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NGSL Coverage of the SHS Entrance Exam and the National Center Test

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While the Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) currently expects students to learn 1,200 English words in junior high school and 1,800 English words in high school (MEXT, 2017), there is little to no guidance on the specific words required. Looking at the reading sections on Japanese public high school entrance examinations and the university National Center Test, this study reports the lexical coverage provided by a well-known and publicly available word list, the New General Service List (NGSL) (Browne, Culligan, & Phillips, 2013). The NGSL provided a high 98.11% coverage of the vocabulary on senior high school entrance examinations using only 1,000 words but was only able to cover 95.26% of the vocabulary on the National Center Test with all 2,801 words. The results will be discussed in detail, along with the utility of the NGSL in Japanese junior and senior high school classrooms.

　文部科学省は2017年現在、中学校で1,200語程度、高校で1,800語程度の英単語を指導することを学習指導要領で指定している（文部科学省、2017）。しかし、指導するべき具体的な語彙については明言されていない。本研究では、公立高等学校入学者選抜学力検査と大学入試センター試験の各読解問題に注目し、New General Service List (NGSL)（Browne, Culligan, & Phillips, 2013）を使用して語彙カバー率を調査した。公立高等学校入学者選抜学力検査の語彙カバー率は、NGSLの最も頻度の高い1,000語のみを使用して98.11%と高いが、大学入試センター試験ではNGSLの全2,801語を使用しても95.26%とカバー率は低かった。本論では調査結果の詳細と、中学校および高校での授業におけるNGSLの有用性について論じる。

NGSL Coverage of Japanese Senior High School Entrance Exam and the National Center Test Reading Sections

According to the current course of study provided by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT), Japanese students are expected to learn 1,200 English words in junior high school and 1,800 English words in senior high school (MEXT, 2017). However, MEXT provides little direct guidance to junior and senior high school teachers about which vocabulary to teach.

For many students, a primary goal of studying vocabulary and learning English is to pass the entrance examinations for the next level of schooling. As teachers, however, we want to encourage more general English proficiency which would serve our students well after they are finished with such tests. The New General Service List (NGSL) is a publicly available word list designed to provide the most important vocabulary for general English proficiency (Browne, Culligan, & Phillips, 2013). In this study, we look into whether the NGSL would also provide junior high school and senior high school students with the vocabulary necessary to succeed on a high school entrance examination and the National Center Test.

Background
Entrance Examinations in Japan

Matriculation into Japanese high schools requires students to take an entrance examination upon applying. Although private high schools typically rely on their own in-house tests for admissions purposes, public high schools in each prefecture utilize tests created by their respective board of education. Entrance examinations for universities follow a similar pattern, with each private university usually relying on their own in-house examinations, and public universities basing their entrance decisions on the combined score of two examinations, the National Center Test (NCUEE, 2017) and each university's in-house test. The National Center Test is administered throughout Japan in January each year, and all students hoping to enter public universities need to take it prior to applying.

Vocabulary Learned from Junior High School and Senior High School Textbooks

To comprehend written texts, readers must have sufficient knowledge of the vocabulary in those texts. The lexical coverage (i.e., the percentage of tokens judged to be known) necessary for reading has been found to range from a minimum of 95% (Laufer, 1989; Laufer & Ravenhorst-Kalovski, 2010) to 98% for optimal unassisted comprehension

(Hsueh-chao & Nation, 2000; Laufer & Raven-horst-Kalovski, 2010; Schmitt, Jiang, & Grabe, 2011). If students hope to do well on entrance examinations, it would be valuable to know which words they should study to reach such a high proportion of known words. Although some companies collect data from past examinations to publish vocabulary books, teachers and students who do not purchase these vocabulary books are left to rely on the MEXT-approved in-class textbooks for guidance or select the words to study on their own.

Previous researchers who analyzed the vocabulary in English textbooks found that while junior high school texts tend to utilize high frequency vocabulary with fewer unique tokens (Hasegawa, Chujo, & Nishigaki, 2008; Kitao & Tanaka, 2009), senior high school textbooks contain a large amount of mid- and low-frequency vocabulary (Browne, 1998; Kaneko, 2013). Examining the relationship between junior high school texts and high school entrance examinations in Tokyo, Aoki (2015) found that junior high school students should be able to reach close to a 95% text coverage threshold on Tokyo Metropolitan high school entrance examinations with the vocabulary in junior high school textbooks. Looking at the vocabulary coverage provided by senior high school textbooks on the National Center Test, most studies have reported positive results based on the minimum 95% coverage threshold (Chujo, 2004; Chujo & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2006). However, these texts have usually been found to fall short of the more stringent 98% threshold recommended for optimal comprehension (Kaneko, 2012).

Word Lists

An alternative to relying only on the vocabulary that appears in textbooks would be to utilize a principled list of the most useful English vocabulary. The NGSL is a publicly available word list derived from the Cambridge English Corpus said to be made up of the "most important high-frequency words useful for second language learners of English" (Browne, 2014, p. 2). Containing 2,801 total words in the list (v. 1.01), the NGSL is most commonly divided into smaller sublists based on frequency rankings, with two 1,000-word levels (the 1st and 2nd levels) and a 3rd level made up of the final 801 words. The words on the NGSL are claimed to provide over 90% coverage of general English corpora, which would make it a useful tool for not only test preparation, but also building general English proficiency (Browne et al., 2013).

Aoki (2015) used the NGSL to look at the vocabulary in Tokyo high school entrance exams, finding that while knowledge of all NGSL words provided the 95% minimum coverage, they fell short of the 98% recommendation for optimal unassisted reading. Previous researchers have measured the vocabulary coverage of the National Center Test using lists such as the JACET8000 (Mochizuki, 2016) (e.g., Kitao & Kitao, 2008), Nation's British National Corpus (BNC) lists (Nation, 2006) (e.g., Kaneko, 2012; Tani, 2008), or researcher-created lemmas from the BNC (e.g., Chujo, 2004; Chujo & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2006).

The NGSL is thought to have several advantages over these other lists for two primary reasons. First, it utilizes the more conservative flemma word counting unit[1], which is preferable to the level-6 word family unit (Bauer & Nation, 1993) used for Nation's BNC lists. The level-6 word family unit groups derivational and inflectional forms together with the base forms during list construction (e.g., *unusable* and *usability* are included with *use*), under the assumption that learners will be able to understand the derived forms if they learn the base form. The flemma groups only grammatically inflected forms together (e.g., *using* and *used* are included with *use*), and it does not discriminate the part of speech (e.g., use_{noun} and use_{verb} are counted together) (Pinchbeck, 2014). Recent research has shown that more conservative units of word counting such as the flemma are more appropriate for Japanese learners because they do not assume knowledge of more complex derived forms (McLean, 2018; Stoeckel, Ishii, & Bennett, 2018). Second, unlike the JACET8000, the NGSL is freely available online and easily incorporated into popular text analysis freeware (e.g, AntWordProfiler [Anthony, 2013]; Compleat Lexical Tutor VocabProfile [Cobb, 2019]; Apps4EFL Onlist [Raine, 2019]), making it accessible to any teacher who wishes to use it for teaching and materials creation. Despite these theoretical benefits, the utility of the NGSL for preparing students to reach an optimal 98% vocabulary coverage on senior high school entrance examinations and the National Center Test needs to be further explored.

Research Questions

RQ1. Can the NGSL provide sufficient lexical coverage of the reading passages in Japanese public senior high school entrance exams based on the 98% coverage criteria?

RQ2. Can the NGSL provide sufficient lexical coverage of the reading passages on the Japanese University National Center Test based on the 98% coverage criteria?

Methods

Analysis

To conduct this study, we analyzed two corpora made of the reading sections from the National Center Test (3,810 total tokens) and the Hyogo Prefectural Senior High School Entrance Exam (8,559 total tokens) from 2017 and 2018. Each file was cleaned to delete the irrelevant sections such as the Japanese directions and item numbers and saved as a text file which was analyzed using AntWordProfiler (v. 1.4.0w; Anthony, 2013). The target texts were then analyzed using NGSL reference lists which contained 1,000 headwords each for the 1st and 2nd levels, with the remaining 801 headwords in the third list. The lexical coverage analysis also included a list of words, referred to hereafter as the Known Words List, assumed to be known such as proper nouns, numbers, glosses, and loanwords. While there were no glossed words on the Center Test, there were a total of 51 included on the high school entrance exams. Loanwords were classified by the first author, who chose words which are commonly used in Japanese such as the names of food (e.g., *cherry*, *tomato*) or sports (e.g., *badminton*, *soccer*).

Results

Research Question 1 asked whether the NGSL could provide sufficient lexical coverage of Japanese public senior high school entrance exams based on the 98% coverage criteria. As shown in Table 1, to achieve 98% coverage junior high school students would need to know the first 1,000 words of the NGSL in addition to the Known Words List, which together provided 98.11% coverage. All words on the NGSL in addition to the Known Words List accounted for 99.51% coverage of all words within the reading passages. Nine words within the reading passages were not found on the NGSL lists and can be seen in Appendix A.

Research Question 2 asked whether the NGSL could provide sufficient lexical coverage of the Japanese University National Center Test based on the 98% coverage criteria. As shown in Table 1, knowledge of all 2,801 NGSL words in addition to the Known Words List would only provide 95.26% lexical coverage. Based on these results, students would need to study additional vocabulary not included on the NGSL in order to reach the stricter 98% coverage threshold on the National Center Test. A look at these off-list words (see Appendix B) suggests that the National Center Test reading passages are quite academic in nature, with 60 out of the 212 off-list headwords (28.30%) appearing on the New Academic Word List (Browne, Culligan, & Phillips, 2013).

Discussion

In this research we examined the lexical profiles of reading passages within Japanese public high school entrance examinations and the National Center Test to determine if knowledge of the vocabulary within the NGSL could provide adequate coverage of these materials. The lexical coverage necessary for reading has been found to range from a minimum of 95% (Laufer, 1989; Laufer & Ravenhorst-Kalovski, 2010) to 98% for optimal unassisted comprehension (Hsueh-chao & Nation, 2000; Laufer & Ravenhorst-Kalovski, 2010; Schmitt, Jiang, & Grabe, 2011). Addressing the first research question, we can see that the NGSL provided sufficient lexical coverage of Japanese public high school entrance exams based on this 98% criterion. Furthermore, this coverage level was reached well within the MEXT (2017) requirement of 1,200 English words for junior high school students.

Answering the second research question, we found that although 95% lexical coverage of the National Center Test reading sections was possible with mastery of all 2,801 NGSL words, students

Table 1. *Lexical Profiles of the 2017-2018 Hyogo Prefectural High School Entrance Examinations and the National Center Tests*

Lists	Senior High School Entrance Examination		National Center Test	
	Text Coverage	Cumulative Coverage	Text Coverage	Cumulative Coverage
1,000-word bands				
1st 1,000	89.66%	89.66%	81.43%	81.43%
2nd 1,000	1.00%	90.66%	8.09%	89.52%
3rd 801	0.40%	91.06%	3.34%	92.86%
Known Words	8.45%	99.51%	2.40%	95.26%
Off-List	0.49%	100.00%	4.74%	100.00%

would not be able to reach optimal 98% coverage without studying additional words not included on the NGSL. Despite this, if students used the NGSL to learn 1,200 words in junior high school and an additional 1,800 words[2] in high school as recommended by MEXT (2017), then they could be expected to attain the 95% minimum lexical coverage required for unassisted comprehension on the National Center Test (Laufer & Ravenhorst-Kalovski, 2010).

Based on these results, junior high school teachers who are unsure of what vocabulary to teach their students would be well-advised to use the NGSL for that purpose, given how easily it reached the optimal 98% coverage threshold (98.11%) within the MEXT guidelines for the number of words to study. The coverage of the National Center Test provided by the NGSL, however, was found to be similar to the reported coverage provided by the vocabulary within senior high school textbooks (Chujo, 2004; Chujo & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2006). Knowledge of the vocabulary within the NGSL or high school textbooks were both found to provide the minimal 95% coverage threshold of National Center Test passages, with optimal 98% coverage remaining elusive and requiring that students study many additional vocabulary items. Looking at the off-list words for these passages (Appendix B), however, these results are perhaps an indication of the difficulty of the National Center Test rather than the insufficiency of the NGSL. The NGSL was created as a pedagogical list of the most important words for learners of English, while the National Center Test is difficult by design in order to separate students by ability for selection purposes.

Although it is hoped that these results can provide guidance to junior and senior high school teachers when preparing their students for entrance examinations, this study was limited in several ways. First, only two years of tests were included in the corpus sample, limiting the generalizability of the results. Furthermore, the sample of tests did not include senior high school entrance examinations created in other areas of Japan or university entrance exams produced in-house by individual universities. In previous studies, private university entrance examinations have been shown to have greater lexical difficulty than the National Center Test, with even less guidance towards which words the students need to study (Chujo & Hasegawa, 2004; Hasegawa et al., 2006). Finally, while this study and most other similar studies assume an understanding of proper nouns in their calculations, more research is necessary to determine if these assumptions are valid (Brown, 2010). Difficulty with such vocabulary would place a greater cognitive burden on students taking these tests.

Conclusion

MEXT currently requires that Japanese students learn 1,200 English words in junior high school and 1,800 words in senior high school (2017). However, as there is no indication of which vocabulary items to teach, teachers must decide for their students. The results of this analysis suggest that the NGSL could be a useful tool for helping junior high school teachers reach the optimal 98% lexical coverage for unassisted comprehension on the reading sections of public senior high school entrance exams within the MEXT-required guidelines, while also encouraging the vocabulary necessary for more general English proficiency. For senior high school students studying for the National Center Test, however, the NGSL was only able to provide 95% coverage, meaning that it would be necessary for students to study vocabulary from additional sources in order to reach the optimal 98% threshold.

Notes

1. The flemma word counting unit is referred to as the *modified lexeme* or *modified lemma* in NGSL descriptions, but they are produced in the same way.
2. With only 2,801 words on the NGSL, studying 1,200 words in junior high school and 1,800 words in senior high school would require students to learn an additional 199 words not included on the NGSL.

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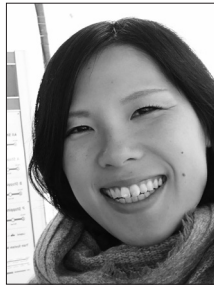
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Appendix A
Senior High School Entrance Exam Reading Passage Vocabulary not on the NGSL
Headword (frequency)

recycling (5), oh (4), accents (1), airport (1), born (1), oclock (1), stadium (1), sunny (1), temple (1)

Appendix B
National Center Test Reading Passage Vocabulary not on the NGSL
Headword (frequency)

schoolyard (14), clip* (13), adolescents* (11), multi-* (11), microscope (8), playground (8), mall* (7), downstairs (6), intelligent (6), cellphones (5), insects* (5), divers (4), footwear (4), lenses (4), telescope (4), xrays (4), apron (3), cricket (3), dining (3), dive (3), documentary (3), explorers (3), invisible (3), oh (3), physically* (3), swallow (3), technological (3), towel (3), typhoon (3), absorb* (2), acquaintances (2), apple* (2), archaic (2), artificial* (2), campus* (2), civilization* (2), conference* (2), creator (2), deadline* (2), fashionable (2), fortunately (2), fur (2), goods* (2), highway (2), impact* (2), ingredients (2), instant (2), invention (2), lick (2), merchant (2), misunderstandings (2), molecules* (2), mt (2), naked* (2), northeastern (2), oclock (2), passive (2), precious (2), psychologists* (2), reservations (2), safely (2), scenery (2), silently (2), spaceship (2), submission (2), suspense (2), toast (2), upload (2), workplace (2), yawn (2), accent* (1), accurately* (1), airplane* (1), annoyed (1), assembly* (1), assert* (1), astonished (1), awake (1), barbecue (1), bathroom (1), benches (1), beneficial (1), biologically (1), bloom (1), blossoms (1), breathable (1), bump (1), bushes (1), changeable (1), chorus (1), classified* (1), click* (1), cloth (1), colonies* (1), comprehension* (1), contrary* (1), controversies* (1), convenience (1), convenient (1), coupon (1), coworker (1), cucumbers (1), cure* (1), deepen (1), delicious (1), demerits (1), depart (1), destinations* (1), detective (1), diagnosing* (1), diagnosis* (1), dinosaurs (1), disadvantages* (1), disappointment (1), downtown (1), economical (1), elbow (1), electron* (1), environmentally (1), envy (1), exit* (1), exploration (1), expressionless (1), frustration (1), globalization* (1), globalized (1), gradual (1), greenhouse (1), guidance (1), hardworking (1), hospitalized (1), huh (1), incorrectly (1), inexpensive (1), insole (1), instructive (1), interacting* (1), internationally (1), interrupted* (1), invade* (1), inventors (1), jazz* (1), jealous (1), jupiter (1), kindly (1), lawn (1), lifestyles* (1), marine (1), marketers (1), mechanical* (1), memorial (1), meow (1), merits (1), mindlessly (1), minerals* (1), misunderstood (1), mmm (1), namely* (1), neat* (1), nest* (1), objectively (1), obtain* (1), octopus (1), orbiting (1), peppers (1), plum (1), primitive* (1), quit (1), railroad (1), realization (1), recalling (1), relieved (1), resembles* (1), revolutionized (1), rewrite* (1), rubber (1), rumor (1), satellite (1), satellites (1), scolded (1), scorer (1), separately* (1), shortages (1), silverware (1), skip* (1), someday (1), speedy (1), spider (1), sympathy (1), teammates (1), traditionally* (1), transformations* (1), treasure (1), tremendous* (1), triumph (1), umbrella (1), unbelievable (1), uncomfortable (1), underneath* (1), underwater (1), uneasy (1), unexpected (1), unexplored (1), unfamiliar (1), unpredictable (1), unstable* (1), vague* (1), viewpoints (1), visibility (1), vitamins* (1), width (1), wow (1)

* indicates that the headword is in the New Academic Service List (Browne, Culligan, & Phillips, 2013)