The Acquisition of Aspiration of Voiceless Stops and Intonation Patterns of English of Adult English Learners: Pilot Study

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This study examines whether or not adult Japanese English learners (JELs) can acquire aspiration of voiceless stops and intonation patterns of English. The subjects were divided into the novice group and the advanced group (each group has 5 subjects), and asked to produce their utterances through the task of picture description and sentence reading. As the result of the computer analysis of the subjects' utterances, it was indicated that the advanced JELs are successful in the acquisition of aspiration of English voiceless stops, but they still have some difficulty in acquisition of intonation patterns of English though they seemed to be more concerned of prominence than the novice.

1. Introduction

There are some phonological elements in English that is critical to the intelligibility but seems to be difficult for JEL's to acquire. Especially aspiration of voiceless stops and intonation are inferred to be difficult to JEL's, for these two elements are mostly not instructed explicitly in the field of Japanese English education. However these two elements have great influence on intelligibility in English (Jenkins, 2002).

Whether or not JEL's can acquire aspiration of English voiceless stops is controversial. Some surveys resulted in that it was difficult for JEL's to acquire aspiration of English voiceless stops. In the study of Riney and Takagi, 10 out of 11 Japanese subjects failed to improve the aspiration of /p/ /t/ /k/ sounds after 42 months (Riney and Takagi, 1999). However in my former study, 10 JEL subjects seemed to be improved in their aspiration through 3 weeks of experiment without any explicit instruction, and they seemed to be successful in differentiation of aspirated and unaspirated voiceless stops.

As for intonation, although it is critical in intelligibility in English, it is widely believed that intonation is very difficult for L2 English learners to acquire. In the sense of acquisition of native-like intonation patterns, intonation is unteachable, or very difficult to teach (Jenkins, 2002 and Hung, 2002). However, though it is dubious to teach students attitudinal and emotive aspect of intonation, which is culture-specific and varies even in native speakers' societies, it is easier to acquire grammatical and informative aspect of intonation (Hung, 2002). If learners can acquire intonation as the

grammatical and informative marker, they would be able to enhance the intelligibility of their English (Hung, 2002).

Although both aspiration and intonation are critical elements in the intelligibility of English, they are regarded to be very difficult for L2 learners to acquire. Therefore it is important to research whether it is really possible for adult JEL's to acquire those two elements.

2. Purpose

The purpose of this pilot study is two-fold: 1) to investigate whether or not adult JELs' can acquire differentiation of aspirated and unaspirated voiceless stops in English, and 2) to examine whether or not adult JELs can acquire intonation patterns of English.

3. Subjects

The subjects are consisted of two groups: a) the novice group, which is composed of JELs who don't have any explicit phonological knowledge and are at the novice level in speaking proficiency, and b) the advanced group, which is composed of JELs who have received relatively abundant phonological input in their adulthood and have already achieved some phonological pattern of English. Each group has 5 subjects. Subjects in the novice group are four undergraduate students and one graduate student from freshman to senior in Waseda University, and subjects in the advanced group are two undergraduate students, two graduate students, and one professor in Waseda University (Table 1, 2, 3).

Subjects in the both group had not measured their VOT nor seen spectrograms, pitch patterns or waveforms of their voices before.

subjects	grade	major	sex
subject 1	1st year of masters course	psychology	male
subject 2	freshman	politics	male
subject 3	fresman	pedagogy	female
subject 4	freshman	politics	female
subject 5	sophmore	politics	female

Table 1. data about subjects in the novice group.

subjects	grade	major	sex
subject6	professor	phonology	male
subject7	sophmore		female
subject8	1st year of masters course	phonology	male
subject9	1st year of masters course	phonology	female
subject10	freshman	literature	female

Table 2. data about subjects in the advanced group.

subjects	experience of staying abroad	experience of studying phonetics/phonology
subject6	finished masters course in the Britain	professor of phonology in university
subject7	no	study in the English-studying club for about 3 years
subject8	no	major phonology in graduate school
subject9	no	major phonology in graduate school
subject10	1 year in the US	no explicit instruction

Table 3. data about the experience of study of subjects in the advanced group.

Number in the close indicates the age the subject stayed abroad.

4. Experiment 1

4-1. Method

In this research I measured VOT of aspirated and unaspirated /p/ /t/ /k/ sounds extracted from subjects. The utterances of subjects were corrected through picture descriptions. The pictures were designed to elicit as many words including /p/ /t/ /k/ sounds as possible. In order to extract the same utterances from all the subjects, the words extracted from subjects should not be difficult. So the words were basically chosen from the word list of the most basic levels in *JASET List of 8000 Basic Words* (Table 4), and a few primary words that were not on the list were added. However sometimes subjects didn't describe the picture with the expected words but substituted the words with their synonyms. In such cases, if the unexpected word included either of /p/ /t/ /k/ sound, I included it in my data. For example, if a subject said "airplane" when the word "plane" is expected, I treated /p/ of "airplane" as a sample of unaspirated /p/ sound, though I had expected to extract aspirated /p/ sound by the picture.

aspirated /p/	unaspirated /p	aspirated/t/	unaspirated /t/	aspirated /k/	unaspirated /k/
computer(1)	airplane(3)	taxi(2)	bookstore	cake(2)	computer(1)
picture(1)	newspaper(1)	tea(1)	drugstore	came(p)	record(1)
park(1)	spider(3)	teacher(1)	station(1)	card(1)	school(1)
paper(1)	spoon(3)	television(1)	straight(1)	class(1)	second(p)
plane(2)		train(1)	street(1)	coffee(2)	
play(1)		turn(1)	student(1)	corner(1)	
pot(2)		TV (p)	study(1)	cup(1)	
surprise(1)					

Table 4. Words extracted from the subjects. The numbers in the brackets indicate the level of the words shown in *JASET List of 8000 Basic Words*. (1) is the most basic and (3) is the most difficult among the words in this table. (p) means the word is not included in the corpus *JACET 8000*, but in its subcorpus. The word without number was not in the corpus. The line under the letter shows the place of the sound where I observed.

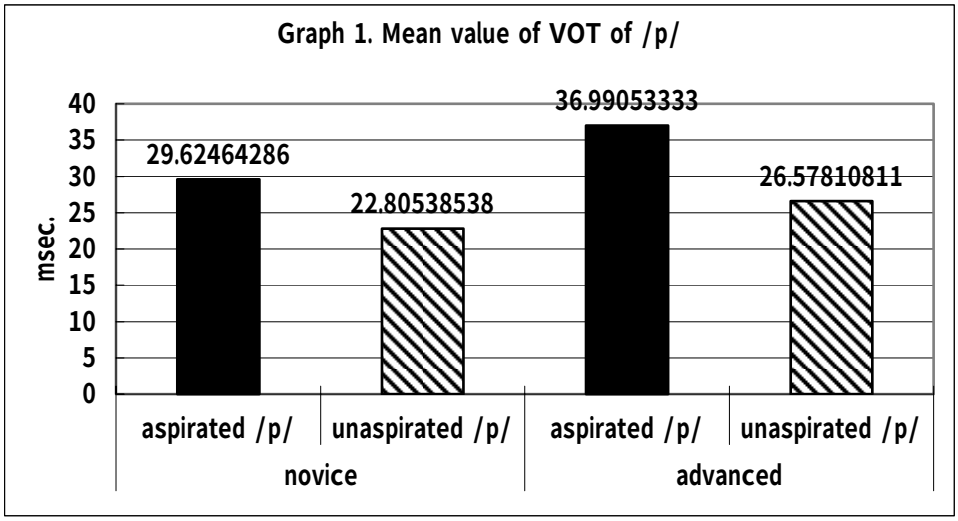
The utterances of subjects were tape-recorded, and the sounds were analyzed with computer program Onsei Rokubunken Version 2.3.0. The VOT values of aspirated and

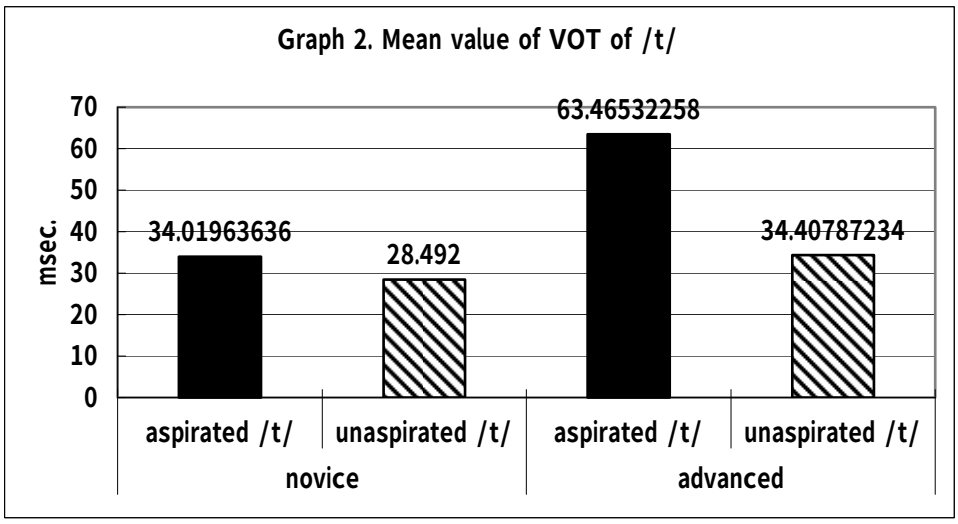
unaspirated /p/ /t/ /k/ sounds were measured through observation of spectrograms and wave forms on the computer. The average length of VOT of each of aspirated and unaspirated /p/ /t/ /k/ was calculated for each group after the measurement.

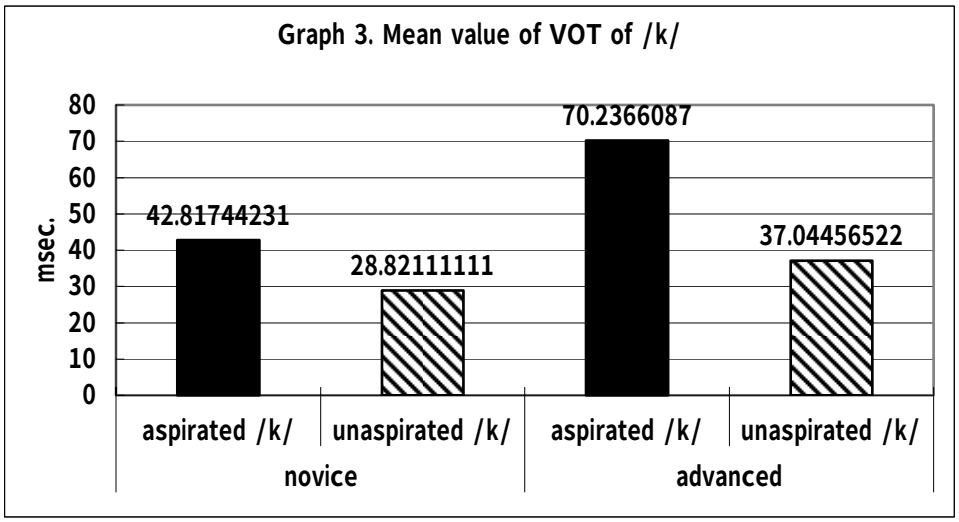
In comparison of the two groups of subjects with different English proficiency, the following results were expected to be seen: Subjects in the novice group would not be able to differentiate VOT of aspirated and unaspitrated /p/ /t/ /k/ sounds, but subjects in the advanced group would be able to.

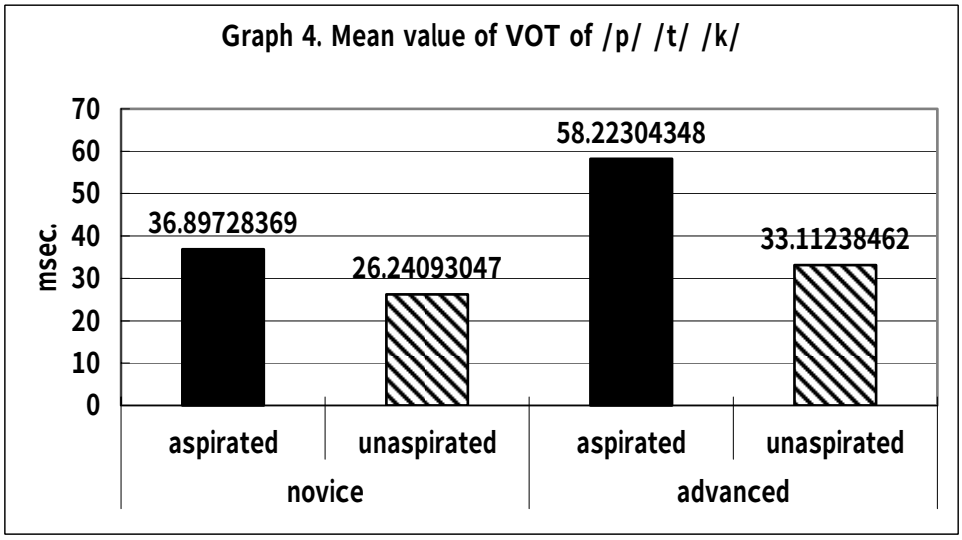
4-2. Result

As was expected, the advanced group seemed to have been able to differentiate VOT of aspirated and unaspirated voiceless stops, but the difference of VOT caused by aspiration difference seemed to be less in the utterances of the novice group (Graph 1, 2, 3, 4).









5. Experiment 2.

5-1. Method

This experiment was for collecting pitch patterns of subjects. All subjects were required to read 11 sentences quoted from Ono, 1986 (See Appendix). All the utterances of subjects were collected and stored into the computer, and their pitch patterns were analyzed with the software Onsei Rokubunken Version 2.3.0.

In this experiment, the following results were expected:

1. The pitch patterns of the advanced group would indicate they were more concerned about prominence of words when they read each sentence.
2. The advanced group would be able to pronounce compound words with proper intonation but the novice group would not be able to.

3. The advanced group would be able to differentiate the strong form and weak form of auxiliary verbs such as “can” or “would” in the sentences, though the novice group would not be able to.

5-2. Result

Generally, subjects in the advanced group seemed to produce sentences with more proper intonation patterns than those in the novice group. Pitch patterns of the advanced subjects suggested they were more concerned about prominence of words and word stress than the novice subjects. Pitch patterns of subjects in the novice group were much flatter than those of subjects in the advanced group. It indicates that subjects in the novice group are not concerned about prominence very much when they pronounce English sentences

However, there were some sentences which seemed to be difficult to pronounce with proper intonation patterns both to the advanced and to the novice subjects in common. These were:

- sentences including pronoun such as ‘you’ and ‘he’
- sentences including compound words and adverb + noun phrases (cold cream, dark room, New York City)

Both the advanced and the novice were likely to pronounce ‘you’ and ‘he’ in Sentence 1, 5, 6 and 9 strongly though they were pronouns, which are to be pronounced in weak forms except in special contexts (e.g.. “Can you play the guitar?” “No I can’t, but HE can.”). Thus they were poor in pronouncing strong forms of auxiliary verbs at the beginning of the sentences, which began with the phrase “Can you…?” or “Would you…?.” Though the advanced were far better than the novice in differentiation of the weak forms and strong forms of auxiliary verbs in the midst of the sentences, they could not pronounce auxiliary verbs in “Can you…?” or “Would you…?” phrases properly except Subject 6.

Differentiation of 2-word compound words and adverb + noun phrases, and pronunciation of 3-word compound words were the other elements that seemed to be difficult to pronounce with proper intonation to the both groups. In Sentence 8, the compound word *cold cream* should be pronounced with high-low intonation, but 3 subjects in the novice group and 2 subjects in the advanced group failed to pronounce this compound word with proper intonation. About *dark room*, which is not a compound word thus pronounced with low-high intonation, seemed to be more difficult to pronounce properly than *cold cream*. Except Subject 6, every subject failed to differentiate this word from *darkroom*, which is a compound word pronounced with high-low intonation and means the room we use in making photographs. Also about New York City, which is a compound word composed of three words, all subjects but Subject 6 were unsuccessful in proper intonation. In this 3-word compound word, *City* should be read with the strongest accent, *New* with the second strongest and *York* the

weakest. However subjects were most likely to put the strongest accent and the highest intonation on *York*.

6. Discussion

It seems that the advanced were successful in differentiation of VOT of aspirated and unaspirated voiceless stops in English, while none of them were concerned about VOT. All the subjects began their study of English at the age of 12 or 13, not in their childhood, and underwent phonological instruction or went abroad for study in their adulthood. They could differentiate the aspirated and unaspirated voiceless stops though they had not been instructed directly about this issue. Therefore it may be possible for adult JELs to acquire the difference of aspirated and unaspirated voiceless stops in English without special endeavor for this issue.

The reason why the advanced could acquire the differentiation of VOT in various aspiration of voiceless stops is not clear, but it may have something to do with the rhythm proficiency of the speaker. However rigid measurement of rhythm proficiencies of speakers is virtually impossible, so it is very difficult to testify the correlation of the acquisition of VOT in voiceless stops and the rhythm proficiency in pronunciation of sentences.

Although I could have some interesting result about VOT and intonation as I mentioned in the former section, there was a practical problems that should be thoroughly reflected: I could not always extract the same stimuli from all the subjects even if they were describing the same pictures. For example, when they look at the picture of a plane, some called it a *plane* as I expected, but some called it an *aeroplane* or an *airplane*. This issue had been expected to happen before the experiment, so I tested a third person who is not related to this experiment at with the pictures. In that pre-test, he described the plane in the picture as a *plane*, so I expected many of the subjects may utter the same word. This expectation was half came true, for all subjects in the novice group gave me the word *plane*. However the advanced, whose vocabularies were more abundant than the novice, gave me various words to explain the same thing. The same thing was true to the stimuli *bookstore*. All the subjects in the novice group described the picture of a bookstore as a *bookstore*, but some subjects in the advanced group described the picture as a *bookshop*. In this case because *bookshop* does not have any voiceless stop in its pronunciation, I had to ignore the data of people who gave me the word instead of *bookstore*.

Of course it is more preferable to extract the common stimuli from all the subjects, but it is very difficult in picture descriptions. In order to extract the stimuli from the novice group, I had to set the level of the stimulus words very basic, and these words should be nouns as possible to avoid the change of pronunciation caused from conjugation. However the words that can meet these condition and moreover preferable to picture description is very limited. How to extract the same stimuli from different

subjects will be the issue for amendment in the following survey.

7. Conclusion

It seemed to be comparatively easy for adult JELs to acquire the aspiration of English voiceless stops. As for intonation, it seemed to be possible for adult JELs to be concerned of prominence of words in sentences, but it seemed to be difficult for them to pronounce sentences including pronoun and compound words with proper intonation.

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Appendix

11 sentences subjects read, quoted from Ono, 1986.

1. Can you read these sentences with ease?
2. I suppose I can get along without her help.
3. The teacher clapped to attract the students' attention.
4. Please feel free to visit me at my office.
5. Would you like to look at this picture?
6. Would you mind putting some more wood on the fire?
7. It's too bad that he can't come to our party today.

8. Where can I buy cold cream? At the drug store.
9. He went into the dark room.
10. I was born in New York City.
11. The captain of our team suggested that we wait another hour.

VOT values of all subjects

	aspirated /p/	unaspirated /p/	aspirated /t/	unaspirated /t/	aspirated /k/	unaspirated /k/
subject1	32.14714	22.5275	34.503	28.33167	46.015	31.98
subject2	32.495	18.032	30.72	28.006	44.491	24.7375
subject3	26.235	20	23.86444	38.57429	44.97429	33.28667
subject4	32.844	18.33833	33.48385	28.986	38.34933	26.69
subject5	28.036	33.35209	42.76231	18.54143	41.93791	26.66667
Mean	29.62464	22.80539	34.01964	28.492	42.81744	28.82111
SD	15.10309	15.64835	17.41039	14.39652	14.83514	10.26766

Table 5. The VOT values of the novice subjects

	aspirated /p/	unaspirated /p/	aspirated /t/	unaspirated /t/	aspirated /k/	unaspirated /k/
subject6	34.16806	24.25727	64.884	28.499	75.53538	37.26933
subject7	30.511	29.98667	59.44667	50.9875	52.71455	29.986
subject8	66.014	17.47	80.01643	48.97833	82.22778	41.66333
subject9	50.01	42.495	62.005	42.5075	61.55308	35.028
subject10	34.98667	29.9775	66.41357	23.59714	60.89273	31.11
Mean	36.99053	26.57811	63.46532	34.40787	69.27235	37.04457
SD	19.5932	12.26559	25.2692	18.78927	29.24465	16.44047

Table 6. The VOT values of the advanced subjects