

Evaluation of an Improved Dictogloss System Oriented for Focus on Form

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Abstract: In this paper, we describe how to improve a Japanese language education environment for nonnative speakers (dictogloss system oriented for focus on form) and its evaluation. Our existing dictogloss system already has some functions supporting learners' self-study with dictogloss activities. However it has not been evaluated in practical situations. To adapt this system to real foreign language education scenes, we improved the system so that it accepts Roman alphabet input without *kana-kanji* conversion, which some learners actually prefer to input with *kana-kanji* conversion. We also developed a recording function of a learner's operations which enables us to analyze activities of actual learners. Preliminary evaluation of our improved dictogloss system with actual learners shows that our improved dictogloss system has better learning effect than a conventional dictation environment.

Keywords: Dictogloss, focus on form, second/foreign language education

1. Introduction

In this paper, we improve a Japanese language education environment for nonnative speakers (dictogloss system oriented for focus on form) and evaluate it. Dictogloss is a multiple skills collaborative activity proposed by Wajnryb (1990). In a dictogloss activity, a teacher reads a short text to learners and the learners try to reconstruct the content of the text and the learners discuss the original short text based on their own reconstructed text. This activity requires learners to exercise their own skills: listening, reading, writing, and speaking.

Learners cannot engage in this activity by themselves, because this activity is a collaborative learning method and it needs some learning partners and a teacher. We developed a prototype dictogloss system which supported learners' self-study by using intelligent agents as a learning partner (learner agent) and a teacher (teacher agent) (Kondo et al. 2012). The intelligent learner agent can suggest its own reconstructed text and discuss the original text with the learner. The intelligent teacher agent can summarize learners' errors.

The existing dictogloss system, however, only has minimum functions supporting learners' self-study. It has not been evaluated in practical situation. To adapt this system to real foreign language education scenes, this paper improves some functions. We also have this improved system evaluated by actual learners of the Japanese language.

2. Functions for Existing Dictogloss System

In this section, we explain the basic functions in the existing dictogloss system.

2.1 Function for Dictation Stage

This stage is a phase in which learners listen to a short text and take notes about the text. In this system, a learner plays a sound file of the short text recorded by native speakers. The learner can listen to this sound up to five times. At the first listening, the learner focuses on listening to the sound without taking any notes. After that, the learner listens to the sound with writing down important words and phrases for reconstructing the original text. The learner inputs his/her own reconstructed text to the system after he/she finishes listening.

2.2 Function for Reconstruction Stage

This stage is a phase in which learners discuss the original text based on their own reconstructed texts. In this stage, the learner agent generates its own reconstructed text which leads the learner to identify his/her errors. The agent engages in discussion with the learner about the reconstructed texts.

2.2.1 Reconstruction Function

The learner agent analyzes the learner's reconstructed text to recognize his/her errors based on the architecture of error detection proposed by Kondo et al. (2010). The learner agent generates its own reconstructed text based on a focus on form approach. Focus on form is a pedagogical approach in which a few grammatical forms are focused in a lesson. In addition, it has been pointed out that keywords in a dictogloss text should be given to learners before they listen to the text (Wajnryb 1990). Accordingly, Kondo et al. (2012) divide forms in a dictogloss text into four categories: (1) focused forms in a given dictogloss text, (2) keywords in the text, (3) FonF forms in the text, and (4) other forms. Among these forms focused forms should be given the highest priority, and keywords should receive the second priority. Forms not belonging to these two categories are further divided into two groups. This is because some forms are suitable for FonF instruction but others are not (Kondo et al. 2010). The learner agent generates different texts depending on which of the four categories the learner's errors involve. The reconstructed texts by the learner agent are generated so that the learner would pay more attention to focused forms and keywords. Table 1 summarizes how different texts are generated by the learner agent. See Kondo et al. (2012) for further discussion.

Table 1 : Answer generation policy for the learner agent.

Learner's answer	(a) Correct	(b) Incorrect
(1) Focused forms	(1a) Incorrect answer	(1b) Incorrect answer*
(2) Keywords	(2a) Incorrect answer	(2b) Correct answer
(3) FonF forms	(3a) Correct answer	(3b) Incorrect answer*
(4) Other forms	(4a) Correct answer	(4b) Correct answer

Incorrect answer* : The learner agent generates a different incorrect answer from the learner's.

2.2.2 Dialog Function

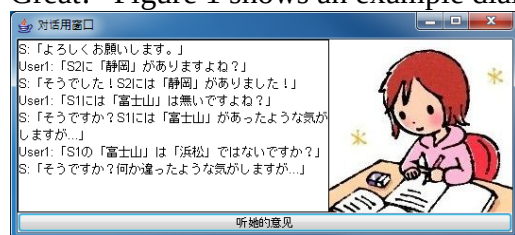
The learner makes the final reconstructed text through discussion with the learner agent. The learner compares his/her own reconstructed text with the agent's reconstructed text. The learner can ask the agent using the following prepared templates:

- (1) "Does *Sn* have *form*?"
- (2) "Does *Sn* not have *form*?"
- (3) "Does *form1* is replaced with *form2* in *Sn*?"

"*Sn*" stands for a sentence number, and "*form*" is replaced by a linguistic form of learner's choice. The learner agent asks the user questions about errors in the user's reconstructed text using the same templates when the agent recognizes user's errors. After finishing the discussion, the learner can submit the final reconstructed text to the system.

In answering questions from the learner, the learner agent replies based on the correct answer. Suppose that the learner asks "Does sentence 2 have *tabe-teiru* (eating)?" and that

the correct answer has *tabe-teiru*. Then the learner agent replies “It certainly has *tabe-teiru*. Great!” Figure 1 shows an example dialog.



S: Let's begin, shall we?
User 1: Does S2 have *Shizuoka*?
S: It certainly has *Shizuoka*. Great!
User 1: Does S1 not have *Mt.Fuji*?
S: Really? It sounds to me that S1 has *Mt.Fuji*.
User 1: Does *Mt.Fuji* is replaced with *Hamamatsu* in S1?

S: Really? Something might be wrong with it.

Figure 1. Example dialog.

2.3 Function for Analysis and Correction Stage

When the learner submits the final reconstructed text, the teacher agent shows the original text and a summary of the learner's errors. This system can recognize the following kinds of errors:

- (1) Erroneous omission: Learners incorrectly omit necessary linguistic forms.
- (2) Erroneous addition: Learners incorrectly add unnecessary linguistic forms.
- (3) Confusion of different linguistic forms: Learners mistake a linguistic form for another form.
- (4) Incorrect word order

In the summary, the learner's errors in the reconstructed text and the corresponding arts in the original text are highlighted in different colors according to the types of errors. The summary emphasizes detailed information about focused forms and errors involving them. Other minor errors are also provided but they are hidden from the learner's view unless he/she requests them.

3. Improvement and Evaluation of the Dictogloss System

3.1 Expansion to input in Roman alphabet without kana-kanji conversion

For actual Japanese language learners, it is difficult to input reconstructed text and/or questions to the learner agent using *kana-kanji* conversion. According to interviews of actual Japanese language learners, a Roman alphabet input without *kana-kanji* conversion is much easier than a *kana-kanji* input method, especially for beginner level learners.

To realize the learner agent and the teacher agent, the dictogloss system needs to identify the words in the learner's reconstructed text and/or learner's questions to the learner agent. Although the words inputted without *kana-kanji* conversion are ambiguous in identifying the intended words, our system can guess the intended words based on the system knowledge about the original text. This is because the system stores semantic representation and surface forms of the original text.

3.2 Recording Function of Learner's Answers and Operations

Our existing dictogloss system has minimum functions supporting learners' self-study, but it isn't designed for practical situations. To provide a more practical dictogloss system, we should record not only learners' answers but also the history of their operations. Thus we added a function gathering learners' answers and operations and transmitting them to a logging server.

4. Evaluation of the Improved Dictogloss System

4.1 Purpose and Method

The purpose of this preliminary evaluation is to evaluate whether our improved dictogloss system has better learning effect than a conventional dictation environment or not.

The subjects of this evaluation are 4 university students. These subjects are nonnative Japanese speakers who are learning the Japanese language. In this evaluation, each subject studies particular Japanese linguistic forms both with our improved dictogloss system and in a conventional dictation environment. In our prepared conventional dictation environment, the subjects play a sound of a short text up to 5 times using Windows Media Player and write down its content using a simple text editor. After answering the problem, the original text is provided in a written text and the learner confirms his/her errors.

2 of the subjects were categorized into a beginner level group and the other 2 subjects to a middle level group. The subjects were shown a Japanese textbook and self-reported their level according to how difficult they think the textbook was. The decision on the categorization was based on the learners' self-evaluation and comments from a Japanese teacher who teaches the subjects. We prepared 6 beginner level problems and 6 middle level problems. In this evaluation, 2 subjects (1 beginner level subject and 1 middle level subject) worked on 3 problems at their level using our system and then worked on the other 3 problems in the dictation environment. The other 2 subjects worked on the problems in the reverse order. When each problem was finished, the subjects self-evaluated their errors and/or their lack of knowledge they found though answering the problems.

We expected that our improved dictogloss system had better learning effect than the conventional dictation environment, based on the following hypotheses:

- (1) Through the discussion with the learner agent of our system, a learner using our system can reconstruct the original text more correctly than using the conventional dictation environment.
- (2) Feedbacks from the teacher agent of our system lead a learner to focus on his/her errors. Especially in learning general usages of grammatical forms, our system has higher effect.
- (3) The feedbacks which highlight focused forms lead a learner to focus on his/her errors in those forms.

4.2 Results

Our hypothesis (1) was confirmed by the result in Table 2. Table 2 shows the correctness of the subjects' reconstructed texts using our system and using the dictation environment. The correctness is measured by correct morpheme rates (the number of all morphemes in the 6 problems was divided by the number of correct morphemes). The correctness using our system is 93.2 %. This percentage is 11.7 percentage points higher than the average using the dictation environment, which is 81.5 %.

Table 2: The correctness of the learner's reconstructed text.

	Our Dictogloss System			Dictation environment		
	total morphemes	total correct morphemes	correct morphemes rate	total morphemes	total correct morphemes	correct morphemes rate
Beginner group	138	131	94.9%	118	104	88.1%
Middle group	98	89	90.8%	98	72	73.5%
total	236	220	93.2%	216	176	81.5%

Our hypothesis (2) was confirmed by the result in Table 2. Table 2 shows the summary of the subjects' self-evaluation after each problem. We categorized their self-evaluation into the following categories:

- (a) The evaluation refers to general usages of grammatical forms.
- (b) The evaluation refers to whether the subject can reconstruct particular forms without referring to their usages.

Table 3 shows that the self-evaluation with our system involved more references to general usages of the grammatical forms in the problems. 5 cases in category (a) were written when the subjects used our system. In contrast, only 1 case in category (a) was written when the subjects used the dictation environment. In category (b), table 3 does not show much difference between our system

and the dictation environment. Additionally, we analyzed the 5 cases in category (a) with our system with respect to whether the teacher agent gave the subjects feedbacks related to general usages of the grammatical forms. In 4 of the 5 cases (80.0 %), the teacher agent gave the subjects such feedbacks. It indicates that the teacher agent's support is effective in teaching knowledge of general usages of the grammatical forms in targeted languages.

Table 3: Categorized learners' self-evaluations.

	Our Dictogloss system		Dictation environment	
	Category (a)	Category (b)	Category (a)	Category (b)
Beginner group	3	4	1	3
Middle group	2	2	0	3
Total	5	6	1	6

Our hypothesis 3 was confirmed by the result of Table 4. The Table 4 shows the rates in which focused grammatical forms were mentioned in the subjects' self-evaluation when the subjects used our system. The focused grammatical forms were mentioned in 4 of the 5 cases (80.0 %) in category (a). The result of category (a) confirmed that the feedbacks of the teacher agent are effective in leading learners to focus on their errors about focused linguistic forms.

Table 4: Focused forms and keywords indicated in subjects' self-evaluations.

	Total of (a)	Focused targeted forms in (a)	Rate of focused forms in (a)
Beginner group	3	2	66.7%
Middle group	2	2	100.0%
total	5	4	80.0%

5. Conclusions

In this paper, we have improved a Japanese language education environment for nonnative speakers (dictogloss system oriented for focus on form) and evaluated it. The Roman alphabet input method in our improved system enables actual learners, especially beginners, to easily input their reconstructed text and questions to the learner agent. The recording function of actual learner's operations enables us to analyze their activities. The preliminary evaluation with actual learners examined our hypotheses (1) (2) and (3), which confirmed that our improved dictogloss system has better learning effect than a conventional dictation environment.

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