in six sections representing seven sensory systems: auditory, gustatory/olfactory, proprioceptive, tactile, vestibular, and visual. The source version of the instrument was written in American English, and the target version was to be in Mandarin Chinese for use in Taiwan. The translation process addressed all the items on the evaluation and the instructions for filling out the questionnaire.

The initial step in generating a valid translation is to conduct a cultural translation (Werner & Campbell, 1970), that is, to revise the source version in order to accommodate to language and cultural differences between the source and target cultures. To accomplish this step, three bilingual Taiwanese occupational therapists made revisions in the source version to ensure that questionnaire items presented in English were culturally relevant to Taiwan. After this initial step, four bilingual translators and two monolingual reviewers participated in a back-translation process. After a repetition of the back-translation process to correct errors in translation, the target version of the ESP in Mandarin Chinese was pretested with six Taiwanese parents. The investigators used the parents' responses regarding the clarity and relevance of the questionnaire to refine the final translation. Details regarding the entire process of generating a valid translation are discussed in the following sections.

Step 1: Cultural Translation

Three bilingual occupational therapists with expertise in the field of sensory integration were involved in this step. They were citizens of Taiwan, native speakers of Mandarin Chinese, had passed the criterion for English competency at the University of Southern California (USC) for international graduate students, had lived in the United States for more than 2 years, and had successfully completed a graduate course on sensory integration at USC.

The first author contacted the bilingual experts individually by telephone. He explained the project in Mandarin Chinese because it was the native language of the bilingual experts. The ESP was then distributed to each expert for comments regarding the cultural relevance of the items. The researcher collected all feedback by telephone and subsequently discussed all comments and suggestions with each expert by telephone. When a consensus was reached and each agreed with the revision, the resulting revised ESP became the source version (in American English) for the next step.

Step 2: Back-Translation Iterative Process

Four bilingual translators and two monolingual reviewers participated in this step. The bilingual translators were citizens of Taiwan, had passed the criterion for English competency at USC for international graduate students, and had lived in the United States for more than 1 year. The first author was one of them. The researcher and one other bilingual translator were registered occupational therapists and had sensory integration training. They translated the source (American English) version into the target (Mandarin Chinese) version. Their background as occupational therapists was thought to be helpful in retaining the original meaning of the items as measures of sensory processing. The other two bilingual translators, called back-translators, translated the target (Mandarin Chinese) version into English. Because they did not have any occupational therapy or sensory integration background and had not read the source version of the questionnaire, their interpretation of the Mandarin Chinese version was assumed to be similar to the interpretations of most Taiwanese parents who do not have such experience. The monolingual reviewers compared the back-translated instrument (in American English) with the source version of the instrument (also in American English). These reviewers spoke English as their native language, had passed the graduate course in sensory integration at USC, and had previously conducted research involving the ESP. The second author was one of them.

To initiate the back-translation process, the two bilingual translators who had backgrounds in occupational therapy translated the source version (culturally revised English version of ESP resulting from Step 1) into Mandarin Chinese. The goal of the translation was to recast the meaning of the source version in the target language rather than to translate literally the words of the source version. These two translators worked independently to produce translated items then, together, reviewed the entire translated instrument and made a few revisions to reach consensus on the translation.

The resulting Mandarin Chinese version then was back-translated into English by two bilingual translators who had not seen the source version of the ESP. The first author instructed the back-translators to render the meaning of the Mandarin Chinese version in English rather than to translate every Chinese word into an English word. This instruction was made in Mandarin Chinese, their native language. After each back-translator finished her translations independently, she reviewed the other's translation, discussed the problematic items, and reached a consensus on the initial back-translated instrument.

After the first back-translation, the monolingual reviewers met and compared each item of the back-translated English version and the source version of the ESP to "detect any errors that might make differences in the meaning people would infer" (Brislin, 1970, p. 197). These instructions were made in keeping with the literature on
cross-cultural translation, which emphasizes equivalence of meaning as the most important factor in generating a valid translation (Brislin, 1970; Sechrest et al., 1972). After further discussion, some items of the source version were reworded for easier translation, and some items simply were retranslated from the original source version because translators had made errors in translation. The four bilingual translators repeated the translation and back-translation of problematic items, and the same monolingual reviewers compared the resulting back-translated items with the source version. At this point, no further errors in meaning between the two translations were found, and the ESP in Mandarin Chinese was ready for pretesting with Taiwanese parents.

**Step 3: Pretest**

The purpose of the pretest was to refine the translation through opinions from the target population, which in this case consisted of Taiwanese parents and primary caregivers. Initially, five caregivers were involved in this step. All lived in Taiwan and were recruited by the first author’s friends or their friends. Four of the caregivers were mothers and one was an aunt who was raising a 6-year-old nephew. The children being rated on the questionnaire were two 4-year-olds, one 5-year-old, and two 6-year-olds. Four were girls, and one was a boy. Before participating in this step, caregivers provided written informed consent, following procedures approved by an Institutional Review Board at the authors’ university.

The researcher explained the goal of this step in Mandarin Chinese by telephone. The Mandarin Chinese version of the ESP resulting from Step 2 was mailed to each participant. Participants were asked to read the instructions and fill out the questionnaire carefully. After completing the questionnaire, they were interviewed by telephone and asked the following questions in Mandarin Chinese: Are there any problems with the meaning of the instructions? Are there any items you do not understand? Are there any items that are difficult to understand or confusing? Please tell me your opinions so that we can solve these problems. Participants provided their opinions on how the wording of the items might be improved for clarity.

To further ensure that Taiwanese family members would interpret individual items appropriately, a sixth caregiver of a 4-year-old boy was recruited to do a detailed item-by-item telephone interview. This caregiver lived in Los Angeles, grew up in Taiwan, and spoke Mandarin Chinese as her first language. Following the same procedure as that used for the initial five caregivers, this mother explained verbally to the researcher the reasons behind her responses to each item of the questionnaire.

The six caregivers’ opinions were collected and summarized in a written memo. The researcher then discussed these opinions with the second author to reach a decision on the final revisions.

At this point, a valid Mandarin Chinese translation of the ESP was completed. Across the three steps of the entire process, 46 revisions were made. The number of revisions made in each step is summarized in Table 1.

**Conclusion**

The rigorous translation procedures used to produce the ESP in Mandarin Chinese will minimize the influence of errors in translation when using this instrument in Taiwan. It is important to note, however, that equivalence of meaning between a source and target version of an instrument does not ensure that performance of the populations for whom these versions are intended will be equivalent. In other words, although we may be confident that we have a valid translation of an instrument, we cannot assume that normative data gathered with the source version are applicable to the population for whom the translation is intended. Thus, we cannot rely on American data to interpret Taiwanese parents’ ratings of their children on the ESP. Sound clinical use of the Mandarin Chinese ESP in Taiwan will depend on research that investigates patterns of parent ratings on the ESP within that culture. ▲

**Acknowledgments**

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**Table 1. Number of Revisions in Sections of the Evaluation of Sensory Processing During the Translation Steps**

<table>
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<th>Step 1</th>
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<th>Step 3</th>
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<td>2</td>
<td>4</td>
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<tr>
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<td>7</td>
<td>1</td>
<td>13</td>
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<tr>
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<td>1</td>
<td>0</td>
<td>5</td>
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</tr>
<tr>
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This study could not have been completed without the help of the bilingual experts, bilingual translators, monolingual reviewers, and parents who participated in the pretest. They deserve very special thanks.

This study was based in part on the first author’s thesis, completed in partial fulfillment of the requirements for a master of arts degree in occupational therapy.

**References**


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