Semantic Transfer and Its Implications for Vocabulary Teaching in a Second Language

NAN JIANG
Department of Applied Linguistics
Georgia State University
Atlanta, GA 30302
Email: njiang@gsu.edu

This study investigated semantic transfer in second language (L2) learning and provided a replication of the author’s study (Jiang, 2002) in a different English as a Second Language (ESL) population. Korean ESL speakers were asked to perform a semantic judgment task in which they decided whether or not 2 English words were related in meaning. Two types of related word pairs served as critical stimuli: word pairs whose 2 members shared or did not share the same Korean translation. The Korean ESL speakers responded to the same-translation pairs significantly faster than to the different-translation pairs whereas no such same-translation effect was found among native speakers of English. The same-translation effect found in L2 speakers was taken as evidence for the presence of first language semantic structures in L2 lexical representations and their continued involvement in L2 processing. Pedagogical implications for L2 vocabulary teaching are discussed.

A LARGE BODY OF LITERATURE ON VOCABULARY ACQUISITION IN A SECOND LANGUAGE (L2) has accumulated since Meara’s (1980) call for more research on this then “neglected aspect of language learning” (p. 221). This research no doubt has helped advance our understanding of L2 vocabulary acquisition in many ways. Furthermore, there is a general consensus today that vocabulary acquisition is at least as important as syntax acquisition in studying L2 acquisition. However, this line of research is not without problems. First, much of the research to date has focused on broad, often pedagogy-related issues, such as the examination of vocabulary acquisition under different learning conditions (e.g., Chun & Plass, 1996; Fischer, 1994; Grace, 1998; Prince, 1996), the study of different vocabulary learning strategies and their effects on retention (e.g., Brown & Perry, 1991; Fraser, 1999; Hogben & Lawson, 1994; Moore & Surber, 1992; Sanaoui, 1995), and incidental vocabulary acquisition in reading (e.g., Rott, 1999; Watanabe, 1997; Wode, 1999). Vocabulary acquisition is often defined in terms of word retention in many of these studies. Other aspects of the acquisition process have rarely become the focus of empirical research. More basic and specific issues related to the acquisition process, such as how lexical knowledge is represented in the learner’s mind, what is involved in the form-meaning mapping process, and what stages a word goes through before it becomes an integrated part of the learner’s lexicon, have received little attention. Furthermore, as pointed out by Meara (1997), this line of research has been largely descriptive and model-free rather than explanatory and model-driven. As a result, one is able to make very few specific claims about the psychological processes and mechanisms involved in L2 vocabulary acquisition today. One has yet to find a theory of L2 vocabulary acquisition that can help generate new research questions and offer a conceptual framework for integrating numerous existing research findings in a coherent way (Meara, 1996; 1997; Nation, as cited in Schmitt, 1995).

A MODEL OF ADULT L2 VOCABULARY ACQUISITION

An effort to overcome these problems can be seen in a recent proposal of a psycholinguistic
model of adult L2 vocabulary acquisition by the author (Jiang, 2000). The model is based on a characterization of the unique learning conditions adult L2 learners face. First, adult L2 learners often do not have as much contextualized input as children do, which makes the extraction and integration of lexical meanings difficult. More important, adults already possess a well-established conceptual and lexical system, and most L2 words have a correspondent concept and translation in the adult learner’s first language (L1). Thus, there is little need for them to learn new concepts or meanings while learning L2 words, at least in the early stages of L2 acquisition. The lack of contextualized input and the presence of an existing conceptual and L1 system make adult L2 vocabulary acquisition fundamentally different from vocabulary acquisition in the L1. When children learn new words in their L1, they learn words and concepts at the same time. As a result, word form and meaning are often inseparable. Thus, when children or adults see a word in their L1, its meaning becomes available automatically. When people speak in their L1, the retrieval of lexical forms is usually spontaneous and effortless. In contrast, adult L2 vocabulary acquisition is accompanied by little conceptual or semantic development. Instead, the existing L1 linguistic and conceptual systems are actively involved in the L2 learning process.

This analysis led me to propose a three-stage model of adult vocabulary acquisition (Jiang, 2000). In the first, lexical association stage, adult learners recognize an orthographic or phonological form, or both, as a word. They understand the word’s meaning within an existing semantic structure, which is closely linked to their L1. To help themselves remember this L2 word, the learners associate it with its L1 translation. In representational terms, the most significant event that occurs at this stage is that a lexical entry is registered in the learner’s mental lexicon. However, unlike a L1 word whose entry contains all four types of lexical knowledge, that is, meaning and syntax in the lemma structure, and morphology and phonology/orthography in the lexeme (Levelt, 1989), this L2 lexical entry contains only form knowledge, that is, phonology and orthography. Other space in the entry is empty (see also De Bot, Paribakht, & Wesche, 1997; Hall, 2002; Meara, 1984). The entry also contains a pointer that links the word to its L1 translation.

Lexical processing and production at this stage rely on the activation and mediation of L1 translations because no direct links exist between L2 words and concepts, or such links are very weak. Because only the semantic and syntactic information, or lemma information (Levelt, 1989), in the L1 entry participates in and assists L2 word use, this part of the L1 entry receives the most activation. The lexeme part that contains form specifications is gradually deactivated. Continued exposure to (and productive use of) L2 words means continued coactivation of a L2 word and the lemma structure of its L1 translation. The outcome of continued exposure is that the semantic and syntactic information in the L1 translation is copied or transferred into the empty space of the L2 word.

The occurrence of this transfer process leads to significant changes in lexical representation and processing of a L2 word and signals the coming of the second stage in lexical development. The L2 entry now contains a mixture of L2 form specifications and semantic and syntactic specifications transferred from its L1 translation. The presence of the semantic content in the entry means that the word is now linked directly to conceptual representations. In processing terms, one may expect a L2 word at this stage to be used with more fluency or automaticity because this direct link makes the activation of L1 translation no longer necessary. At the same time, as in the case of a word at the first stage, there is still significant influence from the L1 in L2 word use because lexical processing and production are still mediated by the lemma information of its L1 translation, which now resides in the L2 entry. Thus, from a processing perspective, this stage may be called L1 lemma mediation stage. From a representational perspective, this stage may be called the hybrid-entry stage because a L2 entry at this stage contains a combination of L2 form information and L1 meaning and syntax information.

In principle, there is a third stage in lexical development when lexical knowledge specific to a L2 word is integrated in its entry and L1 information is discarded. As a result, a L2 word can be used with not only more automaticity, but also more idiomaticity, with little influence from its L1 translation. However, it is suggested by the model (Jiang, 2000) that many words may stop short of this third stage and L1 lemma mediation may become a steady state of lexical processing in advanced L2 learners. A graphic presentation of the model is shown in Figure 1.

THE SEMANTIC TRANSFER HYPOTHESIS

The present study examined a central claim of the model: the assertion that the semantic content residing in a L2 word is transferred from the
FIGURE 1
Stages and Processes of Adult L2 Vocabulary Acquisition

Stage One
Word Association Stage

1a. An entry is created in the L2 lexicon. It contains form specifications and a pointer that links the word to its L1 translation.

1b. The use of L2 words relies on and is mediated by their L1 translations whose entry has semantic, syntactic, morphological, and form specifications.

1c. L1 lemma provides critical information (syntax & semantics) in L2 word use and is simultaneously activated with L2 words.

1d. L1 lemma information is transferred to a L2 entry as a result of continued coactivation.

Stage Two
L1 Lemma Mediation Stage

2a. The transferred lemma information links L2 words and concepts directly and mediates L2 use. Activation of L1 translation in L2 use decreases.

2b. Continued exposure to contextualized input may help develop new, L2-specific meanings and L2 lemma may contain both L1 and L2 specifications.

Stage Three
Full Integration Stage

L2-specific information dominates L2 entries; strong links connect L2 words and concepts; morphological knowledge is integrated; lexical links between L2 words and their L1 translations weaken.
L1, or that the concept onto which a L2 word is mapped is a L1 concept. This semantic transfer claim deserves careful empirical investigation for at least two reasons. First, form-meaning mapping is one of the basic processes involved in vocabulary acquisition. A clear understanding of the process is required for any attempt to develop a theory of vocabulary acquisition. Correspondingly, form-meaning mapping has remained the focus of attention in the study of child vocabulary acquisition (e.g., Bloom, 2000; Clark, 1993). In L2 acquisition research, however, there is only limited discussion of form-meaning mapping (e.g., Ellis, 1997; Henriksen, 1999; Hulstijn, Hollanders, & Greidanus, 1996; Pica, 2002) and semantic/conceptual transfer (e.g., Jarvis, 2000; Jarvis & Odden, 2000; Pavlenko, 1999) in vocabulary acquisition. These topics have been the focus of few empirical studies (e.g., Ijaz, 1986). This is true in bilingual lexicon research as well. The study of the bilingual lexicon has been a dynamic and productive research area over the past 20 years (e.g., de Groot & Kroll, 1997; Harris, 1992; Schreuder & Weltens, 1993). One of the issues that has received the most attention is how the two languages of a bilingual speaker are connected to each other and to conceptual representations (e.g., Chen & Ng, 1989; Francis, 1999; Kroll & Stewart, 1994; Potter, So, Eckardt, & Feldman, 1984). Given the amount of research that has been conducted on this topic, it is surprising that the issue of whether L2 words are linked to existing meanings or concepts or to newly created ones has rarely been addressed. The semantic transfer claim represents an explicit statement about the form-meaning mapping process in the absence of a well-deserved interest in this issue and thus merits careful investigation.

Second, the semantic transfer claim represents a view of form-meaning mapping that is often in contrast to the assumptions held by many L2 researchers. It is often assumed that L2 learners acquire new meanings while learning new words (e.g., Bogaards, 2001; R. Ellis, 1995; R. Ellis, Heimch, Tanaka, & Yamazaki, 1999; Henriksen, 1999). Other researchers have suggested that L2 learners may map L2 words to preexisting semantic structures at early stages of L2 acquisition, but that semantic restructuring will occur as their L2 proficiency improves (e.g., Blum & Levenston, 1978; Giacobbe, 1992; Ringbom, 1983; Strick, 1980). The semantic transfer claim posulates that L2 words are mapped to existing meanings or concepts when such meanings are available and that the transition from mapping to existing meanings to mapping to new concepts may not occur for a majority of words, and as a result, L1 lemma mediation often becomes the steady state of lexical performance in advanced learners.

Evidence in support of semantic transfer and L1 lemma mediation in advanced learners is not difficult to find in the L2 acquisition literature. For example, L2 learners are often found to use L2 words based on the meanings of their L1 translations, thus leading to lexical errors. Such errors are common when two L2 words share the same L1 translation. Under such circumstances, L2 learners, including proficient learners, often use the two words interchangeably (e.g., Martin, 1984; Olsho & Cohen, 1989; Ringbom, 1983; Sonaiya, 1991; Swan, 1997; Zughoul, 1991).

The transfer of semantic structures from L1 to L2 was also demonstrated in a study by Ijaz (1986). Ijaz tested native and nonnative speakers of English on six prepositions in a semantic-relatedness test and a sentence-completion test. In the former test, the participants were asked to indicate their understanding of the meaning of prepositions such as on and over by specifying the position of the word in a diagrammatic semantic space. In the latter test, they were asked to complete sentences with appropriate prepositions. In both tests, the nonnative speakers were found to differ significantly from the native speakers in their performance. Furthermore, the analysis of their performance in relation to their L1 backgrounds showed that their L1 played a significant role in their performance. Ijaz concluded that the linguistic usage of advanced second-language learners is influenced by their mother tongue in a much more subtle fashion than the frequency of erroneous usages clearly traceable to their native language might suggest. Native language conceptual patterns appear to be powerful determinants of the meaning ascribed to L2 words, and they seem to be very rigid and difficult to permeate. (p. 447)

Further evidence for semantic transfer comes from controlled experimental studies of Jiang (2002) and Finkbeiner (2002). My study was specifically designed to test the semantic transfer hypothesis. In two semantic judgment experiments, Chinese-English bilinguals were tested on two types of English word pairs, word pairs that share the same Chinese translation, such as problem-question (both translated into wenti), and word pairs that are also related in meaning but do not share the same Chinese translation, such as interrupt-interfere (translated into daduan and ganrao respectively). The two sets of English word pairs were
similar in the degree of semantic relatedness, as judged by English native speakers. In one experiment, advanced Chinese ESL speakers and English native-speakers were asked to rate the degree of semantic relatedness of these test items on a scale of 1 (least) to 5 (most; Experiment 1). In the next experiment (Experiment 2), they were asked to judge, as quickly and accurately as possible, whether two English words were related in meaning, and their reaction times and accuracy rates were recorded.

According to the semantic transfer hypothesis, the semantic content residing in L2 words is transferred from their L1 translations. Thus, when two English words share the same Chinese translation, their semantic representations in the mind of a Chinese ESL speaker should be highly similar or identical. Different-translation pairs, however, should appear less related because the semantic content comes from two different Chinese translations. Thus, the semantic transfer hypothesis predicts that Chinese ESL learners should provide a higher rating score for the same-translation pairs than for the different-translation pairs. Furthermore, if the semantic transfer hypothesis is correct, Chinese ESL learners should also respond to the same-translation pairs faster than to the different-translation pairs, because it is easier to identify a shared semantic element in a same-translation pair than in a different-translation pair due to their greater semantic overlap. In contrast, whether two English words share the same or have different Chinese translations should not affect the performance of English native speakers who do not know Chinese. If the word pairs are similar in their semantic relatedness, native speakers should not show significant differences in rating scores and reaction times.

The results from the two experiments were consistent with the semantic transfer hypothesis. Even though both sets of word pairs are equally related in meaning, the Chinese ESL speakers provided a higher average rating score and responded faster to the same-translation set than to the different-translation set. Native speakers of English, however, showed no such same-translation effect.

This same-translation effect was also found in a study by Finkbeiner (2002) who adopted a masked semantic priming paradigm. Finkbeiner tested a group of Chinese-English bilingual speakers and a control group of native English speakers in a lexical decision task in which they had to decide whether or not a letter string presented on a computer monitor was an English word. The word target was preceded by a prime word that was either semantically related or unrelated to the target word. Among the related items, half of the related prime words shared the same Chinese translation as the target word, and the others did not. The presentation of the prime word was very brief (75 milliseconds), and thus, the participants were not consciously aware of its presence or of the relationship between the prime and the target. The results showed that when a target word was preceded by a same-translation prime word, it was recognized significantly faster than target words preceded by unrelated prime words. No such priming effect was found in test items whose targets were preceded by different-translation prime words in spite of the fact that these prime words were equally related to the target words. This same-translation effect in semantic priming was not present in the performance of the native English speakers. On the assumption that such a priming effect is semantic in nature and affected by the degree of semantic overlap between the prime word and the target word (de Groot & Nas, 1991; Frenck-Mestre & Prince, 1997; Grainger & Frenck-Mestre, 1998; Williams, 1994), the same-translation effect in priming is exactly what the semantic transfer claim would predict. That is, the same-translation prime words are more likely to produce priming effects than different-translation prime words because the former share the same semantic content as the target words.

THE PRESENT STUDY

The present study had three purposes. First, it was intended to extend the author’s findings (Jiang, 2002) from Chinese-English bilinguals to another ESL group, Korean-English bilinguals. This was important because the same-translation effect, an interesting phenomenon just recently documented, needed to be replicated. Furthermore, it is possible that the effect was an outcome of the particular set of materials used. That is, the particular set of same-translation pairs used in my study (Jiang, 2002) of Chinese ESL learners might not reflect an English-Chinese relation. Rather, they might appear more related than the different-translation pairs to ESL learners from various language backgrounds. Such a perception has nothing to do with the fact that they share the same Chinese translation. Thus, it is necessary to test the same-translation effect in other ESL speaker populations.

The second purpose of the present study was to provide confirmation for the same-translation ef-
fected by using a design that was cleaner than the design of the earlier study. In the earlier study (Jiang, 2002), initial analysis of the English native-speakers’ results in Experiment 2 also showed faster response times to the same-translation pairs than to the different-translation pairs, though the difference was much smaller than that found for the Chinese-English bilingual speakers. I attributed this finding (Jiang, 2002) to the fact that word pairs in the same-translation set were of higher frequency and shorter in length than the different-translation pairs. A reanalysis was done with data from test items that were matched in frequency and length. The same-translation effect remained in the Chinese ESL speakers’ data but disappeared from the L1 English speakers’ performance. Although the reanalysis resolved the frequency and length issues, a set of better controlled materials would help eventually to put the issue to rest. Thus, in this study, a set of same-translation pairs and a set of different-translation pairs that were matched in the degree of semantic relatedness, frequency, and length were identified and used so that the results would not be confounded by frequency and word length factors.

If the findings of my earlier study (Jiang, 2002) were replicated, the study would have a third purpose: to explore the pedagogical implications of the findings. If semantic transfer is a steady state of semantic representation in L2 learners, it has clear implications for teaching vocabulary in a L2.

METHOD

The present study used same research method as my earlier study (Jiang, 2002). Korean ESL learners were presented with a list of random English word pairs that were related or unrelated in meaning. The learners were asked to judge as quickly and accurately as possible whether or not the two English words in each pair were related in meaning. Two sets of related English word pairs served as critical stimuli. The same-translational set consisted of pairs of English words that shared the same Korean translation, such as chance and opportunity which shared the same Korean translation 기회 (pronounced as giwhoi). The different-translational set included English word pairs whose two members were also related in meaning but had two different translations, such as decrease and reduce, usually translated as 줄이다 (julida) and 축소하다 (chuksohada), respectively.

Assuming that a word’s semantic content has to be retrieved and compared while making a semantic relatedness judgment, it is reasonable to suggest that a person’s reaction time in making a semantic judgment is affected by the degree of semantic overlap between two words. The more semantic overlap there is, the easier or faster it is to identify a shared semantic element between two words and reach a positive response. Thus, the participants’ reaction time in semantic judgment offers a reliable and objective indication of the degree of semantic overlap between two words. Based on the above analysis, the semantic transfer hypothesis predicts that the Korean ESL speakers should respond to the same-translation pairs faster than to different-translation pairs because the former has the same semantic content transferred from the same Korean translation. The hypothesis further predicts that no such same-translation effect should be found among native speakers of English who do not know Korean.

However, if a L2 word’s semantic content does not come from its L1 translation, but is developed through the exposure to the L2, then whether or not two L2 words share the same L1 translation should not affect the L2 speakers’ reaction time. Their performance should be similar to that of native English speakers.

Participants

The participants in the study included 15 Korean-English bilinguals, 5 females and 10 males, and 15 English native speakers. All but 1 of the Korean ESL speakers were graduate students studying at Auburn University at the time of testing, and the remaining participant was an undergraduate student at the same institution. The native English speakers were students and staff members at the same university. None of the native English speakers reported knowing Korean. Further information about the Korean ESL speakers’ English learning background can be found in Table 1. This information was obtained from a questionnaire administered to the Korean ESL participants either immediately before or after the experiment.

Materials and Design

The construction of materials followed similar procedures adopted in my earlier study (Jiang, 2002). An initial list of 130 English word pairs was generated by a Korean-English bilingual speaker. The word pairs were all related in meaning, but some shared the same Korean translation and the others did not. A randomized list of
these 260 English words was then given to three Korean-English bilingual speakers who were asked to provide the first Korean translation that came to mind for each English word. A pair of English words was put in the same-translation set if all three informants translated two words into the same Korean word. Otherwise, the pair went to the different-translation set. The two sets of word pairs were then given to three native speakers of English who were asked to rate the degrees of semantic relatedness on a scale of 1 (least) to 5 (most). An average relatedness score was computed for each word pair based on the native English speakers’ rating results. Table 2 presents examples and frequency, length, and semantic relatedness information about the two sets of materials. A complete list of the related word pairs and their Korean translations can be found in the Appendix.

In addition to the 64 related word pairs (32 same-translation pairs and 32 different-translation pairs), 64 unrelated English word pairs were also constructed, with words of similar frequency and length as those in the related pairs. These unrelated pairs were needed in order for the test items to elicit both positive and negative responses. If the test materials included only related items, participants could notice it and just press the Yes button. When both related and unrelated items were included and randomized, the participants actually had to recognize words and retrieve and compare their semantic contents before they could make judgments. Thus, the inclusion of these unrelated items was for task requirement only, and the data on these items were not relevant to the purpose of the

TABLE 1
English Background Information for Korean ESL Participants

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20</td>
<td>37</td>
<td>30.8</td>
<td>4.6</td>
</tr>
<tr>
<td>TOEFL Scoresa</td>
<td>550</td>
<td>595</td>
<td>571.7</td>
<td>18</td>
</tr>
<tr>
<td>Beginning Age</td>
<td>12</td>
<td>14</td>
<td>12.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Years of Formal Instruction</td>
<td>8.0</td>
<td>23.0</td>
<td>11.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Years of Residence in the United States</td>
<td>0.7</td>
<td>8.0</td>
<td>3.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Self-Ratingsb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speaking</td>
<td>2</td>
<td>8</td>
<td>4.9</td>
<td>1.7</td>
</tr>
<tr>
<td>Listening</td>
<td>3</td>
<td>8</td>
<td>6.1</td>
<td>1.6</td>
</tr>
<tr>
<td>Reading</td>
<td>2</td>
<td>9</td>
<td>6.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Writing</td>
<td>2</td>
<td>7</td>
<td>4.9</td>
<td>1.6</td>
</tr>
</tbody>
</table>

a Only 10 participants provided their TOEFL scores.
b Ratings scored on a 10-point scale with 1 indicating minimum proficiency and 10 indicating near-native proficiency.

c Number of occurrences per million based on Kucera and Francis (1967).

TABLE 2
Average Frequency, Length, and Semantic Relatedness Scores for the Same- and Different-Translation Pairs Used in the Study

<table>
<thead>
<tr>
<th>Examples</th>
<th>English Pair</th>
<th>Korean Translations</th>
<th>Frequency</th>
<th>Length</th>
<th>Relatedness Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same-Translation Pairs</td>
<td>chance</td>
<td>기회</td>
<td>87.5</td>
<td>6.78</td>
<td>3.61</td>
</tr>
<tr>
<td>Different-Translation Pairs</td>
<td>decrease</td>
<td>줄이다</td>
<td>축소하다</td>
<td>86.8</td>
<td>6.78</td>
</tr>
</tbody>
</table>

a Number of occurrences per million based on Kucera and Francis (1967).
b Number of letters per word.
c Average rating score on a scale of 1 (least) to 5 (most).
project. Their function was similar to that of nonwords in a lexical decision task.

The study had a $2 \times 2 \times 2$ mixed design with three variables, each with two levels, that is, participant group (native English speakers and Korean ESL speakers), word relatedness (related pairs and unrelated pairs), and translation status or pair type (same-translation pairs and different-translation pairs). The first variable was a between-subject variable and the last two were within-subject variables.

**Procedures**

The participants were tested individually. A test session began with instructions, which were followed by practice, and then by testing. Both the practice and test items began with a fixation point, an asterisk, presented at the center of a computer monitor for 500 milliseconds (ms). The asterisk was followed by two English words presented simultaneously at the center of the monitor. These words remained on the monitor until the participant responded. The participants were instructed to judge as quickly and accurately as they could whether the two words were related in meaning. They responded by pressing one of two designated keys on a keyboard—Yes or No. The participants all received the same 128 related and unrelated items, but the presentation order of these items was randomized and thus different for each participant. A questionnaire was given to the nonnative speakers either before or at the end of the test in order to obtain information about their English learning background. The presentation of the test materials and the recording of the participants’ reaction times and error rates were done with DMDX, an experimental software developed by K. Forster and J. Forster at the University of Arizona.²

**RESULTS**

The average reaction times (in ms) and error rates (in percentages) from the two groups of participants are presented in Table 3 and Figure 2.

In the analysis of the results, only correct responses were included. Outliers in the data were treated by setting them equal to cutoffs established at two standard deviation units above or below the mean for each participant. This procedure affected 4.2% of the total data. Because the results on the unrelated items were not directly relevant to the purpose of the study, analyses of variance were performed on related items only. Two analyses of variance were performed, one treating participants as a random effect ($F_1$), the other treating items as a random effect ($F_2$). They are referred to as participant analysis and item analysis, respectively.

An overall analysis of participant means and item means was first done with SPSS General Linear Model Repeated Measures procedures (see Table 4 for participant analysis results). As one would expect, there was a main effect of participant group. The Korean ESL participants were 540 ms slower than native English speakers in responding to the related items, and the difference was significant in both participant and item analyses, $F_1 = 39.27$, $p = .000$; $F_2 = 51.3$, $p = .000$. There was also a main effect of pair type.

**TABLE 3**

Native and Korean ESL Speakers’ Reaction Times in Milliseconds and Error Rates in Percentages in the Semantic Judgment Experiment

<table>
<thead>
<tr>
<th>Related</th>
<th>Same-Translation</th>
<th>Different-Translation</th>
<th>Unrelated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speakers</td>
<td>1058</td>
<td>1074</td>
<td>1152</td>
</tr>
<tr>
<td>$n = 15$</td>
<td>8.7%</td>
<td>8.1%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Korean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speakers</td>
<td>1549</td>
<td>1662</td>
<td>1797</td>
</tr>
<tr>
<td>$n = 15$</td>
<td>7.7%</td>
<td>13.3%</td>
<td>8.7%</td>
</tr>
</tbody>
</table>

**FIGURE 2**

Native and Nonnative Speakers’ Reaction Times in Milliseconds on Same- and Different-Translation Pairs in Semantic Judgment
The participants responded to the same-translation pairs 64 ms faster than to the different-translation pairs. But the difference was significant by participant analysis only, $F_1 = 12.67, p < .001$; $F_2 = 2.70, p = .106$. What is particularly important for the purpose of this study is that there was a significant interaction of the two variables in both participant and item analyses, $F_1 = 7.27, p = .012; F_2 = 6.40, p = .014$, suggesting that Korean ESL speakers and native English speakers produced different patterns of results. No main effect was found in the error data.

Two separate analyses were then performed, one for the native speakers’ data and the other for the Korean ESL speakers’ data. Native English speakers responded to the same-translation pairs 16 ms faster than to different-translation pairs, but the difference was not significant, $F_1 = .61, p = .45; F_2 = .01, p = .940$, nor was the difference in error rate, $F_1 = .12, p = .74; F_2 = .04, p = .84$. These results suggest that these two sets of materials were highly comparable in the degree of semantic relatedness, frequency, and length.

There was a much greater difference in Korean ESL speakers’ performance in both reaction time and error rate. They responded to the same-translation pairs 113 ms faster than to the different-translation pairs. The difference was significant in both participant and item analyses, $F_1 = 14.07, p = .002; F_2 = 6.64, p = .01$. There was also a significant difference in error rate between the two sets of items; they made many more errors on the different-translation pairs than on the same-translation pairs, $F_1 = 6.40, p = .02; F_2 = 4.96, p = .03$.

These results suggest that whether two English words share the same Korean translation affects the speed and accuracy of Korean ESL speakers in judging the semantic relatedness of English words. These participants were faster and more accurate if two words shared the same Korean translation. The lack of such difference in the native English speakers’ performance suggests that one cannot attribute the Korean ESL speakers’ difference in reaction times and error rates to differences in word frequency, length, or the degree of semantic relatedness in the test materials.

The accuracy data are also informative. Note that both the same- and different-translation pairs were related in meaning and that the correct response for both sets of items should be Yes. The results showed a higher error rate on the different-translation pairs by Korean ESL speakers. That is, they produced the erroneous No response more often on the different-translation items than on the same-translation pairs. Again, this pattern occurred in Korean ESL speakers’ performance only. No such difference was found in the performance of native speakers of English. The semantic transfer hypothesis offers a ready explanation for the results. The semantic content of a same-translation pair comes from the same Korean translation and therefore is identical in principle. Thus, Korean ESL speakers are less likely to make an incorrect No decision on these items than on the different-translation pairs that have different semantic content transferred from two different Korean translations. This difference in semantic content makes Korean ESL speakers more inclined to make an “unrelated” judgment on the different-translation pairs, particularly if the two Korean transla-

<table>
<thead>
<tr>
<th>Tests of Within-Subjects Effects</th>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair Type</td>
<td>62081.6</td>
<td>1</td>
<td>62081.6</td>
<td>12.66</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Pair Type * Participant</td>
<td>35624.0</td>
<td>1</td>
<td>35624.0</td>
<td>7.26</td>
<td>.012</td>
<td></td>
</tr>
<tr>
<td>Error (Pair Type)</td>
<td>137239.2</td>
<td>28</td>
<td>4901.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tests of Between-Subjects Effects</th>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>107088416.0</td>
<td>1</td>
<td>107088416.0</td>
<td>961.68</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Participant</td>
<td>4372920.0</td>
<td>1</td>
<td>4372920.0</td>
<td>39.27</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>3117934.8</td>
<td>28</td>
<td>111354.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

The same-translation effect found in my earlier study (Jiang, 2002) offers an independent and reliable demonstration of semantic transfer in adult L2 vocabulary acquisition. The results of the present study replicated the same-translation effect with a different set of test materials and ESL speakers of a different L1. The replication shows that the effect observed in the earlier study (Jiang, 2002) is not a result of using a particular set of materials or a particular group of ESL speakers. Instead, the same-translation effect represents a common phenomenon among L2 learners.

The same-translation effect found in this study as well as two earlier studies by the author (Jiang, 2002) and Finkbeiner (2002) further demonstrates the long-lasting effect of semantic transfer on semantic representation and lexical performance in a L2. Note that the participants in this study had lived in the United States for an extended period of time by the time of testing (an average of 3.4 years; see Table 1). English had been their studying and working language during this time. However, their L2 lexical processing was still mediated by the semantic structures transferred from their L1.

There is already considerable evidence indicating that semantic development can be very slow and often unsuccessful in L2 acquisition. For example, in a longitudinal study of vocabulary acquisition, Schmitt (1998) found that “the vast majority of meaning senses stayed at the same state of knowledge” (p. 300) over a period of a year. If the participants did not know a particular sense of an English word at the beginning of the study, in most cases (72%), they had no knowledge of that sense after a year of living and studying in a graduate program at a British university. Also consistent with the proposition of slow semantic development in the L2 are the findings that advanced learners can make meaning-driven lexical errors on common words (e.g., Lennon, 1991; Singleton, 1999; Sonaiya, 1991) and that in longitudinal studies, advanced learners show little observed increase in productive vocabulary (Laufer, 1991, 1998). Even children learning a L2 have also been found to be slower in semantic development than native-speaking children (Verhallen & Schoonen, 1993), or to make lexical errors that suggest different semantic representations from those of native-speaking children (Hyltenstam, 1992). Although these findings are all potential evidence for slow, or possibly fossilized, semantic development in a L2, the findings of the present study and my earlier study (Jiang, 2002) provide direct experimental evidence for the continued presence of transferred semantic structures, and thus very limited semantic development in the L2.

The finding of L1 semantic mediation as a steady state of L2 lexical processing has important implications for L2 vocabulary research and teaching. In the sections that follow, I discuss three issues, a broader definition of lexical competence, the use of the L1 as a means of semantization, and ways to help learners overcome semantic fossilization.

Lexical Competence and Semantic Autonomy

The findings of the present study offer a new perspective on how lexical competence should be defined. Much work has been done to refine and broaden the conception of lexical competence. Lexical competence has hence become a multidimensional construct rather than a monolithic concept. In addition to defining and measuring lexical competence in terms of vocabulary size, or breadth, proposals have been made and tasks have been designed to consider and measure lexical competence in terms of depth (Bogaards, 2000; Henriksen, 1999; Read, 1993; Wesche & Paribakht, 1996), organization (Meara, 1996; Schmitt & Meara, 1997), and automaticity (Kempe & MacWhinney, 1996; N. Segalowitz, 1995; S. Segalowitz, N. Segalowitz, & Wood, 1998; N. Segalowitz, Watson, & S. Segalowitz, 1995). The present study points to a further aspect of lexical competence, that is, semantic autonomy. The ultimate goal of L2 learning is to develop a linguistic and semantic means that can function as an autonomous system. Autonomy is important because idiomatic, accurate, and fluent expression of one’s ideas in another language cannot be achieved until one has developed a semantic system that is uniquely coded in and by that language, a system that is shared by native speakers of that language. The findings of this study not only offer a clear illustration of semantic transfer in L2 learning, but also provide a powerful demonstration that the development and integration of L2-specific semantic meanings should not be taken for granted. Thus, semantic autonomy should be considered in defining and measuring lexical competence. Similarly, specific efforts should be made in instruction to encourage semantic development and integration.
**L1 as a Means of Semantization**

This discussion brings me to two pedagogical issues related to these findings. The first one is related to the use of the L1 as a means of helping learners understand the meaning of new words, or semantization.

A wide range of semantization strategies has been studied, from guessing or inferring from context to the use of in-text or marginal annotation with synonyms, translations, definitions, or pictures; from using visual aids such as pictures and objects to consulting a monolingual or bilingual dictionary; from word lists with L1 translations to analyzing lexical forms such as prefixes and suffixes (e.g., Chun & Plass, 1996; Fischer, 1994; Fraser, 1999; Grace, 1998; Hulstijn, 1992, 1993; Hulstijn, Hollander, & Greidanus, 1996; Laufer & Hadar, 1997; Prince, 1996; Schmitt, 1997). These strategies can be classified into three general categories. Intralingual strategies involve the use of linguistic means of the target language such as synonyms, definitions, or linguistic contexts. Interspatial strategies utilize the L1 in the form of a bilingual dictionary, cognates, or L1 translation equivalents, often associated with word lists. Extralingual strategies make use of pictures, objects, physical contexts, and other multimedia aids.

There seems to be a preference, explicitly stated or not, for intralingual strategies over interspatial strategies among many teachers and researchers (e.g., Baxter, 1980). This preference may reflect a perception of the relationship between these strategies and more general pedagogical approaches, as pointed out by Schmitt (1997). Intralingual strategies are “pedagogically correct” because they are consistent with principles of communicative language teaching or comprehensible input. Interspatial strategies, however, have easy associations with the grammar translation method or contrastive analysis.

However, there is already compelling evidence showing that it is not necessary or desirable for learners to avoid using the L1 for semantization. First, as pointed out by many researchers (e.g., Huckin & Coady, 1999; Hulstijn, 1992; Schmitt, 1997), guessing from context has its limitations. Research shows that guessing is often unsuccessful (Li, 1988; Mondria & Wit-de Boer, 1991). Second, interlingual strategies such as providing translation equivalents have several advantages. They are an easy and efficient way of depicting the core meaning of a word. Knowing the L1 equivalent also gives the learner a sense of certainty about the meaning of a word, a certainty that is a vital first step for reinforcing the form-meaning connection and retaining the new word in long-term memory. As Grabe and Stoller (1997) put it, “Perhaps, for adults, there are times when it is important to know that a word is understood accurately” (p. 114). Kern’s (1994) participants also expressed similar feelings in their statements, such as “I don’t really understand what I read until I translate it into English; somehow it isn’t quite ‘real’ until I put it into English” (p. 447). A further advantage of using L1 translations for initial semantization is that linking a L2 word with well-established semantic and linguistic structures helps the learner retain the word better, because the L1 and its semantic structures are no doubt the steadiest “cognitive hook to hang the new item on,” to use Fraser’s words (1999, p. 238). These advantages should explain both the favorable learning outcomes associated with translation or bilingual dictionary use (e.g., Grace, 1998; Hulstijn, 1992; Hulstijn, Hollander, & Greidanus, 1996; Knight, 1994; Laufer & Hadar, 1997; Luppescu & Day, 1993; Nation, 1982; Prince, 1996) and the repeated demonstration of adult L2 learners’ preference for interlingual semantization strategies (Baxter, 1980; Laufer & Kimmel, 1997; Luppescu & Day, 1993; Schmitt, 1997).

The findings of the present study offer a further reason for not avoiding interlingual strategies. The involvement of learners’ L1 semantic structures in L2 processing, as shown in this study, reminds us of a simple fact that is often overlooked or forgotten, that is, learners have to understand the meaning of a new L2 word in terms of their established semantic system. Whether it is by means of pictures, definitions, contexts, or L1 translations, when the meaning of a L2 word is understood, it is the preexisting meaning or concept that is activated and mapped to the word form. That is, L2 word forms will be initially mapped to the preexisting semantic structures (Blum & Levenston, 1978; N. Ellis, 1997; Giacobbe, 1992; Ringbom, 1983; Singleton, 1999; Strick, 1980). Because of the strong association between one’s L1 and semantic representations among adults, the L1 translation of the L2 word will also be activated. Thus, in terms of lexical form-meaning mapping and L1 involvement, different strategies lead to the same outcome: L2 word forms will be mapped to the L1 semantic structures, which will activate L1 translation equivalents. L1 involvement cannot be avoided. Thus, there is no reason not to use L1 as a means of semantization or as a tool for checking and validating learners’ understanding of word meaning. I am not promoting the use of L1 for seman-
tization in place of intralingual or extralingual strategies. Rather, I agree with the view that a mixture of all three types of semantization strategies may produce the best overall effect (Fraser, 1999; Prince, 1996). But I do want to emphasize, in line with the findings of the study, that avoiding the L1 is neither practical nor desirable in adult L2 acquisition. Instead of running the risk of confusing or misleading students while trying to minimize the use of the L1, we can encourage teachers to use interlingual strategies as a quick and efficient means of initial semantization, so that more time and attention can be devoted to helping facilitate the transition from one stage to another.

Overcoming Semantic Fossilization

The preceding discussion raises the issue of how to help learners overcome the continued L1 semantic involvement and facilitate the transition from the second to the third stage of vocabulary acquisition. Semantic restructuring begins when the learner notices the semantic differences between a L2 word and its L1 translation, or between two L2 words that share the same L1 translation. Natural contexts alone may play only a limited role in this regard. The semantic differences between a L2 word and its L1 translation or between two L2 words are often very subtle. Natural contexts may not always be powerful enough to reveal such differences. Thus, natural exposure to the target language may not necessarily lead to substantial semantic restructuring and development. In this area, deliberate instructional intervention may be necessary and effective.

L2 learners can benefit tremendously from a variety of vocabulary instruction techniques that help draw their attention to the semantic differences between a L2 word and its L1 translation and between two L2 words. Some explicit instruction using concrete examples can be given that is based on contrastive analysis of the semantic and lexicalization patterns of the two languages involved. Used appropriately and stringently, such explicit instruction can not only help learners better understand the meanings of a few words, but also help them overcome the misconception that translation equivalents are always identical in meaning.

Instructors can also develop instructional materials that specifically highlight the semantic differences of problem words. For example, whereas a Korean ESL learner, even over many years, may not encounter English input that instantiates the semantic differences between chance and opportunity, which share the same Korean translation, it requires only a few minutes for an instructor to identify numerous sentences that distinguish chance from opportunity by consulting an English corpus such as the Bank of English by COBUILD. These sentences then can be used as intensive input for learners who can use it to discover the semantic differences of these words by themselves, or to practice the use of these words in correct contexts. A meaning-conscious teacher has a variety of ways to demonstrate how a L2 word differs from its L1 translation in meaning. More examples of meaning-focused pedagogical activities can be found in the articles by Sonaiya (1991) and Jullian (2000).

Although helping learners to see such semantic differences serves the pedagogical purpose of improving their lexical performance, I want to emphasize in this context that it is also a critical first step in their semantic restructuring process. Once learners become aware of the differences, the word will assume a new identity. It will no longer be seen through the lens of the L1, but will become a lexical and semantic entity in its own right. A subsequent encounter with the word will not serve to strengthen the form-meaning connections initially established using L1 semantic structures, but will strengthen the new form-meaning connections.

Two further points have to be made about such semantics-driven vocabulary instruction. First, the effectiveness of meaning-focused instruction is determined in part by timing. Focusing learners’ attention on often very subtle semantic differences at a time when they are still struggling with the core meanings of new words may confuse them. At the same time, semantic differences should be pointed out as soon as learners feel comfortable using a word with its core meanings in order to initiate the semantic restructuring process as soon as possible.

Second, although semantic differences can be demonstrated explicitly, a combination of explicit explanation and contextualized input and interaction specifically designed to target a particular word or set of words can be more effective. Sufficient contextualized input and interaction are important because what is learned through explicit instruction needs to be integrated into the developing system through meaning-focused practice and communication. For example, an ESL learner whose L1 does not make a distinction between a cap and a hat may be able to articulate the difference between the two words but use them interchangeably in natural communica-
tion if the knowledge about the difference is not integrated in his or her automatic competence.

CONCLUSION

This study replicated the same-translation effect in L2 semantic judgment first found in my earlier study (Jiang, 2002). The effect is interpreted as evidence of continued L1 semantic mediation in L2 processing among advanced L2 speakers. The lab-based online approach adopted in this study has its advantages. The use of reaction times provides a powerful tool for studying intangible L2 knowledge representation by uncovering in learners’ observable behavior subtle differences that are often hard to discern with other methods. This approach also allows better control of intervening variables than classroom-based research. Its findings are usually more consistent and replicable.

However, when compared to the direct observation of learners’ lexical performance in real time, this approach relies more on inferences and assumptions. Thus, it is important to obtain additional evidence from observing learners’ actual word use. For example, one can design a vocabulary test that involves words that are not distinguished in Korean, such as chance and opportunity, doubt and suspect. The test should include sentences for which only one of the words is appropriate. Contextual cues other than meaning, such as collocations, should be minimized. If L2 word use is mediated by L1 semantic structures, Korean ESL speakers should have a difficult time choosing the right word. If the L2 participants can identify the right word for each sentence consistently, then one can conclude that substantial semantic development has occurred.

The extent of generalizability of the finding to other L2 populations has also yet to be determined. At least three factors need to be considered. One factor is vocabulary learning strategies. The reliance on translation equivalents is characteristic of the learning approach of those who study another language in a formal foreign language classroom setting, such as the participants in the present study and in my 2002 study (Jiang, 2002). Will the findings of this study be true for those who learn a L2 in an immersion program that does not involve extensive use of the L1? To what extent can a combination of more contextualized input and a deliberate avoidance of the L1 make a difference in lexical and semantic development in the L2? The second factor to consider is the relationship between the L1 and the L2. Will a group of ESL speakers whose L1 is typologically related to English, such as Spanish or German, produce the same-translation effect? The third factor is L2 proficiency. The participants in the present study had lived in the United States only for a limited number of years. Will ESL speakers who have lived in the English environment much longer and are much more proficient in English produce the same results? In short, whether the prolonged L1 semantic mediation observed in this study is a universal phenomenon or is limited to certain learner populations has yet to be explored.

ACKNOWLEDGMENTS

I am most grateful to Kyong-mi Lee, whose assistance in material construction and data collection was critical for the completion of the project. Data collection for the project was completed while I was employed at Auburn University and supported by a summer research grant from Auburn University. The writing of this article was supported in part by a visiting researcher grant from the National Research Center for English Language Education, Beijing Foreign Studies University. I am also indebted to the four anonymous MLJ reviewers for their comments. Part of the article was presented at the annual meeting of the American Association for Applied Linguistics, Arlington, VA, March 22–25, 2003.

NOTES

1 No distinction is made between semantic and conceptual representations in this article. See Pavlenko (1999) and responses to this article in the same journal for discussions of this issue.

2 The software is available for free download at the DMASTR Web site at http://www.u.arizona.edu/~kforster/dmastr/dmastr.htm.

3 Information about the Bank of English can be found at the Collins COBUILD Web site at http://titania.cobuild.collins.co.uk

4 I owe this idea to one of the reviewers.

REFERENCES


Jiang, N. (2000). Lexical representation and develop-


---

**APPENDIX**

Related English Word Pairs and Their Korean Translations Used in the Study

<table>
<thead>
<tr>
<th>Same-Translation Items</th>
<th>Different-Translation Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieve – accomplish 성취하다</td>
<td>Ability – capacity 능력 – 용량</td>
</tr>
<tr>
<td>Allow – permit 허용하다</td>
<td>Advantage – benefit 이점 – 이익</td>
</tr>
<tr>
<td>Anticipate – expect 기대하다</td>
<td>Journal – magazine 정기간행물 – 잡지</td>
</tr>
<tr>
<td>Author – writer 작가</td>
<td>Middle – center 한가운데 – 중심</td>
</tr>
<tr>
<td>Behavior – action 행동</td>
<td>Close – near 가까운 – 근처</td>
</tr>
<tr>
<td>Brave – courageous 용감한</td>
<td>Estimate – evaluate 산정하다 – 평가하다</td>
</tr>
<tr>
<td>Chance – opportunity 기회</td>
<td>Development – growth 개발 – 성장</td>
</tr>
<tr>
<td>Charming – attractive 매력적인</td>
<td>Concept – thought 개념 – 생각</td>
</tr>
<tr>
<td>Attach – stick 묶다</td>
<td>Employment – job 고용 – 일</td>
</tr>
<tr>
<td>Contain – include 포함하다</td>
<td>Control – manipulate 제어하다 – 조정하다</td>
</tr>
<tr>
<td>Debate – dispute 논쟁</td>
<td>Vegetable – plant 야채 – 식물</td>
</tr>
<tr>
<td>Doubt – suspect 의심</td>
<td>Caution – warning 조심 – 경고</td>
</tr>
<tr>
<td>Exact – accurate 정확한</td>
<td>Disease – illness 질병 – 병</td>
</tr>
<tr>
<td>Examination – test 시험</td>
<td>Apology – regret 사과 – 후회</td>
</tr>
<tr>
<td>Expense – cost 비용</td>
<td>Spirit – soul 정신 – 영혼</td>
</tr>
<tr>
<td>Forbid – prohibit 금하다</td>
<td>Difficult – hard 곤란한 – 어려움</td>
</tr>
<tr>
<td>Fortune – luck 행운</td>
<td>Condition – situation 조건 – 상황</td>
</tr>
</tbody>
</table>
The U.S. Department of Education has awarded a 5-year, $34.6 million contract to Computer Sciences Corporation (CSC) of Rockville, MD, along with its subcontractors, to develop and operate a new database system for the Educational Resources Information Center (ERIC). The new ERIC database will use the latest search and retrieval methods to cull education literature and give high-quality access to educators, researchers, and the general public.

The ERIC database is the world’s largest education database. Begun in 1966, it is composed of more than 1 million bibliographic records. The goal of the new ERIC is to provide more education materials more quickly and more directly to audiences through the Internet.

With the new ERIC, individuals will be able to go to one Web site to search a comprehensive database of journal articles and document abstracts and descriptions and be able to access full text directly for the first time. The database will include as much free, full text as possible, and links will be provided to commercial sources so that individuals can purchase journal articles and other full text immediately.

“This is a major milestone in furthering the objectives of No Child Left Behind,” said Secretary of Education Rod Paige. “For the first time, educators and policy makers will have an easy to use resource for gaining quick access to comprehensive and up-to-date information and research about education.”

Libraries will also be able to indicate their in-house holdings so that individuals do not purchase information that is already available to them. Materials will be added to ERIC within 1 month of release, and authors will submit conference papers through an online system.

Development of the new ERIC database model began in March, 2004. During the development and transition to the new ERIC, the ERIC database will continue to be available at http://www.eric.ed.gov, and materials selected in 2003 will continue to be added. Until the new model is operational in 2004, no new materials will be accepted for the database. The department will post updated information about the transition on the ERIC Web site and will contact publishers, education organizations, and other database contributors when the new model is ready to begin adding journal articles and other materials this year.

For further information, contact: David Thomas (202) 401-1576