Japanese university students' ability to identify the (ɔ:) phoneme

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Abstract

There are 5 vowels and 17 consonant phonemes in Japanese compared with the English language total of 20 vowels and 24 consonants, Kavanagh (2007). Consequently, when a Japanese person is studying English pronunciation they must also learn how to create 22 new sounds. This paper focuses on just one of those new phonemes (ɔ:) as spoken by the British author of this paper, and tests 103 Japanese university students' ability to identify it from within selected English sentences. In class, when asked to copy the teachers' pronunciation, there does not appear to be a difficulty with the Japanese students' ability to produce the phoneme orally. However, they do find it very difficult to identify the (ɔ:) phoneme independently of the teacher. Approximately 39% of the (ɔ:) phonemes they were shown were not identified. One reason for this may be the fact that there are many variant spellings of this single phoneme. If the (ɔ:) phoneme can be shown to be a sound with which Japanese students have considerable difficulty in identifying, then this would have clear pedagogical implications.

Background research

The subject of pronunciation is a very wide field involving many specialized areas of study. This paper takes as its starting point, the 2013 *Pronunciation in Second Language Learning and Teaching* (PSLLT) conference, USA. The plenary address by Yates was particularly relevant to this paper, and included the following statement:

> *It is beyond dispute that learners who want to develop good speaking skills in a language also need to develop good pronunciation, and yet research continues to report that pronunciation still has low visibility in the curriculum and is often treated as something of a poor relation in the classroom.*

During this two-day event Makino's work on a phonetic corpus of English read by Japanese (2014) was outlined. McCrocklin focused on dictation programs for pronunciation learner empowerment (2014), and Shoji researched Japanese epenthetic vowels in his study of Japanese pronunciation of loanwords (2014). Koffi's work (2014) concentrated on one single phoneme [ʌ] in seven varieties of second language Englishes and was concerned with intelligibility judges' own inability to perceive [ʌ] accurately from non-native speakers speech. The research by Koffi focused on GEA (General American English), was very long, and results were poorly explained. There seems to be a lack of research about British English pronunciation in Japan, specifically surrounding the vowel phonemes and their frequency. This paper looks for reasons why Japanese university students may be having a difficulty correctly identifying the British (ɔ:) phoneme, and offers suggestions for improving pronunciation teaching in the classroom.

Why choose the (ɔ:) phoneme?

In the English language the 24 consonant phonemes only have one or two variant spellings each, for example, (f) finish, photograph and, (g) good, geography. In contrast, the vowel phonemes (split into 12 vowels and 8 dipthongs) have an average of 6 variant spellings each, according to Aiken and Pearce (1993). Of these, the vowel phoneme (ɔ:) has more variant spellings than any other (see Table 1). Aiken and Pearce suggest there are 12 variant spellings, but this paper identifies 3 more (2, 4 and 15 below). This is possibly due to the fact that Aiken and Pearce are both Australian. However, results from a small test on page 9 would appear to refute this.

Table 1. Variant spellings of the (ɔ:) phoneme, and different phonemes from those spellings

	(ɔ:) phoneme		The same letters produce different phonemes			
1.	W<u>a</u>ter	b<u>a</u>ll	h<u>a</u>t	(æ)	b<u>a</u>ss	(eɪ)
2.	T<u>a</u>lk	w<u>a</u>lk	t<u>a</u>lc	(æ)	s<u>a</u>lt	(ɒ)
3.	W<u>ar</u>m	tow<u>ar</u>d	h<u>ar</u>d	(ɑ)	sug<u>ar</u>	(ə)

4.	<u>Au</u>gust	<u>au</u>tumn	v<u>au</u>lt	(ɒ)	m<u>au</u>ve	(əʊ)
5.	D<u>augh</u>ter	c<u>augh</u>t	l<u>augh</u>	(æ)		
6.	Dr<u>aw</u>	y<u>aw</u>n				
7.	B<u>oar</u>d	r<u>oar</u>				
8.	D<u>oor</u>	fl<u>oor</u>				
9.	C<u>or</u>n	f<u>or</u>k	maj<u>or</u>	(ə)	<u>or</u>ange	(ɒr)
10.	M<u>ore</u>	bef<u>ore</u>	<u>or</u>egano	(ɒri)	f<u>or</u>ensic	(ɒrɪ)
11.	B<u>ough</u>t	th<u>ough</u>t	en<u>ough</u>	(ʌf)	alth<u>ough</u>	(əʊ)
12.	F<u>our</u>	p<u>our</u>	col<u>our</u>	(ə)	fl<u>our</u>	(aʊr)
13.	Qu<u>ar</u>ter		g<u>uar</u>d	(ɑ)	jag<u>uar</u>	(jʊə)
14.	S<u>ure</u>		meas<u>ure</u>	(ə)	sec<u>ure</u>	(jʊə)
15.	C<u>orps</u>					

These inconsistencies in English pronunciation and spelling make the EFL (English as a Foreign Language) students' task of learning correct English pronunciation much more difficult. This difficulty is also increased if, as in the case of the Japan language, the L1 does **not** have examples of variant spellings for single phonemes (in contrast, this means that British people should have very little difficulty in correctly pronouncing Japanese words). EFL teachers should be aware of this fact.

The variant spellings of (aw), (oar), (oor) and (orps), 6, 7, 8 and 15 respectively in Table 1, appear to produce a consistent (ɔ:) phoneme from relatively high frequency words.

The frequency of (ɔ:) within 4 selected newspaper articles

The phoneme (ɔ:) has been identified as having the largest number of variant spellings. Next, as outlined in Montero and Vivanco (1975), one has to analyze printed text to ascertain how often the phoneme occurs (in linguistic terms this is often referred to as *frequency*). If the phoneme (ɔ:) only occurs very rarely, then

testing students' ability to identify it would have limited implications.

This paper realizes that the text analyzed is of a very limited source (but with a word count of 14,490, it is comparable to Vivanco in the 1970's who used 17,000 words). Therefore, any conclusions made from the results have to take this fact into account.

The same four articles were chosen from each of 10 copies of the *Guardian Weekly* newspaper, published between February 2017 ~ February 2018, and the results were as follows:

Table 2. Occurrences of the (ɔ:) phoneme in 4 newspaper articles

Article title	Av. number of words	Av. occurrence of the (ɔ:) phoneme	% of text in which (ɔ:) occurs
Good to meet you.	275	8.8	3.3
What I'm really thinking.	309	13.5	4.4
This column will change your life.	450	29.1	6.5
Sport in brief.	460	24.7	3.3
Total	14,490	**761**	**5.1**

These results show the occurrence of (ɔ:) to be approximately 5.1% of all the text analyzed. This is slightly higher than the frequencies found by Fry in 1947 (3.16%), and Vivanco in the 1970's (3.26%). However, they were analyzing speech as oppose to newspaper articles.

To put the figure of 5.1% in context, we look to Nation (2006) who reports on a test undertaken to assess the relationship between text-coverage and reading comprehension for non-native speakers of English. He found that with a text coverage of 95% (1 unknown word in every 20), only a small minority of students gained adequate comprehension. He concluded, "98% text coverage (1 unknown word in 50) would be needed for most learners to gain adequate comprehension". These figures were backed up by Carver's study (1994) of English students comprehension of written text. Given these numbers, a missing 5% comprehension of a text would appear to be highly significant.

The test

The following 24 sentences each contain vowel phonemes that repeat. However, there are only 13 sentences (numbered below but not in the test) containing a repeating (ɔ:) phoneme. Every time the (ɔ:) phoneme repeated in a single sentence, a different spelling variant was used. The participants were only told to identify repeating vowel phonemes, but were not told which phonemes to look for. It was assumed that if students were told to look for one particular phoneme then that would affect the results.

1. The t<u>a</u>ll, sp<u>or</u>ts teacher only t<u>augh</u>t in the <u>Au</u>tumn.
2. My d<u>augh</u>ter w<u>a</u>lked tow<u>ar</u>d the d<u>oor</u>.
    What will you say today to the reindeer?
3. Are you s<u>ure</u> you have dr<u>aw</u>n a picture of c<u>or</u>n on the b<u>oar</u>d?
    I am fed up in my head and my feet feel like lead.
    Noisy lions collect coins to boil.
4. When a w<u>ar</u>m lion r<u>oar</u>s does it get a s<u>ore</u> throat?
    What do you want to be, a teacher, a doctor, or an actor?
5. I b<u>ough</u>t f<u>our</u> locks f<u>or</u> my d<u>oor</u>.
    Walking to work her shirt got dirty.
6. She y<u>aw</u>ned while we were t<u>a</u>lking about the p<u>oor</u> in India.
    Have no fear. Super Bear is here my dear.
7. What kind of sauce do you p<u>our</u> on r<u>aw</u> fish?
8. Drinking w<u>a</u>ter is a nice rew<u>ar</u>d after exercise.
    Hello. Do you like marshmallows? No!
9. I am not s<u>ure</u> about the f<u>our</u>th l<u>aw</u>.
    Have you ever seen a clean teenager?
    I think the quickest way is by ship.
10. Bef<u>ore</u> I <u>or</u>dered the set-c<u>our</u>se meal I s<u>aw</u> dirt on my f<u>or</u>k.
    We do not allow cows to shop in town.
11. I th<u>ough</u>t you had wild b<u>oar</u> on the menu in <u>Au</u>gust.
    You must never trust the worst peoples' custard.
12. He drew a n<u>ough</u>t on the fl<u>oor</u> with ch<u>a</u>lk.

13.　　　I s<u>aw</u> the b<u>a</u>ll in the air and c<u>augh</u>t it in my glove.

All 42 words containing the (ɔ:) phoneme, underlined in the 13 sentences above, are listed in Table 4. They were chosen as representatives of the 15 variant spellings of the (ɔ:) phoneme, and for their perceived high frequency of use. In Table 1, the 13th and 15th variant spellings, q*uar*ter and c*orps*, both appear to be the only examples of their kind. Having such a limited rate of occurrence they were consequently not included in this test. The word *boar* was the only one deemed a low frequency word. However, it was included in this particular test because it was being undertaken in Kagoshima prefecture where one of the famous food products is indeed wild boar.

The participants

A total of 103 Japanese university students took the test. They were 27 second and third year English major university students, who took their tests during one of three classes: public speaking skills (7), reading skills (9), and speaking skills (11). A further 71 first year students came from the law (47), and humanities (24) faculties, taking a compulsory English course.　All these students study in an independent university. The remaining students were 3rd and 4th year students from the education faculty (5) of a state university, taking a general English course.

The results and discussion

Table 3. Frequency of missed (ɔ:) phoneme

Class title	n	Av. misses / 44	Miss %	Low/High
Public speaking skills	7	10	23%	5　/　12
Reading skills	9	11	25%	5　/　15
Speaking skills	11	17	39%	2　/　29
General English (Law dept.)	47	17	39%	6　/　34
General English (Edu. dept)	5	20	45%	11 /　28
General English (Humanities dept.)	24	21	48%	9　/　35
Total	**103**	**17**	**Av. 39%**	

(i) The results show us that the participants failed to identify the (ɔ:) phoneme an

average of 39% of the time. It should also be noted that in the General English course group from the humanities department, the 24 participants failed to identify the phoneme 48% of the time, almost half. These phonemes should have been easier to identify than usual text because they all repeated 2, 3 or 4 times within single sentences, and the students knew this. There are many reasons why different groups produce different scores. For example, their English ability may be lower than other classes tested, or the explanation they received on how to complete the test was not as clear as it had been for the other classes, etc.

(ii) To see which words were not being identified, all participants who recorded 15 or less (ɔ:) phoneme misses were analyzed. Of the 103 participants this amounted to a sample of 45, approximately half. The remaining 58 students were missing most of the phonemes most of the time, but from the group of 45 it was possible to isolate the words containing the repeated (ɔ:) phoneme that were being missed. The following misses were recorded:

Table 4. Number of times words containing the (ɔ:) phoneme were missed

Sure*	65	ball	9	caught	3
Talking	24	board	9	raw	3
Poor	23	floor	9	August	2
Chalk	21	sports	9	taught	2
Saw*	20	ordered	9	roars	2
Yawned	20	course	9	thought	1
Door	19	walked	8		
Before	17	daughter	8		
Drawn	16	law	8		
Bought	15	sore	8		
Pour	15	reward	7		
Warm	14	Autumn	7		
For	14	fork	6		
Toward	13	nought	6		
Corn	12	four	6		
More	12	sauce	4		

| Water | 11 | fourth | 4 |
| Boar | 11 | tall | 3 |

* The word 'sure' accidentally appeared twice, in the sentences 3 and 9. The word 'saw' also appeared twice, in the sentences 10 and 13. While this has an obvious effect on the results it should be noted that even with only half of the 65 occasions that 'sure' was not identified as a word containing the (ɔː) phoneme, it still remains the clear leader in the list above.

There are some further surprises in the list:
- It was thought that the word 'nought' (a word mainly used in British English) would prove to be difficult, but the correct pronunciation of the word appears to have been fairly easy to detect, with only 6 misses.
- The word 'thought', containing the variant *ough* spelling of the (ɔː) phoneme, was almost universally recognized, whereas 'bought' was in the top ten, with 15 misses.
- The word 'ball' with its simple spelling was missed a surprising number of times, 9.

(iii) Below is a list of the spelling variants ranked according to the average number of times they were not identified as being pronounced with the (ɔː) phoneme:

Table 5. Frequency of missed (ɔː) phoneme by spelling

Variant spellings of the (ɔː) phoneme	Average times the (ɔː) phoneme was not identified (n=45)	
	/ 45	As a % (3s.f.)
ure	32.5	72
al	17.6	39
oor	17	38
ore	12.3	27
aw	11.4	25
ar	11.3	25
or	10	22
our	8.5	19
a	7.6	17

oar	7.3	16
ough	7.3	16
au	4.3	10
augh	4.3	10

Instances where the variant spelling was not identified as having the (ɔː) phoneme varied depending on the word, and not on the spelling per se. For example, the *oor* spelling used the following example words 'floor' (9/45), 'door' (19/45), and 'poor' (23/45), producing an average score of 17.

(iv) Further research could try to draw a connection between the ability to identify the correct phoneme in a written text, and comprehension of that written word. One possibility that has been witnessed in the classroom, is that whilst many students may produce a less than perfect pronunciation of a text, their understanding of individual words score much higher. This can clearly be seen in Shoji (2013), showing how Japanese students use epenthetic vowels to pronounce loanwords, eg. 'hand' is pronounced *hando*, and 'sing' is pronounced *singu*. Nobody is suggesting that these students do not know the meaning of the words 'hand' or 'sing', merely that they have a unique way of pronouncing them. However, it would have a clearly negative effect on correct spelling, a fact that is immediately noticed by any EFL teacher in Japan.

(v) The author recognizes many floors in this limited sized test:
-    Possibly the biggest flaw in this research was the fact that participants were asked to identify instances in a sentence when any vowel phoneme repeated. Some sentences contained no examples of the (ɔː) phoneme, some 2, 3, or even 4, but students were **not** asked to identify the actual phoneme they thought was repeating.
-    In reading the 40 newspaper articles the author of this paper found that it was necessary to read each article at least twice because even a native speaker fails to identify every (ɔː) phoneme with one reading. In particular the word, 'for' was missed by the author on a number of occasions. The same phenomena could also be true for the participants of this test who probably only read each sentence once. This may account for the high

recording of misses for 'for' on page 19, (14/45).

- Some students took longer than others and were unable to finish within an adequate time. The 24 sentences were perhaps too long, causing apathy in some participants.

- This paper was aware of the effect of connected speech but did not pay particular attention to it when compiling example sentences. Areas such as *linking*, *intrusion*, *elision*, *assimilation* and *geminates* all have an effect on the way sentences and individual words are pronounced.

Suggestions for improving pronunciation in the Japanese EFL classroom

The purpose of all research into second language acquisition should be to improve the teachers' ability to teach the language and thus facilitate the students' ability to learn. In reading for this paper, the author came across a lot of published material and became aware of the following aspects of pronunciation in the EFL classroom. The suggestions below are a small collection of some of the questions that arose, and may prove to be starting points for further research.

Global English - This test was compiled on the basis that the authors' British accent was the correct one for each word. Although there are no right or wrong accents per se, this paper used the language of 'missed phoneme' to denote a variation in pronunciation (possibly defined as a deviation from RP – received pronunciation). To assess the effect of accents, the test was given to an American (New York) English teacher in Japan, and an Australian (who had lived in England for his first 10 years) English teacher in Japan. The American missed the (ɔː) phoneme 18 times, which amounts to just above the average of 17 from the Japanese students. It is tempting to suggest that the influence of American teachers on Japanese students' English pronunciation correlates to the average number of phoneme misses in this test. However, that is mere supposition and requires further research. The Australian only recorded 5 misses, suggesting that his accent was much closer in pronunciation to the authors'.

All teachers of English must be aware of the effect their accented instruction has

on the English language learnt by their students. It must also be said that in Japan, many Japanese English teachers use far too much Japanese language in the EFL classroom. This is an issue for a separate paper.

The IPA (International Phonetic Alphabet) - Japanese students have to learn three forms of writing in their native language: hiragana (ひらがな), katakana (カタカナ) and kanji (漢字), before they learn A,B,C (romaji – ローマ字). It is therefore not ideal to suggest they should learn a fifth alphabet, eg. the IPA, especially considering the fact that there is no single agreed collection of symbols.

Metalanguage - Japanese students of English should not be exposed to the metalanguage describing phonetic notation (eg. *pharyngeal, sibilant fricative, lateral approximant*). When discussing computer assisted language learning, Claire (1994) says "the fact that learners do not have to master a 'metalanguage' of linguistic terms to describe articulation is seen by Moholt as another benefit of an approach he characterizes as *direct, reliable and quantifiable*".

CALL – (Computer Assisted Language Learning) - CALL provides a graphical trace on the screen of the sound a student makes, to be compared, or not, with the teachers model speech. "Since the 1950s, SGAV (Structuro-Global Audio-Visual) exponents have pointed out that 'the ear is the last to know'. It is for this reason that computer-assisted speech visualization can be an extremely useful tool in raising learner awareness" in prosodic features (such as stress and tone) and phonemes of the language being learnt.

When practicing speech pronunciation with mirrors and recordings, Albertson (1982) agrees that visual feedback of speech using CALL, introduces "the added dimension of being able to see the results of what is felt and heard". Moholt (1990) agrees, "now that students are able to see the immediate displays of their speech patterns and match them on a split screen with target patterns, they can quickly learn to recognize the location, type, size and significance of their errors and monitor their progress with the aid of reliable and precise feedback".

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For a comprehensive analysis of using pronunciation in the classroom to producing positive outcomes this paper suggests Aiken and Pearce (2012).

Conclusion

While this small test is limited in its scope, it clearly demonstrates the importance of pronunciation. Focusing on a single phoneme can shed light on the importance of correct pronunciation as it effects speech production, spelling, reading and listening. If such data can be gained from analyzing one phoneme, then a clear recommendation would be to extend the test to include all British phonemes, thus producing more comprehensive results.

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Appendix A

Table 6. The IPA chart

Iː READ	I SIT	ʊ BOOK	uː TOO	Iə HERE	eI DAY	John & Sarah Free Materials 1996
e MEN	ə AMERICA	ɜː WORD	ɔː SORT	ʊə TOUR	ɔI BOY	əʊ GO
æ CAT	ʌ BUT	ɑː PART	ɒ NOT	eə WEAR	ɑI MY	ɑʊ HOW
p PIG	b BED	t TIME	d DO	ʧ CHURCH	ʤ JUDGE	k KILO	g GO
f FIVE	v VERY	θ THINK	ð THE	s SIX	z ZOO	ʃ SHORT	ʒ CASUAL
m MILK	n NO	ŋ SING	h HELLO	l LIVE	r READ	w WINDOW	j YES

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