Pronunciation Matters: English Consonant Production by AUAP Students

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INTRODUCTION

Most Asia University students study English for at least six and a half years by the time they come to the United States to participate in the Asian University America Program (AUAP). For many, the AUAP experience is the realization of a dream to be able to forge new friendships and communicate successfully with Americans. However, despite their enthusiasm for learning, those participating in AUAP are not immune to the struggles experienced by most Japanese students as they endeavor to master English pronunciation (Purcell and Suter, 1980; Wells, 2000, Aoyama, K. Flege, J., Guion, S., Akahane-Yamada, R., Yamada, T., 2003). Though students appear to make notable progress in their pronunciation skills during their AUAP experience, the journey continues to be a challenging one.

Problematic pronunciation not only interferes with communication, but it may also lead to inaccurate perceptions by native English speakers (Lambert et al., 1960; Giles, 1970). In addition, pronunciation difficulties may be especially confusing when students are unaware of the reason for a particular breakdown in communication (Derwing, 2003). For example, I recently observed a conversation between a new AUAP student and her enthusiastic American roommate that resulted in an awkward miscommunication. Though the puzzled AUAP student assumed that the misunderstanding was due to a grammatical error, it had not occurred to her that the problem was phonological. I reassured her that her grammar had actually been flawless; I then went on to explain that the misunderstanding was due to inaccurate pronunciation. Such challenging experiences may tend to undermine the budding confidence of our AUAP students.

Therefore, crucial aspects of AUAP-related research and materials development should include seeking to identify which English sounds are the most problematic for AUAP students and how instructors can help them develop the production skills they need to communicate successfully. Though an exhaustive examination of all the English segmentals and supra-segmentals would be useful, it simply is impractical in a single study. Moreover, not every phonological segment may be of equal interest. Therefore, though a number of sounds might be examined, this study will focus exclusively on English consonants since they are produced much more consistently by English native speakers than vowels.

Phonemic Problems

Perhaps the greatest reason for the pronunciation pitfalls that Japanese students encounter is because of the phonological differences between Japanese and English. For example, there are six[1] frequently used consonants in English that do not occur in Japanese. These consonants include the retroflex /ɹ/ as in "race," the liquid /l/ as in "lace," the voiced labiodental /v/ as in

[1] The /ʒ/ consonant as in the middle of "pleasure" is omitted here because it occurs less frequently and lacks variety in word position.

"vase," the voiceless labiodental /f/ as in "face," and the voiced and voiceless interdental fricatives as in "that" (/ð/) and "think" (/θ/).

Although most who are familiar with Japanese would agree that these six consonant phonemes do not occur in Japanese, since the English /ɹ/ and /f/ have similar counterparts in Japanese, it may be helpful to draw some basic distinctions. First of all, Japanese includes an alveolar flap /ɾ/, that can be distinguished from the English retroflex /ɹ/ by its manner and place of articulation. The Japanese flap is produced when the tip of the tongue takes one quick bounce off the back of the alveolar ridge. On the other hand, with the tongue in the retroflex position, the English /ɹ/ is made with a stream of air that continues throughout production. Another potentially confusing consonant might be the English /f/ because we often see words like *Mt. Fuji* or *futon* transcribed into English with the letter "f." However, unlike the English /f/, which requires contact between the lower lip and the upper teeth, the Japanese version is made with slightly rounded lips, without contact with the teeth.

In addition to examining these sounds at the phonemic level, these six consonants also could be collapsed into three more general categories. These include the inderdentals (/ð/ and /θ/), the labiodentals (/v/ and /f/) and the liquids (/ɹ/ and /l/). Though each of these consonants are problematic for Japanese ESL learners, most of the literature has focused on the perception or production of the English liquids, /ɹ/ and /l/ (Sekiyama and Tohkura, 1993; Takagi 1993; Flege, Takagi, and Mann, 1995; Riney, Takada and Ota, 2000; Aoyama, Flege, Guion, Akahane-Yamada and Yamada, 2004). This is because while Japanese uses a single flap for this phonological space, English distinguishes between the /ɹ/ and /l/ liquids. The challenge is that the manner of production and the acoustic properties they generate are so similar for most native Japanese speakers that it is difficult for them to differentiate between them in perception or production tasks.

Although much of this research on /ɹ/ and /l/ has been driven by theoretical issues, its application in pedagogy has been limited. What has been needed is a much more complete understanding of AUAP student performance in terms of this entire group of sounds. For example, informal observation has suggested that that some lower-level students produce these sounds more accurately than some of the higher-level students. Other observations have suggested that productions errors are fairly systematic. Subsequently, several years of informal observation has led to three important questions about AUAP student production of these sounds.

Research Questions

1. Is AUAP student production of the /l/, /ɹ/, /v/, /f/, /ð/ and /θ/ phonemes significantly different from the performance levels of native English speakers?

2. Is there a significant difference in accurate production of these sounds between lower and higher-level students?

3. What kinds of errors are produced when these phonemes are unsuccessfully attempted by AUAP students?

Subjects

This study examined the production of six English phonemes (/l/, /ɹ/, /v/, /f/, /ð/ and /θ/) by AUAP students (n = 39) after completing the five-month program at Central Washington University. The group of informants included 15 males and 24 females between the ages of 19 and 21. On average, these students had studied English for seven years including one year at Asia University before coming to the United States. Two general English proficiency levels were represented, including students from Section 2 and Section 4.

Procedures

Informants were asked to read the following paragraph that had been prepared so each of the phonemes to be elicited occurred 5 times in an initial position and 5 times in a non-initial position for a total of 10 occurrences per phoneme (see Table 1).

> Americans Love to Swim. Whether visiting little villages in the North or South, I think that people can see various resorts filled with folks who like to gather to swim. Recently I saw three very thin lifeguards huff and puff up a cliff to reach a viewing area. I saw all of them laugh together, throw rocks from a path above me and then race to dive into a lake. They had a thrill! Even my own mother and father have both said, "My favorite place is a swimming pool!"

Table 1: Words Used to Elicited Phonemic Productions in Initial and Non-initial Positions

	/ð/	/θ/	/v/	/l/	/f/	/r/
Initial	The	Think	Visiting	Little	Filled	Resorts
	That	Three	Villages	Like	Folks	Recently
	Them	Thin	Various	Life	From	Rocks
	Then	Throw	Very	Laugh	Father	Race
	They	Thrill	Viewing	Lake	Favorite	Reach
Non-initial	Whether	North	Love	People	Life	Whether
	Gather	South	Above	Little	Huff	Gather
	Together	With	Of	Thrill	Puff	Together
	Mother	Path	Dive	All	Cliff	Mother
	Father	Both	Have	Pool	Laugh	Father

Though there are numerous ways that performance data might be elicited, an effort was made to develop a tool that would balance competing interests and concerns. At a minimum, the elicitation tool would need to be brief and simple to ensure valid performances, contextualize the task to make it as authentic as possible and ensure that performance was unaffected by issues of word familiarity. With these criteria in mind, the above reading task was developed to elicit the needed data.

Subjects were provided with a copy of the elicitation paragraph and given approximately one minute to review it before reading it aloud. A recording was made of each student's reading. The

data was then transcribed and evaluated by the author for accuracy at the perception level. In other words, an utterance was considered correct if the meaning of the word was clearly indicated by its phonetic representation. For example, the word "sin" was considered an unacceptable substitute for "thin," and the /s/ was recorded as an error. Moreover, since standard English was the production target, utterances such as /də/ for "the" were also rated as an error, even though such productions might be observed in some regional dialects or in certain registers of English.

Word Familiarity and Frequency

Before discussing results, it may be helpful to comment briefly on the familiarity and frequency of the words included in this study. Most of the elicited words occur in English at very high frequencies or came from student textbooks or class materials. However, since some words may have been new to the students, the effect of word frequency on performance was tested using the British National Corpus of 100 million English words. Correlations were calculated for word frequencies and production accuracy and were not found to be significant at the **.**05 level (spoken: initial $r = -0.182$, non-initial $r = -0.169$, written: initial $r = -0.118$, non-initial $r = -0.135$). Therefore, it was assumed that word familiarity or frequency were not confounding variables observed in these data.

Data Analyses and Results

The first research question asked whether AUAP student production of the /l/, /ɹ/, /v/, /f/, /ð/ and /θ/ phonemes significantly differed from the performance levels of native English speakers. To test this, AUAP student performance on each phoneme was compared to the performance of native English speakers. It was assumed that no errors would be observed in the productions of native English speakers. Just to be safe, five native English speakers were observed with flawless results and it was assumed that under normal conditions, additional observations of native English speakers would not be likely to generate any errors. Since multiple comparisons were investigated in this study, the Bonferroni procedure was used to adjust the .95 confidence level for the 12 phonemes being examined.

Table 2 shows that accuracy levels for seven of the twelve phonemes were significantly different from those of native speakers. These include the final position /ɹ/, the voiced and unvoiced interdentals and the voiced labiodentals. Though most of the consonants seem to be neatly arranged based on voicing or word position, differences in performance levels for the initial and final positions of the English /ɹ/ appear to be rather dramatic. Moreover, while the liquids and labiodentals demonstrated both significant and non-significant performance levels depending on voicing or word position, performance levels for the entire group of interdental phonemes were significantly different from those of native English speakers.

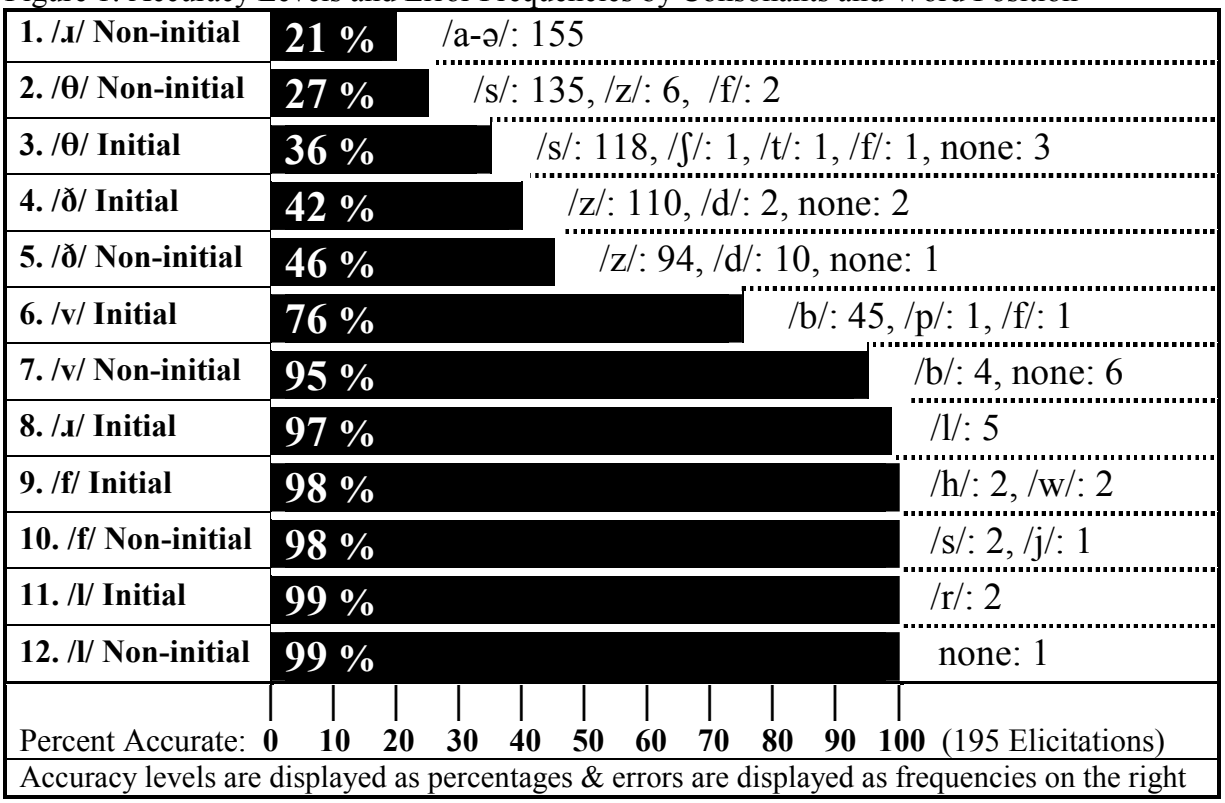
The second research question asked whether there was a significant difference in accuracy levels between lower and higher-level students. To determine this, a t-test was used to compare the lower-level group with the higher level group. As might be expected, the difference between the higher and lower-level proficiency group was significant (95 percent confidence interval, lower proficiency mean = 38.95, higher proficiency mean = 45, $t = 3.3047$, $df = 39$, p-value = 0.002).

Table 2: Accuracy Differences between AUAP students and Native English Speakers

Consonant	Mean	S.D.	*t*-value	Probability
1. /ɹ/ Final	1.0000	1.5043 (u)	16.6048	< 0.000*
2. /θ/ Final	1.3076	1.3008 (u)	17.7252	< 0.000*
3. /θ/ Initial	1.8205	1.4303 (u)	13.8819	< 0.000*
4. /ð/ Initial	2.0769	1.5792 (u)	11.5593	< 0.000*
5. /ð/ Medial	2.3333	1.7966 (u)	9.2689	< 0.000*
6. /v/ Initial	3.7435	1.3321 (u)	5.8899	< 0.000*
7. /v/ Final	4.7435	0.4423 (e)	3.6199	< 0.000*
8. /ɹ/ Initial	4.8717	0.5221 (e)	1.5335	0.1293
9. /f/ Initial	4.9230	0.2699 (e)	1.7795	0.0792
10. /f/ Final	4.9230	0.3542 (e)	1.3560	0.1791
11. /l/ Initial	4.9487	0.2234 (e)	1.4332	0.1559
12. /l/ Final	4.9734	0.1601 (e)	1.0000	0.3205
α = .05/12 = 0.00416, (u) = unbalanced variance procedure, (e) = equal variance, * = significant				

However, it may be of interest to note that while there was a significant difference between the two groups, there were two individuals from the lower proficiency group with accuracy scores of 49 each. These were well above the mean of the higher proficiency group. In addition, there were four individuals from the higher proficiency group below the mean of the lower proficiency group with scores of 38, 37, 37 and 34 (the third lowest score). This suggests that at the individual level, production skills may not always be in sync with other measures of proficiency.

Figure 1: Accuracy Levels and Error Frequencies by Consonants and Word Position



Accuracy levels are displayed as percentages & errors are displayed as frequencies on the right

Finally, the third research question asked what kinds of errors were produced when these phonemes were unsuccessfully attempted by AUAP students. To test this, simple frequency data were gathered for each phoneme. Figure 1 not only shows the accuracy levels for each phoneme, but it also shows error types and frequencies for each phoneme and word position. The greatest number of errors for a single word position came from attempts to produce the final /ɹ/. These errors were collapsed into one single vowel category because responses included a number of very subtle variations, ranging from /a/ to /ə/. Though such productions might be more acceptable in British English, they are inconsistent with North American English and could be especially problematic in combination with other types of errors. Ironically, though the preponderance of literature and popular anecdotes emphasize the difficulty of /ɹ/ and /l/, with the obvious exception of the final position /ɹ/, the liquids did not present a significant challenge for this group of AUAP students.

Conclusion and Applications

Although all AUAP students have dedicated many years to the study of English, pronunciation continues to be one of their greatest challenges. Therefore, the goal of this study was to answer three research questions relating to AUAP student production of the six English consonants including /l/, /ɹ/, /v/, /f/, /ð/ and /θ/. To help answer these questions, a reading task was developed to elicit production data from 39 native Japanese AUAP students.

Perhaps the most dramatic observation from this study is in the stark differences between accuracy levels for the production of the initial and final /ɹ/. This may be the result of some form of phonotactic interference from the consonant-vowel pattern prevalent in Japanese. It might also be related to some form of graphemic interference from the Japanese script that is perpetuated in loanwords or pronunciation guides in elementary English texts.

Another interesting finding of this study is the uniform difficulty of the interdental consonants, regardless of voicing or word position. Unlike the accuracy levels for the liquids and labiodentals, none of the production attempts of the interdentals produced accuracy levels that could be considered similar to those of native English speakers.

Though the scope of this study was narrow, there may be a few practical applications. If time or resources are limited, one approach to pedagogy and materials development might be to focus on those consonants that are responsible for the most errors. For example, Figure 1 suggests that about 68% of the errors observed in this study were based on efforts to produce interdental consonants, as in “thank” or “that.” When the labiodental consonants are included, as in “fine” or “voice,” that figure rises to nearly 77%. If we add the final position /ɹ/, the number rises to over 98%. This suggests that great progress might be made in student production skills if we can minimize errors produced in these three places of articulation.

First, let us consider the final position /ɹ/. The results of this study suggest that 97% of the students observed in this study already produced this sound correctly in the initial position. Therefore, learning might be expedited if teachers can help students to overcome tendencies toward phonotactic or graphemic interference by helping them recognize their success with the

initial position /ɹ/ and apply those same mechanics to their production efforts in the final position.

Second, let us consider the interdentals and labodentals which accounted for more than three fourths of the errors observed in this study. Though some of these phonemes may not have a convenient point of reference from which to work, fortunately, these consonants may be the easiest for teachers and AUAP students to monitor. This is because the places of articulation required to produce these sounds are at the very front of the mouth where the tongue or lower lip touch the base of the upper teeth.

Therefore, it can become fairly simple for a teacher or another learner to visually monitor production, once they understand the oral mechanics involved. In this way, learners can help monitor each other and determine whether the tongue or lower lip is appropriately in contact with the upper teeth. Using a mirror, students could even visually monitor themselves. However, using a mirror may not be necessary. Unlike the retroflex /ɹ/ or other alveolar, palatal or velar sounds whose place of articulation may be less obvious, the base of the upper teeth is a fairly precise target for the tongue or lower lip when producing the interdental and labiodental consonants. Student observation suggests that many Japanese ESL learners can produce these consonants correctly if they learn how to position their mouths, even when perception skills may not be as developed (also see Goto, 1971; Sheldon and Strange, 1982).

Though essential in its own right, some pronunciation work can be done without taking a great deal of time away from other curricular pursuits. If the class time that is allocated for pronunciation work does not allow for adequate time or carefully prepared commercial resources, teachers may benefit from using the portions of those resources that emphasize the most problematic areas. For example, in an integrated skills class, teachers may utilize materials for pronunciation work that were originally designed to develop other language skills. If a teacher notices that problematic consonants appear in a reading or grammar exercise, a few minutes can be taken to identify the potential problems and practice production without detracting from the original focus. Although there is no effortless panacea for problematic pronunciation, perhaps some of these suggestions will be helpful.

These results should be of interest to all those who teach or develop materials for AUAP students. As our understanding of how best to help these students increases, teachers and learners will feel greater optimism that the challenging journey toward more accurate English pronunciation will become more effective and efficient.

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