
An Analysis of Vocabulary Level in Reading Passages of the National Center Test

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Abstract

A strong knowledge of high frequency vocabulary is essential for second language (L2) learners of English as it provides a large proportion of text coverage for general English texts. Additionally, a minimum understanding of 95% to 98% of the words in a text is essential to allow for reasonable comprehension and guessing of words in context. The current study examines the text coverage provided by the New General Service List (NGSL), a list of high frequency vocabulary for L2 English learners, for reading comprehension passages of Japan's National Center Test, a standardised high-stakes national university entrance examination. Results showed that text coverage provided by the NGSL exceeded the minimum 95% threshold for reasonable reading comprehension for examinations between 2015 and 2019 with a similar level of vocabulary found across these years. The findings present a compelling argument that supporting students to acquire high frequency vocabulary should be strongly focused on at secondary school in Japan.

Keywords: Center Test, New General Service List, high frequency vocabulary, vocabulary level, Japan entrance examinations

A strong knowledge of high frequency vocabulary is foundational to second language (L2) learning and obtaining general language proficiency, as words that occur with a high level of frequency provide a disproportionately high percentage of text coverage (Stoeckel & Bennett, 2015). An analysis by Nation (2006) of the British National Corpus showed that knowledge of 3,000 to 4,000 word families is necessary to understand 95% of a general English text. This is an important minimum vocabulary threshold, with Laufer (1989) estimating that knowing 95% of the words in a text allows reasonable comprehension and guessing the meaning of unknown words in context. Later studies concluded that while 95% coverage allows minimally acceptable comprehension, text coverage of at least 98% based on knowledge of 8,000 word families is ideal, and should be an eventual goal for learners as it allows accurate guessing of unknown words in context and unassisted reading for pleasure (Hu & Nation, 2000; Laufer & Ravenhorst-Kalovski, 2010; Schmitt, Jiang & Grabe, 2011). It can therefore be said that a sound knowledge of core vocabulary is essential for L2 learners of English, and the acquisition of high frequency vocabulary should be focused on in teaching and learning English as a second language.

The New General Service List (NGSL)

With the importance of this in mind, Browne, Culligan, and Phillips (2013) published the New General Service List (NGSL) which contains 2,801 important high frequency words useful for second language learners of English. The list was created after an analysis of a 273 million-word subsection of the Cambridge English Corpus and provides 90.34% coverage of this corpus. It has the aim of providing the highest possible coverage of English texts with the fewest words possible. A "modified lexeme" approach is used to group words in the list with a headword including all its parts of speech and inflected forms, but not including derived forms with non-inflection suffixes (Browne, 2014). This results in the NGSL containing 2,368 word families and 2,801 modified lemmas.

Vocabulary in Japanese University Entrance Examinations and Textbooks

The majority of students in Japan take university entrance examinations in their final year of high school, with their scores having a major bearing on receiving admission offers to universities. English examinations include a section which tests reading comprehension and knowledge of vocabulary and

grammar. These examinations have faced criticism due to their difficulty level, and the large vocabulary size required that is greater than what is expected of high school students (Chujo & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2004; Kikuchi, 2006). This has had a strong “washback effect” on English education and vocabulary learning.

Although English reading materials in Japanese high school textbooks are often considered difficult for students (Browne, 1998), vocabulary in these textbooks is still often insufficient in preparing students for the demands of university entrance examinations. The lexical coverage of vocabulary in textbooks for many examinations has been found to be low (Chujo, 2004; Chujo & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2006; Kitao & Kitao, 2011; Matsuo, 2000; Underwood, 2010). This can lead to test-takers facing great difficulty in adequately comprehending the reading passages of examinations as they regularly encounter unknown words while reading beyond their level, potentially leading to demotivation and a lack of confidence. Arguments have been made to bring the vocabulary used in examinations in line with what students actually study in school (Hasegawa, Chujo, & Nishigaki, 2006; Matsuo, 2000).

With the vocabulary in textbooks often inadequate for meeting the demands of entrance examinations, Japanese high school students are compelled to spend a large amount of time studying and memorising hundreds of additional low frequency words for intensive reading purposes. This is done by using a corpus developed from past entrance examinations and published through cram schools, which covers a large amount of low frequency vocabulary (Underwood, 2010). Hence, the vocabulary load on students is very heavy, and a concerted effort is required to memorise low frequency words by students who wish to gain entrance to prestigious universities.

This focus on learning low frequency vocabulary can lead to a lack of high frequency vocabulary knowledge. While the average vocabulary size of Japanese college students was previously estimated at 3,715 word families, students appeared to have “a consistent lack of knowledge of even the most frequent words of English” (McLean, Hogg & Kramer, 2014, p. 53) which can make comprehension more difficult. Ideally, if high school students were required to learn the most frequent vocabulary, it would allow them to comprehend a higher proportion of English texts. This is important as there is a strong relationship between L2 vocabulary knowledge and reading comprehension, with 95% understanding of the words in a text necessary for minimally acceptable comprehension, and 98% for most learners to read unassisted (Hu & Nation, 2000). Laufer and Ravenhorst-Kalovski (2010) note that even small increments in vocabulary knowledge can contribute to reading comprehension. If students were able to recognise high frequency words immediately, it would also lead to faster and more fluent reading (Underwood, 2010).

Vocabulary Requirements for the National Center Test

There are two types of university entrance examinations in Japan; university-specific examinations offered by public and private universities, and the National Center Test (NCT) for University Admissions, a standardised national examination administered once a year and taken by over 500,000 students (National Center for University Entrance Examinations, 2019a). A variety of subjects are tested with English as one of the required subjects. The English examination includes both listening and reading, with the reading section containing several reading comprehension passages with multiple choice questions.

The English examination of the NCT has a reputation for being easier than those of public and private universities. Several studies found the readability and vocabulary level of the NCT to be appropriate for Japanese high school students at their time of graduation, while the difficulty of individual university entrance examinations were significantly above students’ expected level (Chujo, 2004; Chujo, & Hasegawa, 2004; Hasegawa, Chujo, & Nishigaki, 2006; Makoto, MacGregor, Nakajima, & Omori, 2006; Matsuo, 2000). In addition, the vocabulary in junior and senior high school (JSH) textbooks was found to provide coverage of at least 95% for vocabulary in several NCTs (Chujo, & Hasegawa, 2004; Hasegawa,

Chujo, & Nishigaki, 2006). This suggests that the NCT is a more suitable examination for Japanese high school graduates.

More recent research similarly found the NCT to be less challenging than individual university examinations, but also suggested the readability and lexical difficulty level of the test had increased. Tani (2008) reported that 91.2% of the vocabulary in the 2008 NCT was covered in high school textbooks, while Kitao and Kitao (2011) found that textbooks provided only 81.26% lexical coverage (2,368 words) for the 2010 NCT. Although still easier than other entrance examinations, they mentioned that the difficulty level of reading passages had increased since the 2006 NCT, with more low frequency vocabulary and a higher readability level. This was further supported by Underwood (2010) who noted that the readability of the 2008-2009 NCTs had increased to a level comparable to entrance examinations of prestigious public and private universities. These findings suggest that although the NCT is still the most appropriate examination, there is an increased likelihood that many test-takers may have significant difficulty comprehending the reading passages of the NCT.

A strong overlap has been observed when comparing high frequency word lists with vocabulary contained in JSH textbooks and the NCT. Using a lemmatised high frequency word list made from the British National Corpus (BNC), Chujo (2006) discovered the top 3,100 words from the BNC covered 95% of vocabulary in the 2001-2002 NCTs as well as vocabulary in JSH textbooks. A later study by Underwood (2010) found the 2,000 words of the General Service List (GSL), the predecessor of the NGSL, provided 92.67% vocabulary coverage of the 2003-2007 NCTs, 86.45% of the 2008-2009 NCTs and 88.59% for final grade high school textbooks, indicating a degree of compatibility between them. When adding an additional 570 word families from the Academic Word List (AWL) to the GSL, vocabulary coverage for the NCTs increased to over 93%. Underwood noted that this observation was a promising trend in mitigating the difficulty of the NCT and helping students retain high frequency vocabulary knowledge; yet, it would be contingent on choosing this vocabulary for learning at high school level in Japan.

The importance for L2 learners to acquire knowledge of high frequency words and its positive effect on reading comprehension is clearly understood. However, with gaps in their core vocabulary knowledge, Japanese students often have difficulty when sitting university entrance examinations, such as the NCT. With a lack of recent studies and little research comparing high frequency word lists with the NCT, this study uses the NGSL to analyse the vocabulary level of past NCTs, and sets out to answer the following questions:

1. What percentage of vocabulary coverage does the NGSL provide for long reading comprehension passages of the 2014-2019 NCTs?
2. Does this vocabulary coverage achieve the ideal 98% text coverage to allow comfortable reading comprehension and guessing of words in context?

Method

Data Collection

Long reading comprehension passages (Sections 4, 5 and 6) from the 2014-2019 NCTs were analysed using an online corpus analysis tool called VocabProfile (Cobb, n.d.). Using this tool, a text can be entered or uploaded, and the number of words that the text contains from frequency bands of different word lists is calculated, with statistical data being generated. In this study, the reading passages of past tests were copied and pasted into VocabProfile.

Analysis

The analysed passages were compared against the first three NGSL bands, with the text coverage provided by the NGSL calculated for each frequency band.

- NGSL 1 (first 1000 modified lemmas)
- NGSL 2 (second 1000 modified lemmas)
- NGSL 3 (third 801 modified lemmas)
- Off-List words (words not contained in the NGSL)

For the purpose of this study, with the assumption that reading comprehension would not be negatively affected, the following types of words that students would be expected to easily understand from context were recategorised as NGSL Band 1 words: Japanese words, abbreviations, short exclamations, proper nouns, ordinal numbers, days of the week and months.

Results

Table 1 shows the frequency level of the first three bands of the NGSL and off-list words, the percentage of vocabulary from the reading passages covered by each band in the NCTs from 2014 to 2019, and the cumulative text coverage percentage.

Table 1

NGSL text coverage for reading passages of the 2014-2019 NCTs

Frequency Band	2014 NCT		2015 NCT		2016 NCT		2017 NCT		2018 NCT		2019 NCT	
	TC %	Cu %										
NGSL 1	85.64	85.64	88.49	88.49	81.60	81.60	85.91	85.91	81.44	81.44	85.17	85.17
NGSL 2	6.60	92.24	6.73	95.22	9.59	91.19	7.61	93.52	9.68	91.12	8.09	93.26
NGSL 3	2.38	94.62	1.71	96.93	5.30	96.49	2.91	96.43	4.93	96.05	2.51	95.77
Off-List	5.38	100.00	3.07	100.00	3.51	100.00	3.57	100.00	3.95	100.00	4.23	100.00

Note. NCT = National Center Test, NGSL = New General Service List, Off-List = Words not contained in the NGSL, TC % = Text coverage percentage provided by the NGSL, Cu % = Cumulative text coverage percentage provided by the NGSL

It can be seen that the 2,801 high frequency words from the NGSL provided between 95% to 97% overall text coverage of the NCTs from 2015 to 2019. This is above the minimum 95% vocabulary threshold to allow for reasonable reading comprehension and guessing of words in context, but not quite the 98% required for comfortable comprehension. In the 2014 examination, the NGSL provided overall coverage marginally below the 95% threshold, indicating that more low frequency vocabulary was used in this year.

Examinations from 2015 to 2019 also contained a very similar level of vocabulary, with only a 0.88% difference in the cumulative percentage at the NGSL 3 frequency band. For the 2015 NCT, knowledge of only the top 2,000 words of the NGSL was sufficient to reach the 95% threshold. However, this was not repeated in examinations from other years.

A further breakdown of the examinations shows variability in the level of vocabulary between reading passages (see Appendix A). For example, in the 2018 NCT, the NGSL provided over 98% text coverage of the reading passage in Section 4, but less than 95% coverage of the reading passage in Section 6.

Discussion

When comparing the findings with the results of past studies, an observation can be made that the amount of high frequency vocabulary contained in the reading passages of the NCT has significantly increased in recent examinations, continuing the trend identified by Underwood (2010).

The 2,801 word NGSL has provided 96% to 97% coverage of the NCT since 2015, above the 95% threshold for reasonable comprehension and close to the 98% threshold for more comfortable comprehension and accurate guessing of words in context. Therefore, a strong case can be made that students would greatly benefit by learning the high frequency vocabulary in the NGSL. The coverage provided for individual reading passages in different examinations varied from 93% to 98%, showing that knowledge of high frequency vocabulary would help students comfortably comprehend some texts, but they may potentially still struggle with other passages.

According to the New Course of Study guidelines for foreign language education in Japan set by the Ministry of Education, Sports, Culture, Science and Technology (MEXT), students are expected to learn 3,000 words by the end of high school (MEXT, 2015). Hence, it can be argued that learning the words in the NGSL could be considered a realistic goal with consistent and targeted vocabulary instruction and learning. The acquisition of high frequency words and helping students develop a strong retention of them should, therefore, be focused on more in secondary education through regular exposure and practice, and by including a greater amount of this vocabulary in JSH textbooks.

Having knowledge of high frequency words would help students more easily comprehend English texts, such as those in the NCT, and increase their reading fluency in turn. Regardless of whether the NGSL or any other high frequency word list is used, there is a clear need for high school students to acquire core vocabulary, not only for improving their reading comprehension for entrance examinations, but also for their general English language proficiency.

As university entrance examinations of public and private universities have previously been found to contain a higher level of vocabulary than that of the NCT, high school students will undoubtedly be required to continue learning low frequency vocabulary independently through lexical corpora in cram schools. For the learning of high frequency vocabulary to be implemented most effectively, the vocabulary in other university entrance examinations would need to be more closely aligned with that in the NCT and in JSH textbooks. Learning both high and low frequency words for both the NCT and other individual university examinations would increase the already excessive amount of time students need to spend on studying vocabulary. If students cannot cope with such a heavy vocabulary load, this could potentially result in knowledge gaps of high frequency vocabulary remaining.

Conclusion

This study examined the vocabulary level of reading comprehension passages of the NCT by calculating the text coverage provided by the NGSL. The NGSL was found to give greater than 95% text coverage for passages in the tests from 2015 to 2019, indicating that receptive knowledge of high frequency vocabulary would allow students to reasonably comprehend the reading passages of the NCT and increase the likelihood of correctly guessing unknown words in context. The level of high frequency vocabulary was also found to be consistent across the tests between 2015 and 2019 and significantly higher than in previous years.

An important limitation of this study is that vocabulary knowledge is not the only factor that can affect reading comprehension. Other factors should be considered when determining the difficulty level for students to comprehend reading passages; e.g. readability measures, the length and complexity of words,

sentences and texts, students' grammatical knowledge, background knowledge of the topic, level of confidence and automaticity, as well as students' knowledge of reading strategies.

Additionally, it should be noted that proper nouns, often presumed to be easily understood by L2 learners, were recategorised in VocabProfile as NGSL Band 1 words when analysing the reading passages. Brown (2010) points out that studies of text coverage have differed in their treatment of proper nouns with regard to their inclusion or exclusion from data analysis which can lead to different findings. For the purpose of this study, it was assumed that at the time of undertaking the NCT, 3rd year Japanese high school students ought to be able to recognise proper nouns and hence they would not be problematic.

Further research should be undertaken on the text coverage provided by high frequency vocabulary lists for JSH textbooks and for different public and private university entrance examinations. A study by Kaneko (2013) found that the 2,570 word items provided by the GSL and the AWL provided 95.29% average text coverage of the reading passages in the 2003-2011 entrance examinations of Tokyo University, a highly prestigious school. This suggests that even public and private entrance examinations may now contain a larger amount of high frequency vocabulary than previous studies have shown, and that learning high frequency words may also be beneficial for such examinations.

In addition, ongoing changes are being proposed and made by MEXT to the New Course of Study guidelines and the university entrance examination system, including whether to utilise English tests offered by private sector organisations (National Center for University Entrance Examinations, 2019b, 2019c). The effects of any future changes on the vocabulary found in examinations and school textbooks, the teaching of vocabulary in the classroom, and the overlap with vocabulary contained in high frequency vocabulary lists should continue to be examined.

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Appendix

Table A1
NGSL text coverage for individual reading passages of the 2019 NCT

Frequency Band	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	84.06	84.06	88.99	88.99	81.21	81.21
NGSL 2	10.80	94.86	3.32	92.31	11.90	93.11
NGSL 3	2.06	96.92	3.02	95.33	2.24	95.35
Off-List	3.08	100.00	4.67	100.00	4.65	100.00

Note. NGSL = New General Service List, Off-List = Words not contained in the NGSL, TC % = Text coverage percentage provided by the NGSL, Cu % = Cumulative text coverage percentage provided by the NGSL

Table A2
NGSL text coverage for individual reading passages of the 2018 NCT

Frequency Band	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	83.42	83.42	79.47	79.47	82.28	82.28
NGSL 2	12.89	96.31	9.09	88.56	8.28	90.56
NGSL 3	2.11	98.42	8.31	96.87	3.15	93.71
Off-List	1.58	100.00	3.13	100.00	6.29	100.00

Table A3
NGSL text coverage for individual reading passages of the 2017 NCT

Frequency Band	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	81.18	81.18	85.28	85.28	90.53	90.53
NGSL 2	11.76	92.94	8.12	93.40	3.44	93.97
NGSL 3	2.35	95.29	2.20	95.60	4.13	98.10
Off-List	4.71	100.00	4.40	100.00	1.90	100.00

Table A4

NGSL text coverage for individual reading passages of the 2016 NCT

Frequency	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	74.35	74.35	86.62	86.62	81.87	81.87
NGSL 2	13.36	87.71	8.09	94.71	8.22	90.09
NGSL 3	7.11	94.82	2.35	97.06	7.10	97.19
Off-List	5.18	100.00	2.94	100.00	2.81	100.00

Table A5

NGSL text coverage for individual reading passages of the 2015 NCT

Frequency	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	88.46	88.46	93.97	93.97	83.09	83.09
NGSL 2	6.49	94.95	2.85	96.82	10.63	93.72
NGSL 3	1.44	96.39	1.17	97.99	2.42	96.14
Off-List	3.61	100.00	2.01	100.00	3.86	100.00

Table A6

NGSL text coverage for individual reading passages of the 2014 NCT

Frequency	Section 4		Section 5		Section 6	
	TC %	Cu %	TC %	Cu %	TC %	Cu %
NGSL 1	82.37	82.37	88.83	88.83	85.11	85.11
NGSL 2	9.74	92.11	4.85	93.68	6.43	91.54
NGSL 3	1.05	93.16	3.88	97.56	1.72	93.26
Off-List	6.84	100.00	2.44	100.00	6.74	100.00