Phonological and Morphosyntactic Knowledge of Derived English Words by Native Speakers and Japanese Learners of English

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Abstract
This study investigated the phonological and morphosyntactic knowledge of derivational English words possessed by native English speakers and Japanese learners of English with different English proficiency levels. Experiment 1 used English words to examine the effects of word frequency (high and low) and suffix type (neutral and nonneutral). Suffix type affected both intermediate and advanced learners, but frequency had a greater impact on intermediate learners, while either factor did not influence native speakers. Experiment 2 used nonwords to examine the effects of task type (phonological and morphosyntactic) and proficiency (intermediate, advanced, and native). While intermediate learners showed no significant difference between the two tasks, advanced learners and native speakers performed better at the morphosyntactic task than at the phonological task. Taken together, advanced learners, as well as native speakers, are more likely than intermediate learners to use rule-based knowledge, but are less likely than native speakers to possess a sufficient amount of knowledge of individual words. On the whole, advanced learners outperformed intermediate learners in almost all the comparisons made in the study, suggesting a strong association between knowledge of derivational English words and general English proficiency.

Keywords: phonological knowledge, morphosyntactic knowledge, derivational suffixes, English proficiency, vocabulary development

Introduction
A central topic in the study of second language acquisition concerns the development of vocabulary among language learners. How and why does vocabulary knowledge differ between native speakers and second language learners? The present study aims to explore vocabulary knowledge and development by comparing phonological and morphosyntactic knowledge of derivational English words possessed by native speakers and Japanese learners with differing degrees of English proficiency.

Native speakers of English utilize knowledge of derivational suffixes to understand and produce morphologically complex words (Marslen-Wilson, 2007; Marslen-Wilson, Tyler, Waksler, & Older, 1994; Tyler & Nagy, 1989). Derivational processes and derived words make a significant contribution to vocabulary growth among children and adults (Carlisle, 2000; Katamba, 2005; Tyler and Nagy, 1989). Knowledge of derivational processes should also help
learners of English to increase their vocabulary. This type of knowledge can affect how they deal with new words (Ishikawa, 2007, 2011).

From a theoretical point of view, the current research discusses the question of whether derived words are stored as whole derived forms in the mental lexicon or generated from morphological units by rules in the lexicon (Burzio & Caramazza, 1987; Ford, Davis, & Marslen-Wilson, 2010; Hay, 2002; Marslen-Wilson, 2007; Marslen-Wilson & Tyler, 1997; Morris & Stockall, 2012; Post, Marslen-Wilson, Randall, & Tyler, 2008). More specifically, the issue concerns whether a derived word, for example, economic, is represented as a whole form or represented as two separate units, a stem and a suffix, economy and -ic in this instance. To investigate this issue, the present study used nonwords as well as real English words as stimuli. If participants are sensitive to the properties of suffixes in nonwords, then this would imply that suffixes are also stored in the lexicon separately from base words.

There are two types of derivational suffixes in English, neutral suffixes and nonneutral suffixes, which differentially affect the form and stress of stems to which they are added (Burzio, 1994; Fudge, 1984; Katamba, 2005; Teschner & Whitley, 2004). Neutral suffixes, such as -ness, -ment, and -ful, do not cause a change in the form of the stems to which they attach (e.g., develop + ment) and do not change the stress position in the stems (e.g., serious and seriousness). In contrast, nonneutral suffixes, such as -tion, -ity, and -ic, tend to trigger a change of form in the stems (science + ic = scientific) as well as a change of stress (active and activity). Consistent differences between neutral and nonneutral suffixes are found in the acquisition of morphology (Gordon, 1989; Tyler & Nagy, 1989) and phonology (Jarmulowicz, 2002, 2006; Jarmulowicz, Taran, and Hay, 2008) such that nonneutral suffixes tend to be acquired later than neutral ones.

Language learners are sensitive to distributional probabilities of language input to which they are exposed. It has long been noted that word frequency affects the processing and storage of lexical items (Bauer, 2001; Bod, Hay, and Jannedy, 2003; Hay, 2002). Generally, frequent words are recognized faster and remembered more accurately than infrequent words.

Another variable that needs to be investigated in vocabulary learning research is language proficiency. Learners with a higher level of English proficiency show a greater preference for and are more sensitive to the general tendencies of English vocabulary. For example, Ishikawa (2011) investigated Japanese English language learners' phonological knowledge of derived English words and suggested that intermediate learners possess a limited vocabulary of individual words, advanced learners acquire rule-based knowledge, and adult native speakers have both a detailed knowledge of rules and an extensive vocabulary of individual words.

The purpose of the current study is to investigate the phonological and morphosyntactic knowledge of derivational suffixes demonstrated by adult native speakers of English and by intermediate and advanced Japanese learners of English. The study explores how they derive words in accordance with given sentence contexts and where they place primary stress on those derived words, which vary in terms of suffix type and word frequency.

Points of discussion that will be addressed in this paper are (1) effects of word type (real words or nonwords), word frequency (high or low), and suffix type (neutral or nonneutral);
(2) comparison between phonological and morphosyntactic tasks; and (3) comparison
between English-speaking adults and Japanese learners of English with differing degrees of
English proficiency. If the assumption that people with a high level of English proficiency are
more likely than lower-level learners to possess rule-based linguistic knowledge is valid, then
both Japanese advanced learners of English and English native speakers should be unaffected
by word frequency or suffix type. Moreover, this tendency should be particularly pronounced
in the case of nonwords as opposed to real English words, because nonwords need to be dealt
with using combinatory rules in the lexicon. The tendency should also be clearer in the
morphosyntactic task than in the phonological one because the former seems to require more
detailed knowledge of rules than the latter.

**Experiment 1: Real Words**

**Method**

**Participants.** Twenty adult native speakers of English who had not studied linguistics
(students at a university in the United Kingdom) and forty Japanese university students
learning English as a foreign language in Japan participated in the experiment. According to
their TOEFL ITP scores, the Japanese students were divided into two groups, intermediate
and advanced learners, each comprising 20 students. The average TOEFL ITP score of the
advanced group was 499.1 with a range of 550 to 477, and that of the intermediate group was
435.2, ranging from 420 to 467. The two groups differed highly significantly in terms of their
average TOEFL ITP scores (t(38) = 11.16, p < .0001, r = .88).

**Materials.** Sixty derived English words were used as stimulus words. The stems in these
words had more than one syllable to ensure the possibility of stress shift. The words vary in
terms of suffix type (neutral or nonneutral) and word frequency (high or low). Five neutral
(-able, -ance, -ful, -ment, -ness) and five nonneutral (-al, -ic, -ity, -ion, -ous) suffixes were selected
from thirty-two major English suffixes reported in Harwood and Wright (1956). Word
frequency was factored in for each suffix type. Word frequencies per million words for
stimulus words were obtained from SUBTL frequency norms available online at http://
subtlexus.lexique.org/ (Brysbaert & New, 2009). The mean frequencies for high-frequency
words for neutral and nonneutral words were 15.57 and 17.89, respectively, with a range of
3.16 to 55.61. Those for low-frequency words for neutral and nonneutral words were 1.32 and
1.28, respectively, with a range of 1.02 to 1.90. There was no significant difference between
the mean frequencies of neutral and nonneutral words for both high-frequency words (t(28) = .63,
p = .53, r = .11) and low-frequency words (t(28) = .46, p = .65, r = .09). The order of stimuli
within the experiment was randomized and printed on a sheet of paper. All the stimuli are
listed in Appendix 1.

**Procedure.** Participants were tested individually or in small groups. In morphosyntactic
tasks, they filled in the blanks of 60 sentences with appropriate forms of the words given on
the left side, as an example below shows.

Ex. ceremony The music was played at __________ occasions.

In subsequent phonological tasks, participants put stress marks on the words (e.g., victorious)

**ISHIKAWA, K.**

Phonological and Morphosyntactic
printed on sheets to indicate proper pronunciation. The correct answers for both tasks were tallied for each participant.

Post-experimental interviews revealed that all the participants were unaware of the rules of English suffixation and stress patterns, although some commented there might be some rules which they could not describe explicitly. To this extent, both the native speakers and the Japanese learners of English had learned those rules and patterns implicitly (Williams, 2005, 2009).

Results and Discussion

Figures 1 and 2 illustrate the mean proportions of correct answers as a function of group (intermediate group, advanced group, and native English speakers), suffix type (neutral and nonneutral), and word frequency (high-frequency words and low-frequency words) for the phonological and morphosyntactic tasks, respectively.

![Figure 1](https://example.com/figure1.png)

**Figure 1.** Proportion of correct answers for phonological tasks. Error bars show the standard error of the mean.

The proportions of correct answers were rescaled using an arcsine transformation in order to ensure the data were distributed more normally. All the analyses of variances (ANOVAs) reported below were conducted on these transformed proportions.
For the phonological task, a three-way ANOVA was conducted using group (native, advanced, and intermediate) as the between-subjects variable, and suffix type and word frequency as the within-subject variables. There were main effects of group \((F(1, 57) = 18.89, p < .001, \eta^2 p = .40)\), suffix type \((F(1, 57) = 24.06, p < .001, \eta^2 p = .30)\) and word frequency \((F(1, 57) = 25.79, p < .001, \eta^2 p = .31)\). The interaction between group and suffix type approached significance \((F(2, 57) = 3.14, p = .051, \eta^2 p = .10)\), and the interaction between group and frequency was significant \((F(2, 57) = 8.50, p < .005, \eta^2 p = .23)\). The three way interaction was not significant \((F(2, 57) = .23, p = .079, \eta^2 p = .01)\). Post-hoc Bonferroni pairwise comparisons revealed the following differences; although neither of the two factors reliably affected native speakers, word frequency affected the performance of the intermediate groups only \((p < .001)\), and suffix type influenced both the intermediate and advanced groups \((p < .001 \& .05 \text{ respectively})\). The results of group comparisons were as follows; the advanced group performed significantly better than the intermediate groups in all the cases \((p < .05)\) except for neutrally suffixed high-frequency words, and the native speakers significantly outperformed the intermediate group for all the cases \((p < .001)\) and the advanced group for low-frequency words with both neutral and nonneutral suffixes \((p < .05 \& p = .09, \text{ respectively})\).

For the morphosyntactic task, an ANOVA revealed significant effects of group \((F(1, 57) = 780.64, p < .001, \eta^2 p = .97)\), suffix type \((F(1, 57) = 57.42, p < .001, \eta^2 p = .50)\), and word frequency \((F(1, 57) = 420.35, p < .001, \eta^2 p = .88)\). All the interactions were significant, including the three-way interaction \((F(2, 57) = 25.33, p < .001, \eta^2 p = .47)\). Post-hoc Bonferroni pairwise comparisons showed the following differences; both Japanese groups were significantly influenced by both word frequency and suffix type \((p < .001 \text{ for both})\), while suffix type did not affect the performance by the intermediate group for the low frequency words \((p = .30)\). For
the case of native speakers, the correct proportions of low-frequency words with nonneutral suffixes were significantly lower than those of low-frequency words with neutral suffixes and high-frequency words with nonneutral suffixes ($p < .005 \& p < .001$, respectively). The results of group comparisons revealed that the three groups differed significantly from each other in all four conditions ($p < .001$ for all).

In the phonological task, suffix type affected both groups of learners in that neutral suffixes led to more accurate responses than nonneutral suffixes; however, word frequency affected only the intermediate group such that their performance declined for low-frequency words, which in turn suggests that learners with a high degree of English proficiency may exploit rules for deciding stress position in derivational words irrespective of the words’ frequencies. In the morphosyntactic task, the two factors influenced both learner groups, although suffix type had no impact on low frequency words for the intermediate group, indicating a stronger effect of word frequency on learners with a lower proficiency of English. The morphosyntactic task produced fewer correct responses and exhibited more distinct differences among the three groups than the phonological task, which may indicate that the nature of the morphosyntactic tasks is more complicated and closely associated with English proficiency.

**Experiment 2: Nonwords**

**Method**

**Participants.** The same 20 native English speakers as in Experiment 1 and another thirty Japanese university students learning English as a foreign language in Japan served as participants. Japanese learners were separated into two groups (intermediate and advanced groups), each comprising 15 students, according to their TOEFL ITP scores. The average TOEFL ITP score of the advanced group was 516.2 with a range of 590 to 480, and that of the intermediate group was 450.7, ranging from 420 to 477. In cases where the students had not taken TOEFL ITP but had taken STEP Tests or TOEIC, their grades or scores were converted into TOEFL ITP scores with reference to the conversion table provided at http://www.kobecufs.ac.jp/about/contribution/license/files/toeic_toefl_score.pdf. The two groups differed significantly in terms of their average TOEFL ITP scores ($t(28) = 7.15, p < .001, r = .80$).

**Materials.** Nonwords were constructed in the form of CVC-CVC-suffix (e.g., pelsofity). The CVCs of nonwords were taken from Noble (1961) and selected from items scaled low in meaningfulness (range 2.0–2.8). All the nonwords were phonologically legal in English according to the principle of the well-formed syllable (Giegerich, 1992). Thirty nonwords were created for the phonological task. The same five neutral (-able, -ance, -ful, -ment, -ness) and five nonneutral (-al, -ic, -ity, -ion, -ous) suffixes as in Experiment 1 were used. For the morphosyntactic task, twenty-four sentences were prepared using suffixed nonwords, varying in terms of suffix type (neutral or nonneutral). Seven neutral (-ment, -ness -ful, -ish, -ate, -en, -ize) and five nonneutral suffixes (-ion, -ity, -al, -ic, -ify) were selected from thirty-two major English suffixes reported in Harwood and Wright (1956). To test participants' morphosyntactic knowledge in the sentence context, three grammatical categories were included in the selected suffixes. They were nouns (-ment, -ness, -ion, -ity), adjectives (-ful, ish, -al, -ic) and verbs (-ate, -en, -ize, -ify). All the stimuli are shown in Appendix 2.
Procedure. Participants were tested individually or in small groups. In morphosyntactic tasks, they chose the words that best fit the blanks in 24 sentences, as in the example below.

Ex. He shows some ____ at home.
   (a) bozrifen (b) bozrifness (c) bozrivic (d) bozrifize

In subsequent phonological tasks, participants put stress marks on the words (e.g., *hetbodity*) printed on sheets to make the words sound natural. Because we could not decide the correct stress position on nonwords with neutral suffixes (e.g., *pazmeeful*), only the responses from nonwords with nonneutral suffixes were included in the analysis. Nonwords suffixed with *-ion, -ic, and -ity* were judged as correct responses when stress marks were placed on their second syllable, and nonwords with *-al and -ous* were judged correct when stress marks were placed on their first syllable (Fudge, 1984).

Results and Discussion

Since the effect of suffix type did not detect a significant difference between the neutral and nonneutral suffixes ($t(49) = 1.01, p = .319, r = .14$), the following analyses focused on the effects of group (native, advanced, and intermediate) and task (phonological and morphosyntactic). Figure 3 demonstrates the mean proportions of correct responses as a function of group and task.

![Figure 3](image_url)

*Figure 3.* Proportion of correct responses for nonwords. Error bars show the standard error of the mean.

Figure 3 shows that adult native speakers of English performed satisfactorily in the morphosyntactic task (90.4%), but only 73.6% of their responses were correct in the phonological task. It seems that nonwords affect stress judgment more negatively than
morphosyntactic judgment.

A two-way ANOVA was conducted with group as the between-subjects variable, and task type as the within-subject variable. The analysis identified main effects of group ($F(1, 47) = 25.55, p < .001, \eta^2 = .52$) and task ($F(1, 47) = 12.29, p < .001, \eta^2 = .21$), and a significant interaction between group and task ($F(2, 47) = 8.54, p < .001, \eta^2 = .27$). Post-hoc Bonferroni pairwise comparisons showed that while the difference between phonological and morphological tasks was not significant for the intermediate group ($p = .170$), it was significant for the advanced group and the native speakers ($p < .05$ and $p < .001$, respectively) in favor of the morphosyntactic task. In addition, the advanced and native groups outperformed the intermediate group at both the phonological ($p < .05$ and $p = .063$, respectively) and the morphological ($p < .001$ for both) tasks. Taken together, it appears that as English proficiency increases, morphosyntactic knowledge improves remarkably, while the degree of increased phonological knowledge is relatively small.

**General Discussion**

This study was an attempt to explore how learners with different levels of English proficiency develop their vocabulary. It specifically investigated the development of phonological and morphosyntactic knowledge of derived English words by comparing native speakers, and advanced and intermediate Japanese learners of English, with various relevant factors involved.

Consider the effects of word frequency (high or low) and suffix type (neutral or nonneutral). In the phonological task of Experiment 1 using real English words, word frequency affected only intermediate learners, and it did not have an impact on the performance of advanced learners. On the other hand, suffix type affected both groups of learners, whereas neither factor influenced native speakers. In the morphosyntactic task of the same experiment, both word frequency and suffix type influenced the two groups of learners, although intermediate learners were affected by word frequency to a higher degree than advanced learners. Moreover, even native speakers produced a higher rate of incorrect answers for low-frequency words with nonneutral suffixes.

These results only partially support the view that learners with a high English proficiency are likely to possess rule-based knowledge as opposed to whole derived forms (Ishikawa, 2011; Marslen-Wilson, 2007), because if advanced learners had primarily used derivational rules, they would not have been affected by suffix type. Considering the performance of native speakers, who completed the tasks highly satisfactorily, an even higher level of English proficiency may be needed to overcome the difficulties posed by nonneutral suffixes by using rule-governed knowledge of derivational processes.

Turning to the results of Experiment 2 using nonwords, which focused on the effects of group and task, the most noteworthy result was that the two tasks had distinct impacts on the performance of different groups. Whereas intermediate learners showed no significant difference in the rate of correct responses between the tasks, advanced learners and native speakers performed reliably better at the morphosyntactic task than at the phonological task. This may indicate that morphosyntactic knowledge is the key to success in vocabulary growth and development.

28

*JACET Journal 60 (2016)*
Furthermore, advanced learners and native speakers proved to outperform intermediate learners when dealing with nonwords. Given that nonwords illuminate how participants utilize their derivational knowledge per se instead of the memory of individual words (Jarmulowicz, 2006), it appears that advanced learners as well as native speakers most likely possess combinatory, rule-based derivational knowledge. More importantly, although the performances on nonwords were almost the same for advanced learners and native speakers, advanced learners were, for the most part, inferior to native speakers for the tasks dealing with English words. This observation suggests that the crucial difference between advanced learners and native speakers lies in one’s recollection of individual words.

It is also worth noting that while phonological tasks produced more correct responses than morphosyntactic tasks in processing real English words in Experiment 1, the reverse was true in Experiment 2 using nonwords in favor of morphosyntactic tasks. The difference was particularly evident for advanced learners of English. This outcome suggests the possibility that words are processed as a whole without awareness of the role of suffixes in the phonological task, whereas in the morphosyntactic task words are processed analytically and decomposed more distinctly into stems and suffixes, at least in the developing stages of English proficiency.

Overall, learners with a high English proficiency outperformed those with a low English proficiency in almost all comparisons made in the analyses. It seems that as English proficiency increases, knowledge of phonological and morphosyntactic aspects of English words becomes more accurate and stable. The results suggest a close connection between English derivational knowledge and general English competency.

In conclusion, by comparing native speakers and two groups of Japanese learners of English with differing degrees of English proficiency in terms of their two types of lexical knowledge (phonological and morphosyntactic) probed with two types of words (words and nonwords), this study has demonstrated for the first time that as learners develop higher proficiency levels, they are more likely to benefit from rule-based knowledge, albeit with a more limited size of vocabulary than native speakers. The results also provide the first evidence that shows the interaction between English proficiency and knowledge type with a trend toward more improvement in morphosyntactic knowledge with greater proficiency.

Acknowledgments

An earlier version of this study was presented at the 46th Annual Meeting of the British Association for Applied Linguistics, Edinburgh, September 2013. I am grateful to the audience for their valuable comments. I would also like to thank Dr John Williams for his help with recruiting English-speaking participants from the University of Cambridge. I am thankful to three anonymous reviewers from JACET Journal for their constructive comments that helped improve the manuscript. This research was supported by a grant from the Japan Society for the Promotion of Science (No. 23520720).

References

MIT Press.

Appendix 1: Real Words

<table>
<thead>
<tr>
<th>Materials for phonological tasks</th>
<th>Neutral</th>
<th>Nonneutral</th>
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<tbody>
<tr>
<td><strong>suffix</strong></td>
<td>High</td>
<td>Low</td>
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<tr>
<td>-ance</td>
<td>assistance</td>
<td>defiance</td>
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<td></td>
<td>appearance</td>
<td>continuance</td>
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<td></td>
<td>performance</td>
<td>endurance</td>
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<td>-ness</td>
<td>happiness</td>
<td>willingness</td>
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<td></td>
<td>consciousness</td>
<td>seriousness</td>
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<td></td>
<td>forgiveness</td>
<td>emptiness</td>
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<td>-able</td>
<td>valuable</td>
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<td>reasonable</td>
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<td>remarkable</td>
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<td>-ment</td>
<td>management</td>
<td>fulfillment</td>
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<td></td>
<td>development</td>
<td>nourishment</td>
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<td>punishment</td>
<td>requirement</td>
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<td>-ful</td>
<td>successful</td>
<td>deceitful</td>
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<tr>
<td></td>
<td>powerful</td>
<td>resourceful</td>
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<td></td>
<td>delightful</td>
<td>respectful</td>
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*ISHIKAWA, K.*

Phonological and Morphosyntactic
### Materials for morphosyntactic tasks

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<th>Frequency, High</th>
<th>Frequency, Low</th>
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<tr>
<td>suffix</td>
<td></td>
<td></td>
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<tr>
<td>-ance</td>
<td>assist</td>
<td>defy</td>
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<tr>
<td></td>
<td>He offered me practical assistance with my study.</td>
<td>There was a look of defiance in his eyes.</td>
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<tr>
<td>appear</td>
<td>She is never concerned about her appearance.</td>
<td>continue</td>
</tr>
<tr>
<td>perform</td>
<td>The evening performance starts at 8 p.m.</td>
<td>endure</td>
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<tr>
<td>-ness</td>
<td>happy</td>
<td>willing</td>
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<td></td>
<td>The marriage brought her happiness.</td>
<td>He showed great willingness to help students.</td>
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<td>conscious</td>
<td>A high level of consciousness is necessary.</td>
<td>serious</td>
</tr>
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<td>forgive</td>
<td>They prayed for God's forgiveness.</td>
<td>empty</td>
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<td>-able</td>
<td>value</td>
<td>favor</td>
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<td></td>
<td>The book provides valuable information on recent trends.</td>
<td>She made a favorable impression on his parents.</td>
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<tr>
<td>reason</td>
<td>They sell good quality food at reasonable prices.</td>
<td>account</td>
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<td>remark</td>
<td>There will be a remarkable change of weather for a few weeks.</td>
<td>Politicians need to be accountable to the voting public.</td>
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<td>-ment</td>
<td>manage</td>
<td>fulfill</td>
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<td></td>
<td>The report criticizes the bad management of the company.</td>
<td>Winning the championship was the fulfillment of his childhood dream.</td>
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<td>develop</td>
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<td>nourish</td>
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<td></td>
<td>The course emphasizes the development of basic skills.</td>
<td>The plants obtain nourishment from the roots of other plants.</td>
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<td>punish</td>
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<td>require</td>
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<td></td>
<td>The punishment for the crime was too severe.</td>
<td>Food safety is the basic requirement of a country.</td>
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<td>-ful</td>
<td>success</td>
<td>deceit</td>
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<td></td>
<td>The play was very successful on Broadway.</td>
<td>He is a deceitful person who misleads friends.</td>
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<td>power</td>
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<td>resource</td>
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<td></td>
<td>Computers are now more compact and powerful.</td>
<td>She is a resourceful teacher who knows how to manage class.</td>
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<td>delight</td>
<td></td>
<td>respect</td>
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<td></td>
<td>We had lunch at a delightful restaurant.</td>
<td>They were brought up to be respectful of authority.</td>
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<td>Nonneutral</td>
<td>Frequency, High</td>
<td>Frequency, Low</td>
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<tr>
<td>suffix</td>
<td>Frequency, High</td>
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<tr>
<td>-ion compete</td>
<td>There is intense competition between schools to attract students.</td>
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<tr>
<td>educate</td>
<td>She received her elementary education in Britain.</td>
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<td>invite</td>
<td>I received an invitation to the party.</td>
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<td>-al finance</td>
<td>She is receiving financial support from her parents.</td>
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<td>origin</td>
<td>He worked hard to develop his original idea.</td>
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<tr>
<td>politics</td>
<td>He is a political leader in his community.</td>
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<tr>
<td>-ic science</td>
<td>She is interested in the scientific study of earthquakes.</td>
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<td>drama</td>
<td>There was a dramatic increase in population in the area.</td>
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<td>allergy</td>
<td>Unfortunately, I am allergic to cats.</td>
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<td>-ity electric</td>
<td>Leaving lights on in empty rooms is a waste of electricity.</td>
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<tr>
<td>active</td>
<td>The street was noisy and full of activity.</td>
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<td>possible</td>
<td>There is still a possibility of winning the game.</td>
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<td>-ous mystery</td>
<td>A mysterious young woman is living next door.</td>
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<tr>
<td>courage</td>
<td>She made a very courageous decision.</td>
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<tr>
<td>ridicule</td>
<td>I look ridiculous in this hat.</td>
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<tr>
<td>realize</td>
<td>There is a growing realization of the need to change the system.</td>
<td></td>
</tr>
<tr>
<td>coordinate</td>
<td>We need better coordination between team members.</td>
<td></td>
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<tr>
<td>prohibit</td>
<td>They argue for the prohibition of smoking in restaurants.</td>
<td></td>
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<tr>
<td>proverb</td>
<td>Several proverbial phrases were used in his speech.</td>
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<tr>
<td>botany</td>
<td>You should visit a botanical garden to study plants.</td>
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<tr>
<td>ceremony</td>
<td>The music was played at ceremonial occasions.</td>
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<tr>
<td>character</td>
<td>He spoke with his characteristic smile.</td>
<td></td>
</tr>
<tr>
<td>energy</td>
<td>She is an energetic supporter of the project.</td>
<td></td>
</tr>
<tr>
<td>photograph</td>
<td>High-quality photographic paper is available in this store.</td>
<td></td>
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<tr>
<td>authentic</td>
<td>They questioned the authenticity of the letter.</td>
<td></td>
</tr>
<tr>
<td>superior</td>
<td>He talked about the superiority of his method over others.</td>
<td></td>
</tr>
<tr>
<td>humid</td>
<td>The sensor measures temperature and humidity in this room.</td>
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<tr>
<td>malice</td>
<td>He spread malicious lies to damage her reputation.</td>
<td></td>
</tr>
<tr>
<td>victory</td>
<td>He participated in the army's victorious campaign.</td>
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<tr>
<td>conscience</td>
<td>She is a conscientious and hardworking student.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2: Nonwords

Materials for phonological tasks

Neutral suffix

-ance  -ness  -able  -ment  -ful
fospezance  bozrifness  nigwolable  nalhibment  vesropful
gipjodance  dufijness  vomfotable  hespidment  pazmefcul
lepfinance  kognomness  pagmufable  fomganment  wicvidful

Nonneutral suffix

-ion  -al  -ic  -ity  -ous
mozjition  segtidal  risjedic  pelsofity  lifbapous
feswotion  woplufal  lofbepic  hignadity  degwizous
nopgosion  rogcipal  jepligic  hetbodity  nuslefous

Materials for morphosyntactic tasks

Suffixes used

<table>
<thead>
<tr>
<th></th>
<th>Neutral</th>
<th>Nonneutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noun</td>
<td>-ment, -ness</td>
<td>-ion, -ity</td>
</tr>
<tr>
<td>Adjective</td>
<td>-ful, -ish</td>
<td>-al, -ic</td>
</tr>
<tr>
<td>Verb</td>
<td>-ate, -en, -ize</td>
<td>-ify</td>
</tr>
</tbody>
</table>

Sentences used

Noun context  He shows some ( ) at home./ She likes his ( ).
Adjective context  She is very ( ) at school./ He is a very ( ) person.
Verb context  She tries to ( ) her friend./ They want to ( ) their books.

Example

1. She likes his _____.
   (a) mocdetful  (b) mocdetish  (c) mocdetion  (d) mocdetify
2. He is a very ____ person.
   (a) vomfotic  (b) vomfotness  (c) vomfotion  (d) vomfotify
3. He shows some ____ at home.
   (a) bozrifhen  (b) bozrifnness  (c) bozrific  (d) bozrifie
4. She is very ____ at school.
   (a) nopgosify  (b) nopgosness  (c) nopgosion  (d) nopgosic
5. She tries to ____ her friend.
   (a) mozjital  (b) mozjition  (c) mozjitify  (d) mozjitic
6. He is a very _____ person.
   (a) lifbament (b) lifbapity (c) lifbapful (d) lifbapize
7. He shows some _____ at home.
   (a) fospezish (b) fospezal (c) fospezify (d) fospezment
8. She is very _____ at school.
   (a) vesropness (b) vesropify (c) vesropen (d) vesropish
9. They want to _____ their books.
   (a) hetboden (b) hetbodal (c) hetbodish (d) hetbodity
10. He is a very _____ person.
    (a) hignadify (b) hignadness (c) hignaden (d) hignadish
11. She tries to _____ her friend.
    (a) hespidate (b) hespidment (c) hespidness (d) hespidual
12. She is very _____ at school.
    (a) gipjodity (b) gipjodal (c) gipjodment (d) gipjodize
13. She tries to _____ her friend.
    (a) pazmecic (b) pazmecness (c) pazmecity (d) pazmecize
14. He is a very _____ person.
    (a) rogcipity (b) rogcipal (c) rogcipment (d) rogcipize
15. She likes his _____.
    (a) pelsofen (b) pelsofity (c) pelsofic (d) pelsofize
16. They want to _____ their books.
    (a) pimketion (b) pimketal (c) pimketic (d) pimketify
17. He shows some _____ at home.
    (a) feswotion (b) feswoeful (c) feswotish (d) feswotify
18. She is very _____ at school.
    (a) nalhibful (b) nalhibment (c) nalhibity (d) nalhibize
19. He shows some _____ at home.
    (a) nigwolic (b) nigwolen (c) nigwolyty (d) nigwolize
20. They want to _____ their books.
    (a) nusleftness (b) nuslefize (c) nuslefity (d) nuslefic
21. She likes his _____.
    (a) segtidment (b) segtidify (c) segtidish (d) segtidal
22. She tries to _____ her friend.
    (a) lepfimity (b) lepfimen (c) lepfimish (d) lepfimal
23. She likes his _____.
    (a) risjeden (b) risjedic (c) risjedize (d) risjedness
24. They want to _____ their books.
    (a) jepligal (b) jepligment (c) jepligate (d) jepligness