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The Effects of Affective Input Enhancement on Second Language Development in Japanese University Students

Ren Oyama

Ibaraki University, Japan

The present study compares the effects of two types of instruction on text comprehension and the learning of the form, meaning, and grammar of English nouns and verbs in a text: affective input enhancement (Affective IE), which enhances the affective processing of the topic of a second language (L2) text before it is read, without focusing on the linguistic aspects of the text ($n = 40$); and conceptual input enhancement (Conceptual IE), which enhances the conceptual processing of content words in an L2 text before it is read ($n = 43$). The results showed that (1) the Affective IE group evaluated the text topic more positively than the Conceptual IE group, (2) the Affective IE group outperformed the Conceptual IE group in the free-recall task as an index of text comprehension, (3) the Conceptual IE group outperformed the Affective IE group in the learning of the meaning of nouns in the text, and (4) the Affective IE and Conceptual IE groups were equally effective in facilitating the learning of the noun forms and the form, meaning, and grammar of verbs in the text. These findings suggest that Affective IE facilitates text comprehension and L2 learning.

Keywords: **affective input enhancement, MOGUL, input processing, text comprehension, L2 development**

Introduction

Researchers in the field of instructed second language acquisition (SLA) (e.g., Doughty & Williams, 1998) have investigated the optimal environment and effective instruction for facilitating learners' acquisition of the target language, focusing on their cognitive processes and the internal or external factors influencing these processes. The first cognitive process in SLA is input processing. This is the process that is responsible for mapping meaning onto the linguistic form of L2 input. Processing L2 input for meaning, or comprehending L2 input, is important in SLA primarily because only processed or comprehended L2 input comprise the data necessary for constructing a mental representation of L2 grammar (VanPatten, 1996).

Multiple variables are assumed to influence input processing, such as first language (e.g., VanPatten, 1996), typographical salience (e.g., Sharwood Smith, 1991), and affect (e.g., Krashen, 1981; Truscott & Sharwood Smith, 2011). Affect or emotion, which is the focus of the present study, has attracted the attention of researchers in bilingualism and SLA since the 1990s (e.g., Dewaele & Pavlenko, 2002; Schumann, 1997). This trend in SLA research is called the affective turn (Pavlenko, 2013). Four decades ago, Krashen (1981), regarding the role of affect in SLA, posited the affective filter hypothesis that negative affect (e.g., high student anxiety and low student self-esteem) could inhibit input processing, delaying SLA. Language learners and teachers intuitively perceive the hypothesis as valid, but it lacks explanation in light of SLA theory (e.g., Gregg, 1984).

Truscott and Sharwood Smith (2011) proposed Modular Online Growth and Use of Language (MOGUL) as a theoretical framework for explaining L2 processing and development. The MOGUL framework assumes that different modules work in conjunction with the affective module to process L2 input. Those modules facilitate the activity of one another. On the basis of this framework, the researcher hypothesized that affective processing facilitates linguistic processing and development.

SLA researchers have explored whether affective factors influence L2 learning and performance. MacIntyre and Gardner (1994) conducted a computerized experiment in a laboratory setting and demonstrated a negative emotion (i.e., anxiety) induced by exposing the participants to a video camera had a negative impact on L2 vocabulary learning. Dewaele and Alfawzan (2018) analyzed correlational patterns between positive and negative emotions and language performance (i.e., a major foreign language test for Study 1 and a lexical decision test for Study 2). Their results showed that a positive emotion (i.e., foreign language enjoyment) exhibited an effect on foreign language performance that was stronger than the effect of a negative emotion (i.e., foreign language classroom anxiety). To the best of my knowledge, however, the effect of instruction that aims to enhance L2 learners' positive affect regarding L2 input on the development of L2 processing and knowledge has yet to be investigated in the field of effect-of-instruction studies conducted in a classroom setting.

Literature Review

MOGUL

The theoretical framework that guides the present study is MOGUL, as proposed by Truscott and Sharwood Smith (2011). It is an explanatory framework that sets out why input enhancement may or may not work. Input enhancement, as defined by Sharwood Smith (1991), is a type of input manipulation for the purpose of making L2 input features salient so that L2 learners notice and can process the linguistic features. A number of researchers (e.g., Han, Park, & Combs, 2008, for review) have examined the effect of textual input enhancement (Textual IE) (i.e., making target input features salient typographically by using boldface, underlining, highlighting, italicization, and capitalization) on L2 grammar learning. Lee and Huang's (2008) meta-analysis study found that Textual IE had positive but minimal effects (Cohen's $d = 0.22$) on L2 grammar learning compared to the contrast groups. They also found small negative effects on reading comprehension ($d = -0.26$). These findings suggested that Textual IE is likely to facilitate the learning of L2 form but may hinder the comprehension of L2 input. Although previous input enhancement studies overwhelmingly targeted L2 grammar learning (e.g., Lee & Huang, 2008), text comprehension and vocabulary learning have also been investigated (e.g., Kim, 2006; Rouhi & Mohebbi, 2012).

MOGUL (Sharwood Smith & Truscott, 2014; Truscott, 2015; Truscott & Sharwood Smith, 2011) assumes that language processing and development is the result of interactions between language-specific modules (i.e., phonological and syntactic processors) and modules not specific to language (e.g., perceptual, conceptual, and affective processors). Each processor possesses its own memory store (i.e., working memory and long-term memory). The primary function of each processor is to activate the contents of its particular memory store (i.e., representations) and to create new representations. Each processor interacts with other adjacent processors via interfaces, which are responsible for associating the representations of one processor with those of another, resulting in perceiving, understanding, or evaluating the input stimuli.

In the MOGUL framework, development refers to the increase in the resting level and its intensity of activation for a representation in a particular module. Development occurs through online processing. Each of the associated representations used in the processing is activated, and, thereby, their resting levels and intensity of activation rise and further activate associated representations in other modules by spreading activation.

Rationale for Conceptual Input Enhancement

According to MOGUL, instruction can target the processing of each of the perceptual, conceptual, and affective modules to enhance its activation in the hope of facilitating the processing of the linguistic modules. In MOGUL, the linguistic modules are directly connected to the conceptual module. This is why the enhancement of conceptual processing, aimed at facilitating linguistic processing, is possible. The goal of Conceptual IE is to help learners to create more appropriate conceptual representations or correct form-meaning connections by making the meaning clearer, through the teacher's explanation of the target grammatical rule, its concept, or the context in which it is used. Such instruction will foster the construction of explicit knowledge stored as conceptual representations and will not directly result in the construction of new syntactic representations. However, Conceptual IE can allow learners to comprehend input by using explicit knowledge, which will make the input more comprehensible. In this indirect way, explicit instruction facilitates the development of linguistic modules, including syntactic, phonological, and lexical development.

Glossing in L1 or L2 is a way of enhancing vocabulary words conceptually. To examine the effects of glossing on L2 vocabulary acquisition, Rouhi and Mohebbi (2012) compared three groups, in each of which the participants received either L1 glosses, L2 glosses, or no glosses while reading L2 texts. The results showed that glossing in L1 and L2 was effective in promoting L2 vocabulary learning, and there were no statistically significant differences between glossing in L1 and L2. These findings suggest that Conceptual IE in the form of glossing facilitates L2 vocabulary acquisition.

Possible Effects of Affective Input Enhancement

Researchers in non-SLA research fields have revealed the relationship between affect and memory (e.g., Ellis & Moore, 1999, for review) and demonstrated that affect plays an important role in learning (e.g., Immordino-Yang, 2016). In social psychology, it is assumed that the core function of affect is to assign either a positive or negative value to an input stimulus (e.g., Arnold & Gasson, 1954; Scherer, 1984). Individuals evaluate every stimulus in their daily life positively or negatively, based on their past experiences and survival and reproduction instincts. When a person is important, or a grammatical form is useful, individuals evaluate them positively. However, when an experience is stressful, and a communication task is boring, negative values are assigned to them. While a positive value encourages an approach toward the object, a negative value acts as a deterrent. The perceived value of input stimuli determines how they are processed, stored, and subsequently used.

MOGUL makes it explicit that, in SLA, the affective system is an important construct influencing the information processing of human beings. According to Truscott (2015), representations of value are stored in the affective module. They are constantly active and easily reach high activation levels. If they are highly active, a person may be conscious of them, and they are likely to influence processing across the modules (i.e., perceptual, conceptual, and linguistic modules), directly or indirectly. When affective representations and representations in another module are active at the same time, they are connected through associative learning. Repeated and consistent experience strengthens the connections.

In the present study, the researcher proposes Affective IE as the instructional method to enhance the participants' positive affect regarding the topic of the text. In the MOGUL framework, the affective module is indirectly linked to linguistic modules via perceptual and conceptual modules. As a result, Affective IE is assumed to increase the resting level and the intensity of activation of linguistic representations via both or either of the perceptual and/or conceptual modules. More specifically, highly activated affective representations regarding the topic of the text further activate auditory, visual, or conceptual representations in relation to the text topic, subsequently enhancing the processing of phonological and syntactic representations of linguistic items in the text. This mechanism can facilitate the learning of L2 grammar or vocabulary in the text.

Based on the MOGUL framework, in order to explore the effects of affective processing in SLA, the present study compares the effects of Affective IE and Conceptual IE, which is not accompanied by the enhancement of affective processing, in terms of the evaluation of the text topic, the text comprehension, and the L2 learning.

The Present Study

Research Questions

Based on the findings from the previous studies on the effects of IE on L2 learning (e.g., Lee & Huang, 2008; Rouhi & Mohebbi, 2012) and MOGUL (e.g., Truscott & Sharwood Smith, 2011) as a theoretical rationale for Affective IE and Conceptual IE, the present study addresses the following research questions (RQs) to explore the effects of affective processing in SLA:

1. Is there any difference between Affective IE and Conceptual IE in their effects on increasing L2 learners' positive affective evaluation of the text topic?
2. Is there any difference between Affective IE and Conceptual IE in their effects on facilitating L2 learners' text comprehension?
3. Is there any difference between Affective IE and Conceptual IE in their effects on facilitating L2 learners' learning of form and meaning of English nouns?
4. Is there any difference between Affective IE and Conceptual IE in their effects on facilitating L2 learners' learning of form, meaning, and grammar of English verbs?

Participants

The present study was conducted as part of an English class in a university in Japan. The data obtained from those who gave their consent to participate in the study was analyzed. A total of 83 Japanese sophomore university students from two classes participated in the present study ($N_{male} = 75$; $N_{female} = 8$). All of the participants spoke Japanese as their first language. Their scores on the TOEIC Bridge® test ranged from 110 to 129 (maximum possible score = 180). One of the two classes was assigned to the experimental group ($n = 40$) and the other class was assigned to the contrast group ($n = 43$). They were not told the target of instruction in advance.

Teaching Materials

The participants read a text in a 50-minute instruction session. The text was chosen from the textbook used in the class (i.e., *AFP world focus: Environment, health, and technology*, by Shishido, Murphy & Takahashi, 2017). The topic of the text was eating disorders. The 314-word text described how the fashion industry influences people's conception of beauty, which may lead them to develop extreme dietary habits and, ultimately, eating disorders.

Target Linguistic Items

The target linguistic items were 12 verbs and nine noun phrases in the text. The researcher selected these words or phrases because they were assumed not to have been fully understood by the participants, as evidenced by the pretest results shown in Tables 7 and 9. The target items are listed in Table 1 below. The table also displays the argument structures for each of the nine transitive and three intransitive verbs. All of the intransitive verbs required a preposition phrase (PP). Among the transitive verbs, "allow"

required a noun phrase (NP) and an infinitive complement (i.e., to + Verb Phrase [VP]), "provide" required NP and PP, and the others required a single NP.

TABLE 1
The List of the Target Nouns and Verbs

Noun (*N* = 9)		
Anorexia nervosa,	industry,	physique,
dietary habits,	nourishment,	shape,
eating disorder,	obesity,	strength

Verb (*N* = 12)	Argument Structure
Conform, contribute	NP __ PP (to)
Result	NP __ PP (in)
Curb, highlight, improve, maintain, prevent, promote, represent	NP __ NP
Provide	NP __ NP PP (for)
Allow	NP __ NP Infinitive Complement (to VP)

Note. __ indicates the place of the verb; ( ) indicates the preposition or infinitive complement used in the text.

Instructional Treatments

All the participants received a 50-minute instruction session. The session was composed of two activities: a pre-reading activity and a reading activity. In order to test the effects of the target instruction, the researcher established two types of instruction for two separate groups: the Conceptual IE group (the Conceptual IE group, *n* = 43) as the contrast group and the Affective IE group (the Affective IE group, *n* = 40) as the experimental group. The researcher instructed both of the groups.

Conceptual IE

The purpose of Conceptual IE in this study was to lead participants in the Conceptual IE group to establish clear form-meaning connections of the target nouns in the text before it is read. This facilitated the comprehension of the text because the instructional treatment allowed the participants to use the explicit information of some important words embedded in the text while reading it. Based on MOGUL, this instruction can be regarded as Conceptual IE, which activates the processing of the conceptual system (i.e., the knowledge of meaning of the target words) and enhances linguistic processing.

On a screen, the researcher presented six example sentences, each of which included one of the six words or phrases (i.e., anorexia nervosa, dietary habits, eating disorder, industry, shape, and physique). The researcher then asked the participants to guess what they meant in those contexts and write the meanings down on a worksheet in Japanese. Subsequently, the researcher gave the answers orally to the class. Three example sentences including "physique," "shape," and "dietary habits" were accompanied by pictures describing the sentences to aid the participants in guessing the meanings of the words. This instruction lasted for 10 minutes.

Affective IE

The purpose of Affective IE was to activate the learners' affective processing of the topic of the text and lead the learners to assign positive values to it. Based on the MOGUL framework, the researcher hypothesized that, if learners are affectively activated by a text topic, their affective states will further activate linguistic representations of lexical and grammatical forms expressing the topic via the perceptual and/or conceptual systems, subsequently promoting text comprehension and the development of L2 knowledge.

In order to trigger participants' positive affect toward the text topic, the researcher implemented a 10-minute oral introduction, in which the researcher orally presented the topic (i.e., eating disorders) in English using Microsoft PowerPoint. To equalize the frequency of the participants' exposure to the target words, the researcher used six target words identical to those used for the Conceptual IE group. The researcher explained the symptoms of eating disorders and highlighted famous Japanese people who had suffered from the disorders, using colorful pictures and videos, which were not included in the text. In concluding the introduction, the researcher told them that eating disorders are closely related to our daily life (e.g., our eating habits and our conception of beauty) and finally guided them to read the text in order to discover more information about them. Thereafter, the participants answered five true/false questions about the introduction. This introduction concerned topics peripheral to the text, rather than the text's content; thus, the participants did not know about the text's content before reading it.

It should be noted that Affective IE used in the present study was not intended to make linguistic features salient through external input manipulation, but to enhance participants' positive affect regarding the topic, in the hope of enhancing the processing of the lexical items which expressed the topic.

Reading activities

The participants in the Affective IE and Conceptual IE groups engaged in the same reading activity after each pre-reading activity. As explained above, however, the enhanced processing for the two groups before reading the text were fundamentally different from each other, which will result in different processing of the text. This activity was intended to encourage the participants to learn the content and language from the text. While reading, they were given a list of vocabulary words or phrases which might be difficult for them. The list also included all of the forms (i.e., spellings) and meanings (i.e., Japanese translations) of the target nouns and verbs.

The participants were required to read the text twice. First, they read the text to find and underline parts of the text which they thought best described the text. They then read the text to answer five multiple-choice questions. To answer the questions, the participants had to choose a Japanese sentence that was true about the text from four options, including "I don't know." After reading the text, the answer for each question was given to the class.

Procedure

Table 2 shows the procedure of the present study. In week one, the participants' initial knowledge of the target linguistic items was tested with a written test. These pretests took 10 minutes to be completed. In week two, the researcher conducted a 50-minute instructional treatment for each group and administered questionnaires, text comprehension tests, and immediate post-tests. After an interval of four weeks, the researcher administered delayed post-tests.

TABLE 2
Procedure

	Affective IE Group (*n* = 40)	Conceptual IE Group (*n* = 43)
Week 1	Pretest: noun and verb (10 minutes)	
Week 2	Instruction (50 minutes) 1. Oral introduction 2. Reading activity	Instruction (50 minutes) 1. Vocabulary check activity 2. Reading activity
	Questionnaire on the text topic (10 minutes)	
	Text comprehension test (15 minutes) 1. Multiple-choice question 2. Free recall task	
	Immediate post-test: noun and verb (10 minutes)	
Week 3-6	Interval	
Week 7	Delayed post-test: noun and verb (10 minutes)	

Testing Measures and Data Analysis

In order to answer the research questions, the researcher developed a questionnaire to measure the participants' affective evaluation of the text topic and two types of text comprehension tests. The researcher also developed two language tests to assess the outcomes of learning English nouns and verbs from reading the text.

Questionnaire for assessing affective processing

To assess participants' affective reaction to the text topic (i.e., eating disorders), the researcher created a questionnaire based on Scherer's (1984) five stimulus evaluation checks. The researcher used the checks following Schumann (1997), who first applied them to SLA research. Scherer (1984) described basic emotions (e.g., anger, disgust, fear, joy, sadness, and shame) experienced by human beings as a result of evaluations of internal or external stimuli. Scherer (1984) identified five stimulus evaluation checks: novelty, intrinsic pleasantness, goal/need significance, coping potential, and norm/self compatibility. The novelty checks judge whether a stimulus is novel or unexpected. The intrinsic pleasantness checks assess whether a stimulus is pleasant. The goal/need significance checks determine whether it is conducive to achieving a goal or satisfying a need. The coping potential checks evaluate whether one can cope with the stimulus event. The norm/self compatibility checks assess whether a stimulus event or action is compatible with social norms, cultural conventions, or the expectations of significant others (norm compatibility), and whether the stimulus is compatible with the self-concept or ideal self (self compatibility). For instance, one of the basic emotions, "joy," which can be a desirable emotional reaction in language learning situations, is assumed to comprise high novelty, high pleasantness, and high goal/need significance. This model predicts that, for example, a person assigns a positive value to a stimulus which is novel, pleasant, and relevant to the person's goal or need; thus, he or she will engage with it and enjoy it.

In this study, the participants were asked to recall the text topic, and questionnaire items required them to evaluate the topic in terms of the five checks. This questionnaire was used because the questionnaire results were assumed to indicate their affective reaction to the text topic. Each item was rated by circling a number from one (i.e., very negative) to five (i.e., very positive). The score for affective evaluation of the topic was calculated by summing up each of the ratings of all the questionnaire items (maximum possible score = 25; minimum possible score = 5). For example, participants who scored 19 points were considered to be those who evaluated the text topic in a relatively positive way. All of the questionnaire items used in the study are shown in Appendix A.

Text comprehension tests

To test the effect of Affective IE on L2 text comprehension, the researcher developed two types of text comprehension tests: a multiple-choice comprehension test and a free recall task. In the multiple-choice comprehension test, the participants read 10 English sentences that included blank spaces. Each sentence described the main points of the text. The participants were required to choose the option that best completed each sentence, without reading the text again. To answer correctly, they had to understand and remember the content of the text. For each question, they could choose from four options, including "I don't know." The "I don't know" option was included to reduce guessing. Some of the sentences were accompanied by a vocabulary aid written in Japanese, as shown in the example below.

Example: multiple-choice comprehension test
Because of the media, people feel a pressure to lose their weight. It can lead some of them to an
extreme _____.　（condition ＝ 状態）
　　A. behavior in shopping　　B. eating disorder　　C. condition of stress　　D. I don't know.

The scoring procedure for this test was straightforward: one point was awarded for each correct answer to the 10 items (i.e., maximum possible score = 10).

The other comprehension test was a free recall task in which the participants were asked to recall the content of the text and write down, in Japanese, within 10 minutes, whatever they remembered about it. They were allowed to write any information: a word, phrase, sentence, story, or explanation. For the purpose of further analysis, the researcher counted the numbers of text-related content words and phrases (e.g., food, life style, model, nourishment, weight) used in the participants' recall protocols. From the text-related content words, the researcher also identified essential content words and phrases (e.g., anorexia nervosa, beauty, diet, eating disorder, fashion industry, obesity), which were almost essential in expressing the core content of the text.

Testing measures for L2 learning

To test the effect of Affective IE on L2 learning, the researcher administered verb and noun tests before and after the instructional session. Knowledge of vocabulary consists of multiple dimensions, such as form, meaning, and use (e.g., grammatical collocation) (Nation, 2001). In van Zeeland and Schmitt (2013), the knowledge of form, meaning, and grammar, respectively, represents the ability to recognize the target word aurally, understand and recall the meaning of the target words, and recognize the grammatical category of the target word.

The present study used verb and noun tests. The verb tests included the 12 target verbs and six distractors, and the noun test comprised the nine target nouns and three distractors, as shown in Table 1. Following van Zeeland and Schmitt (2013), the verb tests were designed to measure three dimensions of participants' knowledge of English verbs: form, meaning, and grammar. The noun tests were devised to assess two dimensions of participants' knowledge of English nouns: form and meaning.

Knowledge of verbs' and nouns' written form represents visual memory of spellings of the target words. The participants were asked a question ("Have you ever seen this word?") and answered by circling "yes" or "no" on the test sheet. The answer "yes" was worth one point. Only the participants who answered "yes" in the form section were allowed to go to the meaning and grammar sections, because the knowledge of form was a prerequisite for them.

Knowledge of the meaning of verbs and nouns is defined as the ability to choose the correct Japanese translation for each verb and noun from one correct, two incorrect, and "I don't know" options. In the meaning section, each correct answer was worth one point.

Knowledge of verbs' grammar involves the ability to recognize a grammatically correct sentence for each verb. In order to answer correctly in the grammar section, the participants had to know the correct argument structure for each verb. For example, the participants were given sentences such as: "a. The teammate contributed our win," "b. The teammate contributed," and "c. The teammate contributed to our win." The correct usage of the verb "contribute" is option c., because it requires NP in the subject position and PP within VP. Hence, knowledge of the verbs' argument structures was the key to succeeding in the test. Only in the grammar section of the verb tests could the participants choose multiple answers. Two points were awarded for each correct answer. Twelve target items, and three distractors out of six, in the verb test included one correct, two incorrect, and "I don't know" options. In this case, for example, if the participants chose the correct and an incorrect option in a same test item, they were awarded only one point. The remaining three distractors included two correct, one incorrect, and "I don't know" options. In this case, for example, if the participants chose one correct and one incorrect option, they received no points. Some of the sentences were accompanied by a vocabulary aid (see Appendix B).

To examine the reliability of these testing measures, the Kuder-Richardson Formula 20 (K-R 20) value was calculated for the form and meaning sections of the verb and noun tests. Cronbach's alpha (α) was calculated for the grammar section of the verb test. The results indicated high reliability levels for the form section (K-R 20 = 0.86), medium reliability levels for the meaning section (K-R 20 = 0.79), and medium reliability levels for the grammar section (α = 0.78) of the verb test. The results also showed high

reliability levels for the form section (K-R 20 = 0.85) and medium reliability levels for the meaning section (K-R 20 = 0.62) of the noun test.

Data analysis

To answer RQs 1 and 2, t-tests were conducted on the scores from the questionnaire and the two text comprehension tests for both the groups. Two (the Affective IE and Conceptual IE groups) × three (the pretest, immediate post-test, and delayed post-test) two-way repeated measures of analysis of variance (ANOVA) were performed on the results of the verb and noun tests. To answer RQs 3 and 4, post-hoc multiple comparisons with a Bonferroni adjustment were carried out to determine which group or test was significantly better than the others. In addition, the Cohen's effect size (d), which is not influenced by the sample size, was calculated to confirm the practical differences in the scores between groups and between tests.

Results

Questionnaire Results

Table 3 presents the descriptive statistics for the questionnaire results. Means (M) and standard deviations (SD) are shown in the table.

TABLE 3
Descriptive Statistics for the Questionnaire

	Affective IE Group		Conceptual IE Group	
	M	*SD*	*M*	*SD*
Novelty	2.62	1.27	2.77	1.49
Intrinsic pleasantness	3.70	1.02	3.98	1.01
Goal/need significance	3.35	0.80	3.44	1.01
Coping potential	2.75	0.63	2.78	0.97
Self compatibility	3.40	0.59	3.47	0.77
Norm compatibility	4.00	1.06	4.17	0.85
Total	19.83	2.88	20.49	3.13

In order to examine whether there was any difference in the topic evaluation between the Affective IE and Conceptual IE groups, the researcher conducted a t-test, which showed no significant difference between the groups, $t(81) = 0.29$, $p = .77$. Cohen's effect size (d) was 0.22, indicating a small effect.

The questionnaire included a free response item, which required the participants to write how they felt and what they thought about the topic (i.e., eating disorders) in Japanese (See Appendix A). This item did not have any time limit and did not specify a minimum or maximum number of Japanese characters to be written. In order to explore the difference in affective processing between the two groups, two types of post hoc analysis were conducted. First, to find a difference in the quantity of comments the participants made, the number of Japanese characters in the comments was calculated by Microsoft Word for each participant (Table 4) and a t-test was conducted on the number of characters for the two groups. The results of the t-test indicated a significant difference between the two groups, $t(81) = 3.63$, $p = .00$. The effect size (d) was 1.09, indicating a large effect.

TABLE 4
Descriptive Statistics for the Number of Characters in the Comments

	M	*SD*
Affective IE Group (*n* = 40)	79.92	40.97
Conceptual IE Group (*n* = 43)	51.49	29.49

Second, in order to find a difference in the quality of the comments, they were analyzed using KH Coder (Higuchi, 2014), which can identify the frequency of content words in a text. The result of the analysis indicated that the Affective IE and Conceptual IE groups produced 731 and 507 content words overall, respectively. From these, the researcher selected topic-related words and affect-related words. Table 5 shows the number of each type of words used in the comments.

The words in the list were chosen for two reasons: (1) they were used with relatively high frequency in their comments, and, more importantly, (2) content-related words were related to the topic of the text and affect-related words were related to Scherer's (1984) five stimulus evaluation checks. Affect-related words can be interpreted as implying each of the five evaluation checks: "be surprised" and "know … for the first time" (novelty), "interest" (intrinsic pleasantness), "myself" (self/norm compatibility), "need/necessary" (goal/need significance), and "understand/understanding" (coping potential).

Mann-Whitney's non-parametric test was conducted on the frequency of occurrence of each category of words, but no significant differences were found, $U = 26.00$, $p = .20$, $r = 0.30$ (indicating a medium effect) for content-related words; and $U = 14.00$, $p = .18$, $r = 0.36$ (indicating a medium effect) for affect-related words.

TABLE 5
The Number of Content-related and Affect-related Words in the Comments

Content-related Word ($N = 9$)		Affective IE	Conceptual IE
Anorexia nervosa		7	6
Beautiful		8	4
Dieting		8	1
Eating disorder		15	17
Figure/physique		3	5
Gain weight		9	4
Health		4	7
Lose weight		15	9
Meal		7	3
	M	8.44	6.22
	SD	4.19	4.66
Affect-related Word ($N = 7$)		Affective IE	Conceptual IE
Be surprised		3	1
Enjoy		2	0
Interest		4	6
Know … for the first time		12	7
Myself		12	4
Need/necessary		3	1
Understand/understanding		5	2
	M	5.86	3.00
	SD	4.30	2.71

In summary, although the non-parametric test did not detect any significant differences in the quality of their comments, a significant difference was found in the quantity of the comments the participants produced. These results are in favor of the Affective IE group and can be interpreted as Affective IE increasing participants' motivation to express their reactions to the topic after reading about it. Evidently Affective IE caused a difference in their affective responses to the topic.

Text Comprehension Results

Table 6 presents the descriptive statistics for the scores from the multiple-choice comprehension test (maximum possible score = 10), and the number of topic-related and essential content words, both of which were elicited by the free recall task.

To test the effect of instruction on text comprehension, the researcher conducted a t-test on the score for each of the three text comprehension indicators. The results revealed that, while no significant

difference in the scores for the multiple-choice comprehension test was found, $t(81) = 0.29$, $p = .77$, the experimental group recalled significantly more text-related content words, $t(81) = 3.25$, $p = .00$, and essential content words, $t(81) = 2.23$, $p = .03$, than the contrast group. The Cohen's effect sizes (d) were 0.09 for the multiple-choice comprehension test (a small effect), 0.71 for the text-related content words (a large effect), and 0.52 for the essential content words (a medium effect).

TABLE 6
Descriptive Statistics for the Text Comprehension Tests

	Affective IE Group		Conceptual IE Group	
	M	*SD*	*M*	*SD*
Multiple-choice test	6.68	1.46	6.58	1.48
Text-related content word	15.15	6.30	11.09	5.05
Essential content word	9.45	4.61	7.40	3.77

Verb Test Results

Table 7 displays the descriptive statistics for the scores from the form, meaning, and grammar sections of the verb pretests (Pretest), immediate post-tests (Post-test 1), and delayed post-tests (Post-test 2).

TABLE 7
Descriptive Statistics for the Verb Tests

		Affective IE Group		Conceptual IE Group	
		M	*SD*	*M*	*SD*
Form	Pretest	8.98	3.05	8.95	2.77
	Post-test 1	10.45	2.54	10.81	1.86
	Post-test 2	10.27	2.77	10.79	2.11
Meaning	Pretest	4.90	2.81	5.35	2.80
	Post-test 1	7.70	2.80	7.84	2.65
	Post-test 2	6.42	2.83	7.44	2.53
Grammar	Pretest	5.57	4.14	6.07	4.95
	Post-test 1	8.95	5.45	8.44	3.73
	Post-test 2	7.63	4.96	8.63	7.73

Note. Maximum possible score = 12 for the form and meaning sections; 24 for the grammar section.

To examine the effects of instruction on the learning of English verbs, the scores of each group for each section were analyzed statistically with a two-way repeated measures ANOVA. The independent variable was the group (i.e., the Affective IE or Conceptual IE groups) and the dependent variable was the test (i.e., Pretest, Post-test 1, or Post-test 2). The results of the ANOVA indicated significant main effects for the test in the form section, $F(2, 162) = 29.78$, $p = .00$, partial $\eta^2 = .27$; the meaning section, $F(2, 162) = 55.30$, $p = .00$, partial $\eta^2 = .41$; and the grammar section, $F(2, 162) = 21.19$, $p = .00$, partial $\eta^2 = .21$. There was no significant effect on the group for the form section, $F(1, 81) = 0.35$, $p = .56$, partial $\eta^2 = .00$; the meaning section, $F(1, 81) = 1.10$, $p = .30$, partial $\eta^2 = .01$; the grammar section, $F(1, 81) = 0.13$, $p = .72$, partial $\eta^2 = .00$; the interaction in the form section, $F(2, 162) = 0.65$, $p = .52$, partial $\eta^2 = .01$; the meaning section, $F(2, 162) = 1.51$, $p = .23$, partial $\eta^2 = .41$; or the grammar section, $F(2, 162) = 1.35$, $p = .26$, partial $\eta^2 = .02$.

The researcher conducted a between-test comparison of the two groups' average scores for each section. Table 8 shows that (1) the participants' scores for the form section significantly improved from the pretest to both of the post-tests (supported by medium effect sizes), (2) their scores for the meaning section significantly improved from the pretest to both of the post-tests (supported by a large effect size and a medium effect size, respectively), but they decreased from the immediate post-test to the delayed post-test (with a small effect), and (3) their scores for the grammar section significantly improved from the pretest to both of the post-tests (supported by medium effects).

TABLE 8
Between-Test Comparisons of the Form, Meaning, and Grammar Sections of the Verb Tests

	Between-test Comparisons			*d*
Form	Pretest (8.96)	<	Post-test 1 (10.64)**	0.65
	Pretest (8.96)	<	Post-test 2 (10.54)**	0.59
	Post-test 1 (10.64)	=	Post-test 2 (10.54) *ns*	0.04
Meaning	Pretest (5.13)	<	Post-test 1 (7.77)**	0.95
	Pretest (5.13)	<	Post-test 2 (6.95)**	0.65
	Post-test 1 (7.77)	>	Post-test 2 (6.95)**	0.30
Grammar	Pretest (5.82)	<	Post-test 1 (8.69)**	0.60
	Pretest (5.82)	<	Post-test 2 (8.13)**	0.49
	Post-test 1 (8.69)	=	Post-test 2 (8.13)*ns*	0.11

Note. d indicates Cohen's effect size; A = B indicates no significant difference between A and B; **$p < .01$.

Noun Test Results

Table 9 indicates the descriptive statistics for the scores from the form and meaning sections of the noun tests on Pretest, Post-test 1, and Post-test 2.

To examine the effects of instruction on the learning of English nouns, the scores for each group for each section were analyzed statistically with a two-way repeated measures ANOVA. The independent variable was the group (i.e., the Affective IE or Conceptual IE groups) and the dependent variable was the test (i.e., Pretest, Post-test 1, or Post-test 2). The results of the ANOVA indicated significant main effects for the test in the form section, $F(2, 162) = 282.77$, $p = .00$, partial $\eta^2 = .78$; and the meaning section, $F(2, 162) = 289.57$, $p = .00$, partial $\eta^2 = .78$. The results also indicated a significant main effect for the group in the meaning section of the immediate post-test, $F(1, 81) = 5.99$, $p = .00$, partial $\eta^2 = .07$; and the delayed post-test, $F(1, 81) = 5.99$, $p = .00$, partial $\eta^2 = .07$. There was no significant effect for the group in the form section, $F(1, 81) = 0.41$, $p = .53$, partial $\eta^2 = .97$; the interaction in the form section, $F(2, 162) = 0.11$, $p = .90$, partial $\eta^2 = .00$; or the interaction in the meaning section, $F(2, 162) = 1.84$, $p = .16$, partial $\eta^2 = .02$.

TABLE 9
Descriptive Statistics for the Noun Tests

		Affective IE Group		Conceptual IE Group	
		M	*SD*	*M*	*SD*
Form	Pretest	4.32	1.86	4.58	1.81
	Post-test 1	8.45	1.38	8.53	0.63
	Post-test 2	7.95	1.84	8.09	1.17
Meaning	Pretest	2.68	1.42	2.91	1.27
	Post-test 1	6.85	1.76	7.49	0.99
	Post-test 2	5.20	2.00	6.14	1.30

Note. Maximum possible score = 9 for the form and meaning sections.

The researcher conducted a between-test comparison of the two groups' average scores for each section. Table 10 shows that (1) the participants' scores for the form section significantly improved from the pretest to both of the post-tests (supported by large effect sizes), and (2) their scores for the meaning section significantly improved from the pretest to both of the post-tests (supported by large effect sizes), but they decreased from the immediate post-test to the delayed post-test (with a large effect).

TABLE 10
Between-Test Comparisons for the Form and Meaning Sections of the Noun Tests

	Between-test Comparisons			*d*
Form	Pretest (4.46)	<	Post-test 1 (8.49)**	2.70
	Pretest (4.46)	<	Post-test 2 (8.02)**	2.12
	Post-test 1 (8.49)	=	Post-test 2 (8.02) *ns*	0.28
Meaning	Pretest (2.79)	<	Post-test 1 (7.17)**	3.51
	Pretest (2.79)	<	Post-test 2 (5.67)**	1.86
	Post-test 1 (7.17)	>	Post-test 2 (5.67)**	0.94

Note. d indicates Cohen's effect size; A = B indicates no significant difference between A and B; **$p < .01$.

The researcher also conducted a between-group comparison of the average scores for the meaning section of the two post-tests. Table 11 shows that the Conceptual IE group significantly outperformed the Affective IE group for the meaning section of the immediate post-test (with a small effect) and the delayed post-test (with a small effect).

TABLE 11
Between-Group Comparisons for the Meaning Section of the Noun Tests

	Between-Group Comparisons			*d*
Post-test 1	Affective IE Group (6.85)	<	Conceptual IE Group (7.49)*	0.07
Post-test 2	Affective IE Group (5.20)	<	Conceptual IE Group (6.14)*	0.26

Note. d indicates Cohen's effect size; *$p < .05$.

Discussion

In light of the MOGUL framework, which explains language processing and development in association with affect, this study examined whether instruction that aimed to enhance positive affective processing of a topic in the L2 reading material had a facilitative effect on participants' evaluation of the topic, the text comprehension, and the learning of English noun phrases and verbs used in the text.

RQ1 addressed the effect of Affective IE on learners' evaluation of the text topic. The results showed no statistically significant differences regarding the topic evaluation between the Affective IE and Conceptual IE groups (Table 3), as measured by the Likert scale questionnaire. After reading the text, the participants' affective processing of the text topic (i.e., eating disorders) became positively activated through the reading activity itself, regardless of the presence or absence of the affective enhancement. This was because the topic was serious and could be relevant to the participants. This may have contributed to the result. However, post hoc analysis found a statistically significant difference between the two groups in the quantity of the participants' comments on the topic (Table 4). The result implies that Affective IE increased the participants' motivation to express their own ideas on the topic as a result of receiving the instruction. Motivation to do something is processed, not in auditory, visual, phonological, syntactic, or conceptual systems, but in the affective system. Therefore, the answer to RQ1 is affirmative. In order to reveal the effect of Affective IE on the participants' affective reaction to the topic more clearly through a questionnaire, the research design, more specifically the timing of measuring the affective variables (i.e., before or after the reading activity), should be refined carefully in future studies.

RQ2 examined the effect of Affective IE on text comprehension. Table 6 displays the results of the three indices of text comprehension. First, the result of the multiple-choice test indicates no effect of instruction. Second, the result of the free-recall task shows that the Affective IE group recalled and produced a significantly higher number of topic-related content words than the Conceptual IE group. Third, the result of the free-recall task also shows that the Affective IE group recalled and produced a significantly higher number of essential content words than the Conceptual IE group. The answer to RQ2 is affirmative. Although Lee and Huang (2008) reported a small negative effect of Textual IE on text comprehension, the results of the present study exhibited a large or medium positive effect of Affective

IE. In the instructional treatment, Affective IE enhanced the participants' positive affect regarding the topic of the text. As a result, based on the MOGUL framework (Sharwood Smith & Truscott, 2014) reviewed in the Literature Review section, it is assumed that the participants' perceptual and conceptual representations of lexical items that best expressed the topic of the text were also enhanced, enabling the participants to retrieve the information necessary to understand the text effectively.

Regarding RQ3, which investigated the effect of Affective IE on the learning of the form, meaning, and argument structure of English verbs, a stronger effect of Affective IE on language learning was not found (see Tables 7 and 8). The answer to RQ3 is negative. Both of the enhancement techniques were shown to be effective in promoting the learning of the three dimensions of English verbs.

RQ4 asked whether Affective IE is effective in promoting the learning of English noun phrases in the text. Table 10 indicates that both Affective IE and Conceptual IE had significant effects on the learning of the form and meaning of the target noun phrases. Moreover, Table 11 shows that Conceptual IE was more effective than Affective IE in terms of the learning of the meanings of nouns in both of the post-tests, but these results were supported by very small effect sizes (0.07 for the immediate post-test; 0.26 for the delayed post-test). The answer to RQ4 is affirmative. This could be explained by the nature of the instruction, meaning that Conceptual IE focused on the form and meaning of six target noun phrases before the reading of the text and gave the participants explicit information about them, while Affective IE only enhanced the affective processing of the text topic. For these reasons, Conceptual IE could have enabled the participants to use explicit information during the reading activity and the two post-tests, thereby contributing to the results. These findings are compatible with those of previous studies investigating the effects of enhancing target words conceptually (e.g., Kim, 2006; Rouhi & Mohebbi, 2012).

The instructional focus of Affective IE was to enhance participants' positive affective processing of the topic of the text. Affective IE did not focus on any target linguistic items. Despite this, Affective IE was found to be effective in facilitating the learning of the forms and meanings of English nouns and verbs and the learning of the argument structures of English verbs to the same extent as Conceptual IE (Tables 8 and 10). Based on the MOGUL architecture (Sharwood Smith & Truscott, 2014), these findings suggest that the participants' positive affective states activated by Affective IE spread to, and activated, perceptual and conceptual representations associated with L2 words (e.g., verbs and nouns) outlining the text topic, which allowed the participants to use the words for input processing effectively and to consolidate them in memory.

Conclusion

In the present study, the researcher developed Affective IE as instruction to enhance the participants' positive affect regarding the L2 text's topic and examined its effects on the evaluation of the text topic, the text comprehension, and the learning of L2 linguistic items. The results demonstrated that both Affective IE as the experimental condition, and Conceptual IE as the contrast condition, facilitated the text comprehension and the learning of the form, meaning, and grammar of verbs and the form and meaning of the nouns in the text. Stronger effects of Affective IE were found regarding the evaluation of the text topic and the text comprehension, but not on the learning of L2 linguistic items. Although the answers to RQs were only partially affirmative, these findings shed new light on the role of affective processing in cognitive mechanisms of L2 learning.

To provide further insight into the effect of affect in instructed SLA, more research is necessary. First, the present study did not use tests which gauge the participants' spontaneous L2 performance; therefore, it is not clear whether Affective IE facilitates the automatic use of L2 knowledge learned from reading. Second, the present study is the first attempt to implement Affective IE in the form of oral introduction, so future studies should explore the optimal conditions of the oral introduction method for promoting learners' positive affect toward L2 input. Third, as already mentioned above, the timing of the

questionnaire regarding the affective processing should be refined. In the present study, it was implemented after input enhancement and the reading activity; thus, the participants' affective reaction to the topic could have been influenced, not only by the enhancement treatment, but also by the reading activity. In the future research, the questionnaire should be implemented immediately after input enhancement and before reading the text. Finally, the Pygmalion effect, where teacher's high expectation leads to an increase in students' performance, might be a possible limitation because the researcher instructed the Affective IE group.

Although it has some limitations, the present study comprises theoretical and pedagogical implications. Theoretically, the findings of this study are compatible with the MOGUL framework. MOGUL explains that the activation of affective processing spreads to the adjacent modules (i.e., conceptual and perceptual modules) and further facilitates linguistic processing in the phonological and syntactic modules via those adjacent modules, which is why Affective IE was conducive to the significant gains on text comprehension and L2 learning. A pedagogical contribution of the study is its use of oral introduction as a technique for implementing Affective IE. Oral introduction is widely used in Japanese classrooms to introduce the text topic or the target linguistic form of the lesson. The purpose of oral introduction in classrooms is to activate students' background knowledge and increase their motivation to read or learn the materials by encouraging students to make a personal connection with the topic or language (Muranoi, 2006). The present study suggests that teachers' oral introductions can facilitate students' positive side of affective processing and text comprehension, subsequently enhancing L2 development.

The Author

Ren Oyama is an assistant professor at Ibaraki University. His research focuses on the effects of affective processing on L2 development in the context of instructed SLA research. His recent publications include "Effects of Cognitive Comparison during Focus-on-Form Instruction on Japanese EFL Learners' Acquisition of Grammar," by R. Oyama, 2017, *The Journal of Asia TEFL, 14*(1), 1-17.

Institute for Liberal Arts Education
Ibaraki University
2-1-1, Bunkyo, Mito, Ibaraki, 310-8512, Japan
Tel: +81-29-228-8520
Email: ren.oyama.theta@vc.ibaraki.ac.jp

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Appendix A

Questionnaire Items

1. What do you think and how do you feel about the topic of the text? Write whatever you think in Japanese.
2. Is it the first time for you have known about the topic of the text? (novelty check)
3. Do you find it good to know about the topic of the text? (pleasantness check)
4. Do you find it helpful to know about the topic of the text in order to achieve your goals in learning English? (goal/need significance check)
5. Did you feel confident in understanding the topic of the text? (coping potential check)
6. Do you find it helpful to know about the topic of the text in order to approach your self-image in using English? (self compatibility check)
7. Do you think that you should know about the topic of the text as a member of society? (norm compatibility check)

Appendix B

An Example Item from the Verb Test

8. contribute

   (1) この単語を見たことがありますか？　　　はい　・　いいえ

   (2) この単語の意味を選択肢 a 〜 c から 1 つ選んでください。わからない場合は d を選んでください。

             a. 一因となる　　　b. もたらす　　　c. 機能する　　　d. わからない

   (3) この単語を使った英文 a 〜 c の内、英文として正しいと思うものを全て選んでください。わからない場合は d を選んでください。　　（win ＝ 勝利）

       a. The teammate contributed our win.　　　b. The teammate contributed.

       c. The teammate contributed to our win.　　d. わからない