



Text and Instruction Necessary for the Facilitation of EFL Reader's Predictive Inference Generation

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ABSTRACT

Inference generation is necessary for reading to understand stories. However, it may be difficult for English as a Foreign Language (EFL) readers to generate inferences owing to their limited allocation of cognitive resources primarily used in lower-level processing such as lexical and syntactical analysis. Predictive inference, which facilitates readers' context processing and construction of a situational model, can be challenging for EFL readers to produce during reading. This study focuses on textual conditions and teacher's task instructions to suggest the appropriate text choices and instructions to help EFL readers produce predictive inferences. Two story versions (High-predictability Target vs Control) and two different instructions (Predict the end of the story vs Memorize the characters' names) were compared using recall rates. The findings indicated that combining a high-predictability target story with instructions to predict the end of the story would be the most effective pair for predictive inference.

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1. Introduction

1.1 Text Choice and Reading Instruction

Teachers often agonize over choosing appropriate texts for learners to read during lessons. Lexical and syntactic difficulties, the balance between explanatory and narrative stories, the freshness of topics, and the learner's proficiency must be considered to make the best choice. However, ensuring that the stories contain all the elements that promote the reader's inference generation is crucial. Readers decode words and sentences at lower-level processing and link the focal meaning with their prior or world knowledge at higher-level processing (van Dijk & Kintsch, 1983). Therefore, successful higher-level processing, namely, the construction of situation models, must be the reading goal (Kintsch, 1998; van den Broek and Gustafson, 1999). Situational models are the understanding of the entire situation, as described by the text, in which the textual information and the reader's prior world knowledge are integrated (van Dijk & Kintsch, 1983). Inference generation is crucial in situation modelling (Graesser et al., 1994).

Different types of inferences (Table 1) (Graesser et al., 1994). According to their proposal, the first six are required inferences that occur automatically.

Table 1: *The Classification of Knowledge-Based Inference*

Type of Inference	Brief Explanation
Class 1: Referential	A word or phrase is referentially tied to a previous element or constituent in the text (explicit or inferred).
Class 2: Case Structure Role Assignment	An explicit noun phrase is assigned to a particular case structure role (agent, recipient, object, location, or time).
Class 3: Causal Antecedent	A causal chain (bridge) between the current explicit action, event, or state and the previous passage's context.
Class 4: Superordinate Goal	A goal that motivates an agent's intentional action.
Class 5: Thematic	The main point or moral of the text.
Class 6: Character Emotional Reaction	An emotion experienced by a character caused by or in response to an event or action.
Class 7: Causal Consequence	A forecasted causal chain, including physical events and new plans of agents. These inferences do not include the character emotions of Class 6.
Class 8: Instantiation of Noun Category	A subcategory or a particular exemplar that instantiates an explicit noun or an implicit case role required by the verb.
Class 9: Instrument	An object, part of the body, or resource used by an agent to execute an intentional action.
Class 10: Subordinate Goal Action	A goal, plan, or action that specifies how an agent's action is achieved.
Class 11: State	An ongoing state from the textual time frame that is causally unrelated to the story plot. The states include an agent's traits, knowledge, belief, objects and concepts' properties, and entities' spatial location.
Class 12: Reader Emotion	An emotion that the reader experiences when reading a text.
Class 13: Author Intention	The author's attitude or motive in writing.

Note. The author revised the list based on Graesser et al. (1994: 375).

The inferences in the upper class (Classes 1 to 6) are mainly related to backward inferences, such as inferences to connect the previous and the focal statements causally. This backward inference helps readers construct consistency during reading. In contrast, forward inference, such as Class 7 (forecasted causal chain), helps readers enrich contextual comprehension. Making predictions would lead to an active engagement with the text (Allbritton, 2004), facilitate readers to monitor their understanding (Palinscar & Brown, 1984), and help them increase their cognitive interests (Campion et al., 2009). Therefore, there is necessary to promote the reader's forward inference generation and research the texts and instructions to help readers facilitate predictive inference generation.

Predictive inference is the inference about the likely outcomes of events (Weingartner et al., 2003) and characters' behaviours during reading. For instance, learners read a passage like, "Brad wanted to find something special for her, but he had lost his job three months ago and did not have any money to get her anything nice." The next scene reads, "Seeing no salespeople or customers around, he quietly made his way to the counter." Thus, the readers would predict a likely ending of the story, which is not written: "He would steal the ring." Although predictive influence generation regarding text condition and instruction has been researched in the context of L1 (Allbritton, 2004; Cranford & Moss, 2019; Klin et al., 1999), few studies in the context of L2 have been conducted to clarify the texts that would promote English as a Foreign Language (EFL) readers' predictive inference generation.

In addition to the text choice, reading goals, set through teachers' instructions, play an essential role in inference generation. Some studies (Narvaez et al., 1999; van den Broek et al., 2001) have revealed that readers would produce more predictive inferences when the reading goal is "studying" rather than "entertainment." Thus, teachers' instruction impacts readers' reading processes. Magliano et al. (1999) found

that the frequency of predictive inferences depended on the teachers' instructions to the readers, such as instructions for understanding, explaining, and predicting.

1.2 Text-Related Factors of Predictive Inference Generation

As mentioned earlier, the text condition is essential in generating predictive inferences. Cranford and Moss (2019) studied text-related factors that could influence predictive inference generation. They compared response times toward a target probe word, which expresses the summary of the likely outcome in one word, such as “steal” for Brad’s story mentioned earlier. There are four-text versions in their study: High-Predictability Target (HPT), High-Predictability Alternative (HPA), Mutual Predictability (MP), and Control Version (CO). They concluded that generating predictive inferences could be challenging when story development has multiple possible outcomes. Their findings indicated that the specific texts affect predictive inference generation: High-Predictability Target would promote predictive inference generation.

On the other hand, High-Predictability Alternative version would suppress predictive inference generation. Regarding L2 research, Hosoda (2015) examined the effects of two types of text familiarity—*inference ideas* and *text content*—on causal inference generation in expository texts. His findings revealed the conditions in which EFL readers build causal inferences during expository reading. Nevertheless, few studies have examined the influence of narrative text differences on L2 text reading.

1.3 Teachers' Instruction about Predictive Inference Generation

Although teachers instruct EFL readers to set a reading goal and promote predictive inference generation, they often instruct readers to “read the text and answer the comprehension question” or “read the text as fast as you can.” As instructed by *The Course of Study* earlier, teachers must provide students with proper reading goals, and the goal setting may be for searching for specific information. *The Course of Study* states that students should be able to read the necessary information and grasp the writer’s intentions on everyday topics if they seek the teacher’s support to understand words and sentences and find necessary information (Ministry of Education, Culture, Sports, Science and Technology: MEXT, 2018: 24), such as the information needed to capture the outline or the main point. However, there are no instructions for teachers to facilitate inference generation in *The Course of Study*. Therefore, teachers must train students to find the necessary information in an explanatory text.

Allbritton (2004) studied the reader’s strategy for generating predictive inferences through experimental tasks. The experiments prompted strategies according to the tasks rather than explicit instruction and clarified the role of strategy in predictive inference generation. One experiment encouraged the participants to predict the next event/occurrence. Another experiment required the participants to pay attention to the character’s identities by recognizing their names. These tasks led to different results in inference generation. The strategy to predict the next event/occurrence produced faster and more accurate vocabulary judgments in inference conditions. However, constructing story consistency by focusing on characters’ names did not promote predictive inference generation. The findings suggested that reading goals or purposes affect predictive inference generation during reading.

1.4 Predictive Inference Generation and Recall Rates

A study involving Japanese EFL learners (Ushiro et al., 2012) reported no evidence that predictive inferences could be generated online. They concluded that EFL learners could encode predictive inferences into mental representations through the results of the recalled production rate. If readers could encode the inferred information in their mental representations, the recall rate would be superior to those who could not encode it. These offline measurements treated the amount of inferred information that learners could encode in mental representation as the token of situation model construction. Muramoto (2000) claimed that constructing situation models could dictate the number of inferences learners could generate. Furthermore, Kimura (2011) claimed that once a reader constructed a situation model representation for a given text, he or she could remember the information better. The present study investigated whether predictive inferences could be generated and maintained (encoded) in long-term memory from the results of recall rates.

According to Fincher-Kiefer (1993, 1996), bridging inference, classified within backward inference, contributes to propositional text-base construction, and predictive inference contributes to situational model construction. This proposal suggested that recall rate, which represents the results of situational model construction in the reader’s long-term memory, would affect the results of predictive inference generation; however, the influence of other types of inference generation cannot be ruled out. In this study, text difference and task instruction difference are made to promote predictive inference generation, and the results are measured through recall measurement for situational model construction.

1.5 The Purpose of This Study

In this study, the author focuses on the influence of text condition and reading task instruction on learners' predictive inference generation. Learners sometimes do not follow the instructions even if the teachers provided them beforehand. Therefore, the author would apply a task that would make the participants follow the instructions. The inference generation depends on the goal and purpose of reading (Allbritton, 2004). Fincher-Kiefer (1993, 1996) revealed that predictive inference is encoded within a situational model, whereas bridging inference is encoded on a propositional text basis. The author employs an offline measurement, i.e., cued recall task. The present experiments would clarify the consistent results of readers' inference generation encoding, using the experimental material with different degrees of ease of predictive inference generation. However, since the author would not be able to measure the situation of inference generation during reading because the learners are required to complete the task without stopping, the author applied offline measurement to trace their reading and encoding of inferences. The author explored whether the teacher's promotion task instruction encouraged EFL learners to encode the predictive inferences in long-term memory. Under the assumption that the predictive inference of the student was coded into a mental representation, the regeneration rate would be higher. Thus, the research questions (RQs) are as follows:

RQ1. Do text conditions affect the EFL reader's coding of predictive inference?

RQ2. Do task instructions affect the EFL reader's coding of predictive inference?

2. Method

2.1 Participants

The experiment involved 78 Japanese undergraduate students from the same Japanese university. They had majors involving language and culture courses, and their English ability ranked at the intermediate level (CEFR A2). All the participants were divided into two homogeneous groups based on the scores below:

Reading and Listening Test. The basic statistics of the two groups of the TOEIC® IP test, which consists of reading and listening sections, were as follows: Group A: $M = 391.58$, $SD = 53.90$ and Group B: $M = 393.03$, $SD = 52.32$. Analysis variance was performed to verify the homogeneity of the two groups. The result was $F(1, 76) = 1.86$, $p = 0.36$ (ns); In addition to this, only the reading score (Group A: $M = 163.33$, $SD = 36.25$ and Group B: $M = 161.11$, $SD = 30.85$) was analyzed by variance ($F(1, 76) = 1.76$, $p = 0.17$ (ns)) as the present study focuses on reading. Thus, a significant difference was not obtained. Therefore, the two groups were considered homogenous.

Vocabulary Test. In addition to the reading proficiency, the participants' vocabulary level was tested using "The R vocabulary test" (Oba, 2016), which was invented based on the "Japan Association of College English Teachers (JACET) 8000" (University English Education Society, 2016). The result showed that their vocabulary level was Group A: $M = 36.64$, $SD = 3.45$ and Group B: $M = 33.17$, $SD = 4.32$. The result by analysis variance was $F(1, 76) = 1.75$, $p = 0.26$ (ns). Thus, a significant difference was not obtained. Therefore, the two groups were considered homogenous in the aspect of vocabulary as well as reading proficiency.

2.2 Materials

This study cited twelve English stories (two versions $\times$ 6) from Cranford and Moss (2019). The two-story versions cited by Cranford and Moss had different characteristics. The author cited two versions out of the available four versions because they wanted to compare the HPT version and the control version—the HPT version is the teacher's revised version for the readers to generate predictive inference easily, and the control version is the regular authorized textbook used in Japan. The targeted prediction could easily occur in the HPT version because there is no contradiction in storylines. In contrast, the control version worked as filler stories where the targeted or alternative inferences did not occur and had no likelihood of occurring due to the passage (see Appendix). For instance, both versions start with the same scene, "Brad was wandering through a department store, looking for a present for his wife's birthday." However, the HPT version says, "His wife would be happy with the ring, but there was no way he could pay for it," the control version says, "Knowing his wife would be happy with the ring, he wanted to learn more about it. He could almost see the price tag through the glass from where he was standing." Finally, the last sentence says, "He quietly made his way closer to the counter." A probe word—"STEAL"—is used as a cue of free recall.

2.3 Procedure

Each participant received a booklet with twelve English sentences (two story versions [HPT and Control] $\times$ 6), which they had to read at their own pace. The order of the stories was counterbalanced. The participants were requested to read the stories, keeping in mind the task instruction on the booklet's first page. The participants are given the following task instructions:

- Group A: Predict the end of the story (PES)—The participants had to predict the end and write it

down in Japanese.

- Group B: Memorize the names of characters (MNC)—The participants had to memorize the characters' names and write them down.

However, the participants needed to be informed about the cued recall task. After reading all the passages, they received another booklet where they had to recall each passage. Using the cue, they were instructed to recall and write, in Japanese, as much as they could about the passages. The booklet provided a target probe word (e.g., STEAL) for each passage. The participants needed a time limit to complete this task. The author had two reasons for applying the recall task in the experiment. First, the examination process could not be interrupted as the participants were required to complete their respective tasks in one go. Thus, the situation model construction was assessed using an offline measure. Second, the participants were required to effectively utilize the cue (the target probe word) and perform better in the cued recall task.

2.4 Data Analysis

All the texts were divided into idea units (IU) based on Ikeno (1996). Table 2 presents the descriptive statistics of the texts. Two raters carried out this division with the agreement of division as $\alpha = 0.76$ (substantial). Any disagreements were resolved through discussion. The two raters randomly selected and independently scored 30% of the cued recall data. The agreement between the two raters was $\alpha = 0.72$ (substantial). Disagreements were resolved through discussion, and one of the raters individually scored the remaining data. The recall rates between HPT and control were analyzed and compared with a liner effect-mixed (LME) with SPSS advanced version 28.0.1.

Table 2: Descriptive Statistics of the Passages

Story Version	IU	AWC	FREE	FKGL
High-predictability target version	19.25	99.75	72.83	6.74
Control version	22.00	102.75	72.76	6.89

Notes. IU is the average number of IU over twelve stories; AWC is the Average Word Count (the average number of words over twelve stories); FRE/FKGL is Flesch Reading Ease/Flesch-Kincaid Grade Level, which is the average score of the twelve stories.

4. Results and Discussion

Table 3 presents the descriptive statistics of the recall rate. The highest recall rate was for predicting the end of the story with the HPT version ($M = 0.314$, $SD = 0.082$), and the lowest was for memorizing the characters' names with the control version ($M = 0.132$, $SD = 0.073$). Figure 1 presents the interaction between the story versions and the task conditions. A significant interaction was obtained ($F(1, 74) = 4.24$, $p = 0.044$ ($p < 0.05$), $\eta^2 = 0.06$ (medium)). The main effect of the text condition obtained a significant difference ($F(1, 76) = 27.84$, $p < 0.001$, and the condition is $F(1, 76) = 8.10$, $p = 0.006$ ($p < 0.01$)).

Table 3: Descriptive Statistics of the Recall Rate

Condition	Story Version	<i>n</i>	<i>M</i>	<i>SD</i>
PES (Prediction)	High-Predictability Target	20	0.31	0.08
	Control	20	0.17	0.06
	Total	40	0.24	0.10
MNC (Memorization)	High-Predictability Target	19	0.19	0.08
	Control	19	0.13	0.07
	Total	38	0.16	0.08
Total		78	0.20	0.10

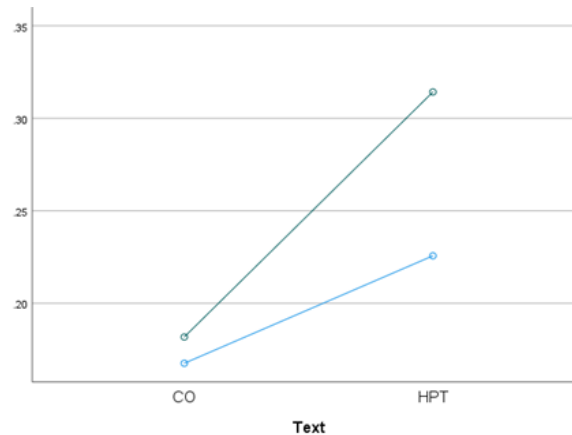


Figure 1: Interaction between Story Version and Task Conditions

Table 4: Estimate for Recall Rate between Story Version and Task Condition

Story Version	Task Condition Estimate		SE	95% CI	
				Lower	Upper
HPT	PES	0.31	0.02	0.28	0.35
	MNC	0.23	0.02	0.19	0.27
Control	PES	0.18	0.02	0.15	0.22
	MNC	0.17	0.02	0.13	0.20

Table 4 presents the recall rate estimates for the story versions and the task conditions. Table 5 presents the comparison between the story versions and the task conditions. The results indicated that HPT witnessed a significant difference despite the task condition.

Table 5: Comparison between Conditions and Story Versions

Task Condition	Story (I)	Story (J)	dif. (I-J)	SE	p	95% CI	
						Lower	Upper
PES	HPT	Control	0.13*	0.02	< 0.001	0.09	0.18
MNC	HPT	Control	0.06*	0.03	0.035	0.01	0.11

3.1 Qualitative Analysis Based on the Participants' Written Comments

Some of the participants' written protocols in the free recall are presented in Table 6. Although the participants' comments were written in Japanese, the author has translated them into English. The following examples are from one of the HPT stories about baseball. The outcome, "The pitcher allowed the batter to hit a home run," was a target prediction led by the previous sentence, "A ball flies through the air." Despite the instructional differences between the PES and MNC, certain appropriate inferences and inappropriate guessing comments were produced.

Table 6: Examples of Participant's Written Comments

Appropriate inferences	Inappropriate guesses
- The opposite team was strong. - The player was in bad shape. - A home run hit the pitcher because the ball flew through the air. - The pitcher who hit a home run must have felt disgusted. - The ball flying may be a goodbye home run.	- Outfielder? The person who is out of the field? - Flew through the air? Was the ball in the air?

We found that some readers appropriately predicted the outcome from the preceding context, while others often made “guesses.” Notably, inappropriate guesses occurred because of a lack of background knowledge and less familiarity with the story topic. For example, in the baseball story, “outfielder” is a position easily understood by people familiar with baseball. However, the participants who commented, “Outfielder? The person who was out of the field?” were majorly female students or those students who had no interest in baseball. The author regards baseball as a popular sport where the students can easily understand the names of the positions. However, the author found that some students did not understand baseball’s “outfielder” position. It suggests that teachers must be careful about text familiarity when choosing a story for students.

4. Discussion

4.1 Answer to Research Question 1 – Do text conditions affect the EFL readers’ coding of predictive inference?

The results indicated that text conditions would affect the EFL readers’ coding of predictive inference. This result is similar to that of Nahatame (2010), which revealed certain text conditions under which readers can benefit from making predictions. In the current study, the HPT version encouraged readers to generate inferences, comparing them with the control version. The HPT story was described in a manner that connected specific sentences or clauses, whereby the first case was the proper cause and the reason for the second case. This kind of story development would help EFL readers generate predictive inferences. This finding indicates that the enumeration of facts, like the control version’s story, would not promote inference generation. As the demand for practical English education increases, explanatory stories are becoming dominant rather than narrative stories. It inevitably leads to more enumeration of facts. Teachers teach the readers to read each fact individually to ensure they read and answer the fact-checking questions correctly. In addition, the author suspects that readers are being taught to read in a manner that would assist in memorizing specific information that appears in the story, such as the characters’ names and characteristics.

4.2 Answer to Research Question 2 – Do task instructions affect the EFL readers’ coding of predictive inference?

The results indicate that task instructions affect the EFL readers’ coding of predictive inference. In this study, the task instruction of PES encouraged predictive inference generation, especially in HPT. However, the task instruction of MNC suppressed predictive inference generation. This conclusion supports the results of Allbritton (2004), in which learners were encouraged to predict the next action/event. It revealed that the task was used to activate reading strategies that would enhance the production of predictive inferences and encourage the readers to focus on the character identities by memorizing and recalling their names.

The findings suggest that teachers’ instructions must be sufficient for EFL readers to produce predictive inferences, such as finding facts to answer fact-checking questions. Contrary to the expectation from English education in Japan, MEXT-approved English textbooks are dominated by explanatory texts that list facts and require students to find the correct description and answers quickly and accurately.

5. Conclusion and Implications

Readers in this study were encouraged to predict using the task instruction, which induces reading strategies to maximize predictive inference generation, especially in the HPT version, where the story development progresses in due course. The combination of the HPT stories and the teacher’s instruction to promote predictive inference generation produces better results than individual factors, such as only text or instruction conditions.

As mentioned earlier, making inferences may significantly contribute to the construction of coherence. Coherence building would strengthen the memory network, which will improve recall. In the daily reading instructions, the study suggests that teachers must instruct students to read a story with the expectation of a specific ending. In addition, the study stresses the importance of balancing narrative and expository texts in reading materials. The “English” subject in Japan, “English Communication,” is overwhelmingly dominated by expository texts and less concerned with narrative texts. However, this study found that regular textbooks (control version) did not encourage readers to generate predictive inferences.

Moreover, a Common Center Test for university entrance examination in Japan expects learners to deal with several texts effectively. The overall word count in the 2022 test was 6,066, an increase of more than 500 words from the 2021 test. Especially after long text questions, the number of words in each story reached 1,000 words, requiring the ability to read quickly and accurately. Teachers’ instruction must be speed-reading instructions to find the necessary facts and memorize specific information to answer the questions to help students with long-form stories. The study implied that the appropriate texts and instructions must cultivate learners’ abilities to construct situation models in reading.

Finally, the author summarizes the critical factors for making the best textbook choices and the necessary actions teachers must take in Table 7.

Table 7: Essential Factors for Best Textbook Choices

Factors	To do	Reasons
Vocabulary difficulties	Oba RLG vocabulary test	The test result suggests readers' vocabulary proficiency level based on JACET 8000.
Syntactical difficulties	FRE and FKGL	The scores of FRE and FKGL suggest the syntactic complexity of the story.
Topic familiarity	Questionnaire	Fresh topics are necessary; however, the questionnaire results would indicate the number of students familiar with the topic.
Ease of inference generation	Try to read from the reader's point of view. Check whether the sentences are a list of facts or make readers think between the lines or about the outcome/end.	Teachers need to revise the original text and provide inferential questions so that readers can produce more inferences (e.g., Why do you think that the character said such a thing? /What will happen next?).

Textbooks for new students must be selected before their enrollment. Therefore, based on the English proficiency of the currently registered students, teachers can predict and prepare appropriate textbooks for the new students. The author hopes that the factors indicated in the study and the suggested actions for the teachers would assist teachers in selecting the best textbook for EFL readers.

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Appendix

Sample of Text between High-predictability Target and Control Version

Story Version		Probe word
High-Predictability Target	Brad was wandering through a department store, looking for a present for his wife's birthday. He wanted to find something special for her, but he lost his job three months ago and didn't have any money to get her anything nice. In the jewellery department, he saw a beautiful ruby ring sitting on a display on the counter. He looked around to make sure no salespeople were watching. His wife would be happy with the ring, but there was no way he could pay for it. He had to have it. Seeing no salespeople or customers around, he quietly made his way closer to the counter.	STEAL
Control	Brad was wandering through a department store, looking for a present for his wife's birthday. Her birthday was months away, and he didn't have any money at the moment, but he had free time that day to start looking. In the jewellery department, he saw a beautiful ruby ring sitting on a display on the counter. He couldn't find a salesperson. Knowing his wife would be happy with the ring; he wanted to find out more about it. He could almost see the price tag through the glass from where he was standing. He quietly made his way closer to the counter.	