
THE EFFECTS OF DISCOURSE MARKERS ON THE READING COMPREHENSION AND SPEED OF CHINESE LEARNERS OF ENGLISH

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ABSTRACT: *Discourse markers are frequently used in academic papers, which abound in logical analyses and arguments. Some linguistic theories have shown that discourse markers are indispensable for both cohesion and coherence of these papers. In this study, a controlled test was carried out to analyze the way in which discourse markers affect the reading comprehension and reading speed of Chinese learners of English. In the study two groups of students (undergraduates and postgraduates) who minored in English as a foreign language were tested with four versions of a medical paper. Four versions were designed: a version without discourse markers, a version with micro markers, a version with macro markers, and a version with both micro and macro markers. A cloze recall test was used to measure the students' comprehension and reading speed. The results show that macro markers play a helpful role in enhancing readers' reading comprehension and reading speed. It is concluded that Chinese teachers should place more emphasis on the instruction of discourse markers, especially macro markers.*

KEYWORDS: Discourse Markers, Reading Comprehension, Reading Speed, Chinese Learners

INTRODUCTION

With increasing research on how to improve the reading comprehension as well as the reading speed of Chinese learners of English, the roles of discourse markers have been extensively studied. The first monograph entitled *Discourse Markers* (Dr. Schiffrin, reprinted in 1996) was published in 1987. The author made a comparative analysis of markers within conversational discourse¹ collected during sociolinguistic fieldwork. Dr. Schiffrin pointed out that discourse markers perform important functions in conversation because they provide contextual coordinates which aid in the production and interpretation of coherent conversations at both local and global levels of organization. However, Dr. Schiffrin focused on the functions of discourse markers in conversations and not in reading. Moreover, the emphasis of her work was merely put on English as a first language, rather than English as a second or foreign language.

¹ See Notes

Dr. Chaudron (1946—2006) was the first scholar who studied the roles played by discourse markers in enhancing the comprehensions of lectures. In his paper (Dr. Chaudron, 1986) Dr. Chaudron surveyed the way in which different categories of discourse markers affect foreign students' understanding of university lectures given in English. He classified discourse markers into two categories: micro-markers such as BUT, SO, etc. and macro-markers such as "Let's go back to the beginning." In order to study the functions of these markers, he designed a survey, in which four versions of the same lecture material were designed: the versions with discourse markers and the version without discourse markers. Then the learners of English as a second language at different proficiency levels were asked to listen to these versions of lecture. The results show that the Macro version helped learners best.

In 2009, Dr. Martinez of Department of English Philology, Faculty of Philology University of Oviedo studied the effects of discourse markers on the reading comprehension of Spanish students of English as a foreign language. (Dr. Ana Cristin Lahuerta Martinez, 2009) According to Ana, she has found a significant correlation between the presence of discourse makers in the text and reading comprehension. Her study did not cover whether discourse markers affected the reading speed. This paper attempts to survey to what extent different categories of discourse markers affect both the reading comprehension and the reading speed of Chinese learners of English.

SOME THEORIES

Grammar Analysis vs. Discourse Analysis

It is a common phenomenon that Chinese teachers of English are used to focusing their attention on grammar analyses while teaching English reading. This, in turn, leads to the fact that many English learners find it very slow to enhance their reading comprehension and speed. (Dr. Yuan, 1982) It is evident today that discourse analysis should be emphasized if we want to help students enhance both the reading comprehension and the reading speed.

Grammar analysis aims mainly at dissecting a well-formed sentence into pieces or bits to explain its internal relationship, while discourse analysis treats the passage as a coherent whole and tries to discover the relationship between the sentences instead of that between the parts in a sentence. (Dr. Brown and Yule, 2003) By comparison, "discourse analysis has studied how rhetorical form or macro-structure governs the writer's syntactic options, and how these in turn help the reader to grasp rhetorical form and to understand compositions as wholes." (Dr. Goodin, 1982)

Cohesion, Coherence and Discourse Markers

In discourse analysis, stress is laid on the understanding of cohesion and coherence of the passage, rather than its grammatical structure. Dr. Omaggio (2000) makes a good description of the importance of cohesion and coherence : "Cohesion is concerned with the way

² See Notes

propositions are linked structurally in a text and how the literal meaning of a text is interpreted. Cohesive elements include the use of pronouns, grammatical connectors, and lexical cohesion and the direct repetition of the same term to refer to the same object.” Dr. Omaggio described coherence this way: “Coherence refers to the ways contextual meaning are related and linked in the parts of the discourse; that is, it refers to the relationships among the different ideas in a text. In a text, every sentence forms part of a developing, cumulative instruction which tells us how to construct a coherent representation.” To state in a simpler way, cohesion refers to the relationship of linguistic elements within a text, while coherence reflects the consistency of meaning. So cohesion and coherence are not the same. Dr. Carell (1982) has studied the relationship between cohesion and coherence and pointed out: “A text will have a low level of cohesion but still be highly coherent if it draws on a shared domain of knowledge and allows for a high level of inference. The reverse is also true: a high level of cohesion does not ensure coherence when the text reflects a misunderstanding of real-world events.”

Let’s look at the following two examples.

Example 1: John is a professor in this field. He is able to help you with this problem.

Here, without the use of a discourse marker such as “And”, “So”, and “Thus”, a reader can still infer the “Cause and Effect” relationship between the two sentences. This is because the text itself draws on a shared domain of knowledge: a professor is an expert in a field. Since John is a professor in this field, he should be able to help one solve the problem. Therefore, this text can be considered cohesive even though no discourse marker is used to connect the two sentences.

Example 2: John is a professor in this field. And he is unable to help you with this problem.

Here, the discourse marker “And” is used to link the two sentences, but the text is not coherent. Instead, it makes the reader confused. Dr. Halliday and Dr. Hasan (1976) have emphasized the importance of cohesion of a text and the use of discourse markers (conjunctions in particular) to achieve cohesion. They describe them this way: “Thus, the concept of cohesion accounts for the essential semantic relations whereby any passage of speech or writing is able to function as a text. We can systematize this concept by classifying it into a small number of distinct categories – reference, substitution, ellipsis, conjunction, and lexical cohesion.”

In short, discourse markers serve the purpose of cohesion and reveal explicitly the underlying relationship between sentences in a text.

Types of Discourse Markers

According to Dr. Halliday and Dr. Hasan (1976), discourse markers can be classified into three categories:

Coordinating conjunctions: and, but, for,

Conjunctive adverbs: furthermore, however, therefore;

Prepositional phrases: in addition; in spite of; as a result;

In terms of their functions, discourse markers are classified by Dr. Halliday and Dr. Hasan into four types:

Additive: and, furthermore; in addition;

Adversative: but, however; in spite of

Causal: for; so; therefore; due to;

Temporal: first; then; finally;

Dr. Quirk et al (1972, p. 664) further include some other expressions into the categories of markers (see Table 1). And Dr. Cook (1975) names them as “macro-markers” because they signal the macro-structure of a text.

Table 1: Quirk’s Classification of Certain Expressions

Category	expressions
Enumeration	The first point I want to make is this...
Transition	I want to begin by saying...
Summation	Let us now turn to ...
Apposition	The next thing is...
Result	My conclusion is...
Inference	I will sum up by saying...
Reformation	Another example is...
Replacement	This means that...
Concession	The consequence was...
	This is because...
	That implies..
	A better way of putting it is...
	The alternative is...
	Another possibility would be...
	It is true...
	The truth is that...

Roles of Discourse Markers in Discourse Analysis

Discourse markers make a text cohesive by promoting clarity. Just as Dr. Hans Guth points out: “Apt transitional phrases help the reader move smoothly from one point to the next. ” (Dr. Guth, 1980, p.49) Also, as Sloan suggests, “In order to avoid the unclarity of the discourse, discourse markers must be used, especially in scientific papers which are characterized by so many logical analyses and arguments.” (Dr. Sloan, 1986, p.168) Hence in scientific papers, readers can often see various discourse markers in almost each and every paragraph. However, macro-markers differ from micro-markers in their features and effects. Macro-markers help the reader better understand the macrostructure of a text by revealing the major information contained in the text and the arrangement of that information, whereas micro-markers are to assist the reader in discerning the links between sentences within a text. As

micro-markers help to reveal the internal relationship within transitional units or between sentences, the reader will find it easy to grasp the discourse efficiently. However, even though relational signals sometimes lie within transitional units already, micro-markers are still needed. Under certain circumstances the absence or omission of micro-markers may create ambiguity that can lead the reader to the misunderstanding or misreading. Two examples are cited below to explain the importance of micro-markers.

Example 1:

"It is hard to answer that question with reference to a short time period because no one has really studies it. BUT for long-term studies, ductal ligation is a very important model for inducing pancreatic atrophy."

If we take out " BUT ", the relationship between the two sentences will be non-sequential, and as a result, ambiguity occurs.

Example 2:

"He was an unqualified doctor. HOWEVER, he was assigned to study medicine at a medical university for three years."

If "However" is removed, readers may consider the relationship between the two sentences as "cause and effect", and then they may think that the doctor was thus sent to get more training at a medical university because he was unqualified at the moment. In fact, this sentence means that though the doctor was unqualified, others had to trust him with the thought that he studied medicine in any case.

The second rule of micro-markers is to act as fillers to allow readers to have a pause and to catch their breaths before plunging into the next thought. As Sloan says, "The written language, an outgrowth of speech, should also allow for the momentary suspension of thought. " (Dr. Sloan, 1986, p.175)

On the other hand, Dr. Schiffrin suggests, "Cohesive devices do not themselves create meaning; they are clues used by speakers and hearers to find the meanings which underlie surface utterances." (Dr. Schiffrin 1988, p.9) And discourse markers are the most commonly used cohesive devices.

Then, how do readers manage to use these clues to find the meanings underlying surface writing? The next section discusses relationships between reading comprehension processes and the use of discourse markers.

Schema Theory

Based on the study of cognitive psychology, the schema theory is mainly concerned with how various types of background knowledge affect the understanding of a text. Schema is referred to as the building block of cognition which is stored hierarchically in one's long-term memory.(Dr. Rumelhart, 1981) Schema in people's minds can be of various types. As we all know, during cognition of some new information, one always associates a piece of new information with old things or experiences which have already been stored in one's mind. In other words, the cognition or comprehension of any new information is very often influenced or controlled by the schemata existing in one's mind. The incoming new information must be related to the old schemata. Schema can not only give one some guidance to comprehending

all sorts of new things and experiences, but also help one describe these things and experiences in words.

According to Dr. Carrell (1982), scheme can be further classified into two types: (1) formal schema, which reflects one's background knowledge about the rhetorical or discourse structures of different types of texts; and (2) content schema, which refers to one's knowledge about the external world, objects, events, and situation as well as one's expectations. For example, while the reader is reading a text, he usually employs his background knowledge about the real-world to expect what the text is going to talk about. So, content schema will guide his comprehension of events, objects, and situation. Moreover, content schema is more important if the relationship between sentences is not illustrated in an explicit way. In this case, it is left to the reader to understand the topic and to decode the underlying relationship between sentences, which has to rely upon the functions of content schema.

Let's look at the following examples:

"The young Chinese mother was so glad to finally give birth to a son, a second child. Three days later, she was dismissed. "

Even with a close reading of the sentences, a native English speaker will be at a loss if he is unaware of China's one-child policy. But a Chinese reader can easily understand that the mother was dismissed as a punishment for her illegal second delivery. She had a second child at the cost of losing her job. Here we can see how content schema has its influence on one's reading comprehension. At the same time, the reader while reading also uses "formal schema", i.e. his knowledge of the rhetorical structure of the discourse, which directs him to correctly interpret the linguistic representation of the events and activities described in the text. While reading a paper, for example, those who are well-acquainted with the discourse structure of the introduction part of the paper may have no difficulty reading the whole paper.

Dr. Kintsch and van Dijk made a good summary of the functions of the schema. They claim, "It is the schema which determines which of the many propositions in a text are relevant or irrelevant to the reader, and thus directly affects how and whether they are processed or recalled. If the reader has a schema that is not well defined, the outcome of the processing of the text will be haphazard with obvious problems for comprehension, whereas if he is familiar with conventional nature of the text, well-defined schemata will be produced, which will aid comprehension and recall." (Dr. Kintsch and van Dijk, 1975) Based on this theory, if a reader, especially a reader whose first language is not English, is unfamiliar with conventional nature of a text, well-defined schemata will not be produced, which can not help comprehension and recall. With this in mind, the use of discourse markers should play a good role in aiding a reader comprehend and recall well.

The objective of this paper is to analyze the way in which readers react to discourse markers in a text.

PURPOSE and HYPOTHESES

The purpose of the present survey is to answer two questions concerning reading academic papers.

(1) What are the effects of macro-markers on readers' reading comprehension as well as reading speed?

(2) What are the effects of micro-markers on readers' reading comprehension as well as reading speed?

The survey was based on a paper on medical ethics chosen from "Journal of Medical Ethics". Four different versions were designed for the same paper. They were used to test undergraduates and graduates who minored in English. Then, measurements of their reading comprehension and speed were taken.

The hypotheses of the survey are that the more discourse markers are used, the better readers comprehend the paper and the faster they read it. In other words, with more discourse markers used in the paper, readers may catch hold of more information conveyed in the paper and read more smoothly.

More specifically, the hypotheses are:

1. If the reading speeds of the investigated subjects are the same, then:

(1) they would comprehend the paper with macro-markers better than the paper without any discourse markers.

(2) they would comprehend the paper with micro-markers better than the paper with only macro-markers.

(3) they would comprehend the paper with both micro-markers and macro-markers best.

2. If the reading comprehension of the subjects is the same, then:

(1) they would read the paper with macro-markers faster than the paper without any discourse markers.

(2) they would read the paper with micro-markers faster than the paper with only macro-markers.

(3) they would read the paper with both micro-markers and macro-markers fastest.

MATERIALS

A paper read by Dr. Jean Davies (1988) and published in an issue of "Journal of Medical Ethics" (See Appendix C) was chosen as the source material. This paper dealt with the problem of euthanasia in Great Britain. As the topic of this sort had been widely discussed in newspapers and journals, the contents of the paper were supposed to be familiar to medical students in China. Moreover, the writing style of the paper was not difficult for university students to understand. Hence, both the contents and the writing style of the paper would not cause the reader any hindrance in reading and understanding, which guaranteed that background knowledge and difficulty of the subject would not affect this experiment. The first version of the paper, i.e. the Baseline Version, contained no discourse markers. However, caution was given to avoid any influence of conveying the meaning as the result of lack of discourse markers.

In the second version of the paper, i.e. the Micro Version, only micro-markers were employed. But on other changes were made concerning the contents of the paper. These micro-markers used were mainly as follows (for the complete list of the discourse markers used, see Appendix A):

ADDITIVE: moreover, in addition;

APPOSITION: for example;

COMPARISON: similarly;

ADVERSATIVE: however, nevertheless;

CONTRACTIVE: in fact;

GENERAL CAUSAL: so, then, therefore;

Attempts were made not to allow any of these discourse markers to add any semantic meaning to the paper. The semantic relationships marked by the micro-markers had already underlined the text. These markers gave no new propositional meaning to the text.

The third version, called the Macro Version, contained signals about the major propositions to show certain important transition points. The following are some examples (for the complete list, see Appendix A).

ADDITIVE: What is more,...

APPOSITION: Another example is that...

CAUSE: This is because...

SUMMATION: It is concluded that...

Also, these markers gave no new propositional meaning to the text.

In the fourth version, called the Micro-Macro Version, both micro and macro markers were employed.

The following are some examples to show the four different versions (for the complete paper version, see Appendix B):

Baseline Version:

The deliberate killing of one private citizen by another is deeply disapproved of in our society. The action is defined as a crime.

(2) Micro Version:

The deliberate killing of one private citizen by another is deeply disapproved of in our society. Furthermore, the action is defined as a crime.

(3) Macro Version:

The deliberate killing of one private citizen by another is deeply disapproved of in our society. What is more, the action is defined as a crime.

(4) Micro-Macro Version:

The deliberate killing of one private citizen by another is deeply disapproved of in our society. And what is more, the action is defined as a crime.

Since different discourse markers were used in the four different versions, their total word numbers were different, as shown in Table 2.

Table 2: Total Word Number of Each of the Four Versions

Paper version	Total words
Baseline Version	1101
Micro Version	1139
Macro Version	1185
Micro-Macro Version	1200

These four versions were made by this writer and checked by two American colleagues. The principles were 1) to guarantee these revised papers, especially the baseline version, can be read smoothly; 2) not to let the difference of word count in the revised papers affect comprehension and recall.

METHODS

The recall cloze test was chosen as the method to measure the reading comprehension of the investigated students because this sort of test has been shown by certain scholars to be a relatively reliable measurement of the reader's reading comprehension (Dr. Henning et al, 1981). The method used to check the reading speed was to ask the investigated subjects to record their exact reading time they used. Before the real test was carried out, several preparatory tests were undertaken to make sure: (1) the contents of the paper and its questions for comprehension would not interfere with the reading comprehension; (2) the recall cloze test used was reliable; and (3) the way of subjects' recording their reading time was reliable and accurate. The preparatory tests were done on ten graduate students and ten undergraduate students of Xi'an Medical University. The former had studied English for more 10 years; the latter for 7 years. The results showed that both groups of students could comprehend and recall the main ideas of the papers.

Investigated Subjects

In order to find out whether discourse markers would affect the reading comprehension and speed of both intermediate and advanced English learners, two groups of subjects were chosen for taking the test. Group one was made up of medical undergraduates; group two was made up of medical postgraduates. The undergraduate group consisted of 64 third-year medical students of Xi'an Medical University. Having studied College English for two years, the students of this group had achieved the intermediate level of English proficiency, a level which is close to Band 5 of the IELTS test. The students of the postgraduate group were considered at an advanced level of proficiency, a level which is close to Band 6 of the IELTS. 68 first-year graduate students enrolled at Sichuan University were chosen at random. And they were at that moment taking a reading comprehension course given by Chinese and American instructors.

Procedures

The four versions of the paper were given at random to all the subjects. They were informed of this test in advance. The test was given at their regular class time, with the presence of their English instructor. Before the test papers were handed out, the detailed explanation for the purpose and procedures of test was made in Chinese so as to avoid any misunderstanding by the subjects. Then, they were asked to pay attention to the following requirements:

- (1) Write down accurately the starting time before reading, and the finishing time when the reading is over.
- (2) Read the paper only once. No time is given for a second reading. Reverse the reading paper after finishing reading it and do a recall cloze test.
- (3) No note-taking is allowed.

Analysis

The score measurements and the reading-speed records were analyzed separately in an analysis of variance (SPSS/PC)³ In addition, the comparisons of means in pairs were made according to the above-mentioned hypotheses so as to find out the different effects of discourse markers in different versions. For example, the Macro Version was compared with the Micro Version; the Macro Version was with the Micro-Macro Version; the Macro Version was with the Baseline Version; the Micro Version was with the Micro-Macro Version; the Micro Version was with the Baseline Version, and finally, the Micro-Macro Versions was compared with the Baseline Version.

RESULTS

The results of the two groups are reported separately as follows.

1. The undergraduate group

(1) Score measurements

Table 3 shows means of recall scores. The full score is 10 points.

Table 3: Means of Recall Scores

Version	N4	Mean	s.d. ⁵
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³ SPSS/PC: Statistical Program for Social Science -- Personal Computer. See Notes

4. " N " refers to number of the subjects.

5. "s.d." refers to "standard deviation "

6. "SS" refers to "sum of squares".

7. "d f" refers to "degree of freedom".

8. "MS" refers to "mean square ".

9. "F" refers to calculated statistics.

10. "P" refers to probability value. See notes

Baseline	16	3.1250	1.6279
Micro	17	2.5294	1.1246
Macro	14	4.1429	2.3158
Micro-Macro	17	2.6471	1.4550
Overall mean	64	3.111	

Table 4: Analysis of Variance of Scores by Version

Source	SS6	d f7	MS8	F9
Total	187.75	63		
Between Groups	24.16809	3	8.05603	2.95486*
Within Groups	163.5819	60	2.726365	

* $P_{10} < 0.05$

Table 4 shows the results of the Analysis of Variance in this measurement as affected by the different paper versions. It is evident from Table 4 that there is a significant effect of the version ($F_{3/60} = 2.95486$, $P < 0.05$). Table 5 shows the results of comparison of means in pairs. This analysis is aimed at making comparison of differences to find out which pair of comparison shows significant difference. From Table 5, it is noted that there appears no significant differences between the means of the Macro and the Baseline Versions. This finding conflicts with the hypothesis. Also, in contrast with the hypothesis, the Marco Version is superior to the Micro Version ($P < 0.05$), and moreover, it is even superior to the combined Micro-Macro Version. However, the comparisons reveal no differences whatever between the Micro-Macro Version and the Micro Version or the Baseline Version.

Table 5: Results of Comparison of Means in Pairs

Pairs	Q value ¹¹	a ¹²	v ¹³	q (0.05;0.01) ¹⁴	P value
Macro vs. Baseline	2.5417	2	60	2.83; 3.76	$P > 0.05$
Macro vs. Micro-Macro	3.6781	3	60	3.4; 4.28	$0.01 < P < 0.07$
Macro vs. Micro	3.829	4	60	3.74; 4.59	$0.01 < P < 0.05$

¹¹ "Q value" refers to calculated statistics;¹² "a" refers to the number of groups;¹³ "v" refers to degree of freedom within groups;¹⁴ "q" refers to significant level;

Baseline vs. Micro-Macro	1.4752	2	60	2.83- 3.76	P>0.05
Baseline vs. Micro	1.4134	3	60	3.4; 4.28	P>0.05
Micro-Macro vs. Micro	.2753	2	60	2.83;3.76	P>0.05

Reading Speed Measurement

Table 6 shows the means of reading speed for the four versions.

Table 6: Means of Reading Speed

Version	N	Mean (wpm)	s.d.
Baseline	16	77.5562	15.80
Micro	17	87.8365	16.89
Macro	14	94.6929	15.96
Micro-Macro	17	82.8606	16.18
Overall Overall mean	64	85.7366	

Table 7 shows the results of the Analysis of Variance in the reading speed measurements as affected by the different paper versions.

Table 7: Analysis of Variance of Reading Speed by Versions

Source	SS	d f	MS	F
Total	18212.13	63		
Between Groups	2403.75	3	801.25	3.04111*
Within Groups	15808.38	60	263.4729	

* P15< 0.05

It is clear from Table 7 that there is a significant effect of the version on the reading speed.

Table 8 shows the results of comparison of means in pairs. The purpose is also to find out which pair has a significant difference between means of the reading speed.

Table 8: Results of Comparison of Means in Pairs

Pairs	Q value	a	v	q (0.05;0.01)	P value
Macro vs. Micro	1.7416	2	60	2.83; 3.76	P>0.05
Macro vs. Micro-Macro	2.9597	3	60	3.4; 4.28	P>0.05

Macro vs. Baseline	4.1369	4	60	3.74; 4.59	0.01<P<0.05
Micro vs. Micro-Macro	1.2446	2	60	2.83- 3.76	P>0.05
Micro vs. Baseline	2.4817	2	60	3.4; 4.28	P>0.05
Micro-Macro vs. Baseline	1.2628	2	60	2.83;3.76	P>0.05

Based on Table 8, the subjects could read the Macro Version faster than those who read the Baseline Version ($P<0.05$). This result supports the hypothesis. However, in conflict with the hypothesized effect, there are no differences in comparison of means between the Micro Version and the Macro Version; nor are there any differences between the Micro-Macro Version and the Macro Version. These comparisons also reveal no difference between the Micro-Macro Version and the Micro Version; no difference between the Micro-Macro Version and the Baseline Version ($P>0.05$).

Relationship between the score and the reading speed

Table 9 below shows that there exists a significant difference ($P<0.05$) in score means between the Macro Version and the Micro Version while the reading speeds for the two versions are similar ($P>0.05$). Clearly, in terms of accelerating the reading comprehension, the Macro Version is significantly superior to the Micro Version. Also, the recall score mean for the Macro Version is significantly higher than that for the Micro-Macro Version ($P<0.05$) while the reading speeds for the two versions show no difference at all ($P>0.05$). In direct conflict with the hypothesis, the combination of the Micro and Macro markers can not help the subjects to best comprehend the paper, nor can they make them read fastest. While the score means for the Macro and the Baseline Versions reveal no significant differences, there does exist a significant difference between the reading speeds ($P<0.05$). This supports the hypothesis.

Table 9: Means of Answer Scores and Reading Speed Measurements

Version	N	Score	Speed (wpm)
Baseline	16	3.13	77.5562
Micro	17	2.59	87.8365
Macro	14	4.14	94.6929
Micro-Macro	17	2.65	82.8606
Overall	64		
Overall mean		3.111	85.7366

To sum up, the findings show that the macro-markers help the subjects increase not only their reading comprehension but also their reading speed. However, the micro-markers do not show any superiority in this regard.

The Postgraduate Group

Table 10 shows the means of the recall measurements.

Table 10: Means of Recall Measurements

Version	N	Mean	s.d.
Baseline	17	2.6471	1.46
Micro	19	3.7895	1.93
Macro	15	4.5333	1.72
Micro-Macro	17	3.6471	2.1
Overall Overall mean	68	3.60425	1.8

Table 11 suggests the results of the Analysis of Variance in the measurements as affected by the different paper versions.

Table 11: Analysis of Variance of Score Means by Versions

Source	SS	d f	MS	F
Total	229.8089	67		
Between Groups	29.15289	3	9.717631	3.099477*
Within Groups	200.656	64	3.135249	

* $P < 0.05$

It can be evidently seen in Table 11 that there is a significant effect on the version in the cloze responses ($F [3/64] = 3.099477, P < 0.05$). Table 12 shows the results of the comparison of means in pairs, the purpose of which is to find out which pair of comparison shows a significant difference. From Table 12, it is noted that there are no differences in means between the Macro Version and the Micro Version, which is contradictory to the hypothesis. Also, in conflict with the hypothesis, the Micro-Macro Version is not superior to the Baseline Version, the Micro Version as well as the Macro Version, in terms of facilitating the reading comprehension. However, in agreement with the hypothesis, the Macro Version is significantly better than the Baseline Version ($P < 0.05$). Other results reveal no difference between the Micro Version and the Baseline Version. Hence, it is of interest to note that, among the four versions, only the Macro Version is significantly superior to the Baseline with its advantageous effects on the reading comprehension, although the Micro and Micro-Macro Versions seem to produce better results than the Baseline Version.

Table 12: Results of Comparison of Means in Pairs

Pairs	Q value	a	v	q (0.05;0.01)	P value
Macro vs. Micro	1.7796	2	64	2.83; 3.76	$P > 0.05$
Macro vs. Micro-Macro	2.1203	3	64	3.4; 4.28	$P > 0.05$

Macro vs. Baseline	4.3618	4	64	3.74; 4.59	0.01<P<0.05
Micro vs. Micro-Macro	.3316	2	64	2.83- 3.76	P>0.05
Micro vs. Baseline	2.5757	3	64	3.4; 4.28	P>0.05
Micro-Macro vs. Baseline	2.2546	2	64	2.83;3.76	P>0.05

Reading Speed Measurements

Table 13 shows the means of the reading speeds for the four different versions.

Table 13: Means of Reading Speed

Version	N	Mean (wpm)	s.d.
Baseline	17	76.3947	14.17
Micro	19	83.6678	12.54
Macro	15	93.3847	16.89
Micro-Macro	17	83.8	17.56
Overall Overall mean	68	84.3118	

Table 14 shows the results of the Analysis of Variance in the reading speed measurement as affected by the different paper versions.

Table 14: Analysis of Variance in Reading Speed by Versions

Source	SS	d f	MS	F
Total	17281.69	67		
Between Groups	2307.063	3	769.0208	3.286816*
Within Groups	14974.63	64	233.9785	

* P< 0.05

It is clear from Table 14 that there are significant effects of the different versions on the reading speed.

Table 15 shows the results of comparison of means in pairs, the purpose of which is to figure out which pair of comparison shows a significant difference in means of reading speeds.

Table 15: Results of Comparison of Means in Pairs

Pairs	Q value	a	v	q (0.05;0.01)	P value
Macro vs. Micro	2.6543	2	64	2.83; 3.76	P>0.05

Macro vs. Micro-Macro	2.6909	3	64	3.4; 4.28	P>0.05
Macro vs. Baseline	4.5478	4	64	3.74; 4.59	0.01<P<0.05
Micro vs. Micro-Macro	.0356	2	64	2.83- 3.76	P>0.05
Micro vs. Baseline	1.9327	3	64	3.4; 4.28	P>0.05
Micro-Macro vs. Baseline	1.8982	2	64	2.83;3.76	P>0.05

Just as what the hypothesis supposes, the Macro Version is significantly superior to the Baseline Version in augmenting the reading speed. However, in conflict with the hypotheses, other results reveal no differences between pairs. It is worth noticing that in this comparison only the Macro Version is significantly superior to the Baseline.

Relationship between the Scores and the Reading Speed Measurements

As is seen in Table 16, the subjects of the Micro Version could achieve nearly the same reading speed in terms of getting the similar amount of information which the subjects of the Macro Version could get. This finding is contradictory to the hypothesis: the subjects would comprehend the paper with micro-markers better than the one with only macro-markers. With the measurement supporting the hypothesis, the subjects who read the Macro Version could read faster and acquire more information than those who read the Baseline Version. Again, in conflict with the original hypothesis, it turned out that the subjects reading the Micro-Macro Version could not comprehend the paper best; nor could they read it at the fastest speed.

Table 16: Means of Answer Scores and Reading Speed Measurements

Version	N	Score	Speed (wpm)
Baseline	17	2.6471	76.3947
Micro	19	3.7895	83.6679
Macro	15	4.5333	93.3849
Micro-Macro	17	3.6471	83.8

To sum up, the findings show that macro-markers not only facilitate the reading comprehension but also increase the reading speed. By contrast, micro-markers fail to show this sort of superiority.

DISCUSSION

The first point for discussion is why micro-markers did not help the subjects of both groups to better understand the contents of the paper and enhance the reading speed.

For one thing, unlike macro-markers which are generally considered as the higher-order discourse markers that signal major transitions and emphasis in the paper, micro-markers are the lower-order markers of segmentation and intersentential connections. In this respect, they probably do not add enough content to make the subsequent information more salient or meaningful. And for another, with a number of micro-markers scattered throughout the paper, this might probably make the whole paper look less well-organized, just as what is explained by Dr. Hiller et al (1968) in their research. Dr. Sloan (1986) also points out that only 7% of all transitional units required micro-markers to ensure clarity (here he means instant clarity). After analyzing 25 essays, Sloan found that micro-markers are never absolutely essential to revealing the meaning of the essays.

Thirdly, due to the lack of the knowledge of discourse analysis and discourse markers, Chinese learners of English have got into the habit of decoding a paper word by word, rather than extracting the information out of the paper through comprehending the discourse devices. Consequently, while reading the Micro Version, the subjects either neglected micro-markers or spent more time decoding them, especially those unfamiliar micro-markers. As a result, their reading speed slowed down.

Fourthly, because Chinese teachers of English usually focus on grammar analysis instead of on discourse analysis in their teaching, their students can not be well-informed of the knowledge of micro-markers and hence are inclined to overlook the transitional implication of micro-markers. As a result, based on this survey, micro-markers could not play a useful role in enhancing the subjects' efficient reading even though they came across these markers. Furthermore, as they had to make frequent stops to think about some unfamiliar micro-markers, this might have made them lose the thread of thinking and memorization. Thus, they did not benefit from the use of micro markers while reading the paper with micro-markers. It seemed to them that the Micro Version was the same as the Baseline Version.

The second point for discussion is whether it is true that, as pointed out by Dr. Sloan (1986), the absence of some obligatory markers affects the reading speed, but it does not or seldom affect the reading comprehension. Dr. Sloan explained in this way: "Whatever misreading results from the absence of obligatory markers is almost always fleeting. The next sentence or two usually correct any misconception by supplying information that restores clarity to the momentarily puzzling."

This survey proves this theory because it explains why the subjects of the undergraduate group who read the Baseline Version could get the same amount of information as those who read the Macro Version at a slower speed. With the same theory, the subjects of the Baseline Version in the postgraduate group should have comprehended the Baseline Version as well as those of the Macro Version at the expense of spending more time decoding discourse structures. In other words, if they had concentrated on the thread of ideas of the text along the linear structure of the paper, they should have read efficiently and smoothly even though no markers were used

to signal the transition of the ideas. On the contrary, it turned out that although the subjects of the Baseline Version in the postgraduate group had spent more time reading their paper, they failed to understand it better than those who read the Macro Version. The only explanation is that the subjects who read the Macro Version in this group had benefited much more from the use of macro-markers. It is worth noting how the investigated readers of the Macro Version could read better and faster than those of the Baseline Version. Since the subjects of the Macro Version also read their paper word by word, then how could we explain the role played by the macro-markers in helping the readers read the Macro Version better and faster?

The first explanation is that macro-markers are usually made up of commonly-used words, with which the readers were quite familiar and were therefore easy to decode. In this sense, these macro-markers played their role in signaling the major transitions and conveying the emphases expressed in the text. Hence, the investigated students were able to employ these signals to successfully carry out a triple reading process (Dr. Yorio, 1971), i.e. the storage of the past cues, prediction of the future cues, and associations between the two. This triple reading process strengthened the readers' ability to recall the facts they had just learned from the paper. As they efficiently received many productive language cues to determine the information of the text, they could move faster from one point to another as well.

Miller explains this phenomenon in this way: "It has been established that there is a severe limit to the amount of information that we are able to receive, process and remember. The reader, therefore, does not use all the information on the page, but rather, must select the most productive language cues in determining the message of the writer" (Dr. Miller, 1975). Goodman also points out: "Reading is a selective process. It involves partial use of available minimal language cues selected from perceptual input on the basis of the readers' expectation. As this partial information is processed, tentative decisions are made to be confirmed, rejected or refined as reading progresses." (Dr. Goodman, 1972) Therefore, there is no wonder that, with the help of macro-markers, the investigated students could read the Macro Version better and faster.

The third point for discussion is concerned with why the Micro-Macro Version did not show any superiority over the Baseline Version in terms of helping the readers increase the reading comprehension and speed. In the first place, the further addition of micro-markers to the macro-markers achieved no better results. Rather, it cost the readers more time in reading more markers, and yet getting no further information valuable in any sense. This only distracted the readers from observing and decoding the macro-markers. In the second place, owing to the possibility of not knowing the meaning of some micro-markers and too much relying on the word-by-word reading habit, the readers had often to stop now and then to analyze the relationships between the unfamiliar transitional units introduced by those unfamiliar micro-markers and macro-markers. Consequently, they could not go on reading smoothly. Moreover, their frequent hesitations before these troubles inevitably made them lose the thread of thinking and memorization. That is, the past cues were forgotten, the present cues were lost, and there

was no way to predict what was coming next and to make associations between the storage of past cues and the prediction of future cues. Dr. Omaggio's investigations support this explanation. As she describes, "Rather than recalling cues with which they are familiar, ESL [English as a second language] readers are forced to recall cues that they either do not know at all or know imperfectly. Because of this, the readers will forget those cues much faster than they would in their native language. They must simultaneously predict future cues and make associations with past cues, a slow and painful process in the second language for many inexperienced learners. "(Dr. Omaggio, 1987) This study proves that it is also a slow and painful process in the foreign language for many inexperienced learners.

It is evident, therefore, that the addition of micro-markers tends to decrease the role and functions of macro-markers when these two kinds of markers go hand in hand. Hence, in this survey the Micro-Macro Version showed no superiority over the Baseline, the Micro, and the Macro Versions in terms of helping accelerate the reading comprehension and speed.

The fourth point to be discussed is why macro-markers could not lead the subjects of the postgraduate group to their better recall of the ideas and facts of the material and to their faster reading than micro-markers. If we consider the role of discourse markers, macro-markers, as a rule, should be regarded as a better role to play in promoting efficient reading than micro-markers. But, in this study, there were no significant differences between the Macro Version and the Micro Version.

One explanation is that some micro-markers used in the versions of the test paper were of relatively more semantic value in conveying the information and could often reveal some signals about the organization of the text. Since the subjects in the postgraduate group were at the advanced level of English proficiency, those who read the Micro version must have benefited from micro markers by efficiently decoding the information implied by these markers.

Perhaps Dr. Clarke's following remarks might give another satisfactory answer: "ESL students should be made aware of the strong tendency in English for linear argumentation. Unlike many other languages, contiguous English sentences often imply causation or chronological sequence of events. Therefore, it is necessary to emphasize the arrangement of ideas as an important clue in deciphering the overall meaning of a text. "(Dr. Clarke, 1986) Therefore, even if micro-markers signal less discourse information than macro-markers, the linear argumentation itself in the paper might have better helped the advanced readers in reading the Micro Version.

Dr. Halliday and Dr. Hasan also support this explanation as they point out: "Although the cohesion is achieved through the conjunctive expression, it is the underlying semantic relation that actually has the cohesive power. This explains how it is that we are often prepared to recognize the presence of a relation of this kind even when it is not expressed overtly at all.

We are prepared to supply it for ourselves, and thus to assume that there is cohesion even though it has not been explicitly demonstrated. "(Dr. Halliday and Dr. Hasan, 1976. p. 226)

Clearly, in this study both the underlying semantic relation of the Micro Version and the subjects' command of medical knowledge helped the readers of the Micro Version a lot in terms of decoding the information contained in the text and therefore they were able to get the same recall score at the same speed as those readers of the Macro version. By comparison, the readers of the Micro Version in the undergraduate group were not familiar with the semantic value of micro markers and hence failed to understand the underlying semantic transition of the Micro Version. Consequently, they could not comprehend the Micro Version as well as those who read the Macro Version. Nor could they read as fast as those who read the Macro Version.

CONCLUSION

Attempts have been made in this survey to study the effects of discourse markers on the reading comprehension and the reading speed. On the basis of this survey, the following conclusions can be drawn.

1. Macro-markers help the readers who are either at the intermediate level or advanced level better comprehend the paper because they add enough content or signals to make the subsequent information more salient or meaningful.
2. Also macro-markers help them increase their reading speed because they are usually made by commonly used words and can be easily decoded.
3. The apt use of micro-markers help readers read the paper efficiently. But this does not mean that the more micro-markers are used, the better comprehension and the faster reading readers can achieve. Instead, many micro-markers added to the paper may hinder readers in comprehending it and even prevent them from reading more smoothly.
4. The combined use of both micro and macro markers in the version appears not to help the readers comprehend best and read fastest as this study hypothesizes. The reason might be that the combined use of micro-markers and macro-markers make the entire paper merely appear less well organized.

The implications of this study are supposed to be useful for both teachers and learners of English.

To teachers of English

In order to develop their students' skills in gaining better reading comprehension and faster reading speed, teachers should make their students be aware that both the formal schema and content schema can enhance their reading comprehension process. While teaching the formal schema, they should stress the functions of macro-markers because the knowledge of these markers can enhance students' reading skills so as to comprehend reading materials better and read them faster. Furthermore, in the process of teaching those students whose English proficiency is at the intermediate level, emphasis should also be placed on the teaching of micro-markers, which commonly used in academic papers that abound in analyses and complex theories. As far as English writing course is concerned, students should be encouraged to use

discourse markers more effectively because the apt use of them can help students achieve cohesion and coherence in their writing. However, English teachers must warn their students against any lavish use of micro-markers because it may destroy the overall coherence of their writing.

To English learners

It is important that more attention should be paid to the ongoing "thread" of the information conveyed in the paper by carefully decoding the discourse structures signaled by discourse markers, particularly micro markers. And the knowledge of discourse markers is especially beneficial when students read academic papers, which are characteristic of the use of a number of discourse markers.

To conclude, discourse analysis should be an important teaching content in China's English reading class of today. And students' command of the knowledge of discourse markers can assist them to comprehend English papers better and read them faster.

NOTES

1. "Discourse" refers to formal, extended, spoken or written treatment of a given subject. It has several properties: it forms structures, conveys meanings and accomplishes actions. For more information, see "Discourse Markers" by Schiffrin (1996).
2. Yuan (1982) once made a study in the U.S. on Chinese scientists' difficulties in comprehending English science lecture; and he found: "In general, the subjects were rather weak at paying attention to the sequence of the lecture because of their neglect of the logical connectors of sequence and their lack of recognition of transition from one main idea to another. Besides, they paid more attention to decoding the speech sentence by sentence than to extracting the science information from the lecture through understanding the rhetorical nature and functions of both textual and lecture discourse."
3. SPSS/PC (Statistical Program for Social Science -- Personal Computer) is the most powerful software package for microcomputer data management and analysis in the world, which is produced and distributed by SPSS Inc.
4. "N" refers to number of the subjects.
5. "s.d." refers to "standard deviation". The standard deviation is the most widely used statistical measure of the spread or dispersion of a set of data. It is the positive square root of the variance. In this survey the standard deviation is smaller, which means the differences of the subjects in their reading comprehension and speed are not significant. And the differences in the means must have resulted from the paper versions.
6. "SS" refers to "sum of squares".
7. "df" refers to "degree of freedom".
8. "MS" refers to "mean square".
9. "F" refers to calculated statistics.
10. "P" refers to probability value.
11. "Q value" refers to calculated statistics;
12. "a" refers to the number of groups;
13. "v" refers to degree of freedom within groups;

14. “q” refers to significant level;

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APPENDIX A Micro-markers and Macro-markers

Micro-markers	Macro-markers
<p>Furthermore In addition Then Moreover Also And</p> <p>But Nevertheless; However; Nonetheless</p> <p>So Thus; Hence; Therefore; Consequently</p> <p>For example Similarly</p>	<p>What is more, What is most important... It is evident that... The truth is that.. One important point is that... It must be emphasized that... It is of note that... It means that...</p> <p>In spite of this,</p> <p>This is because... On the basis of this situation.. It is conclude that..</p> <p>... is an example; Another example is that...</p>