

Developmental Progression of Referential Resolution in Comprehending Online Texts

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ABSTRACT

The purpose of this study is to examine readers' comprehension as they develop their mental representation of reference in four sequential online texts. A total of 92 college students from three reading classes were recruited to complete the following steps in each text: (1) identify references, (2) draw the relationships between references, and (3) answer reading comprehension test items. Results of this study showed that the correlation between referential resolution and reading comprehension tests ranged from .68 to .90 in four online texts. This indicated that when readers' scores in referential resolution increased, their scores in reading comprehension tests were also raised. Among three groups of readers, the more-proficient readers were able to integrate the references in different parts of the text as a coherent network from text 1 to 4. In contrast, average and less-proficient readers initially did not integrate any reference when reading the first text. They eventually clustered different references and referred them to a correct subject in the final text. The keys to the development of college readers' mental representation of reference lay in whether they were actively engaged in comprehension monitoring and frequently asked for *feedback tool* as a scaffold.

Keywords

Reading strategy; Feedback tool; Trace result; Comprehension monitoring; Reading comprehension

Introduction

Whether a reader is able to construct a comprehensible and coherent mental representation of textual information in memory is central to comprehension (van den Broek & Kremer, 1998; Walsh & John-Laird, 2004). According to Payne and Reader (2006), the construction of mental representation is a necessary step for comprehension. It aids the reader to encode textual information in a clustered way so that the textual information is more likely to be stored into the reader's long-term memory (Potelle and Rouet, 2003). Tea and Lee (2004) also state that the reader's mental map presents his text processing and helps him solve reading difficulties, such as referential resolution.

Referential resolution is the process of searching for events, people, or objects appearing in different parts of a text referring to the same entity (Paterson, Sanford, Moxey, and Dawydiak, 1998). This is essentially difficult for college students who learn English as a Foreign Language (EFL) in Taiwan for they very often fail to recognize the connections among sentences in texts due to the lack of instruction in referential resolution (Bensoussan and Laufer, 1984; Chu, Swaffar, and Charney, 2002). For instance, in a short text "I have a brother. His name is Tom. He is a senior high school student." The mental map of this short text in referential resolution is shown in Figure 1.

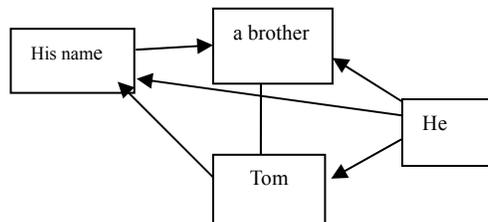


Figure 1. An example of mental map in referential resolution

Referential resolution in this study is defined as a reading strategy applied by the reader to interpret the references that have the same meanings as other elements in a text, such as "his name", "Tom", and "he" refer to "a brother." While resolving the references, the reader is engaged in comprehension monitoring which he monitors, regulates, and evaluates his own reading process (Hartman, 2001). The management and regulation of one's own reading process is helpful for meaning construction of text (Paris and Winograd, 1990).

Comprehension monitoring is the awareness that a reader has about the linguistic forms and their relationships with other elements in a text (Potelle and Rouet, 2003). More-proficient readers are found to plan, predict outcomes, and monitor their reading process (Brown, 1987). Particularly, they are able to detect inconsistencies in reading and commonly look back at and recall the text inconsistencies (Zabrack and Ratner, 1989). The results of Yang's study (2002) also reveal that the more-proficient readers actively engage in monitoring their ongoing reading process as they try to compensate for words that have not been previously decoded. They also employ higher levels of comprehension monitoring in reading such as examining text coherence by internal and external consistency (Baker, 1996).

In contrast, less-proficient readers are indicated to have a lower level of comprehension monitoring (Oakhill & Yuill, 1988). Their lower comprehension monitoring may result from inadequate knowledge and skills in reading comprehension. They commonly have a limited vocabulary and they often fail to comprehend the individual words in a text. As a result, they spend much time and efforts on decoding each word in a sentence rather than comprehending and integrating textual information. Focusing on the decoding process, most less-proficient readers are unaware of connections in linking sentences together (Bensoussan & Laufer, 1984).

Less-proficient readers will not engage in comprehension monitoring unless they are asked to think about their reading process through activities or instruction (Hartley, 2001). The computer assisted learning environment is found to greatly support readers' engagement of comprehension monitoring as it provides explicit modeling and individualized scaffolding (Potelle and Rouet, 2003). The modeling and scaffolding may help readers build the mental map to show their cognitive structure and the meaningful content of the text. This is fundamentally important for EFL college readers in Taiwan as there are about 45 or more students of varying language proficiency levels involved in one class. The large class size limits the classroom teacher from providing the individualized support and guidance and monitoring each reader's progress.

In this study, the computer system first informs students of the goal of incorporating the system in instruction and the types of references a student is asked to identify. It then models the procedure in identifying and resolving reference. A trial section is also provided for students to practice. After these three activities, the system requires students to identify the references in reading an online text and then to figure out the relationship between references by drawing their mental maps. That is, the computer system allows the reader to recognize and clarify the meanings of the references in a text. If students encounter difficulties in identifying and resolving references, a *feedback tool* is provided for their scaffolding. The *feedback tool* provides three candidate references for each referential device that needs correction back to students. Finally, students are asked to finish an online reading comprehension test in each text.

The purpose of this study is thus to examine readers' comprehension as they develop their mental representation of reference in four sequential online texts. Three research questions are addressed.

1. How do EFL readers with different English reading proficiency level develop their mental representation of reference in four sequential online texts?
2. How does the incorporation of system in instruction help EFL readers develop their mental representation of reference in comprehending texts?
3. How does the development of readers' mental representation of reference assist their comprehension of online texts?

Method

Participants

A total of 92 junior and senior college students were recruited from three reading classes in a technological university in central Taiwan. Their language proficiency levels were identified by their reading scores in a simulated online exam *Testing of English for International Communication* (TOEIC). The maximum achievable score in the reading section of the online exam was 200.

The frequency distribution of all the participants' score was used to divide the participants into three groups of readers. The highest frequency falls in the two intervals, 101-110 (8 students) and 151-160 (8 students). These two intervals serve as the benchmarks for dividing the participants into three groups of readers. Participants with reading scores above 151 were identified as the more-proficient readers and those with reading scores below 101 were the less-proficient readers. Participants with reading scores between 101 and 151 were identified as the average readers.

Thus, 29 more-proficient readers, 32 average readers, and 31 less-proficient readers were identified in this study. The more-proficient readers showed a mean score of 175.52 with a standard deviation of 14.60, the average readers a mean score of 126.41 with a standard deviation of 15.09, and the less-proficient readers a mean score of 74.03 with a standard deviation of 17.53.

Material

The online referential resolution practice used four texts to examine the participants' reading comprehension. The four texts were selected from *College Reading Workshop* (Malarcher, 2005) based on the following four criteria: a number of references for reading practice, similar length, similar readability level, texts written for EFL college students. The four texts were *Ideas about Beauty* (number of words: 582; number of referring words: 25; Text 1), *Fast Food and Teen Workers* (number of words: 583; number of referring words: 25; Text 2), *Adventure Tours for Charity* (number of words: 599; number of referring words: 43; Text 3), and *Traditional Markets vs. Modern Markets* (number of words: 577; number of referring words: 31; Text 4). The full text of *Ideas about Beauty* (text 1) is shown in Appendix.

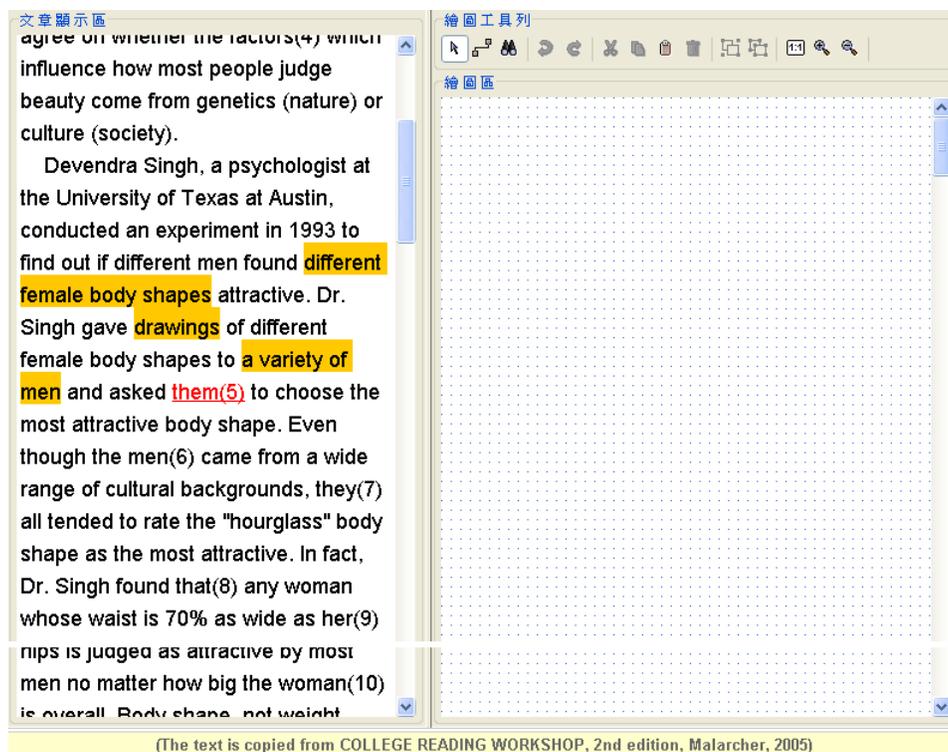


Figure 2. Feedback tool requested by a student

Procedures of Data Collection

Three phases were involved in the procedure of data collection. In the first phase, 92 college students received reading instruction in referential identification and resolution. In this instruction, types of reference and usage of the referring strategy were provided. This allowed students to have opportunities to practice the strategy. Three types of references, personal, demonstrative, and locative references, were investigated in this study as they appeared more frequently in texts ((Fortanet, 2004). Personal reference refers to individuals or objects by specifying their functions

or roles in a context, such as “I,” “me,” and “you.” Demonstrative references substitute nouns when the nouns can be understood from the context. They also indicate whether they are replacing singular or plural words. Examples include “this,” “these,” “that,” “more,” “neither,” etc. Locative references are used to indicate locations. Examples include “here” and “there.”

In the second phase, students were introduced the online system of referential resolution. They were demonstrated how to use the online system and offered chances to practice it. For example, when students encountered difficulties in constructing their initial maps, they could request feedback by clicking an icon in the tool bar. Figure 2 shows the feedback received by a student. The three candidate references were highlighted for the student to make a second attempt at the correct answer. Then, the student connected the chosen reference to construct the mental map (see Figure 3).

In the third phase, participants were asked to complete the online task in class during the period between October 2nd, 2006 and January 3th, 2007. The online system of referential resolution required the student to follow the steps in reading an online text: (1) identify references, (2) draw relationships between the references, and (3) answer reading comprehension test items. There were ten items in each comprehension test and the full score points of each test were 10. Finally, the system recorded participants’ reading behavior and performance.

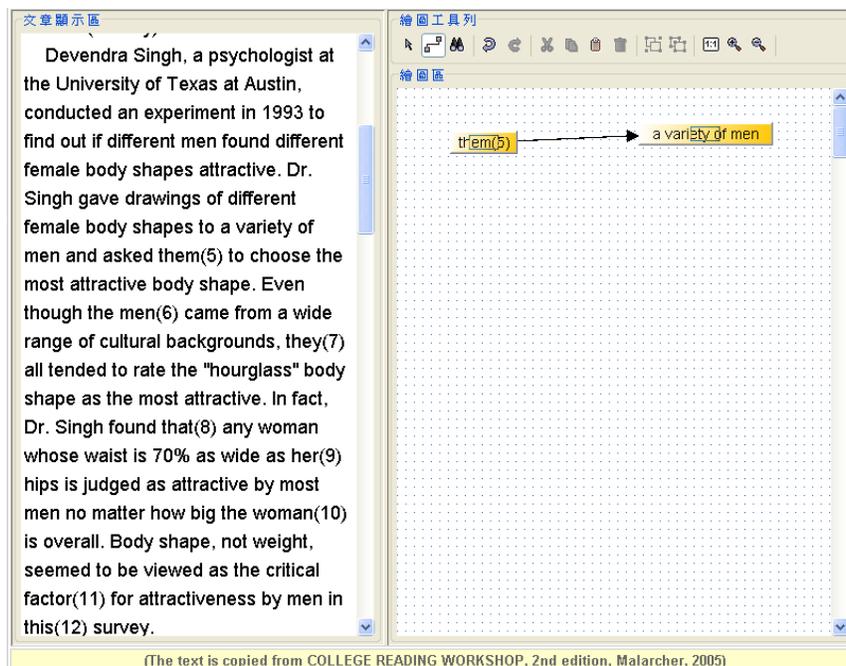


Figure 3. The mental map the student drew after feedback

Procedures of Data Analysis

The collected data were categorized into reading product and reading process. In reading product, students’ score points in referential identification, referential resolution, the frequency of *feedback tool* request, and reading comprehension test were analyzed by Statistical Package for Social Science (SPSS) 14.0 version. Mean, standard deviation, and Pearson product-moment correlation coefficient were computed to examine students’ performance on the referential resolution task and to investigate the relationships among referential identification, referential resolution, and reading comprehension test. In reading process, participants’ mental maps of referential resolution, the trace results of their reading process, and the frequency of *feedback tool* request were examined.

Result

Reading product

In reading product, students' scores in referential identification and resolution were shown in percentage since the number of referential words is different in each text. For each reading comprehension test, the full score points are 10. The means and standard deviations of referential identification, resolution, and reading comprehension test are shown in Table 1.

Table 1. Descriptive statistics of readers' performance in the system

| Variable | Text | | Text 1 | | Text 2 | | Text 3 | | Text 4 | |
|----------------------------|-------|----|--------|------|--------|------|--------|------|--------|------|
| | Group | N | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Referential identification | MR | 29 | 22.93 | 1.25 | 23.72 | 1.49 | 40.10 | 2.76 | 49.72 | 1.33 |
| | AR | 32 | 21.16 | 2.81 | 20.56 | 1.41 | 38.16 | 3.06 | 38.72 | 2.30 |
| | LR | 31 | 19.93 | 1.75 | 18.26 | 1.48 | 24.00 | 4.55 | 24.71 | 4.21 |
| Referential resolution | MR | 29 | 21.59 | 1.86 | 21.86 | .99 | 42.97 | 6.63 | 49.69 | 3.39 |
| | AR | 32 | 15.34 | 3.09 | 18.59 | 1.24 | 32.72 | 5.50 | 36.28 | 1.40 |
| | LR | 31 | 13.13 | 2.09 | 14.19 | 2.27 | 14.61 | 3.62 | 20.19 | 5.06 |
| Reading comprehension | MR | 29 | 8.93 | .70 | 8.07 | .65 | 8.83 | 1.04 | 9.55 | .51 |
| | AR | 32 | 6.28 | .47 | 7.78 | .42 | 7.28 | .89 | 8.19 | .69 |
| | LR | 31 | 5.35 | .49 | 6.45 | 1.12 | 5.35 | .75 | 6.32 | 1.51 |

Note: N refers to the number of participants; SD refers to standard deviation; MR refers to the more proficient readers; AR refers to average readers; LR refers to less proficient readers; the means of referential identification and resolution are shown in percentage.

As shown in Table 1, all three groups of readers made progress as they read the four sequential online texts. The more-proficient readers outperformed the average and the less-proficient ones as their mean scores in referential identification task ranging from 22.93 to 49.72. In contrast, the mean of the referential identification task for the less-proficient readers only ranges from 21.16 to 38.72. Furthermore, the mean of reading comprehension test for the more-proficient readers ranges from 8.07 to 9.55 whereas the mean for the average readers is from 6.28 to 8.19.

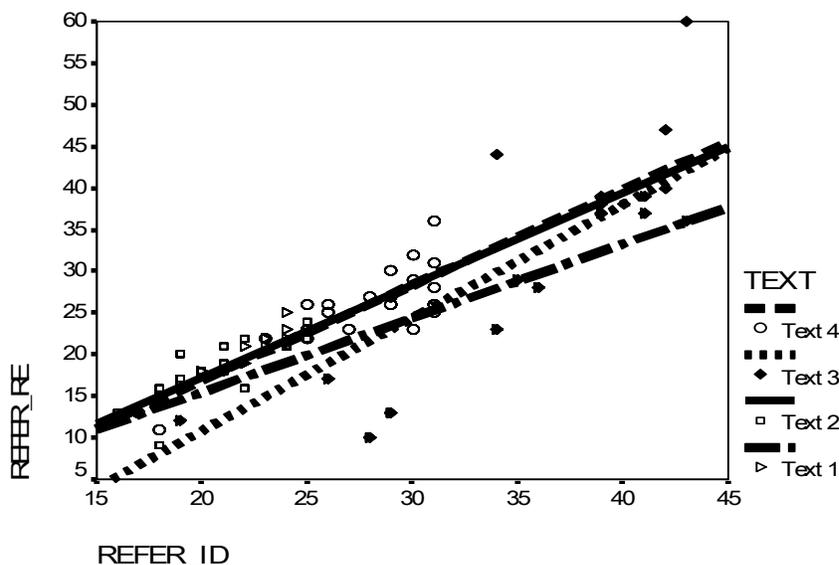


Figure 4. The relationship between referential identification and resolution

Correlation coefficient was also conducted to examine the nature of the relationship between the variables in this study. The correlation coefficient for the referential identification and referential resolution for text 1, 2, 3, and 4 are .81, .84, .85, and .84 which show a positive relationship between the two variables (see Figure 4). That is, as readers' scores in referential identification increased, their scores in referential resolution also raised. Furthermore, the correlation coefficient between referential resolution and reading comprehension test for four texts are .68, .71, .94, and .90 which also indicate a positive relationship. As readers' scores in referential resolution increased, their scores in reading comprehension test were also raised.

Reading process

In the following, one student was randomly selected from each reading proficiency group, a total of 3 students, to represent the developmental process of more proficient, average, and less proficient readers in referential resolution and reading comprehension.

Reading process of the more-proficient readers

In this study, the more-proficient readers were found to be able to integrate textual information in four sequential online reading tasks. Figure 5 shows one of the examples.

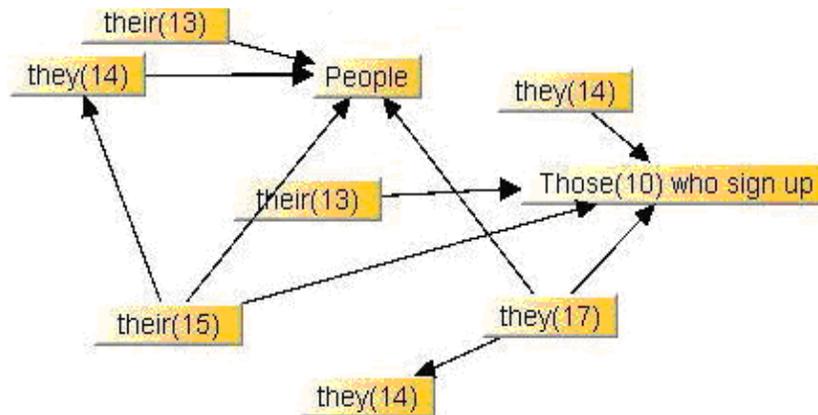


Figure 5. The more-proficient reader's mental representation of personal references

In addition to the more-proficient reader's mental representation of referential resolution, he read and reread the sentences and requested the *feedback tool* as he was not sure what references referred to. Figure 6 presents one of the more-proficient reader's reading process in which he requested the *feedback tool* for assistance.

Figure 6 shows that the more-proficient reader constantly requested the *feedback tool* 21 times (e.g. line 150). He requested the *feedback tool* either for overcoming his reading difficulties or confirming his selection. For instance, after he read the sentences, he requested the *feedback tool* of *this* (12) (e.g. lines 21~23). Then, he read and reread the sentences and finally made a correct selection. The more-proficient reader also requested the *feedback tool* as he tried to confirm the answer he chose. For example, after he connected *the men* (23) to its subject (e.g. lines 150~153), he checked the connection again by requesting the *feedback tool* for 4 times. Then, he revised his connection by cutting the previous selection.

Table 2 further presents the more-proficient reader's frequency request of the *feedback tool* for resolving personal references. It was found that the more-proficient reader increased his request of *feedback tool* in resolving personal references in four texts.

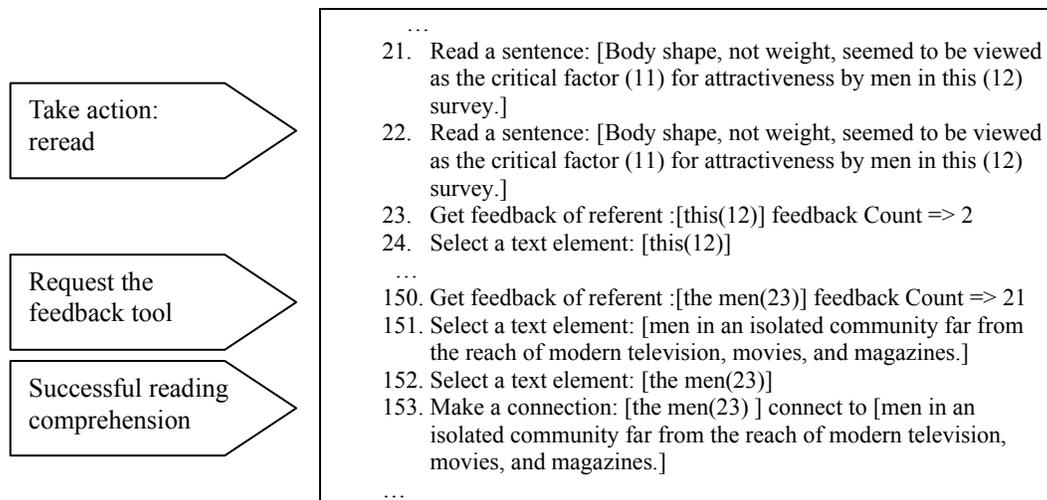


Figure 6. Trace results of the more-proficient reader's reading process

Table 2. The more-proficient reader's frequency request of the *feedback tool* in resolving personal references

| Text | Reference | Frequency | Reference | Frequency | Total |
|------|-----------|-----------|-----------|-----------|-------|
| 1 | them(5) | 0 | they(7) | 0 | 3 |
| | her(9) | 3 | | | |
| 2 | their(13) | 1 | their(14) | 1 | 5 |
| | their(16) | 0 | they(17) | 1 | |
| | they(30) | 1 | They(31) | 1 | |
| 3 | their(11) | 1 | their(13) | 1 | 7 |
| | they(14) | 1 | their(15) | 2 | |
| | their(52) | 1 | they(53) | 1 | |
| 4 | they(4) | 1 | their(6) | 2 | 7 |
| | They(7) | 1 | their(8) | 0 | |
| | their(10) | 1 | they(11) | 0 | |
| | their(12) | 1 | they(20) | 0 | |
| | they(22) | 1 | they(24) | 0 | |

Reading process of the average readers

The average readers were discovered to develop their mental representation of references when reading four online texts. Figure 7 shows one of the average readers' mental maps of personal references along with the four online texts.

In graph (a) of Figure 7, the average reader initially did not integrate any personal reference when reading the first text. She began to link some personal references in the second text. For example, in graph (b), she referred both *their* (13) and *they* (14) to *teens*. She even could find out the possible subjects that the personal references refer to, such as referring all *they* (30), *they* (31), and *their* (35) to *students*. In graph (c), she not only referred the personal references to a correct subject but also made these references mutually linked. For instance, the reference *they* (14) was connected to *people* and *their* (15). Eventually, she constantly referred the personal references to a correct subject. In graph (d), she integrated the personal references in different parts of the text referring to a correct subject. For example, she referred all *they* (4), *they* (20), *they* (22), and *they* (24) to *people*.

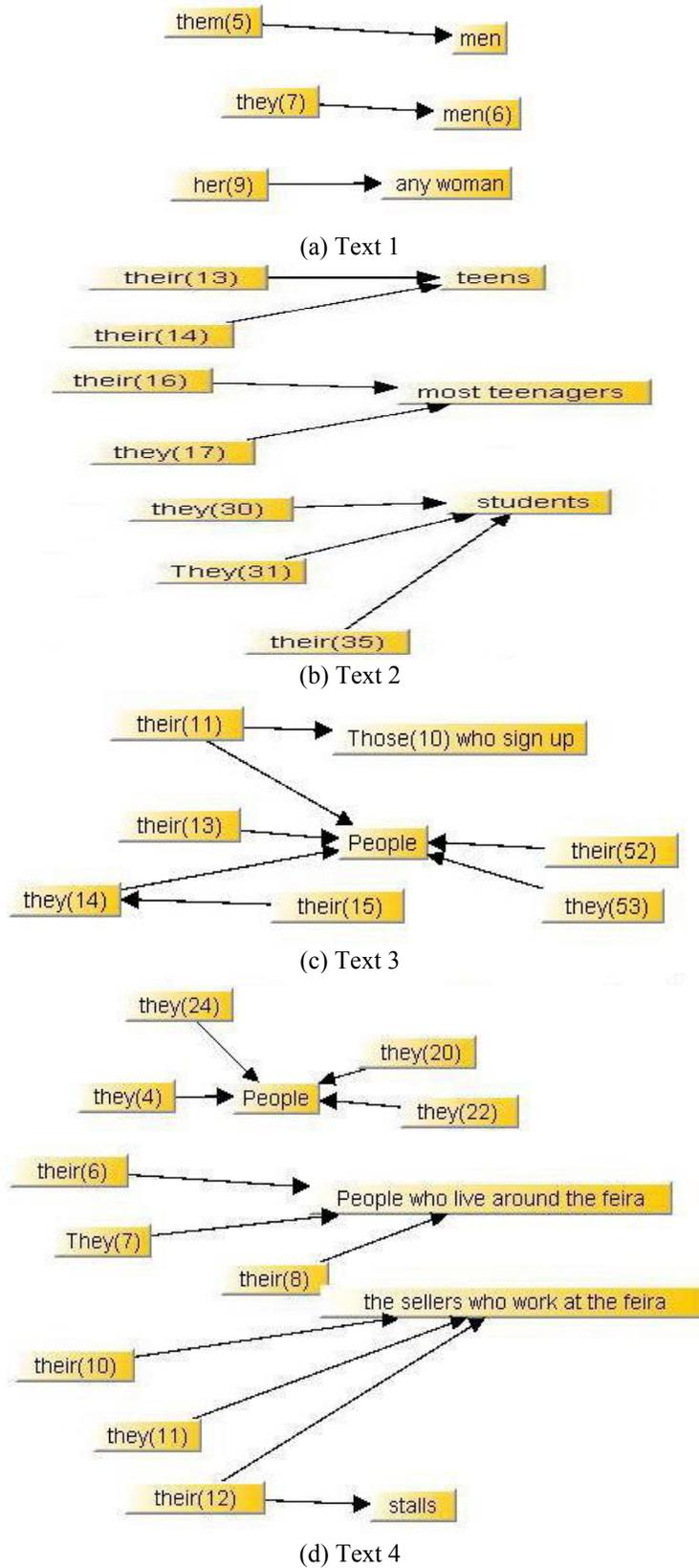


Figure 7. Examples of the average readers' mental maps in personal reference

From the analysis of the trace results, it was found that the average reader relied much on the *feedback tool* in their reading process. She requested the *feedback tool* to either overcome her reading difficulties or confirm her selections of the references. Figure 8 shows one of the average readers' trace results.

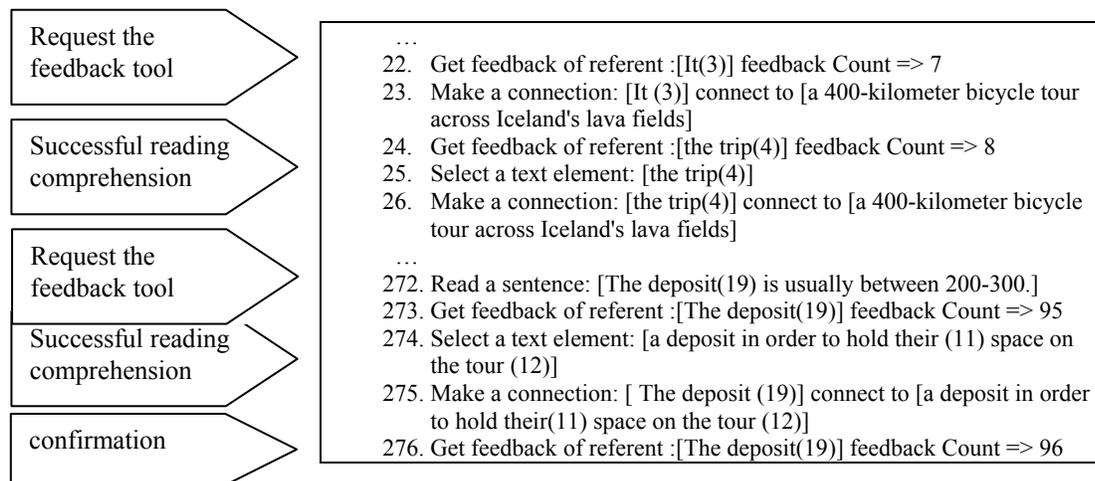


Figure 8. Trace results of the average reader's reading process

As shown in Figure 8, the average reader requested the *feedback tool* 96 times (e.g. line 276). He entirely depended on the *feedback tool* in connecting the references to the correct subject (e.g. lines 22~26). After receiving the feedback, he did not reread the sentences for comprehension. As a result, he tended to have a partial understanding of the textual information and kept requesting the *feedback tool* for revising his connections. For instance, he requested the *feedback tool* of the demonstrative reference, *this trip* (6). He added and erased the text elements that he initially selected. The similar reading process repeatedly occurred as shown in line 272 to 276. He, again, requested the *feedback tool* of the demonstrative reference, *the deposit* (19), and made the final connection.

In developing the mental maps of reference, the average reader engaged in comprehension monitoring by the assistance of *feedback tool*. Table 3 shows the average reader's frequency in requesting the *feedback tool* when resolving the personal references.

Table 3. Frequency of the *feedback tool* request in resolving personal references

| Text | Reference | Frequency | Reference | Frequency | Total |
|------|-----------|-----------|-----------|-----------|-----------|
| 1 | them(5) | 0 | they(7) | 0 | 1 |
| | her(9) | 1 | | | |
| 2 | their(13) | 1 | their(14) | 1 | 7 |
| | their(16) | 1 | they(17) | 1 | |
| | they(30) | 1 | They(31) | 2 | |
| 3 | their(11) | 2 | their(13) | 1 | 10 |
| | they(14) | 3 | their(15) | 2 | |
| | their(52) | 1 | they(53) | 1 | |
| 4 | they(4) | 1 | their(6) | 2 | 7 |
| | They(7) | 1 | their(8) | 0 | |
| | their(10) | 1 | they(11) | 0 | |
| | their(12) | 1 | they(20) | 0 | |
| | they(22) | 1 | they(24) | 0 | |

Table 3 shows that the average reader asked help from the *feedback tool* more frequently from text 1 to 4. He was able to monitor his reading process and frequently asked for assistance as he encountered difficulty in resolving the personal references. His performance in the reading comprehension test, 8 out of 10 points (80 % correct), further illustrated his better textual understanding in text 2.

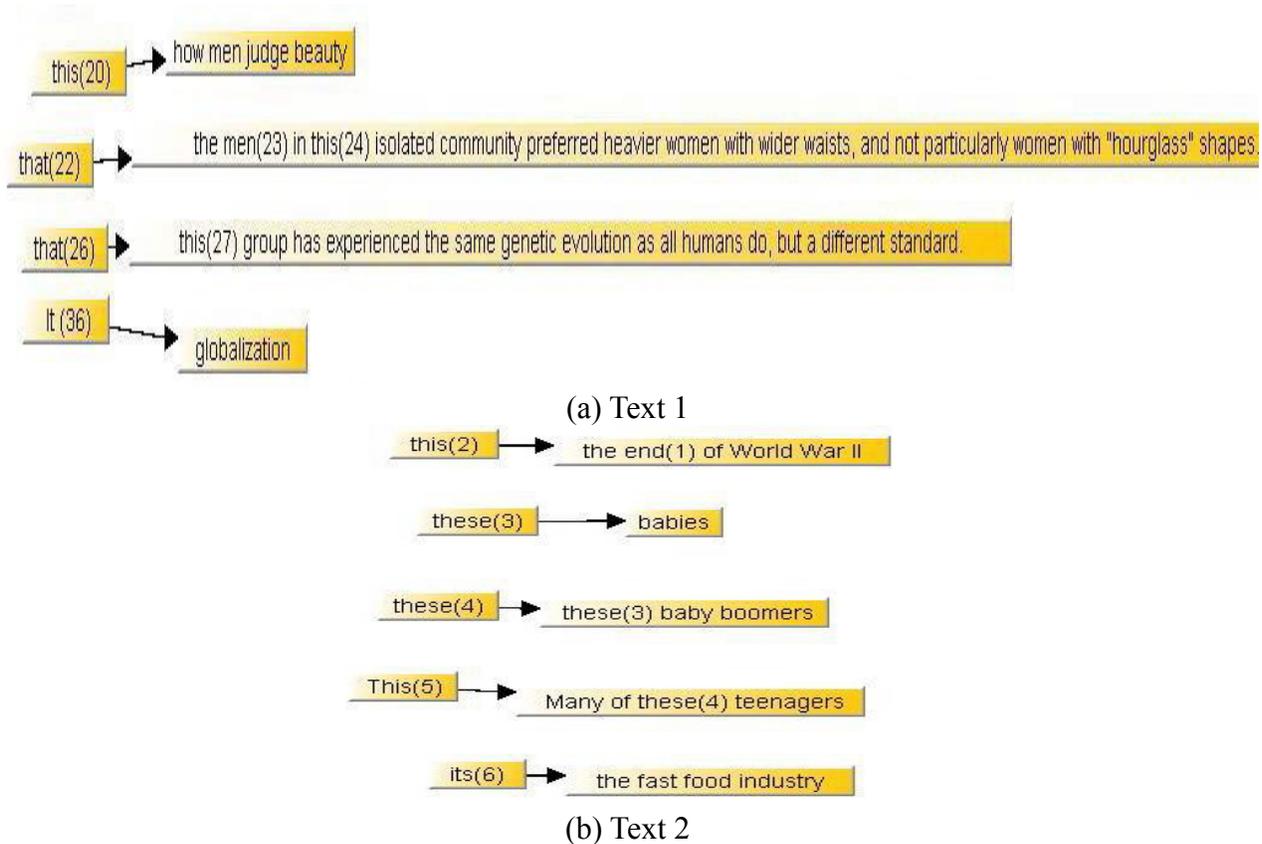
After the average reader had drawn the relationships among references, he still needed to take a multiple-choice comprehension test in each text. A test item in reading comprehension test of the text *Fast Food and Teen Worker* is shown as follows.

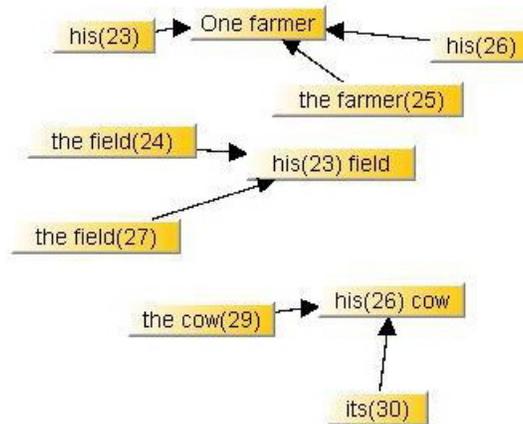
- ___ 5. Which of the following is NOT true?
- (A) Fast food workers quit their jobs easily.
 - (B) Most Americans have worked in fast food restaurants.
 - (C) Teenagers can hardly find jobs in fast food restaurants.
 - (D) McDonald's is the largest fast food chain in the United States.

In answering the item #5, the reader first had to identify the main character in the text and select the correct description of the character. Since he referred and integrated the personal references in the text to the correct subject, *most teenagers* (see graph (b) of Figure 7), he was able to choose one of the four options that is mainly related to the teenagers, namely, option C.

Reading process of the less-proficient readers

The less-proficient reader was also found to develop his mental map of reference as he tried to finish the four sequential online tasks. Figure 9 presents the less-proficient readers' mental maps in resolving personal references.





(c) Text 3



(d) Text 4

Figure 9. The less-proficient readers' mental maps in demonstrative reference

In graph (a) and graph (b) of Figure 9, the less-proficient reader did not integrate any of the demonstrative reference. Instead, he referred each demonstrative reference to its subject separately. In graph (c) and graph (d), he started to connect some of the demonstrative references like *the cow* (29) and *its* (30) to the correct subject, *his* (26) *cow*, in a successive way. *The store* (45) and *its* (42) were linked together with *an international chain store*.

In Figure 10, the trace results revealed that the less-proficient reader rarely requested the *feedback tool* in text 1. Most of the time, he repeatedly selected and erased the incorrect references and eventually referred the references to an incorrect subject when reading the online text.

Figure 10 shows that the less-proficient reader never requested the *feedback tool* for assistance even though he was not sure about what the references referred to in the text. Instead, he only read and reread some sentences (e.g. line 78-81). He then randomly connected a reference to a subject.

In developing his mental map of reference, the less-proficient reader was more aware of his reading process and actively asked for help. Table 4 shows the less-proficient reader's frequency in requesting the *feedback tool*.

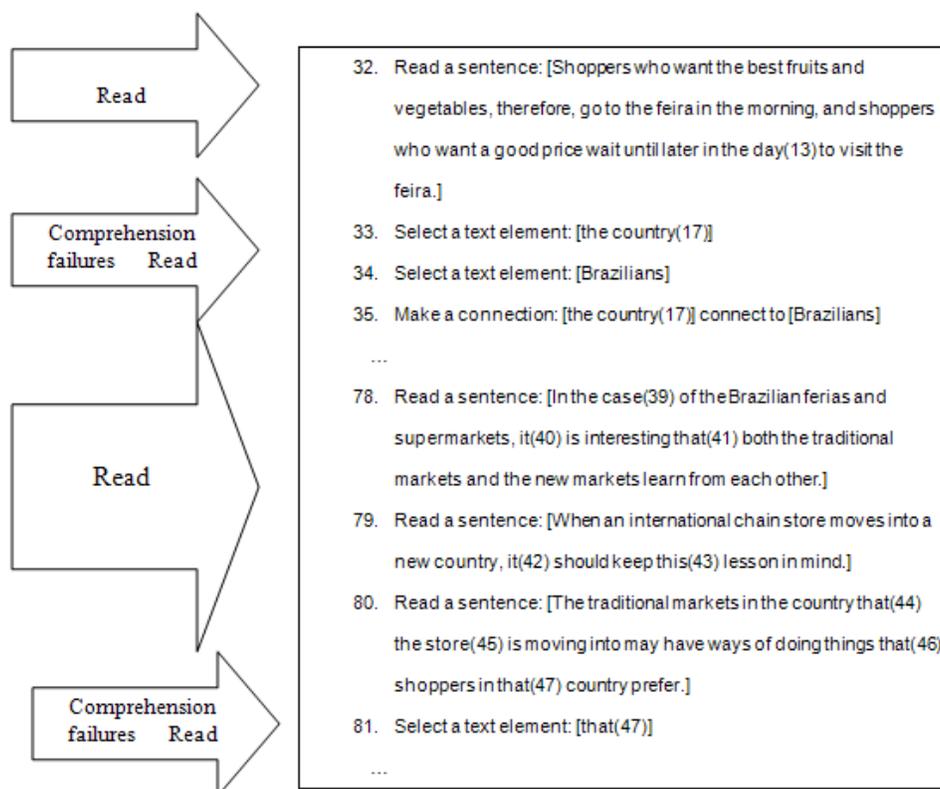


Figure 10. Trace results of the less-proficient reader's reading process

Table 4. The less-proficient reader's frequency request of the *feedback tool*

| Text | Reference | Frequency | Reference | Frequency | Total |
|------|-----------------|-----------|-----------------|-----------|-------|
| 1 | this(20) | 0 | that(22) | 0 | 0 |
| | that(26) | 0 | It(36) | 0 | |
| 2 | this(2) | 0 | these(3) | 1 | 2 |
| | these(4) | 0 | This(5) | 0 | |
| | its(6) | 1 | | | |
| 3 | his(23) | 1 | the field(24) | 1 | 7 |
| | the farmer(25) | 1 | his(26) | 1 | |
| | the field(27) | 1 | the cow(29) | 1 | |
| | its(30) | 1 | | | |
| 4 | the seller(26) | 5 | this(28) | 1 | 9 |
| | the shopper(29) | 1 | the shopper(31) | 1 | |
| | it(42) | 1 | | | |

Table 4 revealed that the less-proficient reader requested the *feedback tool* more frequently when reading the final online text. By the assistance of the *feedback tool*, he not only solved his reading problems but also enhanced his reading comprehension. He initially got 3 score points (30% correct) and 5 points (50%) in text 1 and 2. He further advanced to 6 points (60% correct) and 7 points (70% correct) in text 3 and 4. An exemplary test item in *Adventure Tours for Charities* is shown below.

- ___ 4. What is NOT mentioned as the way for people to raise money?
- (A) Some people ask for help from friends.
 - (B) Some people ask the party guests pay for attending the parties.
 - (C) One worker sells his car.
 - (D) One farmer sells his one-meter square of field.

Since the less-proficient reader successfully figured out the demonstrative references referring to the farmer (see graph (c) of Figure 9). He had better understanding of the textual information related to the farmer. He could select the correct answer, option D, and further abandoned the incorrect answer, option C. Another exemplary test item in *Traditional Markets and Modern Markets* is shown as follows.

- ___ 6. What would you suggest people who want to open a new store in Brazil bear in mind?
- (A) They should remember the names of the shoppers.
 - (B) They should make friends with the sellers at the ferias.
 - (C) They should remember the names of the streets in Brazil.
 - (D) They should know that shoppers might still prefer the ferias.

The less-proficient reader correctly linked the demonstrative references like *the shopper (29)* and *the store (45)* (see graph (d) of Figure 9) to correct subjects. He eventually integrated the textual information and enhanced his comprehension. As a result, he selected the correct option, namely, option D.

Conclusion

Some conclusions can be gleaned from the result of this study. First, the incorporation of computer system in instruction supported the average and the less-proficient readers to develop their mental representation of reference when reading four sequential texts. It was found that the average reader initially did not integrate any reference when reading the first text. She did begin to link some references in a successive way in the second text. This also resulted in her performance in the reading comprehension test, 8 out of 10 points (80 % correct) in text 2. She even could find out the possible subjects that the references referred to. In the third text, she not only referred the references to a correct subject but also made these references mutually linked. In the final online text, she clustered the references in different parts of the text referring to a correct subject.

The developmental process of the average reader's mental map in referential resolution is also true for the less-proficient reader. The less-proficient reader did not integrate any reference when he read the first online text. Instead, he referred each reference to its subject separately. In the third and fourth text, he started to connect some references to the correct subject in a successive way. In the process of developing his mental map of reference in interpreting textual information, the less-proficient reader was more aware of his reading process and actively asked for help than before. As a result, he was able to select a correct answer in the multiple-choice reading comprehension test. In the reading comprehension tests, the less-proficient reader initially got 3 score points (30% correct) and 5 points (50%) in texts 1 and 2. He further advanced to 6 points (60% correct) and 7 points (70% correct) in text 3 and 4. That is, the more the reader was engaged in comprehension monitoring in drawing their mental maps of referential resolution, the higher score he obtained in the reading comprehension tests.

Second, it was found that the keys to the development of readers' mental representation of reference lay in whether the reader was actively engaged in comprehension monitoring and frequently asked for help. In the engagement of comprehension monitoring, the reader read and reread the sentence many times to make sure if his comprehension was coherent or not, such as adding or erasing a text element. This helped the reader monitor, regulate, and evaluate his own reading process and construct the meanings of the textual information.

Third, the request of *feedback tool* is essential to develop the reader's mental representation of the reference. It assists the reader to grasp the main idea of the text as the reader tries to connect sentences together by reference. In this study, the more-proficient readers requested the *feedback tool* as they were not sure about the correct referential resolution. They depended on the *feedback tool* to confirm the choices they made. The average readers relied on the *feedback tool* when they encountered difficulty. They also requested the *feedback tool* to make sure if their selection was correct. In contrast, the less-proficient readers seldom requested the *feedback tool*. They very often failed to

monitor their reading process and hardly sought help from the *feedback tool*. Instead, they gave up reading the texts easily. It was found that the modeling and practicing instruction for using the *feedback tool* in the computer system was particularly necessary to the less-proficient readers.

Finally, the importance of the tracing and recording the reader's reading behavior and process should be emphasized. The *trace result* provided by the computer system makes the intangible reading process visible to the teacher. Every reading action that the reader takes is recorded in the system. This enables the teacher to observe the difficulties that readers encounter and the performance among the students with various English reading proficiencies. Based on these information, the teacher could modify his follow-up instruction to help the reader overcome their difficulties and better develop their integrative skills in reading.

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Appendix

Online reading text: *Ideas about Beauty*

Most people would agree that “beauty is in the eye of the beholder.” That is, everybody has a different measure of what (or who) is beautiful and what is not. And in fact, researchers in different fields have collected convincing evidence that even people from different cultures tend to rate beauty in much the same way. However, researchers do not agree on whether the factors which influence how most people judge beauty come from genetics (nature) or culture (society).

Devendra Singh, a psychologist at the University of Texas at Austin, conducted an experiment in 1993 to find out if different men found different female body shapes attractive. Dr. Singh gave drawings of different female body shapes to a variety of men and asked them to choose the most attractive body shape. Even though the men came from a wide range of cultural backgrounds, they all tended to rate the “hourglass” body shape as the most attractive. In fact, Dr. Singh found that any woman whose waist is 70% as wide as her hips is judged as attractive by most men no matter how big the woman is overall. Body shape, not weight, seemed to be viewed as the critical factor for attractiveness by men in this survey.

Dr. Singh explained this result from the perspective of evolution. Women who develop an hourglass shape have a relatively high level of estrogen, the female hormone. Because estrogen levels also influence fertility, men may subconsciously view these women as good candidates for producing children. Therefore, according to Dr. Singh, the men choose this type of women who have the potential for having more children. Over time, evolution would favor men who have inherited genes from their fathers which influence the selection of this type of fertile woman.

Douglas Yu, a biologist at Imperial College in London, has a different theory about men’s ideas of beauty. Dr. Yu thinks that culture, especially culture developed through exposure to the media, has had the largest influence on how men judge beauty. In order to test this, Dr. Yu traveled to southeast Peru to interview men in an isolated community far from the reach of modern television, movies, and magazines. Through his own survey, Dr. Yu found that the men in this isolated community preferred heavier women with wider waists, and not particularly women with “hourglass” shapes. Because this small community has lived apart from western mass communication, their own culture has not been influenced by outside standards of beauty. Dr. Yu points out that this group has experienced the same genetic evolution as all humans do, but a different standard.

In order to check the reliability of his study, Dr. Yu surveyed two other groups of men from this same community. However, the second and third groups surveyed by Dr. Yu had had more exposure to Western media. The results of these later surveys showed that as men from this isolated community came into contact with Western media, their standards of beauty began to change more toward the Western standard of beauty. Dr. Yu concluded from these findings that even if evolution played a part in men’s selection of mates, cultural influences were more powerful in the end and worked faster in changing men’s standards.

With both satellite communication and the Internet broadcasting images and information, globalization has become almost impossible to avoid. It is becoming harder and harder to find isolated communities like the one surveyed by Dr. Yu. The genetics vs. culture debate may soon become irresolvable simply because there will be no uninfluenced groups left to ask.