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Abstract

This study investigated L2 readers' monitoring of local and global coherence along the protagonist, causal, and intentional dimensions of narratives. Japanese university students (N = 18) read English narratives containing context and target sentences separated by one (the local condition) or four filler sentences (the global condition) with their eye movements recorded. The results showed that readers constantly monitored protagonist coherence; however, they had increased difficulty monitoring causal and intentional coherence.

Keywords: L2 reading, narrative comprehension, situation models, coherence monitoring, eye tracking

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Constructing coherent situation models is essential for successful narrative comprehension. Readers build these models by monitoring coherence along five kinds of information described within texts (*protagonist*, *causality*, *intentionality*, *temporality*, and *spatiality*) called situational dimensions (Zwaan & Radvansky, 1998). Amongst these, protagonist (characters' trait–action links), causality (physical cause–effect links), and intentionality (characters' goal–action links) play particularly important roles in the situation-model construction. By constructing such situation models, readers can achieve coherence of their understanding at not only a local (between adjacent sentences) but also a global (distant sentences in texts) level.

In previous first-language (L1) studies applying an inconsistency-detection paradigm (Hakala & O'Brien, 1995), readers detected intersentential inconsistencies about protagonist, causality, and intentionality when inconsistent sentences were near each other (*local coherence*), indicating that L1 readers stably monitored dimensional local coherence (e.g., van der Schoot et al., 2012). Moreover, Hakala and O'Brien (1995) reported that L1 readers monitored inconsistencies of protagonist-related information even when inconsistent sentences were distant from each other (*global coherence*).

Similar with L1 researchers, we investigated how second-language (L2) readers monitored coherence in narratives (Ushiro et al., 2019). Although we found that L2 readers monitored local coherence along the situational dimensions of the protagonist, causality, and intentionality in different ways (strategically vs. automatically), it remains unclear whether and how they monitored global coherence, especially for the above dimensions. Given that

monitoring global coherence requires readers' activation of pre-read information (Tapiero, 2007), it might be difficult for L2 readers to monitor global coherence due to their limited cognitive resources lacking rich situation models. These findings have interested us in investigating to what extent L2 readers can monitor coherence of narrative at different levels, which may lead to better understanding of readers and instruction in L2 classroom.

We used an eye tracker to specify readers' processing during reading since looking back (i.e., total count or frequency of regressions to the prior context sentence after the target sentence is fixated on at least once) plays an essential role in monitoring dimensional coherence (Hyönä et al., 2003). We adopted an *eye-movement matrix* showing "how often readers move their eyes from possible starting to destination sentences (Hyönä et al., 2003, p. 328)." Thus, the present study explored how Japanese L2 readers monitored local and global coherence along the protagonist, causality, and intentionality dimensions.

Method

Participants and Apparatus

Participants were 18 Japanese university students with corrected-to-normal vision. Three participants' data were excluded because of inaccurate measurements. Participant's general English proficiency was estimated to be at the basic to independent level (A1 to B2) per the Common European Framework of Reference for Language, according to their self-reported standardized test scores. Their eye movements were recorded using EyeLink® 1000 Plus from SR Research Ltd. (Ontario, Canada), and they sat 51 cm away from the camera and 70 cm from a 21.5-inch computer screen (screen resolution: 1920 × 1080).

Materials and Procedure

Twenty-four experimental texts (eight texts each for the protagonist, causality, and intentionality dimensions) from previous studies (e.g., Wassenburg et al., 2015) were adopted and revised for L2 readers. Table 1–3 show examples of experimental texts for each dimension.

Table 1

An Example of Protagonist Texts

1. Introduction	Haruka met her boyfriend for lunch at a restaurant.
2. Context	She always wanted to eat fantastic junk food. (Consistent) She had been a strict vegetarian for 10 years. (Inconsistent)
	They read the menu to decide what to eat. (Local)
3. Filler	They read the menu to decide what to eat. It didn't take much time for her to decide. Her boyfriend was so hungry because he didn't have breakfast. So, he chose a large-size dish from the menu. (Global)
4. Target	Haruka first ordered a popular cheeseburger and French fries.
5. Closing	Her boyfriend then ordered a large-size meat spaghetti plate.
Comprehension question	Was Haruka meeting her husband for lunch? －No.

Table 2

An Example of Causal Texts

1. Introduction	Tomoko recently redecorated her living room.
2. Context	She painted the walls white and got a new white carpet. (Consistent) She painted the walls black and got a new black carpet. (Inconsistent)
	She put some pictures on the wall. (Local)
3. Filler	She put some pictures on the wall. She also bought a new sofa and new chairs for the room. She put a large TV on the opposite side of the pictures. In the middle of the room, she placed a coffee table. (Global)
4. Target	Tomoko found her living room to be very light in color.
5. Closing	She felt relaxed as soon as she entered the room.
Comprehension question	Did Tomoko move to a new house? －No.

Table 3

An Example of Intentional Texts

1. Introduction	Daiki had been looking forward to his vacation.
2. Context	He wanted to relax under the sun in a warm place. (Consistent) He wanted to enjoy winter sports at a cold place. (Inconsistent)
	He spent a lot of time looking for the best place. (Local)
3. Filler	He spent a lot of time looking for the best place. He visited a travel agency to talk about his vacation. There, he looked through many pamphlets on vacations. He talked with a travel agent and thought about it a lot. (Global)
4. Target	Daiki finally spent his vacation at a beach in Hawaii.
5. Closing	Being at the beach was his favorite memory in the foreign country.
Comprehension question	Did Daiki look forward to a school trip? －No.

The experimental texts consisted of five sections based on Hakala and O'Brien (1995). A *context* sentence provided information on one of the three dimensions that were consistent or inconsistent with the *target* sentence (consistent/inconsistent conditions, respectively). To

separate target sentences from context sentences, *filler* sentences were presented in either local (one filler sentence) or global conditions (four filler sentences). After the target sentence, a *closing* sentence concluded the story. The texts were accompanied by a comprehension question about explicit information in the text encouraging the participants to read for comprehension.

The procedure comprised: (a) informed consent, (b) calibration of the eye tracker, (c) practice reading, and (d) experimental reading and comprehension questions. The inconsistency and filler conditions of the texts were counterbalanced across participants.

Scoring

After data cleaning, readers' eye-movement path (e.g., 1-2-3-4-5-2) was created. Then, the number of readers' forward and backward eye movements in each dimension, consistency (consistent/inconsistent), and filler (local/global) condition was calculated and summarized as eye-movement matrices based on Hyönä et al. (2003). When more look-backs to context after encountering target sentences were observed in the inconsistent than consistent condition, participants were assumed to detect inconsistencies and process them strategically.

Results

The results of the eye-movement matrices for the local condition (Table 4) showed that more target-to-context look-backs were observed in the protagonist (consistent: 0.8% [the rate of target-to-context look-backs to the sum of eye movements] vs. inconsistent: 2.0%) and the intentional texts (3.2% vs. 3.9%) of the inconcistent conditions than that of consistent conditions. However, such an inconsistent effect was not observed in the causal texts (2.3% vs. 2.1%).

As for global coherence, increased target-to-context look-backs associated with inconsistency were observed only for the protagonist texts (0.3% vs. 1.1%, see Table 5) but not for the intentional (0.5% vs. 0.4%) and causal texts (0.0% vs. 0.0%).

Table 4

*Eye-Movement Matrix for Three Dimensional Texts in Local Conditions (*N = *30)*

	Destination sentence									
	Protagonist									
	Consistent					Inconsistent				
Starting sentence	1	2	3	4	5	1	2	3	4	5
1. Introduction	-	46	2	2	2	-	45	3	5	4
2. Context	11	-	42	3	1	18	-	39	6	6
3. Filler	3	12	-	43	3	1	15	-	39	1
4. Target	6	**2**	13	-	33	6	**6**	12	-	44
5. Closing	6	5	5	9	-	8	11	8	19	-
	Intentionality									
	Consistent					Inconsistent				
Starting sentence	1	2	3	4	5	1	2	3	4	5
1. Introduction	-	50	1	4	1	-	54	3	3	2
2. Context	20	-	43	5	1	24	-	54	5	7
3. Filler	3	11	-	37	1	4	17	-	47	5
4. Target	3	**8**	7	-	33	4	**13**	14	-	35
5. Closing	8	9	3	6	-	5	15	5	18	-
	Causality									
	Consistent					Inconsistent				
Starting sentence	1	2	3	4	5	1	2	3	4	5
1. Introduction	-	51	0	2	1	-	49	2	4	1
2. Context	18	-	42	5	3	22	-	39	4	3
3. Filler	4	14	-	37	1	3	14	-	45	2
4. Target	4	**6**	5	-	35	2	**6**	21	-	39
5. Closing	7	7	12	7	-	3	9	6	19	-

Note. Numbers represent the sum of participants' movement from each starting sentence to destination sentence. The bold, red numbers are target-to-context look-backs. Participants read two texts for each condition, and the analyzed data size was 30.

Table 5

*Eye-Movement Matrix for Protagonist Texts in Global Conditions (*N = *30)*

	Destination sentence							
	Consistent							
Starting sentence	1	2	3	4	5	6	7	8
1. Introduction	-	41	2	1	0	2	1	0
2. Context	12	-	38	0	0	0	0	0
3. Filler (1)	2	8	-	40	2	0	1	0
4. Filler (2)	1	1	10	-	36	2	0	1
5. Filler (3)	0	0	2	11	-	34	1	0
6. Filler (4)	0	2	0	1	6	-	34	2
7. Target	3	**1**	2	1	0	7	-	34
8. Closing	1	1	5	2	4	1	13	-
	Inconsistent							
Starting sentence	1	2	3	4	5	6	7	8
1. Introduction	-	51	7	1	0	0	1	0
2. Context	20	-	38	1	1	3	3	1
3. Filler (1)	5	8	-	40	0	0	0	2
4. Filler (2)	1	2	8	-	44	2	0	0
5. Filler (3)	0	0	2	11	-	42	1	0
6. Filler (4)	1	2	0	0	9	-	44	4
7. Target	3	**5**	0	1	0	10	-	45
8. Closing	2	5	2	6	3	4	16	-

Note. Numbers represent the sum of participants' movement from each starting sentence to destination sentence. The bold, red numbers are target-to-context look-backs. Participants read two texts for each condition, and the analyzed data size was 30.

The results of participants' target-to-context look-back rates in different dimensions and coherence conditions are shown in Table 6.

Table 6

Rates of Participants' Target-to-Context Look-Backs in Different Dimensions and Levels (%)

Dimension	Local Coherence		Global Coherence	
	Consistent	Inconsistent	Consistent	Inconsistent
Protagonist	0.8	2.0	0.3	1.1
Causality	2.3	2.1	0.0	0.0
Intentionality	3.2	3.9	0.5	0.4

Discussion

The results suggest that participants monitored protagonist coherence strategically when the target and context sentences were presented nearby and distantly (local and global coherence). However, participants failed to monitor local coherence of causality and global coherence of intentionality, indicating different dimensions are monitored to different degrees and in different manners. In light of van der Schoot et al.'s (2012) study reporting that less-skilled L1 readers who failed to reactivate prior information during reading could not monitor global coherence, it would be reasonable that L2 readers with limited cognitive resources had difficulty in discourse-level processing on separated sentences (i.e., integration) and failed to monitor global coherence.

Interestingly, however, the protagonist information is relatively salient (Zwaan & Radvansky, 1998) and attracts even L2 readers' attention (Ushiro et al., 2019) resulting in readers' strategic look-back behavior. In sum, although L2 readers construct rich situation models in terms of protagonist in narratives resulting in monitoring global coherence, it is difficult for them to monitor intentional global coherence and causal local and global coherence.

Although this study succeeded in revealing ease differences in terms of global coherence monitoring for multiple dimensions during L2 reading, it should be noted that the sample size of participants and materials was not sufficient due to the preliminary and qualitative nature of this study. Therefore, future research should conduct an experiment with an ample sample size and analyze results statistically. In addition, a more detailed investigation of L2 readers' coherence monitoring by considering learners' proficiency and cognitive capacity during analyses is desired.

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