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A Preliminary Study of Orthographic and Phonological Features of Nursing English Vocabulary

Yoko ICHIYAMA

Abstract

The purpose of this paper is to report the processes and results of a small-scale study on the orthographic and phonological features of nursing vocabulary listed in a reference book used in English classes at the Faculty of Nursing. The paper aims to examine the extent to which grapheme–phoneme correspondences of Nursing English vocabulary differ from that of Japanese one-to-one correspondences. The results reveal that most English graphemes use phonemes that do not follow Japanese one-to-one relationships between grapheme–phoneme relationships or phonemes that do not exist in Japanese pronunciation.

Introduction

In the recent years, the importance of developing students' orthographic and phonological processing skills has been acknowledged, especially in second language. Little has been reported, however, on the orthographic and phonological features of Nursing English vocabulary. Although the 2012 version of *Course of Study* shows (MEXT, 2011) a drastic increase in its content, for example, students learn more words at junior high schools than in the 2002 version (1,200 words vs. 900 words), the actual teaching of phonological awareness and orthographic processing skills is relatively limited. The teaching of phonological awareness and orthographic processing skills appears to be, in fact, encouraged to a certain extent in the *Course of Study*. In the “reading activity” section, for example, students are encouraged to acknowledge the shapes and the meanings of alphabetic letters and to pronounce the words based on the rules of grapheme–phoneme correspondence. Students also need to acknowledge that English vowel and consonants differ in number and type than in Japanese. Moreover, a word may have a sequence of consonants (e.g. “street”) or end with a consonant (e.g. “school”), which does not happen in Japanese (e.g./sutori:to/). The *Course of Study* further states that students should not only acquire knowledge of the pronunciation of individual words but also sequences of words, such as liaison, in which the sound of a consonant becomes unpronounced at the end of a word due to a vowel at the beginning of the next word. However, as Kameyama (1992) pointed out, Japanese students have fewer opportunities to learn the relationships between English writings and pronunciation. While researchers like Smith (2012) and Noguchi (2014) demonstrated the need to

G = Grapheme, P = Phoneme

JE = phonetic symbol that has same grapheme as the Japanese one-to-one correspondences between graphemes and phonemes

NE = phonemes that do not follow Japanese one-to-one correspondences between graphemes and phonemes but whose phonetic symbol exists in Japanese pronunciation

NNE = phonemes that do not follow Japanese one-to-one correspondences between graphemes and phonemes and whose phonemic symbol does not exist in Japanese

An example of the list of words with their phonetic symbols is shown below in Table 2.

Table 2 *An Example of the List of Nursing English Terms*

Term	Phonetic symbol	Number of syllables	1st syllable' grapheme and phoneme	2nd	3rd	4th	5th	6th
1	arthritis	ar'θ rat. təs	2	a = a	i = ai	is = əs		
2	cholic	kou lik	2	o = ou	i = i			
3	cystic	sis tik	2	y = i	i = i			
4	keloid	kí: loid	2	e = i:	oi = oi			
5	mucoid	mjú: koid	2	u = ju:	oi = oi			
6	mucous	mjú: kəs	2	u = ju:	o = ə			
7	nasal	néi zəl	2	a = ei	a = ə			
8	neoplasm	ní:ə plæ'zm	2	eo = í:ə	a = æ			
9	optics	a' p tiks	2	o = a	i = i			
10	ovoid	óu void	2	o = ou	oi = oi			
11	pelvic	pél vik	2	e = e	i = i			
12	plasmid	plæ' z mid	2	a = æ	i = i			
13	pleural	plúə rəl	2	eu = iə	a = ə			
14	renal	rí: nl	2	e = i:	a = *			
15	scleral	sklíə rəl	2	e = iə	a = ə			
16	sigmoid	síg moid	2	i = i	oi = oi			
17	splenic	splí: nik	2	e = i:	i = i			
18	thyroid	θ áiə roid	2	y = ai	o = ɔ			
19	ureic	juə rik	2	u = juə	ei = i			
20	venous	ví: nəs	2	e = i:	ou = ə			
21	abdominal	æb. 'dɑ:. mɪn. l	3	a = æ	o = a:	i = i	al = əl	
22	adenoid	'æ.də.'noid	3	a = æ	e = ə	oi = oi		
23	adipose	'æd ə poʊs	3	a = æ	i = ə	o = ou		
24	androgen	æn drə dʒən	3	a = æ	o = ə	e = e		
25	anemia	ə.' ni:. miə	3	a = ə	i = i:	ia = iə		
26	antigen	'æn. tə. dʒən	3	a = æ	i = ə	e = ə		
27	aorta	e.' ɔ:r. tə	3	a = e	o = ɔ:	a = ə		
28	apnea	'æp. niə	3	a = æ	ea = əa			
29	arthralgia	ɑ:r θ ræ' l dʒə	3	a = a	a = æ	ia = ə		

30	atrophy	'æ. trə. fi	3	a=æ	o=ə	y=i			
31	biliary	'bi. liə. ri	3	i=i	ia=iə	y=i			
32	cataract	'kæ. tə. rækts	3	a=æ	a=ə	a=æ			
33	causalgia	kə: zæ' l dʒiə	3	au=ɔ:	a=æ	ia=iə			
34	cerebellar	sɪər- bəl ər	3	e=ie	e=e	a=ə			
35	cerebral	'se. rə. brəl	3	e=e	e=ə	a=ə			
36	cervical	sə' r vik əl	3	e=ə:	i=i	a=ə			
37	chondritis	kan drai təs	3	o=a	i=ai	is=əs			
38	chondroma	kan rou mə	3	o=a	o=ou	a=ə			
39	colonic	kə. lɒ. nɪk	3	o=ə	o=a	i=i			
40	cranial	'kret. Ni əl	3	a=ei	i=i	a=ə			
41	cranioste- nosis	krei ni ou sti nou sis	3	a=ei	i=i	o=ou	e=i	o=ou	i=i
42	cystitis	si' stai. tɪs	3	y=i	i=ai	i=i			
43	diaphragm	dái ə fræ'm	3	ia=ai	a=ə	a=æ			
44	diphtheria	dif θ iə riə	3	i=i	e=iə	ia=i			
45	diplegia	dai plí: dʒə	3	i=ai	e=i:	ia=ə			
46	dysfunc- tion	dis fʌ' ŋk fən	3	y=i	u=ʌ	u=ə			
47	dyspepsia	dɪs. ' pep. siə	3	y=i	e=e	ia=iə			
48	dysplagia	dai plí: dʒə	3	y=ai	a=i:	ia=ə			
49	dysplasia	dis plei zə	3	y=i	a=ei	ia=ə			
50	dyspnea	disp ní: ə	3	y=i	e=i:	ea=ə			

Results

The average number of syllables per word in the reference book's vocabulary list was 4.41. There were no single syllable words, while some words had more than seven syllables. The words with the most syllables was "otorhinolaryngology" [ou/tou/rai/nou/lær/iŋ/ gə' l/ə/dʒi] (slash indicating syllabic boundaries).

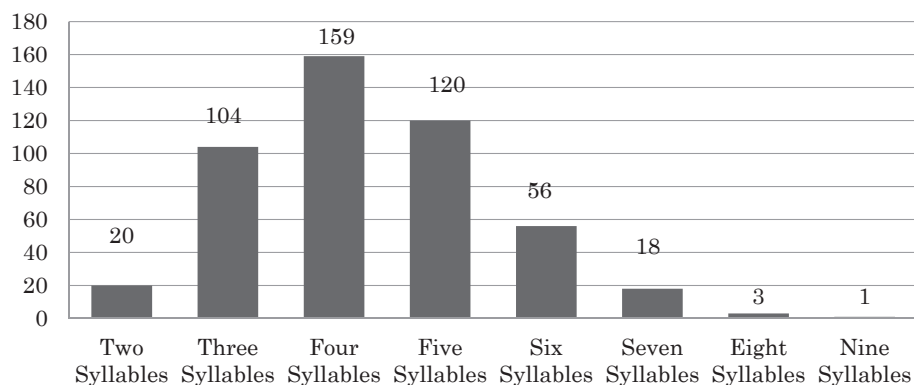


Figure 1. *Number of words by syllables for words in the reference book.*

As shown in Figure 2, all graphemes except /u/ (3%) comprise approximately a quarter of all graphemes in the list of Nursing English terms in the reference book respectively.

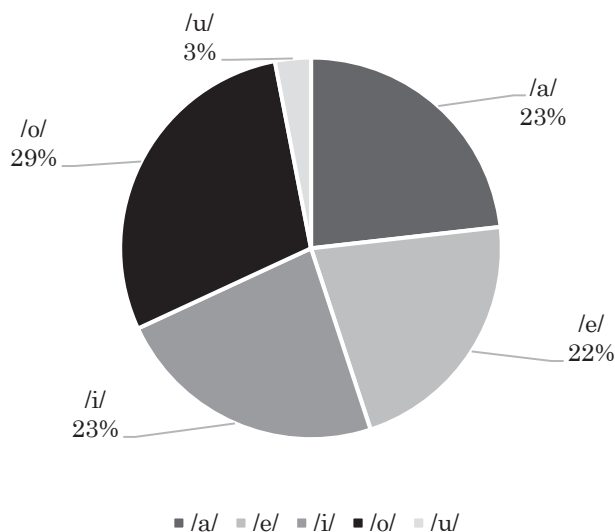


Figure 2. *Percentage of graphemes /a/, /e/, /i/, /o/, and /u/ in the list of Nursing English terms in the reference book.*

As described earlier, the author has divided the vowels of English phonemes into three categories: one, phonetic symbols that have same graphemes as the Japanese one-to-one correspondences between graphemes and phonemes (JE); two, phonemes that do not follow Japanese one-to-one correspondences between graphemes and phonemes but whose phonetic symbol exists in Japanese pronunciation (NE); and, three, phonemes that do not follow Japanese one-to-one correspondences between graphemes and phonemes and whose phonemic symbol does not exist in Japanese (NNE). This categorization is used to identify difference between the orthographic and phonological features of English and Japanese terms. For the grapheme /a/, the phonetic symbol [a] will be categorized as JE; [a:], [ai], [e], [i] and [o] are categorized as NE; and [ə], [ɔ (:)], [æ], and [ʌ] are categorized as NNE.

Figure 3 shows the percentage of JE, NE, and NNE for the graphemes /a/, [e], [i], [o], and [u] in the Nursing English terms in the reference book. The results indicate that graphemes /a/, /o/, and /u/ are rarely pronounced in English in the way Japanese pronounce the graphemes /a/ and /u/. Moreover, the number of NNE vowels exceeds not only that of JE but also NE. Reading the graphemes /a/, /o/, and /u/, therefore, is deemed to be more challenging for Japanese learners of English. On the other hand, pronouncing the grapheme /i/ is less challenging, since majority of the grapheme /i/

will be read as [i], which is the same as the Japanese grapheme–phoneme correspondence.

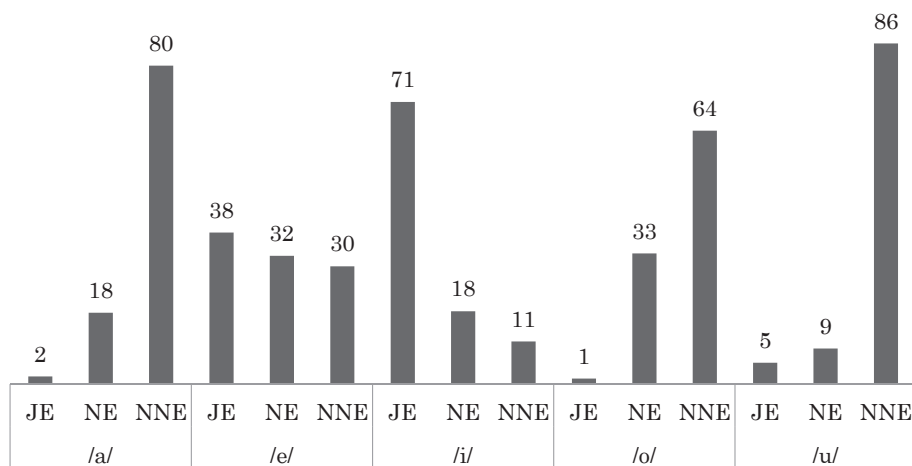


Figure 3. *The number of JE, NE, and NNE phonemes of the graphemes /a/, /e/, /i/, /o/, and /u/ in the Nursing English terms of the reference book.*

Conclusion

The analysis of vocabulary contained in the reference book has revealed several orthographic and phonological features infrequently addressed in Japanese English education. Firstly, the terms are comprised of relatively large number of syllables. Moreover, several graphemes, especially /a/, /o/, and /u/ have more difficult grapheme–phoneme correspondences. Their phonemes do not exist in Japanese pronunciation. Japanese learners of English tend to adapt the English terms into Japanese pronunciation. Proficiency in orthographic and phonological awareness would benefit the Japanese learners of English to read fluently. The faculty would therefore benefit from placing students in appropriate English classes based on their abilities with English orthography and phonology.

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