

A Prototype System for Practicing English Speaking

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The Asian Conference on Education 2019
Official Conference Proceedings

Abstract

In this study, we developed a prototype system that helps students practice speaking English. When students speak English, they may have difficulty expressing their intentions in real time, even when they know the correct words and phrases. To think of the correct English terms smoothly, it is important that students use the language knowledge they have acquired. By using probable linguistic situations, our system attempts to check and provide information about the words and phrases learners can use. We conducted an experiment with 105 first-year Japanese university students to investigate the following research questions: (1) Does the prototype system run properly, provide questions, and save the log data as expected?; (2) When we check the learners' answers in real time, how many evaluation items and evaluation levels are appropriate?; and (3) How should we display the results of the evaluation to ensure visual comprehension? Concerning the first question, the results of the experiment show that the system runs properly and saves the log data. For the second question, the results suggest that a few evaluation items and a few evaluation levels are preferable for checking the learners' answers in real time. Results for the third question suggest that a color-coded table could help visually interpret the learners' results. In this table, English sentences grouping probable linguistic situations are classified according to the percentage of the correct answers, such as less than 50%, 50–80%, and more than 80%.

Keywords: language learning system, speaking practice, language use, CG characters

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Introduction

In response to the policy of the Ministry of Education, Culture, Sports, Science and Technology (2014a, 2014b), oral English proficiency in Japan must be improved. However, the results of our previous study indicate that many students feel that they are not good at listening/speaking in English (Kashiwagi et al., 2018).

When students speak English, they may find it difficult to express their intentions in real time, even when they know the correct words and phrases. In such cases, students are not making full use of their English language knowledge. To think of the correct English terms smoothly, it is important that students use the language knowledge they have acquired.

In our study, we proposed a method for creating questions that help students practice speaking English (Kashiwagi et al., 2019). By using probable linguistic situations with target words and phrases, our system attempts to support learners by checking and providing the information about which words and phrases learners can use. To produce rough probable situations in the system, the introduction of CG characters mentioned in the following chapter is considered to help learners become familiar with speaking English.

In this study, we develop a prototype system and conduct an experiment to investigate the following research questions:

- (1) Does the prototype system run properly, provide questions, and save the log data as expected?;
- (2) When we check the learners' answers in real time, how many evaluation items and evaluation levels are appropriate?;
- (3) How should we display the results of the evaluation for visual comprehension?

The prototype system is described in the following chapters, after which, the experiment, its results, and discussions are presented. Finally, we give our conclusions, and suggest additional studies for improving the system.

Prototype System

This chapter introduces CG characters, the structure of the prototype system, and an example use case for the system.

Introduction of CG Characters

To produce CG contents in the system, we use TVML (TV Program Making Language, TVML Home Page) Player X. TVML is a text-based scripting language that automatically generates television programs (Hayashi, 1999). TVML Player X is software used to read a script written in TVML (hereinafter called TVML script) and to automatically generate the program's video and audio. TVML Player X consists of AnimeViewer and SendScriptX. AnimeViewer is a viewer tool for generating and displaying a CG content from a TVML script, while SendScriptX is a tool for sending a TVML script to AnimeViewer.

TVML Player X not only generates static content that remains the same, it also generates dynamic content that changes according to external input, such as selecting a question on the teacher’s side. By using an API (Application Programming Interface) that is open to the public, application software that controls TVML Player X can be developed to realize these dynamic contents.

Kashiwagi, Kang, and Ohtsuki developed an application tool called “MINI BASIC” in the article “A study on a method for dynamic control and use of TVML contents.” In this tool, a template file in TVML format is prepared to create a TVML format question file. A TVML format question file is created in the tool by obtaining question sentence text data from the “Qdata file” mentioned later, and by putting the obtained question sentence data into the template file in TVML format. When a teacher selects a question, corresponding question sentence data is obtained, and a TVML format question file is automatically generated with the obtained question sentence data. The TVML format question file is then sent to the AnimeViewer and a CG content is produced.

Structure of the Prototype System

The structure of the prototype system is shown in Figure 1. The system consists of a question setting tool, “MINI BASIC” mentioned above, and AnimeViewer. In the question setting tool, questions are selected and sent to “MINIBASIC.” In “MINI BASIC,” a TVML format question file is generated with the question sentence data sent from the question setting tool. The generated question file in TVML format is sent to AnimeViewer and a CG content is produced. The results of the evaluation are saved in the question setting tool. To exchange data between the question setting tool and “MINI BASIC,” virtual communication ports are used here.

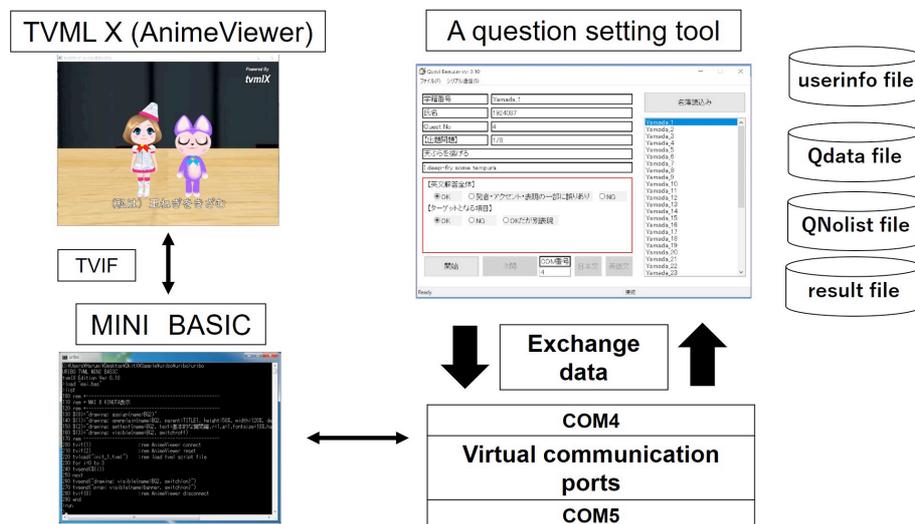


Figure 1: System overview

Related data are prepared in the following files: user information, such as the student name, student number, and a question set number for the corresponding student are incorporated in a CSV file named “userinfo file.” In the “Qdata file,” Japanese and English sentences are organized in situational categories, such as “Kitchen,” “Bath and Laundry,” and “Commuting.” In the “QNolist file,” sets of question numbers representing which Japanese/English sentences are provided as questions are grouped

together. The results of the evaluation of the answers for respective students are saved in the “result file.”

An Example Use of the System

An example use case for the system is described below in Figures 2 and 3.

1. When a teacher presses the button “Read in the user information” on the right top side of the screen in Figure 2 (1), the “userinfo file” opens, and user information is read in. Usernames are then displayed on the right side of the screen (2) in the tool.
2. When the teacher selects a username (3), corresponding question data are presented in the middle of the screen (4). For example, in Figure 2, the username “Yamada_1” is selected, and the information from the first question is displayed, that is, the Japanese sentence “*Tempura wo ageru*” and the English sentence “I deep-fry some tempura.”

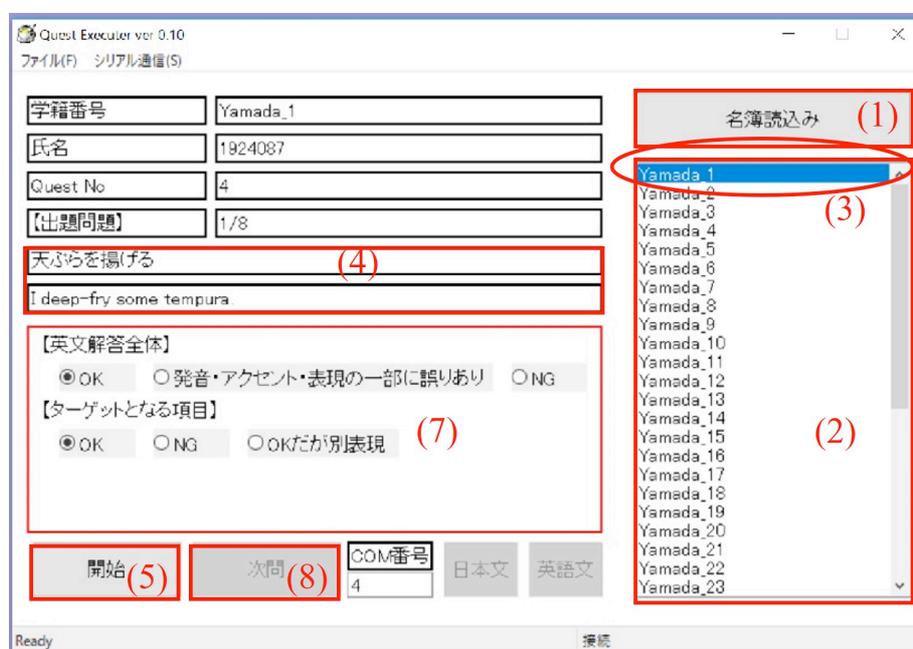


Figure 2: Example screen from the question setting tool

3. When the teacher presses the “Start” button (5) on the left bottom of the screen, related question data are sent to MINI BASIC and converted into a TVML file. The converted TVML file is then displayed on the AnimeViewer. In this example, CG characters appear on the screen of the AnimeViewer, as shown in Figure 3, and the learner is given instructions such as “Please translate the following Japanese sentence into English.” The Japanese sentence of the first question “*Tempura wo ageru*” in Japanese is then displayed on the AnimeViewer in Figure 3 (6). At the same time, a synthetic voice is generated based on the same Japanese sentence text data, and the synthetic voice is provided to the learner.
4. The learner orally translates the Japanese sentence into English.
5. The teacher evaluates the learner’s answer by checking the items shown in Figure 2 (7) and goes on to the next question by pressing the “Next” button in Figure 2 (8).
6. When the system finishes providing questions, the results after checking the answers are saved in the “result file.”



Figure 3: Example screen of AnimeViewer

Experiment

Participants

In the experiment, 105 first-year students who were learning English at a university in Japan took review quizzes. They translated the Japanese sentences into English, and their answers were checked and saved in the system.

Procedures

We first provided students with the Japanese and English sentences in advance for review quizzes. The Japanese and English sentences shown in Figure 4 are expressions related to “Kitchen” and “Bath and Laundry.” We instructed the students to practice speaking English sentences without looking at the text information. Next, using the prototype system, we gave them review quizzes one by one as shown in Figure 5. In this experiment, a doctoral course student checked the students’ answers by checking items on the screen of the system shown in Figure 2.

Concerning the review quizzes, 53 of the 105 students took pattern 1 of the review quiz, and the remaining 52 students took pattern 2. Similarly, 55 out of 105 students took pattern 3 of the review quiz, and the remaining 50 students took pattern 4. Some sentences were not shown to the students in advance. Unannounced sentences are highlighted in orange in Figure 5.

In the review quizzes, a CG character gave students instructions, such as “Please translate the following Japanese sentence into English.” The Japanese sentence of the first question was then displayed on the screen of the system, as shown in Figure 3. At

the same time, a synthetic voice was generated based on the same Japanese sentence data, and the synthetic voice was provided to the student.

Situation	English	Japanese
Kitchen	I deep-fry some tempura.	天ぷらを揚げる
	I grate daikon radish.	大根をすりおろす
	I tear some lettuce.	レタスをちぎる
	I cook thin Japanese noodles in boiling water.	そうめんをゆがく
	I heat frozen food in the microwave.	冷凍食品をレンジで温める
	I turn on the stove.	コンロの火をつける
	I turn down the stove.	コンロの火を弱める
	The flame goes out.	(コンロの)火が消える
Bath, Laundry	I get in the bathtub.	湯舟に入る
	I soak in the bathtub.	湯舟につかる
	I get out of the bathtub.	湯舟から出る
	I push down the body soap pump.	ボディソープのポンプを押す
	I air out the bathroom.	風呂場を換気する
	The laundry has really piled up.	洗濯物が山のようにたまってしまった
	I hang the laundry out to dry.	洗濯物を外に干す
	I fold the laundry.	洗濯物をたたむ
	I pull out a drawer.	引き出しを開ける
	I put the folded clothes away in the drawers.	たたんだ服をタンスにしまう

Figure 4: Japanese and English sentences provided to students in advance

Quiz pattern	English	Japanese	Number of participants
1	I deep-fry some tempura.	天ぷらを揚げる	53
	I tear some lettuce.	レタスをちぎる	
	I cook thin Japanese noodles in boiling water.	そうめんをゆがく	
	I chop the onions.	玉ねぎをきざむ	
	I scrub the bathtub with a brush.	ブラシで浴槽をこする	
2	I grate daikon radish.	大根をすりおろす	52
	I tear some lettuce.	レタスをちぎる	
	I heat frozen food in the microwave.	冷凍食品をレンジで温める	
	I hang the laundry out to dry.	洗濯物を外に干す	
	I grill the fish.	魚を焼く	
3	The flame goes out.	(コンロの)火が消える	55
	I soak in the bathtub.	湯舟につかる	
	I push down the body soap pump.	ボディソープのポンプを押す	
	I air out the bathroom.	風呂場を換気する	
	The laundry has really piled up.	洗濯物が山のようにたまってしまった	
	I pull out a drawer.	引き出しを開ける	
	I put out a towel.	タオルを出す	
4	The flame goes out.	(コンロの)火が消える	50
	I soak in the bathtub.	湯舟につかる	
	I push down the body soap pump.	ボディソープのポンプを押す	
	I air out the bathroom.	風呂場を換気する	
	The laundry has really piled up.	洗濯物が山のようにたまってしまった	
	I pull out a drawer.	引き出しを開ける	
	I lay out a bath mat.	バスマットを敷く	

Figure 5: Review quizzes

Results and Discussion

In this section, we discuss the research questions mentioned in the first chapter.

Operation Verification of the Prototype System

Concerning the first research question, we verified the operation of the prototype system. In the experiment, a doctoral course student was able to use the prototype system after listening to a brief explanation of how to use it. When he used the prototype system in the experiment, the system ran properly. The CG characters appeared on the screen of AnimeViewer without undue delay, provided students with questions, and saved the log data as expected. The percentage of correct answers in respective questions based on the log data are described later. The results of the experiment indicate that the prototype system runs properly and saves the log data.

Number of Evaluation Items and of Evaluation Levels

Concerning the second question, we prepared two evaluation items in the experiment, as shown in Figure 2. The first item was used to check whether the answer was correct as a whole sentence including vocabulary, grammar, and pronunciation. Regarding this item, we set three evaluation levels: “correct,” “some mistakes in the answer,” and “wrong.” When there were some mistakes in the answer, such as mistakes in the pronunciation of the word, vocabulary, and grammar, we evaluated it as “some mistakes in the answer.” Another item was used to check whether the target word or phrase was correct. Here, we prepared some transitive verbs and phrasal verbs as a target word or phrase in the English sentences. Regarding this item, we set three evaluation options, that is, “correct,” “wrong,” and, “correct, but another expression.”

In an interview, the doctoral student who used the system for evaluation said that a few evaluation items and a few evaluation levels in respective evaluation items were suitable numbers for checking answers in real time, and that they had difficulties evaluating students’ answers in real time if there were more than four or five evaluation levels. Also, we observed that two evaluation levels, such as “correct” and “wrong” would be preferable when evaluating target words or phrases in real time. These results suggest that a few evaluation items and a few evaluation levels are preferable to check the learners’ answers in real time.

Display of the Results of the Evaluation for Visual Comprehension

Concerning the third research question, we proposed the use of a color-coded table to help visually understand the learners’ results. In the table, English sentences are grouped according to probable linguistic situations, such as “Kitchen,” “Bath and Laundry,” “Commuting,” and so on. These sentences are then classified according to the accuracy rate of the questions; for example, the percentage of the correct answers in respective question is less than 50%, 50–80%, and more than 80%.

An example image of the color-coded table is shown in Figure 6, which shows the results of the percentage of correct answers in the experiment. We calculated the percentage of correct answers concerning the evaluation items to check whether the

answer was correct as a whole sentence. The percentage of correct answers was calculated only by using the results of the evaluation option of “correct,” excluding those of the other options, that is, the options of “some mistakes in the answer” and “wrong.”

In Figure 6, the sentences for which the percentage of the correct answers in the experiment was less than 50% are highlighted in red, those for which the percentage was 50–80% are highlighted in yellow, and those for which the percentage was more than 80% are highlighted in green. Some sentences that were not yet given in the review quizzes are not colored. Sentences marked with * represent those that were not shown to the students in advance.

Percentage of the correct answers of the questions related to respective situation			
Kitchen		Bath. Laundry	Commuting
I deep-fry some tempura.	89%	I get in the bathtub.	I walk on the sidewalk.
I grate daikon radish.	94%	I soak in the bathtub.	The light turns red.
I tear some lettuce.	32%	I get out of the bathtub.	The light starts to blink on and off.
I cook thin Japanese noodles in boiling water.	60%	I push down the body soap pump.	I go through the ticket gate.
I heat frozen food in the microwave.	85%	I air out the bathroom.	I go up the stairs.
I turn on the stove.		The laundry has really piled up.	I catch the train.
I turn down the stove.		I hang the laundry out to dry.	I get into the train.
The flame goes out.	85%	I fold the laundry.	The train arrives on time.
I chop the onions.*	62%	I pull out a drawer.	The train is a few minutes late.
I grill the fish.*	71%	I put the folded clothes away in the drawers.	I get off the train.
• • •		I scrub the bathtub with a brush.*	• • •
• • •		I put out a towel.*	• • •
• • •		I lay out a bath mat.*	• • •

Figure 6: The color-coded table

Most of the sentences in this table are green-colored, indicating that more than 80% of students gave correct answers. Meanwhile, the sentences with *, that is, sentences to which the students were not exposed in advance, are yellow or red colored, indicating that 50–80% or less than 50% of the students gave correct answers.

This indicates that as most of the sentences were shown to the students in advance in the experiment, they had enough time to prepare for the quizzes; therefore, they were able to give correct answers.

Concerning the sentences with *, we assume that most of the students were not able to give correct answers because they had never seen the sentences before.

Also, concerning the sentence “I tear some lettuce,” the percentage of correct answers is 32%. The percentage is low even though this is a sentence that was shown to students in advance. This is mainly because of pronunciation mistakes for the verb “tear.” A certain number of students mistakenly pronounced it as the noun “tear,” which means a drop of salty liquid that comes out of one’s eye when one is crying.

The results of the percentage of the correct answers of the target words or phrases in the questions were similar to the results in Figure 6.

Thus, the color-coded table makes it easy to understand students’ performance on respective sentences. These results suggest that a color-coded table could help visually interpret the learners’ results.

However, a limitation of the current study should be mentioned. This study was conducted mainly for verifying the system's operation. We need to prepare more sentences in probable linguistic situations toward full-scale operation. We should also implement the color-coded table in the system. In addition, we should prepare a similar color-coded table for individual students to support their practice.

Conclusion

In this study, we developed a prototype system to help students practice speaking English. When students speak English, they may find it difficult to express their intentions in real time, even when they know the correct words and phrases. To think of the correct English terms smoothly, it is important that they focus on the use of the language knowledge they have acquired.

By using probable linguistic situations with target words and phrases, our system attempts to check and provide information about the words and phrases learners can use. We conducted an experiment to investigate the following research questions: (1) Does the prototype system run properly, provide questions, and save the log data as expected?; (2) When we check the learners' answers in real time, how many evaluation items and evaluation levels are appropriate?; and (3) How should we display the results of the evaluation for visual comprehension?

In the experiment, we gave review quizzes to 105 first-year Japanese university students using the prototype system. They translated the Japanese sentences into English, and their answers were checked and saved in the system.

Concerning the first question, the results of the experiment show that the system runs properly and saves the log data. In response to the second question, the results suggest that a few evaluation items and a few evaluation levels are preferable for checking the learners' answers in real time. Results for the third question suggest that a color-coded table could help visually interpret the learners' results. In this table, English sentences grouping probable linguistic situations are classified according to the percentage of correct responses to questions, such as less than 50%, 50–80%, and more than 80%.

As a continuation of this study, we hope to prepare more sentences in probable linguistic situations toward full-scale operation. We also intend to implement the color-coded table as part of the system.

Acknowledgement

This work was supported by JSPS Grant-in-Aid for Scientific Research Number JP18K02822.

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