<table>
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<th>Title</th>
<th>Aural Recognition of English Inflectional Words of Japanese Listeners</th>
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<td>Author(s)</td>
<td>Nakamura, Jinsei</td>
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<tr>
<td>Citation</td>
<td>沖縄短大論叢 = OKINAWA TANDAI RONSO, 12(1): 31-42</td>
</tr>
<tr>
<td>Issue Date</td>
<td>1998-03-01</td>
</tr>
<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/20.500.12001/10676">http://hdl.handle.net/20.500.12001/10676</a></td>
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<tr>
<td>Rights</td>
<td>沖縄大学短期大学部</td>
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In this paper, an investigation was carried out into the effects of contextual constraints in the recognition of inflectional words in English. A hypothesis was proposed that low-intermediate Japanese listeners of English might direct considerable attention to semantic constraints, which are primarily concerned with the recognition of the stem as opposed to the suffixes of a word which syntactic constraints affect, in the recognition of inflectional words in English. This hypothesis has been confirmed by the experiment.

1. Introduction

Before discussing the effects of semantic constraints in the recognition of inflectional words in English on which this experiment was conducted for the present paper, we will briefly review the semantic and syntactic effects on word recognition processes in general, which have been examined by many researchers.

1.1. Contextual Constrains for the Recognition of Words

1.1.1. Semantic Constraints

The role of semantic constraints in word recognition processes has been thoroughly examined in research conducted by Tyler and Wessels. These researchers state that although a syntactic form-class constraint has a limited role in word recognition, semantic context, even at minimal levels has a strong facilitatory effect. The strength of this effect is due to the fact
that semantic context produces constraints during interaction with constraints provided by sensory input that stimulate the rapid reduction of the initial cohort to a small set, which, in the limit, consists of a single member. (Tyler and Wessels, p. 418)

During their research on listening recognition, on the other hand, McNeill and Lindig mentioned the results of experiments conducted by Sachs (1967) and Bransford and Franks (1971). Retention of the surface structure of sentences in a listener's memory, according to their data, is short. However, semantic content is extremely resistant to loss. In the instance listeners found sentences difficult to remember, except in the form of a semantic representation, they would regenerate the sentences repeatedly from this semantic representation just to detect the coincidence of a phoneme, syllable, or word in the search list. (McNeill and Lindig, p. 419)

Linda Conrad states that a large majority of research in native listening and reading research has found that comprehension is dependent on the effective utilization of surface cues in integrating new information into the semantic context of a message. Semantic information remains in long-term memory, unlike many cues with surface features that do not become fully represented and are no longer completely retrievable. (Linda and Conrad, p. 60)

1.1.2. Syntactic Constraints

According to Tyler and Marslen-Wilson, an enormous amount of research has focused on the relation between context and word-recognition processes without sufficient analysis of morphological structures. Research has been traditionally centered on morphologically simple units, or rather the stimuli in the actual experiments were monomorphemic words. (Tyler and Marslen-Wilson, p. 741)

In their analysis of syntactic constraints, Tyler and Marslen-Wilson provide a clear example:
...consider the context, "The two children were slowly ..." followed by the base-form "wonder." This base-form can take a number of inflectional (-ing, -s, -ed) suffixes (as well as the derivational suffix -er). The syntactic properties of the preceding context constraint the type of verbal inflection which is permissible, only allowing the -ing form. At the same time, because a noun cannot occur in this context, the syntactic properties of the utterance also rule out the derived form of "wander" (wanderer). (Tyler and Marslen-Wilson, p. 743)

Tyler and Wessels state that in word recognition, syntax imposes constraints on permissible form-class categories and on word endings, such as inflectionals and derivations. These researchers present an alternative perspective in assuming that although syntactic constraints do not significantly facilitate identification of the stem of a word form, they have an effect on the reduction of the amount of sensory input necessary for the recognition of its suffixes. Syntax has a major and essential role in language understanding in its wider sense. In short, in the absence of syntactic information, one is unable to obtain a meaningful interpretation of an utterance. An information source that may be important in a certain aspect of the system may not be important in every aspect. (Tyler and Wessels, p. 418)

1.1.3. Different Roles of Semantic and Syntactic Constraints for Recognition of Inflectional Words in English

In this section, we will discuss in more detail the roles of syntactic and semantic constraints in the recognition of spoken words.

Tyler and Marslen-Wilson conclude that they are able to recognize a distinction of a word-form as either having primarily a semantic function (base-forms with or without derivational morphology), or having primarily a syntactic function (inflectional morphology). (Tyler and Marslen-Wilson, p. 742)

The results of testing conducted by Tyler and Marslen-Wilson on multimor-
phemic words, consisting of a stem and a suffix, exemplified the process in which different types of context influence varying aspects of lexical representation. Early identification of stems is affected by semantic context in the instance they are heard in a semantically appropriate context. The identification of stems is not affected by syntactic constraints. Syntactic constraints do, however, affect the identification of the inflected full-form in the instance of syntactically sensitive suffixal information. (p. 750)

In regard to the role of the syntactic function of inflectional morphemes, and the semantic function of base-forms and derivational morphemes, Tyler and Marslen-Wilson state, there is no limitation to either within a particular syntactic or semantic function, but one must recognize that there is a difference in their primary function. (p. 743)

In short, semantic and syntactic constraints have different functions in the recognition process of spoken words. In the case of inflected words, semantic constraints affect the recognition of the base, while syntactic constraints affect the recognition of the fully inflected words. (p. 741)

1.2. Morphologically Complex Forms in English

In the English language, morphologically complex forms include a base along with one or more affixes. A combination of a base and affix is defined in linguistic terminology as a *word-form* (Lyons, 1977). Any meaning conveyed by a word-form is mainly determined by the meaning of the base. Affixes may provide additional syntactic or semantic information to the word-form, however the degree and the manner is determined by the type of affix involved. (p. 742)

Affixes may be classified as either *prefixes* or *suffixes* in the English language. Most suffixes may be classified as either inflectional or derivational. (p. 742)

1.2.1. English Inflectional Morphemes

The main distinction between an inflectional or a derivational suffix may
be exemplified in the type of syntactic roles which they fulfill. In the English language, inflectional morphology is referred to suffixes which have a primarily grammatical function, marking tense, aspect, number, person, and case. An example of the paradigm of verbal inflections for a verb such as jump includes: jump, jumps, jumped, and jumping. The inflectional morphemes displayed, in this particular case (-s, -ed, and -ing), are closely tied with the syntactic organization of the sentence in which they occur. (p. 742)

1.2.2. English Derivational Morphemes

In comparison, the function of a suffix with derivational morphology is the alternation of the semantic properties of the base-forms they are attached to. An example may include the following pairs of base-forms and derived forms: nation/nationhood, deliver/deliverance, write/writer. The derivational morphemes in this example, (-hood, -ance, -er) alter the meanings of the base-forms in various ways, and have only a secondary affect on their syntactic properties. In certain situations, this may cause a change in the syntactic form-class of the base. (p. 742)

2. Experiments

2.1. Subjects

Seventeen sophomores from the Department of English, Junior College Division, University of Okinawa, served as subjects in the experiment. Among the total of 17 subjects that participated in the experiment, individual English level proficiency was determined by their score on a test given by the Nihon Eigo Kentei Kyokai. Three of the subjects held the fourth grade level certification of English proficiency, nine of the subjects held the third grade level certification of English proficiency, and five of the subjects held the pre-2nd grade level certification of the Standard Test of English Proficiency (STEP).

2.2. Materials
The inflectional words used for the experiment were limited to those in the word list of the textbook, New Horizon I & II, which are being used in senior high schools in Okinawa. The average number of words in a sentence, in which the target words were tested, was 6.62 for Listening Test-A (hereafter abbreviated as L-A) and 6.87 for Listening Test-B (L-B) respectively, whereas that for Listening Test C (L-C) and Listening Test D (L-D) was 7.85 and 7.28 respectively.

The target words tested for L-A and L-B were heard in context with the following 9 grammatical patterns (hereafter referred as Category 1): third person singular present, past, present participle, past participle, gerund, reflexive pronoun, comparative and superlative degree of adjective, possessive case and number.

L-A consisted of 9 sentences in which inflectional target words were heard in context with normal semantic constraints, whereas L-B consisted of another 9 sentences in which inflected target words were heard in context, this time with minimal semantic constraints.

L-C and L-D included inflectional target words in context with the following 7 grammatical patterns (Category 2): passive voice, present perfect, past perfect, future progressive, present progressive, past progressive, and present perfect progressive.

L-C consisted of 7 sentences in which inflectional target words were heard with normal semantic constraints, whereas L-D consisted of another 7 sentences in which inflected target words were heard with minimal semantic constraints.

The same stimuli were used for the multiple-choice written tests, W-A, W-B, W-C, and W-D, in order to compare the results of the listening tests and those of the written tests of inflectional vocabulary items. The written tests were administered a week after the four listening tests were conducted.
2.3. Procedure

The subjects were instructed to dictate a total of 32 sentences, in which the inflectional target words were heard, for L-A, L-B, L-C, and L-D, and to define in Japanese, the meaning of each sentence, as soon as they finished dictating it in English. Each sentence, recorded on a tape recorder by a native speaker of American English, was played twice to the subjects. The sentences were read at a normal speed of 222 words per minute (sentence rate).

For both the listening and written tests, the words dictated were counted as right answers if they were fully inflected in syntactically correct sentences. The words (stems) with minor mistakes in spelling were also counted as correct answers.

2.4. Results

As shown in Table 1 below, the average recognition rate of the inflectional target words was 55.77 % for L-A, and 8.88 % for L-B respectively, whereas that of the same stimuli for the written tests, W-A and W-B, was 74.66 % and 51.11 % respectively.

The ratio of the results of L-A to W-A was 68.45 %, and that of L-B to W-B was 15.92 %. There was a significant difference between the results of the two tests.

Table 1 Results of L & W Tests Per Subject (Category 1)

<table>
<thead>
<tr>
<th>Category</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semantic Constraints</td>
<td>Normal</td>
</tr>
<tr>
<td>Test Type</td>
<td>L-A</td>
</tr>
<tr>
<td>Avg. Recognition Rate (%)</td>
<td>51.11</td>
</tr>
<tr>
<td>Ratio of L to W (%)</td>
<td>68.45</td>
</tr>
</tbody>
</table>

L-Listening Test  W-Written Test

As Table 2 shows, on the other hand, the average recognition rate of
inflectional target words for L-C and L-D was 24.10 %, and 20.53 % respectively, whereas that for the written tests, W-C and W-D, was 70.53 % and 60.39 % respectively. The ratio of the results of L-C to W-C was 34.17 %, and that of L-D to W-D was 32.39 % respectively. No significant difference can be observed between the results of the two tests.

Table 2 Results of L & W Test Per Student (Category 2)

<table>
<thead>
<tr>
<th>Category</th>
<th>Normal</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Type</td>
<td>L-C</td>
<td>W-C</td>
</tr>
<tr>
<td>Ave. Recognition Rate (%)</td>
<td>24.10</td>
<td>70.53</td>
</tr>
<tr>
<td>Ratio of L to W (%)</td>
<td>34.17</td>
<td>32.39</td>
</tr>
</tbody>
</table>

As shown in Table 4, however, the results of a close analysis made for errors on the test, L-C, showed that of the total of 87 grammatically incorrect sentences dictated by the subjects, 23 were correct in meaning. In other words, the subjects were able to understand the meaning of 23 out of 87 grammatically incorrect sentences although they were not able to integrate all the fragments they heard into grammatically correct sentences.

Of the total of 90 grammatically incorrect sentences for L-D, on the other hand, there were only 2 sentences whose meaning was correct.

The same tendency can be observed for L-A and L-B as seen in Table 3.

It was discovered, moreover, that there were such errors as overgeneralization, ignorance of rule restrictions, and complete application of rules to be found in the total number of 47 grammatically incorrect sentences (24 for L-A and 23 for L-C) whose meaning was correct. Those types of errors are common for foreign or second language learners. (Kakita, N. and Ozasa, T., p. 39)
Table 3 Results of Error Analysis of L-A & L-B for Category 1

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Normal</th>
<th>Minimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>24</td>
<td>15</td>
</tr>
<tr>
<td>C</td>
<td>37</td>
<td>109</td>
</tr>
<tr>
<td>D</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4 Results of Error Analysis of L-C & L-D for Category 2

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Normal</th>
<th>Minimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

A: Only stems of full-forms were recognized (identified).
B: Grammatical structures were incorrect but the meaning of the sentences was correct.
C: Neither grammatical structures nor meaning was obtained (no answers).
D: Grammatical structures were correct but the meaning was incorrect.

3. Discussion and Conclusion

As shown in Table 1 (Category 1), the subjects achieved a relatively high score on the recognition test of inflectional words heard in context with normal semantic constraints, whereas subjects made a very low score on the test with minimal semantic constraints. This indicates that semantic constraints appear to affect the recognition of inflectional words tested, at least in the present experiment. In other words, the subjects appeared to find it
relatively easier to recognize inflectional words with normal semantic constraints as opposed to those with minimal semantic constraints.

On the other hand, the subjects attained approximately the same results on the tests for Category 2 as shown in Table 2, regardless of the degree of semantic constraints, normal or minimal. The ratio of L-C to W-C, and L-D to W-D was almost the same for each set of the tests. This seems to indicate that little semantic constraints imposed upon the recognition of inflectional words.

After interviewing the subjects, however, it was discovered that a majority of the subjects (16 out of 17) tried to reconstruct inflectional words in context, paying careful attention to semantic constraints.

As seen in Table 4, as well as Table 3, moreover, there were a considerable number of cases in which the subjects were not able to reconstruct the inflectional words although they remembered the form of semantic representation of sentences in which inflected words were tested. The major reason for failure was their poor knowledge of syntactic structures in English. Some of the major types of errors observed in the experiment were overgeneralization, ignorance of rule restrictions, and incomplete application of rules, as mentioned earlier.

As Linda Conrad argues, it seems that low-intermediate Japanese listeners were faced with so much new information at the syntactic and phonological levels that they were unable to retain and integrate all of this and additionally direct attention to the semantic cues. Another perspective is that they might have given active attention to semantic constraints to try to recognize the inflectional words as David McNeill and Karen Lindig argue:

Sacks (1967) and Bransford and Franks (1971) have shown that the retention of the surface structure of sentences is quite shorter lived in memory. In contrast, semantic content is highly resistant loss. If listeners find sentences
difficult to remember except in the form of a semantic representation, they
would be forced to regenerate the sentence over and over from this semantic
representation in order merely to detect the coincidence of a phoneme, syllable,
or word in the search list. (McNeill and Lindig, p. 419)

As observed in the analysis of errors discussed above, semantic con­
straints appeared to be effective for the recognition of inflectional words
for Category 2 as well, implying that the Japanese subjects paid careful
attention to semantic constraints to recognize inflectional words, regardless
of the different grammatical categories.

As expected, moreover, the average recognition rate for each listening
test was approximately between one fifth and one third of that of each
post-listening written test administered to the same subjects. This might
imply that low intermediate Japanese listeners were not able to make a full
use of their syntactic knowledge which was confirmed by our written tests
for the recognition of inflectional words in English.

The present paper dealt with the effect of semantic constraints on the
recognition by low-intermediate Japanese listeners of English inflectional
words in context. This experiment supported the assumption that low-
intermediate Japanese listeners devoted considerable attention to semantic
constraints to recognize inflectional words in English with which syntax is
primarily concerned.

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