Using smartphones to detect and self-correct pronunciation in ESL classrooms of Japan

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Abstract

Pronunciation focused language learning enhances speaking and listening skills, so is viewed important in Japanese ESL classrooms. While debates about adopting an accent remain, the first step is to learn communicable pronunciation. In our previous studies, we suggested that students' ability to distinguish English and similar phonemes in their native language can be boosted by combining English and native words containing the target phoneme/s. This way, similar-yet-different phonemes in English can be more distinguishable for ESL students, leading to improved pronunciation. In this study, thirty Japanese university students participated in tests using the voice-to-text feature in smartphones. Students first recorded their pronunciation of word pairs then confirmed the appearance of intended words, as text, in their smartphones. If a wrong word appeared, they could detect their own pronunciation error. They recorded 3 lists of word pairs containing 1) English-English words, 2) English-Japanese words, and 3) Borrowed words in Japanese-English words. Each list contained ten pairs of words with the target phoneme/s mistaken easily by any Japanese ESL students. A week after the initial test, students recorded the same words after a practice drill in an effort to pronounce correctly. The results showed that, for English-English word pairs, some phonemes improved greatly. For English-Japanese word pairs, some Japanese words did not appear correctly even after practice. For borrowed Japanese words, all words improved after the practice drill but the most improvement was seen for words written in Katakana.

I. Introduction:

With improved technology, it has become common that we give verbal instructions to run electric gadgets, use internet search engines or exchange voice messages. On the other hand, we also follow machine-delivered verbal instructions like GPS car navigation, security system warnings etc. While people-to-people communication has become easier, communicating with machines still depends on perfecting our pronunciation so that it becomes machine-comprehendible. Many non-native speakers of English refrain from using this voice recognition feature because their own pronunciation is not machine-comprehendible yet. Even to use such technology in everyday life, it is a prerequisite that correct pronunciation is used. In this study, we focused on correcting students' English pronunciation by using voice-to-text translation feature available on smartphones. Milliner (2015) has stressed the value of language-learning tools that come as built-in, core applications or "apps" in smartphones when they are unboxed. Of the many uses of smartphones, he has highlighted evaluating pronunciation by self-recording.

Shrestha (2011) proposed a number of ways that mobile technologies, particularly, mobile phones, can be deployed for language learning. Günüç (2017) also mentioned how the ITC technology can be effectively integrated into English language teaching and learning.

According to Saito (2007) the Japanese learners of English have difficulty in learning English pronunciation, especially in segmental phonology, because they have to learn many phonemes that do not exist in Japanese but do exist in English. However, little attention is given to pronunciation teaching in English education in Japan and to the development of effective strategies to address the problem. He also demonstrated that explicit phonetic instruction led to improvement of students' pronunciation dramatically. Students became more aware of their pronunciation after activities based on explicit phonetic instruction and so he says such activities contributes to pronunciation pedagogies in EFL situations where English is not used on a daily basis and learners cannot have regular access to real-life communication with native speakers of English.

In Japanese, all borrowed words from other languages are expressed in a separate script called Katakana, though many English phonemes are absent in it. Sometimes students have to unlearn the Katakana pronunciation and relearn the actual pronunciation of the English word. In his book, James Stanlaw (2004) has written that "Japanese students come to class thinking they already know so much English, when in fact they actually have to unlearn a lot." Unlearning can begin only when the students are aware of their mistakes and realize that correction is required.

In our previous study (Tuladhar and Akatsuka, 2017), we concluded that being able to express a sound in written form in one's native language greatly influences pronunciation, for example glottal reinforcement or retroflex fricative sounds and diphthongs are absent in Japanese so Japanese students tend to insert vowels, hence, pronouncing the word "taxi" as "ta-ku-shi." In a similar study conducted in Nepal (Tuladhar and Akatsuka, 2018), we found that Nepali students tend to replace English phonemes with similar-yet-different sounds existing in Nepali Devanagari script, for example, in Nepali Devanagari script /s/, /ʃ/, z/ and /dʒ/ do not exist but similar sounds /ʂʌ/, /ʃʌ/, /sʌ/ and /dʐʌ/ exist. Knowing such details about student's native language can help the ESL teacher teach correct pronunciation.

In this study, we explored using voice-to-text feature in smartphones to teach English pronunciation in ESL classrooms of Japan. We selected English phonemes considered difficult for Japanese ESL learners either because they don't exist in their native script or because they are similar-yet-different. To distinguish similar-yet-different sounds, we required students to switch the language in smartphones from English to Japanese. If the students' pronunciation is incorrect, their smartphones would show a different word, making it possible for them to self-detect their own pronunciation error. An average learner would simply re-pronounce the word again and again, trying to make the intended word appear on the smartphone screen. During this process, unlearning and re-learning correct pronunciation can take place so we implied it in this study.

We hypothesized that, for students to unlearn incorrect English pronunciation, they must first be able to distinguish similar-yet-different (similar to their native language but different from English) phonemes, then pronounce the words acknowledging that difference.

II. Methods:

Thirty Japanese students who were studying at university first year participated in this study. Students were required to pronounce words projected on a screen to their smartphone so that it would be translated into text by the voice-to-text application. Each word was projected on the screen for 5 seconds. Then students were asked to instantly email the translated text to their teacher. They were asked to pronounce the intended word only once, holding their smartphone microphones close to their mouth.

To determine students' capacity to distinguish similar phonemes, we created three different minimal pairs including those that combined native Japanese and English words. We created 3 lists of word pairs, each containing 10 words: 1) English-English word pairs 2) English-Japanese word pairs (expressed in Kanji or Hiragana script), and 3) Borrowed words in Japanese-English word pairs (expressed in Katakana script).

In the first part, students were asked to pronounce English-English word list consisting phonemes thought difficult for Japanese students, as shown in Table 1. It was checked whether their smartphone correctly translated their pronunciation to the intended English word projected on the screen previously. For example, if they pronounced "shy," the text must also record "shy" to be considered correct.

In the second part, students were asked to pronounce another list. Each word pair in the list was a combination of English and Japanese words as shown in Table 2. We tested the students' ability to distinguish the similar-yet-different phonemes found in their native language.

In the third part, students were asked to pronounce a list that contained borrowed words in Japanese language (now available in a Japanese dictionary) and written in Katakana, a script to represent all foreign words. Students were asked to record the English word and the Japanese version of the same word, which is pronounced differently but has same or similar meaning.

In the second phase, after a week, participating students were asked to practice the correct pronunciation with the teacher before recording it on their smartphones. They repeated the same steps to email text of tested words to the teacher.

Finally, all students were asked two questions after each phase. The questions were: 1) how did you feel when the intended word appeared as text on your phone? 2) how did you feel when it did not appear on your phone?

Accent was not a variable in this study, however, for uniformity, all smartphones were set to use American English before commencing the tests.

III. Results and Discussion

In this study, we tested students' pronunciation of word pairs shown in Tables 1, 2, 3. To be considered correct, the words they pronounced had to appear as text on their smartphones. The number of students who pronounced the words correctly before and after the practice drill are shown in Figures 1, 2, 3. The results were compared based on whether their scores 1) differed within the pair or 2) differed before and after the practice drill. The score differences within the pair, before and after the practice drill were compared. The score difference showed whether it was easier for students to pronounce either one of the word in the word pair, signaling whether he/she can distinguish the similar-yet-different sounds. The bigger the score difference within the word pair, the higher the possibility of students had inclination to either one of the tested phoneme. The correct scores for all word pairs are presented within brackets separated by colon and the difference between those scores is presented following the semi-colon in Tables 4, 5, 6. Word pairs with similar, contrasting and very contrasting scores were divided accordingly. Common mistakes while pronouncing the tested words were noted.

Test 1: For English-English word pairs shown in Table 1, we tested the phonemes /s/ & /ʃ/, /l/ & /r/, /v/ & /b/, /f/ & /v/, /iː/ & /i/, /t/ & /tʃ /, /p/ & /f/ and /ks/ & /s/. The score differences within the pair, before and after the practice drill were compared and the results are presented in Figure 1 and Table 4.

Word pairs in the very contrasting category remained in the same category though improvement was seen be-

Table 1: First row of each column shows the tested English phonemes. Second row shows the tested word and its phonetic symbol. Third row shows the similar-yet-different word pair and its phonetic symbol.

English-English word pairs

/s/-/ʃ/	/fl/-/fr/	/kr/- /kl/	/v/-/b/	/f/-/v/	/iː/-/ɪ/	/f/-/v/	/t/-/tʃ/	/p/-/f/	/ks/-/s/
Sigh /saɪ/	**Fly** /flaɪ/	**Crap** /kræp	**Vet** /vet/	**Gift** /gɪft/	**Sleep** /sliːp/	**Leave** /liːv/	**Two** /tuː/	**Pool** /puːl/	**Flex** /fleks/
Shy /ʃaɪ/	**Fry** /fraɪ/	**Clap** /klæp/	**Bet** /bet/	**Give** /gɪv/	**Slip** /slɪp/	**Leaf** /liːf/	**Chew** /tʃuː/	**Fool** /fuːl/	**Bless** /bles/

Table 2: First row of each column shows the tested sounds. Second row shows the tested word and its phonetic symbol. Third row, shows the similar-yet-different Japanese word, its phonetic symbol in English, how it is written in alphabets and the English meaning of the Japanese word.

English-Japanese word pairs

Spy /spaɪ/	**Sign** /saɪn/	**Lake** /leɪk/	**Dark** /dɑːk/	**Foods** /fuːdz/	**Free** /friː/	**Crow** /krəʊ/	**Barber** /ˈbɑːbə/	**Fan** /fæn/	**Chalk** /tʃɔːk/
酸っぱい /sɯppai/ suppai (Sour)	社員 /ɕaiɴ/ shyain (Employee)	礼儀 /reigʲi/ reigi (Manners)	抱く /dakɯ/ daku (Hug)	富士 /ɸɯdʑi/ fuji (Mt.Fuji)	不利 /ɸɯrʲi/ furi (Disadvantage)	黒 /kɯro/ kuro (Black)	馬場 /baba/ baba (Horse Stable)	不安 /ɸɯaɴ/ fuan (Anxious)	直接 /tɕokɯsetsɯ/ chyokusetsu (Directly)

Table 3: First row in each column shows the tested word and its phonetic symbol. Second row shows the similar-yet-different Japanese borrowed word, its phonetic symbol in English and how it is written in alphabets.

English-Japanese borrowed word pairs

Drink /drɪŋk /	**Life** /laɪf /	**Milk** /mɪlk/	**Beer** /bɪə /	**Steak** /steɪk /	**Earphone** /ˈɪəfəʊn/	**Soccer** /ˈsɒkə/	**Winter** /ˈwɪntə /	**Whiskey** /ˈwɪski /	**Figure** /ˈfɪgə/
ドリンク /dorʲŋkɯ/ dorinku	ライフ /raiɸɯ/ raifu	ミルク /mirɯkɯ/ miruku	ビール /biːrɯ/ bīru	ステーキ /sɯteːkʲi/ sutēki	イヤホン /ijahoɴ/ iyahon	サッカー /sakka/ sakkā	ウィンター /ɯintaː/ uintā	ウイスキー /ɯisɯkʲiː/ uisukī	フィギュア /figʲɯa/ fuigua-

fore and after the practice drill. Word pairs "fly-fry" and "pool-fool" had similar score differences even after the practice drill. The score differences between "gift-give" and "leave-leaf" were the highest before practice and "sleep-slip" after practice. The score difference between "vet-bet" and "two-chew" was the lowest before practice and the later remained the lowest even after practice though the number improved slightly. The word that improved the most after practice was "sleep" and the words that scored less even after practice were "vet", "leaf", "fly", "shy" and "sigh."

When common mistakes in this list were analyzed, it was found that students mispronounced "slip" as "strip", "bless" as "place", "yes" or "mess"; "two" as "to", "fool" as "who", "flex" as "flacks", "bet" as "bad", "clap" as "club", "gift" as "gifs", "leaf" as "leap".

Test 2: For English-Japanese word pairs shown in Table 2, we tested students' ability to distinguish similar-yet-different sounds in their native language. The score differences within the pair, before and after the prac-
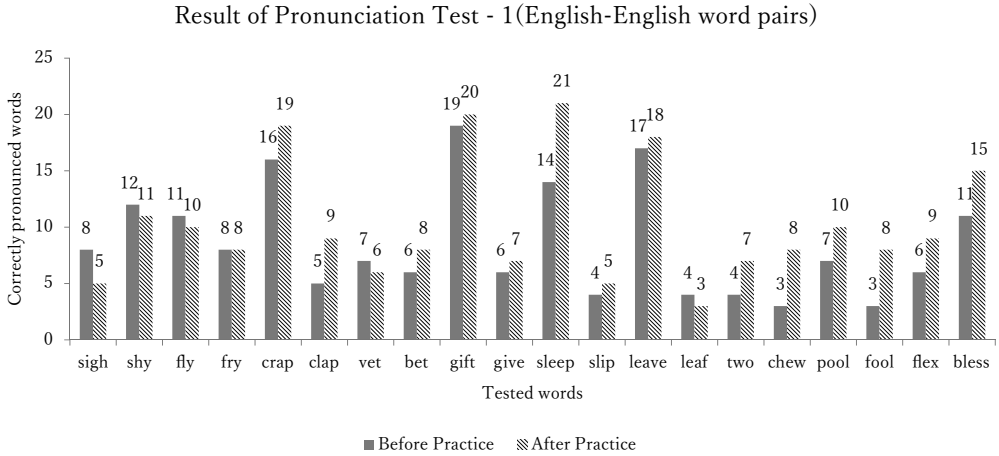
Result of Pronunciation Test - 1(English-English word pairs)

Fig. 1. Result of pronunciation test of English-English word pairs show that after practice, students got better results for most words except "sigh", "shy", "fly", "vet", "leaf". The number of correctly pronounced words differed greatly for combinations of crap-clap, gift-give, sleep-slip, leave-leaf showing difference in recognition of similar-yet-different sounds between the phonemes /r/ & /l/, /f/ & /v/, /ɪ/ & /iː/. After practice, the biggest improvement was seen in the word "sleep", "chew", "fool", "bless". Words that didn't improve even after practice were sigh, shy, fly, vet and leaf. Result for sigh got worse after practice perhaps because it includes the silent letter "g".
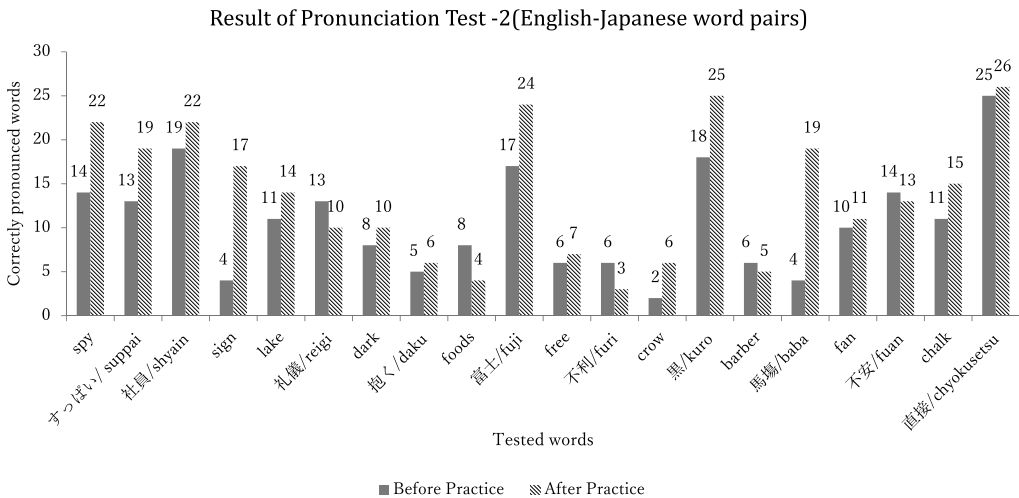
Result of Pronunciation Test -2(English-Japanese word pairs)

Fig. 2. Result of pronunciation test on English-Japanese word pairs show that after practice, results improved for most words except "foods", "reigi", "furi", "barber" and "fuan". We notice that the pair word improved after practice. The number of correctly pronounced words differed greatly for combinations of crow-kuro, foods-fuji, barber-baba, chalk-chyokusetsu which could mean that students confidence in either one of the pair.

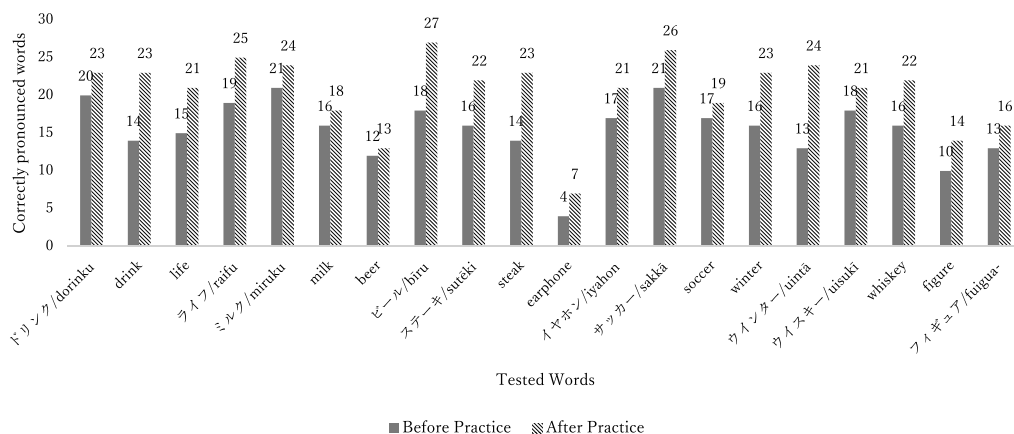Result of Pronunciation Test -(Borrowed-Japanese word pairs)

Fig. 3. Result of pronunciation test of English-Japanese word pairs show that after practice, results improved for all words. The biggest differences were seen for word of "uintā" and then "drink", "bīru" and "sutēki". The biggest difference in word pair combinations were seen for "earphone-iyahon" and "beer – bīru".

tice drill were compared. The results can be seen in Figure 2 and Table 5. The results showed that word pairs "foods-*fuji*" and "crow-*kuro*" remained in the very contrasting category even after the practice drill whereas, the score difference between the word pairs "lake-*reigi*", "dark-*daku*" and "free-*furi*" changed from similar to contrasting although individual word scores increased. Words that scored less even after the practice were, "*fuan*", "*furi*", "*reigi*" among Japanese words and "barber" and "foods" among English words. The word that improved the most, after the practice drill, were words "*baba*" and "sign."

When commonly mistaken words in this list were analyzed, it was found that, students mispronounced the words "foods" as "who", "*furi*" as "furi" meaning "free" in Japanese, "we", "hoodie" or "three", "sign" as "sayings", "spy" as "hi", "life" as "hi", "drink" as "dream", "dark" as "duck" or "dog", "barber" as "papa", "crow" as "claw", "chalk" as "talk" or "hawk", "bless" as "yes". Even Japanese words were pronounced differently such as "*reigi*" as in "*reiji*" etc.

Test 3: For borrowed word in Japanese-English word pairs shown in Table 3, we tested students' ability to distinguish similar-yet-different sounds written in Katakana script.

The results showed that though the score difference for individual words were seen, word pairs "earphone-*iyahon*", "life-*raifu*", "soccer-*sakkā*", "steak-*sutēki*", "winter-*uintā*", "whiskey-*sakkā*" "figure-*fuigua-*" remained in the same category even after the practice drill. The score difference between "drink-*dorinku*" became same after practice. However, the score difference between word pair "beer-*bi-ru*" became very contrasting after the practice drill. The highest improvement after the practice drill was seen for the word "*uintā*" meaning winter.

When commonly mistaken words in this list were analyzed, it was found that students mispronounced "steak" as "stick", "drink" as during", "beer" as "beard", "earphone" as "your home", "your phone", "airphone", "whiskey" as "whisper". The score difference between "earphone-*iyahon*" was the highest both before and after the

Table 4

Practice Drill	Similar score difference	Contrasting score difference	Very contrasting score difference
Before	vet-bet (7-6;1) two-chew (4-3;1)	sigh-shy (8-12;4) flex-bless (6-11;5) fly-fry (11-8;3) pool-fool (7-3;4)	crap-clap (16-5;9) sleep-slip(14-4;10) gift-give(19-6;13) leave-leaf(17-4;13)
After	vet-bet (6-8;2) two-chew (7-8;1) fly-fry (10-8;2) pool-fool (10-8;2)	sigh-shy (5-11;6)	crap-clap (19-9;10) sleep-slip (21-5;16) gift-give (20-7;13) leave-leaf (18-3;15)

Table 5

Practice Drill	Similar score difference	Contrasting score difference	Very contrasting score difference
Before	spy-*suppai* (14-13;1) lake-*reigi* (11-13;2) dark-*daku* (8-5;3) free-*furi* (6-6; 0) barber-*baba* (6-4;2)	fan-*fuan* (10-14;4)	foods-*fuji* (8-17;11) crow-*kuro* (2-18;16) chalk-*chyokusetsu* (11-25; 14) sign-*shyain* (4-19;15)
After	spy-*suppai* (22-19;3) fan-*fuan* (11-13;2)	sign-*shyain* (17-22;5) lake-*reigi* (14-10;4) dark-*daku* (10-6;4) free-*furi* (7-3;4)	foods-*fuji* (4-24;20) crow-*kuro* (6-25;19) barber-*baba* (5-19;14)

Table 6

Practice Drill	Similar score difference	Contrasting score difference	Very contrasting score difference
Before	steak-*sutēki* (14-16;2) winter-*uintā* (16-13;3) whiskey-*uisukī* (16-18;2) figure-*fuigua-* (10-13; 3)	life-*raifu* (15-19;4) soccer-*sakkā* (17-21;4) drink-*dorinku* (20-14;6) milk-*miruku* (16-21;5) beer-*bīru* (12-18;6)	earphone-*iyahon* (4-17;13)
After	steak-*sutēki* (23-22;1) winter-*uintā* (23-24;1) whiskey-*uisukī* (22-21;1) figure-*fuigua* (14-16; 2) drink-*dorinku* (23-23;0)	life-*raifu* (21-25;4) soccer-*sakka* (19-26;7) milk-*miruku* (18-24;6)	earphone-*iyahon* (7-21;14) beer-*bi-ru* (13-27;14)

practice.

Before commencing tests 1-3, the meaning of the tested words was neither taught nor confirmed with the students so it may affect their score. After each test, the students were asked how they felt when the word they pronounced, appeared on their smartphone screen and when it did not. Their answers are presented as Table 7. From their answers, we learn that many students could detect incorrect pronunciation and yet they couldn't pronounce correctly and make the text of the intended word appear in their smartphones. After practice, they succeeded in getting better scores so many of them thought that the practice drill was helpful. Also, it became clear that their

Table 7: Students' responses to the following questions in their own words: 1) How did you feel when the word you pronounced appeared correctly as text on your smartphone? 2) How did you feel when the word you pronounced did <u>not</u> appear as text on your smartphone screen?

Students' responses before the practice drill

I felt glad that my English pronunciation is not so bad; I felt relieved and confident; I think this test was fun and I felt good to see the words appear on the phone screen; I felt the phone is not technologically ready to understand my mis-pronunciation and we all pronounced together so phone catched other sounds; I felt uncomfortable and recognized how I pronounced each word, this test let us know how our pronunciation is; It was annoying because sometimes the phone did not recognize even my Japanese; this function in my phone is unuseful for me; I will take care of my English pro-nunciation; sometimes the phone didn't catch my voice and words did not appear as I expected; It was interesting how words were totally different than what I pronounced; the phone did not fill in English quickly; it's a good way to study pronunciation with this function; the same word is pronounced differently in Japanese and English; Voice recorder sometimes did not catch the last letters like p, b, s and such words were difficult to emphasize when I spoke directly; I must be more careful; I felt disappointed; the words that appeared were so different from what I pronounced; I couldn't pronounce well; It's difficult to pronounce perfectly in English; I thought I should study about pronunciation; I realized that I may be misunderstood while having a conversation with a foreigner; I felt embarrassed, sad and annoyed; It was funny that other's would hear me like this; Even Japanese words did not show up on the phone; They were similar pro-nunciation so I wasn't to pronounce each word clearly; I should practice more, using this technology is very difficult; The phone did not even the Japanese words correctly sometimes, I was very surprised, I will try to record my reading and check my pronunciation; Most words I pronounced was not recognized, I have to practice more often; It was diffi-cult to move my tongue, Almost all words were different than what I intended, I found that I did not speak correctly.

After the practice drill

I could correct many Japanese words; I want to practice more; I could record more correct words because I could hear model pronunciation first; I have to practice more each pronunciation that has different sound than Japanese; The 2 pronunciations were very different; I think I could pronounce better than before because we practiced, my confidence increased when the word appeared; I thought it is difficult to distinguish Japanese from English; I could pronounce well than before; It is not easy to pronounce completely; I want to learn pronunciation; Practicing helped, maybe practice is good, after practicing I feel little easy to pronounce; Practice is important, it became better than before; I think it is dif-ficult to pronounce "r" and "l" so I have to practice; More right words come on my phone this time; Phone did not re-cord even Japanese words correctly; Japanese words did not show on my phone so I thought Japanese is more difficult than English; I could pronounce correctly than last time; Some Japanese words also couldn't pronounce so I was very surprised; It was easier than before; I was nervous and unrelaxed when it was not shown; I felt happy and relieved; I think my cell phone did not work out; I feel I can say correct pronunciation; I want to fix my incorrect pronunciation; English words in Japanese is a little bit different; It's interesting that I mistake even Japanese; I had a sensation that I'm a well-pronouncer, I think the machine doesn't work well; I couldn't often pronounce properly; I have to pronounce slowly with loud voice; Most of my words were incorrect, so I must try to pronounce correctly; I spoke in big voice moderately; "Earphone" was very difficult and I'm not good with "r"; I felt better than last time, also I think my mis-takes appeared because I did not switch the language; It's better than last time, it's important to open big mouth and pronounce clearly; I feel my pronunciation became better, I often pronounce wrongly and feel like I should work on pronunciation; I feel happy because my pronunciation is not wrong; I spoke correctly but it doesn't appear correctly, I wonder why, I think I need practice more and more; When I pronounced a word starting with "s" it did not appear be-cause of my pronunciation.

smartphones did not record even Japanese words correctly because they didn't switch the language or due to other technical difficulty. Kiernan & Aizawa (2004) have mentioned potential advantages of mobile phones as well as some of its limitations, but overall suggested that mobile phones represent a language learning resource worthy of further investigation.

In this test, all students pronounced the words simultaneously and the time allotted to them was limited so these facts may have affected their score. In addition, the students were not given another chance to re-pronounce the words in both phases. During the practice drill, however, they pronounced each word 3 times with their teacher before recording it on their smartphones. Students were not asked to pronounce sentences or longer paragraphs so tone and intonations were not checked. Only single words were listed so the phone did not self-correct based on context.

These tests helped determine target phonemes that can improve with practice if students are provided opportunities to self-detect their pronunciation error. In a similar study, Liakin et.al. (2015) investigated the acquisition of the L2 French vowel /y/ in a mobile-assisted learning environment, via the use of automatic speech recognition (ASR) and found that ASR group improved significantly from pretest to posttest, suggesting that this type of learning environment is propitious for the development of segmental features such as /y/ in L2 French.

IV. Conclusion

The present study focused on an area not so highlighted in language research, involving self-detecting errors and repairing pronunciation through self-awareness of similar-yet-different phonemes in native language and English. Failure in oral communication usually occurs when pronunciation hampers comprehension. The potential language repairing opportunities can be created by using smartphones. In this study, we tested only Japanese students therefore, testing students of other nationalities is a topic for further research.

Instant detection of mispronunciation using smartphones is helpful also because it does not require a second person to correct it. In this test students could detect their pronunciation mistake when a different word appeared on their phone. Self-realization of pronunciation errors became evident among students this time and other methods using smartphones for similar purposes can be suggested. Also, this time only words were tested but testing students to pronounce longer sentences would be significant.

Japanese words written in Kanji characters can be pronounced in multiple ways so students may have difficulty determining which pronunciation to use. This is different in the English language because English words have just one style of pronunciation, though it may include silent letters and can be influenced by various international accents. Thus, voice-to-text feature in smartphones can be considered effective in self-detecting pronunciation mistakes instantly and can be an important tool to improve English pronunciation. Also, pronunciation practice highlighting the similar-yet-different sounds can be a good practice method for second language acquisition.

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第二言語学者におけるスマートフォンを利用した発音の自己修正の可能性

トゥラダール　アスタ

要　　旨

　英語を第二言語として学ぶ際、母語に存在しない音を間違って聞き取り、発音することがしばしばある。発音を重視することでリスニングとスピーキングスキル向上につながりスムーズなコミュニケーションができやすい。そこで、母語と英語の類似した発音を聞き分け、自分の発音ミスを自覚し、正しい発音を身に着ける方法を探った。本稿では、日本語に存在しない音と似ているからこそ間違いやすい音を集め単語ペアを組み、日本の大学 1 年生 30 名を対象にスマートフォンのアプリを使用した発音テストを実施した。単語ペアは「英語―英語」、「英語―日本語」、「英語―日本語の外来語」の三種類用意した。その結果、自分の発音がスマホに間違って記録されたことで間違い認識力が高まり、多くの場合は正しく発音することができた。そして、英語の黙字、長母音、重母音をより強調して発音練習する必要があることが分かった。一方、日本語では読み方が多いこと、つまり漢字の音読みと訓読みがあることは英語と違う点であるように見えても、アクセントによっては英語発音にも違いが生じることなど英語発音を学ぶ日本人学生にとっての難点のあることが分かった。スマホアプリを使用した言語学習方法は今後より発展が望めるであろう。