Using Automated Speech Recognition Software to Promote Pronunciation Practice Outside the Classroom

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Many second language learners feel that it is impossible to improve L2 pronunciation outside of the classroom, due to the lack of an interlocutor who can provide constructive feedback. Automated speech recognition (ASR) software has the potential to fill this gap, allowing learners more opportunities for independent practice. This pilot study examined the use of one ASR app, Otter, on the motivation of a group of L2 English learners at a university in Japan. Twenty university students used the app to practice pronunciation outside of class for five weeks. The results show that the ASR software led to perceived improvement in pronunciation and an increase in motivation to practice pronunciation. Implications for teachers and further research are also discussed.

多くの第二言語（L2）学習者は、建設的なフィードバックを提供してくれる対話者がいないため、教室外でL2の発音を向上させることは不可能だと感じている。自動音声認識（ASR）ソフトウェアは、このギャップを埋める可能性があり、学習者が自主的に練習をする機会を増やすことができる。本パイロット研究では、日本の大学におけるL2英語学習者の動機付けに対するASRアプリケーション「Otter」の使用効果を検証した。20名の大学生が5週間にわたり授業外で発音練習にこのアプリを使用した。その結果、ASRソフトウェアの使用によって学習者は発音の改善が感じられ、発音練習に対する動機付けの向上に繋がることが明らかになった。結びとして、教師への示唆と今後の研究展望についても論じている。

The COVID-19 pandemic imposed several restrictions on both everyday life situations and classroom teaching. This unprecedented event forced many educational institutions to rapidly move from face-to-face classroom teaching to online learning. The classroom subsequently changed from "a unique social environment with its own human activities and its own conventions governing these activities" (Breen & Candlin, 1980, p. 98) to an online platform with prescribed interactions and conventions, one which was more strictly regulated by the teacher (Sidi et al., 2023). For second language learners, engagement in this new classroom environment was often largely reduced to listening, watching, and speaking only when unmuted or when directly asked for information. These limitations were felt by teachers when working with students on pronunciation. In an online environment, teacher feedback is even more limited than in the classroom. Technological barriers add further difficulty for teachers and learners (Hulse, 2021; Phan & Nguyen, 2022), and for the teacher to provide feedback on pronunciation (Lee et al., 2015). These issues highlight the importance of exploring new solutions to the problem of feedback and monitoring in pronunciation practice. As technology is being embraced in this developing online learning environment, it is worth exploring how new developments may allow for more efficient self-directed pronunciation practice than was previously possible.

Literature Review

Traditional Pronunciation Practice

Research has shown that students recognize the importance of improving pronunciation and display a desire to practice it (Levelle & Levis, 2014; McCrocklin & Link, 2016; Yamaguchi, 2002). However, while pronunciation practice has evolved

from drill-based imitation activities to a more meaningful communicative approach, second language (L2) learners who want to improve this skill are still often restricted by a teacher-led approach that takes place mainly in the classroom (McCrocklin, 2016). This aligns with the widely adopted framework for teaching pronunciation established by Celce-Murcia et al. (2010), which consists of five phases that move learners from "analysis and consciousness raising to listening discrimination and finally production" (p. 45). The framework can be seen below in Table 1:

Table 1

Summary of Communicative Framework for Teaching English Pronunciation (Celce-Murcia et al., 2010, p. 45).

Description and analysis	*oral and written illustrations of how the feature is produced and when it occurs within spoken discourse*
Listening discrimination	*focused listening practice with feedback on learners' ability to correctly discriminate the feature*
Controlled practice	*oral reading of minimal-pair sentences, short dialogues, etc., with special attention paid to the highlighted feature in order to raise learner consciousness*
Guided practice	*structured communication exercises such as information-gap activities or queued dialogues, that enable the learner to monitor for the specific feature*
Communicative practice	*less structured, fluency-building activities (e.g., roleplay, problem solving) that require the learner to attend to both form and content of utterances*

Improving pronunciation in L2 learning requires the learner to differentiate between sounds, to produce those sounds in particular contexts, and to revise sound production based on feedback. The above framework highlights the reliance on teacher feedback and affirmation in practicing pronunciation. From a learner's perspective, it is therefore easy to see how a sense of dependence on the teacher can develop. Furthermore, pronunciation practice can be time-consuming and is often demoted in favor of other language skills in the classroom (Isaacs, 2009; Lang et al., 2012; Pennington, 2021). For second-language learners to improve their pronunciation, they need opportunities to speak and receive feedback, but it is not always possible for teachers to provide these opportunities in a traditional classroom environment due to time constraints (Saito, 2014) as well as large class sizes. It would therefore be ideal for learners to be able to practice pronunciation independently and receive individual feedback.

Automated Speech Recognition

The level of autonomy required for learners to successfully practice pronunciation independently has been difficult to achieve. Within the field of language acquisition, Holec (1981) described autonomy as "the ability to take charge of one's learning" (p. 3). However, it has been suggested that learners need "strategies, skills and tools that empower them to experiment with pronunciation without relying on a teacher for constant monitoring and feedback" (McCrocklin, 2016, p. 26). Therefore, it is important for both teachers and learners to explore new opportunities that technological developments may offer in this regard (Dalby & Kewley-Port, 1999; Shadiev & Yang, 2020).

Automated speech recognition (ASR) is one such promising digital technology. ASR is defined by Levis and Suvorov (2013) as:

> an independent, machine-based process of decoding and transcribing oral speech. A typical ASR system receives acoustic input from the speaker through a microphone, analyzes it using some pattern, model or algorithm, and produces an output, usually in the form of a text (p.1).

Levis and Suvorov (2013) discussed an important distinction between *speech recognition* software and *speech understanding* software. Speech recognition is concerned with determining precisely what has been said, while speech understanding software is concerned with establishing the *intended meaning* of an utterance. Many common ASR applications and tools such as Google Assistant, Siri, and Alexa work by deducing the meaning of what is said - even if incorrect words or phrases are used, these programs can interpret an utterance into meaningful language. For the purposes of pronunciation practice, it is ideal for ASR applications to show precisely what the speaker has said, errors included, rather than attempting to match the speech to a prescribed formula; the software should attempt to *recognize* speech rather than *understand* it.

Recent strides in the development of pattern-recognition, aided by artificial intelligence, have produced several ASR applications that are easily accessible to language learners through modern devices (McCrocklin, 2016). These applications, as an

objective listener, can provide immediate autonomous feedback for students enabling them to experiment with sounds in a low-stress, safe environment (Banafa, 2008; Derwing et al., 2000). The time to practice pronunciation with ASR technology can, in theory, be endless and flexible. McCrocklin (2016) conducted a 3-week workshop with 48 American university students studying English and found that using ASR software for pronunciation practice twice a week (and once as homework) increased beliefs of autonomy. ASR also has the potential to be used to improve pronunciation accuracy (Hincks, 2003; Neri et al., 2003, Neri et al., 2008), and boost motivation (Dalby & Kewley-Port, 1999) and autonomy (Shadiev & Yang, 2020).

Since ASR software is a new development in the field of pronunciation practice, it is important to assess its viability in a variety of ways. The aim of this pilot study is to examine the effect of using one such ASR application, Otter, on learner motivation to practice pronunciation. This led to the following research questions:

RQ1. Can Otter support learners in the process of pronunciation practice outside the classroom?

RQ2. Does the continued use of Otter affect learners' motivation to practice pronunciation?

Method

Participants

The study was conducted at a private university in Japan which focuses mainly on foreign language study. Institutional approval of this study was granted, and the students were informed that participation would have no bearing on their grades. Signed consent was obtained from the participants, which initially consisted of 23 undergraduate students, most of whom were Japanese. The participants varied in age from 18 to 21 years old and were enrolled in English courses, alongside other L1 (Japanese) and L2 (Chinese, Korean, Spanish, Portuguese, Malaysian, Thai, Indonesian) courses, at freshman and sophomore levels. They had varying levels of English proficiency from low-intermediate to upper-intermediate. There were 18 female participants and five male participants. A total of 20 participants completed the study.

Procedure

Because the study was conducted online, we set up a Google Classroom to liaise with interested parties and to coordinate the study through the delivery of instructions and materials. Before completing the introduction (pre-experiment) questionnaire, participants attended a 15-minute orientation session (via video conference) that demonstrated how to use the ASR software (Otter) where to find the weekly sentences and to complete the weekly questionnaires. We instructed the students to record each sentence three times using Otter, and then complete the weekly questionnaire. We chose sentences, rather than isolated words, as this is more authentic and, therefore, more beneficial for learners (Bradley-Bennett, 2007). The students uploaded the transcripts of the recordings and completed the questionnaires each week in Google Classroom. This process was repeated four times. At the end of week five, the students completed an exit questionnaire.

Materials

Weekly Sentences

We selected the sentences for weekly practice from the Corpus of Contemporary American English (COCA). Ellis (2006) suggested that a key criterion in selecting target features for language instruction is problematicity; the challenge, however, is determining what is problematic. For this present study, we selected five common problematic pronunciation features: /r/ & /l/, /b/ & /v/, /ð/, /ʃi/ & /si/, and finally, consonant clusters such as /str/, /spl/ and /skr/. We felt that these five sounds represent the most frequently problematic pronunciation features among Japanese learners of English. Robinson (1996) stated that this use of teachers' knowledge to identify problematic language features has several advantages: it is empirical, it can be replicated, and it has a high level of face validity. Each of the sentences used for this pilot study included at least one example of the problematic pronunciation features described above. These sentences were edited by the authors for clarity and length (as we deemed some sentences too long and complicated for the participants to reliably produce) and to remove unnecessary vocabulary which might interfere with transcription. The full list of sentences can be found in Appendix A.

Otter

Otter is advertised as an artificial intelligence (AI) transcription software which can be used to transcribe real-time conversations from speech to text. Otter can understand "regional accents" in both the U.K. and the U.S. and boasts the ability to understand "(southern) American, Canadian, Indian, Chinese, Russian, British, Scottish, Italian, German, Swiss, Irish, Scandinavian, and other European accents" (Supported Languages,

2020). We chose Otter for its free usage and incorporation of AI, suggesting continuous development and availability, and because we found it to be the most accurate and user-friendly among the widely available ASR applications at the time. We demonstrated how to use the software and provided a written step-by-step guide, and suggested the participants download the software onto a compatible device and experiment with it in their own time before the study began, to improve familiarity.

Questionnaires

All questionnaires consisted of a variety of multiple-choice questions and gradient answers based on a six-point Likert scale. The introduction questionnaire consisted of nine questions that target initial student self-perception regarding the use of technology for pronunciation practice and their pronunciation abilities and goal. The weekly questionnaires asked participants to rate their motivation, their perceived success and their comfort using Otter. The exit questionnaire asked them to rate their overall improvement in pronunciation, the success of their practice, the ease of using Otter, how their motivation had changed, and whether they would continue to use the software after the end of the study. We added an option for additional comments from participants at the end of all questionnaires.

Results

Introduction Questionnaire

The introduction questionnaire consisted of nine questions to assess initial student self-perceptions regarding the use of technology for self-study related to pronunciation practice, their pronunciation abilities, and individual goals. See Appendix B.

Using Technology and Independent Study

Most participants considered themselves relatively proficient with technology. The average rating was 3.82 on a Likert scale with 1 as *I cannot use technology well* and 6 as *I find it easy to use technology.* Most participants (60.9%) stated they previously used apps for self-studying and over 90% of participants considered online learning to be useful in general. The participants reported varying levels of motivation when studying online. The average score was 3.35 where 1 was '*Not motivated* and 6 was *'Very motivated'*. No participants selected the lowest or highest motivation choices. Nearly 75% of participants felt they could study well independently.

Pronunciation Abilities, Goals, and Motivation

Participants generally rated their pronunciation skills as poor, with an average rating of 2.65 out of 6 with 1 being *very poor* and 6 as *very good.* Question 7 asked participants their main goal for pronunciation practice. The participants' goals for pronunciation varied, but by far the most common choices were to be understood by a native speaker (43.5%) and to sound like a native speaker (39.1%). A further 13% wanted to pronounce full sentences well. Participants reported varying levels of success in improving their pronunciation through self-study, but none rated themselves as *very successful*. 26.1% reported that they had not tried, while a further 39.1% declared that they had not been very successful. Participants felt generally optimistic about the possibility of improving pronunciation through self-study with an average rating of 3.95. A Likert scale was used with 0 designated as *no improvement* and 6 as *I can improve a lot.*

Weekly Questionnaires

The five weekly questionnaires each contained three questions that were designed to measure motivation and perceived success towards independent pronunciation practice, as well as their experience and comfort with studying online and using Otter. See Appendix C for an example. The first question asked *How would you rate your motivation to practice pronunciation this week?* Participants were given a Likert scale to respond, with a rating of 1 designated as *very low* and 6 as *very high.* Figure 1 shows the reported average motivation rate across the five weeks.

Question two asked *How successful was your pronunciation practice this week?* Using a Likert scale, students could select from 1 (*Not successful at all*) up to 6 (*Very successful*). Figure 2 shows the average perceived success of the group across the five weeks of the study.

Question 3 asked: *How easy was the software to use this week?* The Likert scale graduated from *very difficult* at point 1 to *very easy* at point 6. Participants gave an average rating for ease of use of Otter each week, as seen in Figure 3.

Figure 1

Average Weekly Rating of Motivation to Practice Pronunciation

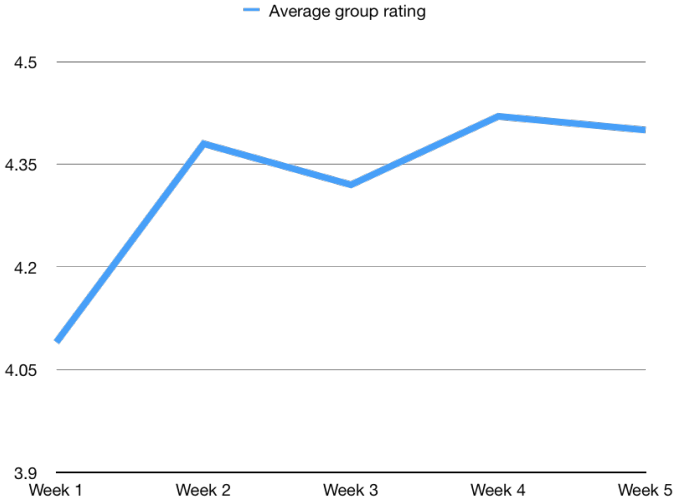


Figure 2

Perceived Success of Independent Pronunciation Practice

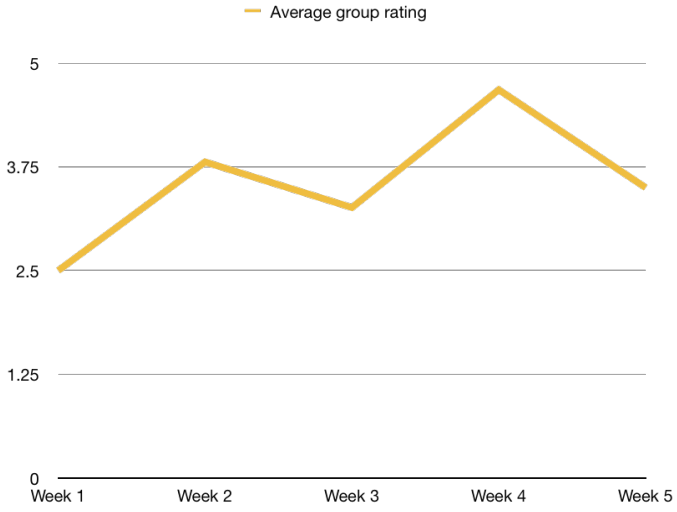
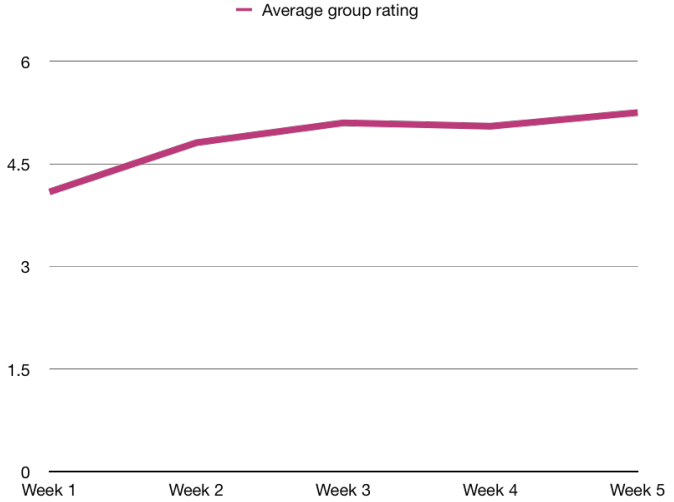


Figure 3

Average Weekly Rating of the Ease of Software Use

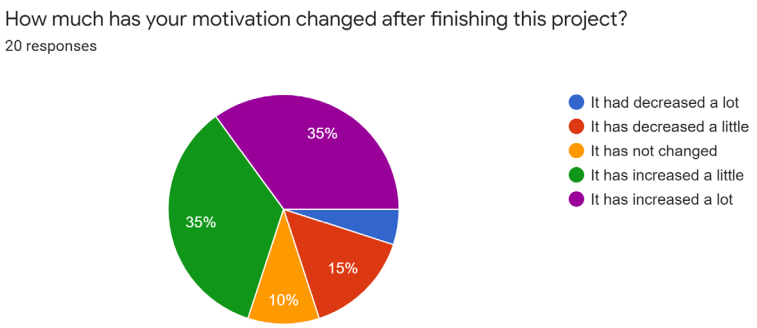


Exit Questionnaire

At the end of week 5, the students completed the exit questionnaire. The first two questions measured perceived improvement in pronunciation and success in independent pronunciation practice. There was an average rating of 4.55 for perceived pronunciation improvement. On this scale, 1 was labeled *no improvement* and 6 was *a lot of improvement.* For question two, there was an average rating of 4.4. A rating of 1 was designated as *not successful at all* and a rating of 6 as *very successful.* Question three asked how easy participants thought the software was to use overall. 95% rated it 5 or above, where 1 was *difficult to use* and 6 was *very easy to use.* Question four explored changes in participant motivation towards practicing pronunciation. The results can be seen in Figure 4.

Figure 4

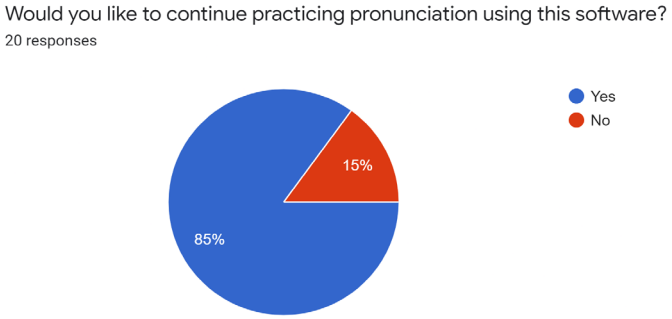
Answers to Question 4 in the Exit Questionnaire



Question 5 asked if participants would continue to use the software for pronunciation practice after the study, with 85% responding affirmatively (see figure 5). The exit questionnaire also allowed participants to leave unsolicited comments about the study. The individual responses (8 in total) reported that they either enjoyed using the software, felt increased motivation, or both.

Figure 5

Answers to Question 5 in the Exit Questionnaire



Discussion

The aim of this pilot study was to investigate whether using an ASR application, Otter, affected learners' willingness to practice pronunciation outside the classroom. The results suggest that Otter can support learners with a measured positive impact on perceived improvement and success in pronunciation practice. In addition, the reported ease of use of the software indicates that it is also a very accessible tool to use for this purpose. Usability of the Otter application was rated highly, with 100% of participants rating it as easy to use and 65% of these indicating it was very easy to use.

The study also aimed to establish whether the continued use of Otter affects learners' motivation to practice pronunciation. The participants reported that it had an overall positive effect that increased over time. The pre-study questionnaire revealed that the participants in this pilot study were initially receptive to online, independent study, indicating a high level of comfort and confidence in using online education tools, with over half stating they had previously used applications for educational purposes. However, this was contrasted with a perceived lack of overall confidence in pronunciation ability (average rating of 2.65) and low perceived success in previous pronunciation practice attempts. The initial receptivity was well-placed, as average motivation and perceived success increased throughout the weekly questionnaires. The former showed a high initial rating of 4.09 and increased to 4.40 by week five. Perceived success fluctuated throughout the five weeks but showed a moderate positive climb from 2.50 to 3.50. This further supports the claims that ASR has the potential to be used to improve perceived pronunciation accuracy and boost motivation (Dalby & Kewley-Port, 1999; Hincks, 2003; Neri et al., 2003, Neri et al., 2008; Shadiev & Yang, 2020).

These findings were also expressed in the post-study questionnaire with a positive rating for overall perceived improvement (4.55 on average) and perceived success (4.40). In addition, 70% of the participants reported an increase in motivation to practice pronunciation, half of whom reported that the increase was large; while 85% indicated that they would like to continue using Otter to practice pronunciation. However, 20% of participants reported a decrease in motivation to practice pronunciation. This is a strong indication that using ASR applications like Otter to practice pronunciation is not suited to all language learners. It is worth mentioning here that the global COVID-19 pandemic, which required the participants to be completely online for one year (2019-2020) may have also given them less opportunity to get the English exposure normally provided in face-to-face classes, which may have influenced their motivation.

The overall positive perception of improvement coupled with an increase in motivation to independently practice pronunciation strongly suggests that using ASR applications is a promising way to develop evidence-based strategies for pronunciation improvement. This creates opportunities for learners to employ autonomy in their pronunciation practice. Using ASR applications, learners can receive feedback and develop strategies to take charge of their learning without relying on a teacher (Holec, 1981).

Pronunciation is seen as an important skill and students show a clear desire to practice it (Levelle & Levis, 2014; McCrocklin & Link, 2016; Yamaguchi, 2002); however, it is often overlooked in favor of other skills (Isaacs, 2009; Lang et al., 2012; Pennington, 2021). Teachers could use ASR applications to assign pronunciation activities as homework to allow students to practice at their own pace rather than taking valuable time in a classroom setting. These students would also benefit from personalized feedback, allowing them to develop evidence-based strategies for improving learning (McCrocklin, 2016). In addition, teachers could treat these activities as formative assessment to more firmly establish pronunciation as a valued skill.

Limitations and Future Research

This pilot study has several limitations which should be acknowledged. First, the number of participants (n = 20) was small. A larger number of participants would perhaps have allowed for more definitive conclusions as to the effect of the ASR software on the learners' motivation. The participants were also a homogeneous group, consisting of Japanese learners (and one Chinese student) in a very narrow age range, all of whom were enrolled at the same university. A larger and more diverse group of participants might produce different results.

Another limitation is in the self-reported data, specifically the measurement of learners' motivation. This pilot study used weekly questionnaires which asked the participants to measure their level of motivation to study English as a second language; they simply rated their motivation level for the week using a Likert scale. The concept of motivation itself was not discussed in detail with the participants; they were not questioned on their reasons for learning English as a second language or the types of motivation they possess. It was decided that introducing these concepts might prove difficult to adequately explain and that the focus of the study should be on the use of the ASR software.

A further consideration is the software itself. While the participants generally found the Otter app easy to use, some students reported frustration when it failed to understand some of their utterances. It is possible that such issues could negatively impact the learners' motivation. McCrocklin (2016) suggested the possibility of learners being encouraged to try different ASR applications to find a program that works well for them. Future studies could incorporate a variety of ASR applications to compare their effects on student pronunciation and motivation.

In a potential future study, practice sentences could be recorded by a native speaker as a model for participants. This would, however, leave learners dependent on teachers for modeling, but would also allow them to practice and receive feedback. Learners could personalize their practice by finding their own sources of modeling such as movies, TV shows, podcasts and YouTube videos.

Conclusion

The use of ASR applications, like Otter, shows promise as a tool to support pronunciation practice for second language learners, and the timing is significant as potential modern-day users are primed from previous experience with online applications. It had a positive impact on the perceived improvement and success of the participants in this pilot study as well as motivation. This is a positive indicator to proceed further with this research and evaluate the accuracy of Otter's transcription software through rigorous testing. This includes observing consistency when recording multiple English utterances of the same sentences from both native speakers and foreign learners. Some participants expressed frustration that the application did not always record utterances accurately. In one case, Otter repeatedly transcribed one participant's name incorrectly.

While using ASR applications like Otter appears to have a positive effect on learners, it would be premature to fully recommend it as a tool for improving the accuracy of pronunciation without evaluating its accuracy to transcribe English utterances from language learners attempting to use it for this purpose. Technology is proving to be a great asset in the development of independent language learning, but it is important to scrutinize new developments to ensure novelty is not mistaken for progress.

All authors declare that they have no conflicts of interest.

Bio Data

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Appendix A

Participant Correspondence: Weekly Sentences

Week 1

1	The questionable crystal ball rested on a card table.
2	The web version lets you shift the route to your preferred street or highway or whatever.
3	For updating the news about this agency, you can sign up for getting the newsletter from here.
4	Are they a sinister force of the right, or of the government?
5	He displayed his Ten Commandments prominently above his bench.

Week 2

1	The intended singer pulled out just before musical rehearsals began.
2	His family has lived in the village for centuries.
3	What will you do then? Hunting season will be too late.
4	But the dispute has picked up steam since November 2011.
5	Doctors say there's no evidence to support widespread screening.

Week 3

1	Some of the really good designs on the market even have horizontal rod storage lockers.
2	The ancient village is famous for its abundant olive groves.
3	Then apps like this one will end up being worthy of any kind of news.
4	President Obama has rejected the Israeli call for a red line.
5	They certainly still have frustration after that experience yesterday.

Week 4

1	Soon you'll realize that you're the one who's compromised.
2	Her husband, obviously, has a very busy schedule.
3	But once in a while you step on it from one end to the other.
4	I hadn't sung for this music director before.
5	Certainly, you just described it here, the scene.

Week 5

1	In the on-call room where the pediatric residents rested was a bunk bed.
2	The massive blaze destroyed the firehouse and everything in it.
3	If it takes an extra minute to do it, that's fine, but if there were a race, I'd win.
4	In 1995, he had me sign a napkin for him.
5	The boys reflected on their two failed attempts and decided that a third try might be the charm.

Appendix B

Participant Correspondence: Questionnaires

Introduction Questionnaire

* Required

1. Email *

2. Upload your completed consent form here. *

   Files submitted:

3. How would you rate your ability to use technology? *

   Mark only one oval.

	1	2	3	4	5	6	
I cannot use technology well	◯	◯	◯	◯	◯	◯	I find it easy to use technology

4. Have you used apps for studying before? *

   Mark only one oval.

   ◯ Yes
   ◯ No

5. How useful is online learning for you? *

   Mark only one oval.

	1	2	3	4	5	6	
Not useful	◯	◯	◯	◯	◯	◯	Very useful

6. How motivated do you feel when you study online? *

   Mark only one oval.

	1	2	3	4	5	6	
Not motivated	◯	◯	◯	◯	◯	◯	Very motivated

7. Do you feel like you can study well independently? *

   Mark only one oval.

   ◯ Yes
   ◯ No

8. How would you rate your pronunciation now? *

   Mark only one oval.

	1	2	3	4	5	6	
Very poor	◯	◯	◯	◯	◯	◯	Very good

9. What is your main goal for pronunciation? *

   Mark only one oval.

   ◯ I want to pronounce individual words well
   ◯ I want to pronounce full sentences well
   ◯ I want to be understood by my peers
   ◯ I want to be understood by a native speaker
   ◯ I want to sound like a native speaker

10. How successful have you been in improving pronunciation through self-study? *

    Mark only one oval.

    ◯ I have not tried
    ◯ Not very successful
    ◯ Somewhat successful
    ◯ Successful
    ◯ Very successful

11. How much do you think you can you improve your pronunciation through self-study? *

    Mark only one oval.

	1	2	3	4	5	6	
No improvement	◯	◯	◯	◯	◯	◯	I can improve a lot

Appendix C

Weekly Questionnaire (Weeks 1-5)

Weekly Survey

Complete this after you have recorded your 5 sentences

The respondent's email (null) was recorded on submission of this form.

* Required

1. Email *

2. How would you rate your motivation to practice pronunciation this week? *

Mark only one oval.

	1	2	3	4	5	6	
Very low	◯	◯	◯	◯	◯	◯	Very high

3. How successful was your pronunciation practice this week? *

Mark only one oval.

	1	2	3	4	5	6	
Not successful at all	◯	◯	◯	◯	◯	◯	Very successful

4. How easy was the software to use this week? *

Mark only one oval.

	1	2	3	4	5	6	
Very difficult	◯	◯	◯	◯	◯	◯	Very easy

5. Do you have any other comments you would like to add? (For example, challenges with pronunciation, using the software, successes, etc.) Answers in English or Japanese are ok!

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Exit questionnaire

Exit Questionnaire

Thank you for completing the study! We really appreciate your effort and contribution.

Dan, Mark and Mike

The respondent's email (null) was recorded on submission of this form.

* Required

1. Email *

2. How would you rate your overall improvement in pronunciation? *

Mark only one oval.

	1	2	3	4	5	6	
No improvement	◯	◯	◯	◯	◯	◯	A lot of improvement

3. How successful was your pronunciation practice overall? *

Mark only one oval.

	1	2	3	4	5	6	
Not succesful at all	◯	◯	◯	◯	◯	◯	Very successful

4. How easy was the software to use overall? *

Mark only one oval.

	1	2	3	4	5	6	
Very difficult to use	◯	◯	◯	◯	◯	◯	Very easy to use

5. How much has your motivation changed after finishing this project? *

Mark only one oval.

- ◯ It had decreased a lot
- ◯ It has decreased a little
- ◯ It has not changed
- ◯ It has increased a little
- ◯ It has increased a lot

6. Would you like to continue practicing pronunciation using this software? *

Mark only one oval.

- ◯ Yes
- ◯ No

7. Would you like to add any other comments about your experience with this project?

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