Understanding Protagonist, Causal, and Intentional Links During EFL Narrative Reading

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Abstract

Information in narrative texts is linked by different, multiple dimensions such as protagonist, causality, intentionality, spatiality, and temporality. However, little is known about how English as a foreign language (EFL) students understand different dimensions of narratives during reading. This study explored Japanese EFL students’ understanding of multidimensional links between narrative sentences, focusing on three important dimensions for comprehension: protagonist, causality, and intentionality. In the experiment, 35 Japanese graduates and undergraduates read narrative texts. Some of the texts contained context sentences that are consistent or inconsistent with later target sentences in terms of the three dimensions. Reading times for target sentences revealed that the participants detected inconsistencies in the causality and intentionality dimensions, indicating that they understood causal and intentional links during reading. The participants understood intentional links most stably, suggesting that intentionality has the prominent status in EFL narrative comprehension. By contrast, the participants failed to understand protagonist links.
These findings lead us to propose that EFL readers understand three important dimensions of narratives to different degrees, which provides some implications for EFL reading instruction.

1. Introduction

Building coherent comprehension of narrative texts, known as *situation models*, requires readers to understand not only the meaning of individual sentences but also links between multiple sentences (Kintsch, 1998). Sentences in narratives are linked to each other by means of different, multiple relations (referred to as *dimensions*; Zwaan & Radvansky, 1998); therefore, readers need to understand intersentential links along the several dimensions. These dimensions include the protagonist, or characters’ traits and actions (e.g., *Mary was a junk food lover, and Mary ordered a cheeseburger*); causality, or cause-effect relations between events (e.g., *Sophie painted the walls white, and Sophie found her room light and bright*); and intentionality, or characters’ goals and actions (e.g., *Martin wanted to relax in a warm place, and Martin finally spent his vacation in Hawaii*).

Although many studies have explored narrative comprehension in second-language (L2) reading (e.g., Morishima, 2013; Ushiro et al., 2016), most of them have focused on only one specific dimension (e.g., protagonist), with little attention to the multidimensionality of situation models. Hence, there is only limited empirical evidence of how L2/English as a foreign language (EFL) readers understand different dimensions of narratives, and how they should be supported in doing so. To address this gap, this study examined whether and how Japanese EFL readers understand intersentential links along multiple dimensions of narratives. This study’s findings would reveal the characteristics of multidimensional situation models in EFL reading, such as the dimensions in which readers understand intersentential links more or less stably. It would also contain implications for reading instruction tailored to different dimensions of narratives.

1.1 Different Dimensions of Situation Models

Zwaan and Radvansky (1998) proposed the multidimensionality of situation models in their comprehension theory of the *event-indexing model*. This model holds that the elaborated situation model involves understanding intersentential links along the five dimensions: protagonist, intentionality, causality, spatiality, and temporality. The model also posits that, among these dimensions, the first three (protagonist, causality, and intentionality) are particularly important for comprehension. Thus, as a first step to explore the multidimensionality of EFL readers’ situation models, we focused on these three dimensions, which are explained in detail below.

First, the protagonist dimension is defined as links between characters’ traits and actions. The event-indexing model holds that the protagonist dimension is important because narrative stories usually revolve around a protagonist. Indeed, both first-language (L1) and L2 readers have been
found to understand links between characters’ traits and actions during narrative reading (Hakala & O’Brien, 1995; O’Brien, Rizzella, Albrecht, & Halleran, 1998; Ushiro et al., 2016).

Second, the causality dimension is defined by physical cause-effect links between story events. According to the event-indexing model, causality is important because it explains why a story event leads to or results from other events, thus providing physical reasons for linking pieces of information. There is considerable evidence that L1 readers understand causal links between story events during reading (e.g., Myers, Shinjo, & Duffy, 1987; Singer, Halldorson, Lear, & Andrusiak, 1992). In the L2 context, Takaki (2014) showed that Japanese university students understood causal links during reading, but high school students did not. This suggests that causality is indeed an important dimension of EFL reading comprehension, and also that readers’ degrees of understanding can be affected by their reading proficiency.

Finally, the intentionality dimension is defined by links between characters’ goals and their actions. Besides the event-indexing model, the causal network model emphasizes the importance of intentionality in narrative comprehension (Langston & Trabasso, 1999; Trabasso & Magliano, 1996). The causal network model assumes that situation model construction proceeds mainly by readers’ understanding of why a character performs a given action. Hence, intentional information, which is directly linked to goal-action relations, is likely to attract readers’ attention. Indeed, L1 readers are reported to routinely link characters’ goals and actions as they proceed through texts (Magliano, Trabasso, & Graesser, 1999; Tapiero, van den Broek, & Quintana, 2002). Similarly, Ushiro et al. (2014) demonstrated that Japanese university students inferred characters’ goals based on their actions, indicating that intentionality is understandable even to EFL readers.

Accordingly, all three dimensions of protagonist, causality, and intentionality are theoretically considered to be vital for comprehension. Note that, however, some empirical studies have demonstrated that readers understand different dimensions to varying degrees. For example, Tapiero et al. (2002) reported that intentional links received more attention than causal links from L1 readers. Likewise, Nahatame (2013) demonstrated that EFL readers made inferences more easily about intentional information than causal information. Such superiority of intentionality over causality is explained by the fact that goal-action relations are embedded in ordinary readers’ daily experiences, and thus familiar to them (Mulder, 2008). These findings suggest that EFL readers’ understandings may differ among dimensions. However, there is still limited L2 research comparing understandings of two or more dimensions. Addressing this possibility requires a methodology that can simultaneously compare readers’ levels of understanding for each one. The following section describes such a method.

1.2 Inconsistency-Detection Paradigm

To assess how well readers understand intersentential links, researchers have used a methodology called the inconsistency-detection paradigm (IDP; O’Brien et al., 1998; Wassenburg, Beker, van den Broek, & van der Schoot, 2015). For example, consider the text in Table 1. Readers
read a target sentence (e.g., “Mary ordered a popular cheeseburger and French fries.”) after context sentences that provide a consistent or an inconsistent description to the target sentence (e.g., “She always wanted to eat fantastic junk food.” or “She had been a strict vegetarian for 10 years.”). If readers understand the link between the context and target sentences, they should detect the inconsistency between those sentences in the inconsistent condition (i.e., it is unnatural that a vegetarian ordered a cheeseburger). The core assumption of the IDP is that such inconsistency detection leads to longer reading times for target sentences in the inconsistent condition than in the consistent condition (called the inconsistency effect), due to the comprehension difficulty and additional processing associated with the inconsistency. We employed the IDP because it allows us to assess whether the participants’ understandings differ among the three dimensions by manipulating the dimensions of context and target sentences.

### Table 1
An Example Protagonist Text in the Inconsistency-Detection Paradigm

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Mary was meeting a friend for lunch at the restaurant.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td>Mary always wanted to eat fantastic junk food. She would never be serious about her diet. She loved meat and anything cooked with oil. (Consistent) Mary had been a strict vegetarian for 10 years. She was always very serious about her diet. She would not eat anything cooked with oil. (Inconsistent)</td>
</tr>
<tr>
<td>Filler</td>
<td>When her friend arrived, Mary read the menu and called the waiter.</td>
</tr>
<tr>
<td>Target</td>
<td>Mary ordered a popular cheeseburger and French fries.</td>
</tr>
<tr>
<td>Post-target</td>
<td>After they ordered, they began to chat again.</td>
</tr>
</tbody>
</table>

Most of the past studies using the IDP focused on the protagonist dimension. They showed that L1 readers detect protagonist inconsistencies stably during reading, even when context and target sentences are separated by several sentences (Hakala & O’Brien, 1995; O’Brien et al., 1998). By contrast, L2 readers were found to detect such inconsistencies when target and context sentences were separated by a single sentence (like the text in Table 1), but not by multiple sentences (Ushiro et al., 2016). It was hypothesized that L2 readers’ difficulty with inconsistency detection is due to their limited cognitive resources for linking sentences (Morishima, 2013).

As for the causality and intentionality dimensions, such IDP studies have been conducted exclusively with L1 readers. They reported that both causal and intentional inconsistencies are detected during L1 reading (causality: Wassenburg et al., 2015; intentionality: Poynor & Morris, 2003). In L2 reading research, some studies have shown that causal and intentional links are understandable to L2 readers (Nahatame, 2013; Takaki, 2014); however, no L2 study has used the IDP to explore these dimensions.

In sum, studies exploring the multidimensionality of situation models have been conducted mostly with L1 readers. Moreover, L2 research has mostly targeted one specific dimension (e.g., protagonist); only a limited amount of L2 research has simultaneously examined two or more
dimensions in a single experiment. Finally, past L2 studies have used different methodologies (some used the IDP, whereas others did not), making it impossible to compare their results in parallel. Consequently, the existing findings do not allow a definitive conclusion of how L2 readers understand intersentential links along multiple dimensions.

To fill in this gap, this study aimed to explore whether and how EFL readers understand intersentential links along multiple dimensions of narratives. We employed the IDP to compare the extent of readers’ understanding of protagonist, causal, and intentional dimensions. By doing so, this study sought to clarify the multidimensionality of EFL readers’ situation models that remained unclear in past studies. In addition, we included readers’ levels of English reading proficiency as a variable, following Takaki’s (2014) finding that this affects understandings of causality. Therefore, we formulated the following research question (RQ).

RQ: Do EFL readers with different English reading proficiency detect protagonist, causal, and intentional inconsistencies during reading of narrative texts?

The event-indexing model predicts that readers should detect inconsistencies in all three dimensions, because they are all important for comprehension (Zwaan & Radvansky, 1998). However, given EFL readers’ cognitive limitations, the extent of their inconsistency detection might differ among the dimensions; for example, based on the studies reporting the superiority of intentionality over causality (Nahtame, 2013; Tapiero et al., 2002), it is possible that EFL readers might detect inconsistencies of some dimensions more stably than others.

2. Method

2.1 Participants

Thirty-five Japanese university students participated in this study (23 females and 12 males; average age = 20.11, range = 18 to 24). Their majors included engineering, medical sciences, medicine, psychology, science and so on. All the participants were native speakers of Japanese who had learned English at least for six years in Japanese formal education.

Their general English proficiency was estimated to range from intermediate to advanced, based on their self-reported standardized test scores: the TOEIC listening and reading test ($M = 806.88, SD = 63.24$, range = 700 to 910); the TOEFL ITP test ($M = 493.20, SD = 31.70$, range = 470 to 550); the TOEFL iBT test ($M = 89.80, SD = 19.87$, range = 69 to 117); and the EIKEN test (Grade 4 to Grade 1: Grade 4, $n = 1$; Grade 3, $n = 2$; Grade Pre-2, $n = 4$; Grade 2, $n = 12$; Grade Pre-1, $n = 2$; Grade 1, $n = 2$). Note that 30 participants reported at least one of the scores, and that five participants reported none of the scores.
2.2 Materials

**English reading proficiency test.** To assess the participants’ L2 reading proficiency, an English reading proficiency test was constructed. The test items were collected from retired copies of the reading subsection of the EIKEN test (Obunsha, 2005a, 2005b), which is widely used as a standardized English test and is familiar to Japanese EFL learners. The EIKEN test has different grades with different levels of difficulty, thus allowing us to select appropriate test items based on the participants’ English proficiency. Given that the participants were university students, and that Grades 2 and Pre-1 are recognized as a benchmark for high school graduates and intermediate university students, respectively, this study adopted four passages from Grade 2 with 20 multiple-choice questions (i.e., each passage was accompanied by five questions), and two passages from Grade Pre-1 with eight questions (i.e., each passage was accompanied by four questions). The reliability of the test was acceptable (Cronbach’s \( \alpha = .80 \)).

**Reading materials.** A total of 51 narratives were collected from the previous studies (e.g., Poynor & Morris, 2003; Wassenburg et al., 2015). These narratives included 30 experimental texts. Every 10 experimental texts were manipulated with consistencies in their protagonist, causal, or intentional dimensions (details are provided below). Besides, 20 distractor texts were included to distract the participants from the research intention, and the rest was one practice text. Tables 2, 3, and 4 show sample texts describing protagonist, causality, and intentionality, respectively.

Because the focus of this study was on discourse-level comprehension, not on lexical or syntactic items, the texts were revised so that EFL readers would not have difficulty with word- or sentence-level understanding. Specifically, low-frequency words at Level 5 or above on the JACET 8000 list (Japan Association of College English Teachers, 2003) were replaced with high-frequency words at Level 4 or below. Furthermore, sentences with complicated structures were paraphrased with simple ones. Then the lengths of the experimental texts were controlled across the conditions, resulting in the following numbers of words as a function of the dimension and the consistency: protagonist \((M = 48.20\text{ words}, SD = 2.25 \text{ for consistent}; M = 49.30\text{ words}, SD = 1.83 \text{ for inconsistent})\); causality \((M = 48.10\text{ words}, SD = 2.23 \text{ for consistent}; M = 48.00\text{ words}, SD = 2.40 \text{ for inconsistent})\); and intentionality \((M = 48.00\text{ words}, SD = 2.05 \text{ for consistent}; M = 48.20\text{ words}, SD = 2.04 \text{ for inconsistent})\).

All the texts consisted of the five sentences: (a) an introduction introducing settings, (b) a context describing one of the three dimensions (i.e., protagonist, causality, and intentionality) consistent or inconsistent with a later target sentence, (c) a filler separating the context and target sentence, (d) a target relative to the context sentence, and (e) a closing sentence concluding the story. Although some past studies used two or more filler sentences, the present study used a single sentence as filler based on Ushiro et al.’s (2016) finding that EFL readers’ inconsistency detection was observed only with a text with a single filler sentence, but not for one with multiple filler sentences.
Table 2

An Example Protagonist Text

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Mary was meeting a friend for lunch at the restaurant.</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>She always wanted to eat fantastic junk food. (Consistent)</td>
</tr>
<tr>
<td></td>
<td>She had been a strict vegetarian for 10 years. (Inconsistent)</td>
</tr>
<tr>
<td><strong>Filler</strong></td>
<td>When her friend arrived, Mary read the menu and called the waiter.</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Mary ordered a popular cheeseburger and French fries.</td>
</tr>
<tr>
<td><strong>Closing</strong></td>
<td>After they ordered, they began to chat again.</td>
</tr>
</tbody>
</table>

Table 3

An Example Causality Text

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Sophie had recently moved into a new house.</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>She painted the walls white and got a new white carpet. (Consistent)</td>
</tr>
<tr>
<td></td>
<td>She painted the walls black and got a new black carpet. (Inconsistent)</td>
</tr>
<tr>
<td><strong>Filler</strong></td>
<td>Sophie was very pleased with her new house.</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Sophie found her new room very light and bright.</td>
</tr>
<tr>
<td><strong>Closing</strong></td>
<td>She felt relaxed as soon as she entered her home.</td>
</tr>
</tbody>
</table>

Table 4

An Example Intentionality Text

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Martin had been looking forward to his vacation.</td>
</tr>
<tr>
<td><strong>Context</strong></td>
<td>He wanted to relax under the sun in a warm place. (Consistent)</td>
</tr>
<tr>
<td></td>
<td>He wanted to enjoy winter sports at a cold place. (Inconsistent)</td>
</tr>
<tr>
<td><strong>Filler</strong></td>
<td>Martin spent a lot of time looking for the best place.</td>
</tr>
<tr>
<td><strong>Target</strong></td>
<td>Martin finally spent his vacation at a beach in Hawaii.</td>
</tr>
<tr>
<td><strong>Closing</strong></td>
<td>It was the best choice among the places he compared.</td>
</tr>
</tbody>
</table>

Context sentences in the experimental texts were presented in either the consistent or inconsistent condition according to their consistency with target sentences. These consistencies were related to characters’ traits and actions in the protagonist texts (e.g., Mary was a junk food lover/a vegetarian → She ordered a cheeseburger); the cause-effect relations of physical phenomenon in the causality texts (e.g., Sophie painted the walls white/black, and got a new white/black carpet → She found her room very light and bright); and characters’ goal-action relations in the intentionality texts (e.g., Martin wanted to spend his vacation in a warm/cold place. → He finally spent his vacation in Hawaii). The practice and distractor texts were presented only in the consistent condition. The validity of this consistency manipulation was confirmed in a pilot study (see the next subsection).

To motivate the participants to read for understanding, each text was paired with a yes-no comprehension question. Each one queried literal understanding of a sentence, except context and
target sentences (e.g., “Was Mary meeting her husband for lunch?” for the passage in Table 2). The correct answer was “yes” for half of the questions, and “no” for the other half.

Two counterbalanced material sets of texts were created, each of which included 30 experimental texts (i.e., 10 texts for protagonist, causality, and intentionality, respectively), plus 20 distractor texts. In each situational dimension, five experimental texts were presented in the consistent condition, and the other five experimental texts were in the inconsistent condition. Following a Latin square, the experimental texts were presented in the consistent condition in one of the material sets and in the inconsistent condition in the other material set, and vice versa.

**Pilot study.** The purpose of the pilot study was to confirm the validity of the consistency manipulation of the experimental texts (i.e., the context and target sentences were less consistent in the inconsistent condition than in the consistent condition). Eighteen Japanese university students read the 30 experimental texts written on paper; after reading each text, they were asked to rate how likely events in target sentences were to occur, considering corresponding context sentences (the likelihood rating) on a 5-point Likert scale (1 = low, 2 = relatively low, 3 = neither low nor high, 4 = relatively high, 5 = high). This likelihood rating procedure followed past IDP studies (e.g., O’Brien et al., 1998; Ushiro et al., 2016). Table 5 shows the results of the likelihood ratings.

<table>
<thead>
<tr>
<th></th>
<th>Protagonist</th>
<th>Causality</th>
<th>Intentionality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>95% CI</td>
<td>SD</td>
</tr>
<tr>
<td>Consistent</td>
<td>4.36</td>
<td>[4.25, 4.46]</td>
<td>0.23</td>
</tr>
<tr>
<td>Inconsistent</td>
<td>1.36</td>
<td>[1.24, 1.47]</td>
<td>0.25</td>
</tr>
</tbody>
</table>

A two (consistency) × three (dimension) two-way repeated analysis of variance (ANOVA) yielded a significant main effect of consistency, $F(1, 27) = 3136.65, p < .001, \eta^2 = .97$, with lower likelihood ratings for the inconsistent condition than for the consistent condition across the three dimensions. The analysis shows neither a main effect of the dimension, $F(2, 27) = 1.04, p = .367, \eta^2 = .05$, nor a Consistency × Dimension interaction, $F(2, 27) = 0.95, p = .401, \eta^2 = .02$. These results confirm the validity of the consistency manipulation; context and target sentences were less consistent in the inconsistent condition than in the consistent condition, and this was the case for all the three dimensions.

**2.3 Procedure**

The experiment was conducted from August to October, 2016, on an individual basis. First, an experimenter explained the general purpose and procedure of the experiment to the participants, and obtained their informed consent (approved by the research ethics committee of University of
Tsukuba). Before the reading task, the participants read a practice passage and answered an associated comprehension question so that they could familiarize themselves with the procedure.

In the reading task, each passage was presented sentence by sentence on a computer screen. First, the signal “Ready?” was presented on the left center of the screen. The participants’ pressing the “yes” button on the Response Pad RB-730 (Cedrus, U.S.) caused the first sentence to appear. The participants were asked to read each sentence for comprehension and press the “yes” button when they understood the presented sentence. Reading times for a target sentence were recorded with SuperLab 5.0 (Cedrus, U.S.). After the concluding sentence was finished, a fixation (???) appeared for 500 ms. Finally, a comprehension question was presented. The participants were instructed to answer the question by pressing a “yes” or a “no” button, and their response accuracy was recorded. After the comprehension question, a correct-or-incorrect feedback was given to the participants to encourage their careful reading. Subsequently, a 1000-ms blank was followed by another “Ready?” prompt. This sequence was repeated for all 50 passages, which were presented in a random order. To avoid the participants’ fatigue, a 5-min break was given after every 17 passages. When all the texts were finished, the participants took the L2 reading proficiency test for 30 min. The average time to complete the experiment was 70 min.

2.4 Scoring and Analysis

Prior to the analysis, the reading times for target sentences (hereafter, target reading times) were converted to ms per syllable to account for differences in sentence length. Data were removed when the participants mistakenly skipped over either target or context sentences (2.10% of the dataset). We checked whether there existed target reading times longer than $M + 3SD$ in each experimental condition, but there was no such outlier.

To investigate whether the inconsistency effect appeared in the texts of each dimension, we tested target reading times with a $2 \times 2 \times 3$ ($\text{proficiency: high, low} \times \text{consistency: consistent, inconsistent} \times \text{dimension: protagonist, causality, intentionality}$) mixed ANOVA. We interpreted the results by combining statistical tests with effect sizes and confidence intervals (CIs). Note again that longer target reading times in the inconsistent condition than in the consistent condition suggest that the participants detected inconsistencies in the texts and therefore understood intersentential links during reading.

3. Results

3.1 English Reading Proficiency Test

Table 6 shows descriptive statistics of the participants’ scores on the English reading proficiency test. The participants were divided by a median split ($Mdn = 16$) into the high- and the low-proficiency groups. An independent $t$ test confirmed that the high-proficiency group scored significantly higher than the low-proficiency group, $t(33) = 6.92$, $p < .001$, $d = 2.34$. 

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Table 6

Means, 95% CIs, and Standard Deviations for the English Reading Proficiency Test

<table>
<thead>
<tr>
<th>Proficiency</th>
<th>n</th>
<th>M</th>
<th>95% CI</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>17</td>
<td>12.56</td>
<td>[11.29, 13.83]</td>
<td>2.75</td>
<td>5.00</td>
<td>16.00</td>
</tr>
<tr>
<td>High</td>
<td>18</td>
<td>19.53</td>
<td>[18.01, 21.05]</td>
<td>3.20</td>
<td>17.00</td>
<td>28.00</td>
</tr>
<tr>
<td>Total</td>
<td>35</td>
<td>15.94</td>
<td>[14.42, 17.47]</td>
<td>4.60</td>
<td>5.00</td>
<td>28.00</td>
</tr>
</tbody>
</table>

Note. CI = confidence interval, possible maximum score = 28.

3.2 Reading Times for Target Sentences

Scores on comprehension questions were generally high ($M = 90.58$, $SD = 13.29$), confirming that the participants read the texts for understanding (no participants showed a correct proportion of 70% or less). Table 7 shows the mean target reading times for the protagonist, the causality, and the intentionality texts as a function of the consistency condition and the proficiency groups.

Table 7

Means, 95% CIs, and Standard Deviations of Reading Times for Target Sentences (Milliseconds per Syllable)

<table>
<thead>
<tr>
<th></th>
<th>Protagonist</th>
<th></th>
<th>Causality</th>
<th></th>
<th>Intentionality</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>95% CI</td>
<td>M (SD)</td>
<td>95% CI</td>
<td>M (SD)</td>
<td>95% CI</td>
</tr>
<tr>
<td>Consistent</td>
<td>443.08 (167.47)</td>
<td>[365.72, 520.45]</td>
<td>437.33 (174.82)</td>
<td>[356.57, 518.09]</td>
<td>354.94 (108.76)</td>
<td>[304.69, 405.18]</td>
</tr>
<tr>
<td>Inconsistent</td>
<td>447.98 (110.28)</td>
<td>[397.04, 498.93]</td>
<td>467.07 (116.67)</td>
<td>[413.17, 520.97]</td>
<td>445.76 (133.12)</td>
<td>[384.26, 507.25]</td>
</tr>
<tr>
<td>Consistent</td>
<td>320.47 (98.11)</td>
<td>[273.83, 367.11]</td>
<td>298.86 (89.51)</td>
<td>[256.31, 341.41]</td>
<td>246.52 (64.53)</td>
<td>[215.84, 277.19]</td>
</tr>
<tr>
<td>Inconsistent</td>
<td>370.25 (106.49)</td>
<td>[319.63, 420.87]</td>
<td>365.87 (126.96)</td>
<td>[305.52, 426.22]</td>
<td>324.17 (99.52)</td>
<td>[276.86, 371.48]</td>
</tr>
<tr>
<td>Consistent</td>
<td>383.53 (149.73)</td>
<td>[333.93, 433.13]</td>
<td>370.07 (154.86)</td>
<td>[318.77, 421.38]</td>
<td>302.28 (104.39)</td>
<td>[267.69, 336.86]</td>
</tr>
<tr>
<td>Inconsistent</td>
<td>410.23 (113.89)</td>
<td>[372.50, 447.96]</td>
<td>417.92 (130.48)</td>
<td>[374.69, 461.14]</td>
<td>386.70 (131.62)</td>
<td>[343.10, 430.30]</td>
</tr>
</tbody>
</table>

Total (N = 35)
The ANOVA indicated a significant main effect of proficiency, \(F(1, 33) = 10.65, p = .003, \eta_G^2 = .19\), with shorter reading times for the high- than for the low-proficiency group. More importantly, a significant Dimension × Consistency interaction was found, \(F(2, 66) = 3.69, p = .030, \eta_G^2 = .01\). Any other effects, including the interaction effect of proficiency and consistency, \(F(1, 33) = 0.82, p = .373, \eta_G^2 = .01\), were not significant.

To interpret the observed Dimension × Consistency interaction, we performed Bonferroni-adjusted post-hoc tests. The results showed that target reading times were significantly longer in the inconsistent condition than in the consistent condition for causality, \(F(1, 33) = 7.89, p = .008, \eta_G^2 = .04\), and the intentionality texts, \(F(1, 33) = 22.97, p < .001, \eta_G^2 = .15\) (see Figure 1). These inconsistency effects indicate that the participants detected inconsistencies during reading the causality and the intentionality texts. By contrast, the inconsistency effect was not significant for the protagonist texts, \(F(1, 33) = 2.28, p = .141, \eta_G^2 = .01\), suggesting that the participants failed to detect inconsistencies during reading the protagonist texts.

It should also be noted that the size of the inconsistency effect was larger for the intentionality texts (\(\eta_G^2 = .15\)) than for the causality texts (\(\eta_G^2 = .04\)). Additionally, the CIs of reading times showed no overlap between the consistent [267.69, 336.86] and the inconsistent conditions [343.10, 430.30] for the intentionality texts, whereas they overlapped between the consistent [318.77, 421.38] and the inconsistent [374.69, 461.14] conditions for the causality texts. Given these results, it is possible to state that the observed inconsistency effect was particularly large for the intentionality texts compared to the causality texts.

4. Discussion

The analysis of target reading times revealed that the participants understood intersentential links in the causality and the intentionality dimensions, but not the protagonist dimension. The results for the causality and intentionality dimensions are in line with previous literature that emphasizes the importance of these two dimensions in situation models (e.g., Langston & Trabasso, 1999; Zwaan & Radvansky, 1998). As described in the literature review, causality and intentionality explain why narrative events occurred, and why characters took given actions, respectively (Langston & Trabasso, 1999; Singer et al., 1992). In other words, these dimensions provide physical
and motivational reasons for linking pieces of narrative information, thus playing an important role in building coherence between sentences. For this reason, causality and intentionality were more likely to attract the participants’ attention during reading.

In particular, as suggested by the largest inconsistency effect, the participants understood intentional links most stably. This finding is consistent with the comprehension model supposing that narrative comprehension is centered around intentionality (Langston & Trabasso, 1999). Furthermore, past research has empirically proven that intentionality received greater attention than causality during reading (Tapiero et al., 2002), and that intentional information was easier to infer than causal information (Nahatame, 2013), due to the high familiarity of goal-action relations to readers (Mulder, 2008). The present participants’ strongest sensitivity to intentional links is in accordance with these existing findings, emphasizing that intentionality has the prominent status in EFL readers’ narrative comprehension.

As opposed to the causality and intentionality dimensions, the participants failed to understand links in the protagonist dimension. This stands in contrast to past L2 research reporting that EFL readers detected protagonist inconsistencies when target and context sentences were separated by one sentence (Ushiro et al., 2016). This inconsistency can be explained in terms of two perspectives: (a) the amount of information about characters’ traits and (b) methodologies to assess reading times. First, the protagonist texts in this study included just a single context sentence stating the most important character trait (e.g., vegetarian; see Table 2), whereas those in previous studies had three to four context sentences (see Table 1) elaborating on character traits (e.g., Ushiro et al., 2016). We decided to adopt a single context sentence in this study, because the original causality and intentionality texts derived from past studies included a single context sentence (Poynor & Morris, 2003; Wassenburg et al., 2015); therefore, we needed to match the number of context sentences between the texts to minimize the differences in stories. However, for protagonist texts, information from one sentence might be insufficient to determine specific character traits, because character traits are usually elaborated on by various descriptions or episodes as a story unfolds (Zwaan & Radvansky, 1998).

Second, Ushiro et al. (2016), who observed EFL readers’ inconsistency detection for the protagonist texts, used an eye-tracking measure. In this method, readers can read the entire text at once and look back to previous sentences. By contrast, the self-paced reading used in this study presented one sentence at a time, meaning that looking back to previous sentences was impossible. Such limited accessibility to prior text might be cognitively demanding, which in turn made linking target and context sentences difficult. Indeed, Morishima (2013), who used the self-paced reading, also failed to observe the inconsistency effect for EFL students reading protagonist texts similar to the ones we used.

In summary, it was shown that the extent of the participants’ understanding differed according to the type of dimension. Intentional links were understood most stably, followed by causal links. Protagonist links were least understood. This is in contrast with the event-indexing model, which
supposes that these three dimensions are all important for situation model construction (Zwaan &
Radvansky, 1998). This divergence from the event-indexing model may be explained in terms of
the limitation of cognitive resources. In EFL reading, processing individual sentences draws many
cognitive resources from relational processing, including understanding intersentential links
(Morishima, 2013). Consequently, the participants could not direct their attention equally to all types
of information, resulting in the observed order among the three dimensions (i.e., intentionality >
causality > protagonist). This finding highlights the characteristics of multidimensional situation
models with regard to EFL readers and demonstrates that they do not necessarily understand the
important dimensions of narratives to the same degree.

We should also consider the lack of influence of the participants’ reading proficiency. Unlike
Takaki (2014), who reported the proficiency effect on the understanding of causality, this study
yielded no significant difference in inconsistency detection between the high- and low-proficiency
groups. Note that Takaki’s study compared the comprehension between high school and university
students. Thus, the proficiency gap between two participant groups in this study might be smaller
than that in Takaki’s study, not substantial enough to affect the results. Additionally, it is possible
that other reader factors than reading proficiency might matter for the inconsistency detection. For
example, Wassenburg et al. (2015) reported that detecting inconsistencies involves self-monitoring
of comprehension, which can be influenced by factors such as readers’ metacognitive skills and the
evaluative mindset. These factors are not necessarily dependent on reading proficiency. Because
these possibilities are difficult to examine with the present findings alone, they need to be verified
by future research.

5. Conclusion and Implications

This study examined how well EFL readers understand intersentential links during narrative
reading in terms of the multidimensionality of situation models. The findings can be summarized in
the following three statements. First, the participants understood intentional and causal links during
reading. Second, the participants were most sensitive to intentional links. Third, protagonist links
were difficult to understand, compared to the other two dimensions. So far, L2 studies have mostly
focused on one specific dimension of situation models (e.g., Morishima, 2013; Ushiro et al., 2016),
with little information available on how L2 readers understand different dimensions of narratives.
Addressing this gap, the present findings provide new insights into the multidimensionality of
situation models in EFL readers and suggest that these readers understand three important
dimensions of narrative texts to different degrees.

In addition to the theoretical implications, the present findings offer some implications for
reading instruction. First, as the participants understood causal and intentional links during reading,
these dimensions are likely to be more accessible by EFL students in general. As causal and
intentional links are understandable to students, these two dimensions are useful for introducing the
notion of relational text comprehension to them. Furthermore, when teachers want students to engage in a post-reading activity such as retelling, students are likely to perform better if they are given characters’ goals, or results of some narrative events, as a cue. In this kind of task, the understood causal or intentional links would allow students to effectively reconstruct text content, because these links frame the main storyline of the narratives.

Still, given the nature of these two dimensions, some caution is needed while applying the present findings to instructional practices. For causality, understanding of causal relations between events sometimes requires certain background knowledge. When a narrative contains a phenomenon that is unfamiliar to students, it is advisable to explain the necessary background information beforehand (e.g., White color makes a place look light and bright.). For intentionality, characters’ goals are not always explicitly stated. Readers then need to infer the characters’ goals from their actions, which is usually difficult for low-proficiency students. For such students, focusing on goal-oriented actions (e.g., asking students “Why do you think Martin spent his vacation at a beach in Hawaii?”) would be helpful. When these interventions work successfully, students would then understand the causal and intentional links on their own, as found in this study.

Finally, students may need support in their understanding of protagonist links, as suggested by the present participants’ failure to understand those links during reading. Possible interventions include explicitly directing students’ attention to characters’ traits or attributes, for example, by instructing students to mentally visualize what the character is like (Horiba, 2013) or having them predict what the character will do based on the characters’ trait. Also, by asking questions pertaining to the characters’ trait-action relations before reading (e.g., Read the text to answer “Why did Mary order a cheeseburger?”) teachers may be able to elicit students’ conscious efforts to understand protagonist links, and search for the relevant character descriptions (e.g., Mary always wanted to eat junk food.).

6. Limitations and Suggestions for Future Research

We must note that this study has several limitations that merit attention for future research. First, as noted in the discussion, the self-paced reading method used here prevented the participants’ looking back to previous sentences. This methodological limitation may decrease the ecological validity of the results, because readers usually try to look back at the prior context when they encounter inconsistencies. To confirm the generalizability of the present findings, additional research needs to be done with measures that can assess a wider range of reading behaviors, including reading back (e.g., eye-tracking), and examine whether different results will emerge.

Second, the present experimental texts were short, consisting of only five sentences. However, L2 readers usually face much longer narratives, including several hundred words or more. Understanding intersentential links in such longer narratives can be affected by additional text factors, including the distance between the contradicting sentences (Ushiro et al., 2016). At the same
time, the understanding of intersentential links may be facilitated by increasing elaborative descriptions on relevant information (Smith & O’Brien, 2016). Future research should address the possible effects of these text factors by employing longer narratives.

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