

# The Effect of Word-word Space Reading and Resolutions on Ambiguities of Chinese Segmentation by Advanced L2 Learners of Chinese

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## **Abstract**

That Chinese text does not have a word boundary pose a question of whether L2 learners of Chinese are affected by the text at a word boundary. The present study consisted of two related experiments, i.e., one reaction time experiment and one pencil-paper experiment on the ambiguity of Chinese segmentation. The reaction time experiment was conducted by  $2 \times 2 \times 2$  within-subjects ANOVA (analysis of variance) with text presentation, length and difficulty of a sentence as the independent variables, and reading reaction time as the dependent variable. The results indicated that there were only significant main effects for word boundaries, length and difficulty of a sentence while the two/three-way interactions were not significant. Meanwhile, the pencil-paper experiment was conducted by single factor within-subjects ANOVA with the possible number of word combination (PNWC) as the independent variable, and the incorrect number of the ambiguity of Chinese segmentation which was made by the subjects as the dependent variable. The results demonstrated that there was a significant main effect for PNWC, without significant two-way interaction. Word boundary can help L2 learners of Chinese reading texts and understanding the meaning of texts fast. Apart from theoretic implications, this paper also tried to propose an approach on Chinese segmentation which can be used in Chinese as a foreign language classroom.

## **Keywords**

L2 learners of Chinese, advanced stage, Chinese segmentation, sentence, reading

## **Introduction**

There is no word-word space to mark word boundary in Chinese text, but only narrow space between two continuous characters to mark the morpheme boundary. However, native learners of Chinese basically do not have difficulty in reading Chinese text (e.g. Bai, Yan & Liversedge et al., 2008; Liang & Bai, 2010; Shen, Bai & Zhang et al., 2010; Shen, Li, & Zhang, 2001). This does not mean that word boundary or segmentation is not of great importance in Chinese L1 reading. Indeed, existing reading studies have indicated that the Chinese word plays an important role in reading. Furthermore, words have a psychological reality in Chinese. In fact, the first step to successful Chinese reading is to recognize a word and to segment the boundary between words (e.g. Hoosain, 1992; Li, Gu & Liu et al., 2013; Shen, Liversedge & Tian et al., 2012; Zang, Liang & Bai et al., 2012). Many researchers have shown that word-word space is necessary for Chinese reading, although there is no word-word space between two words. In other words, native speakers and L2 learners of Chinese must know the location of the word boundary to clearly recognize the word. Chinese segmentation has a crucial function for recognizing words in a Chinese text, and it clearly shows the boundary between two words. Word boundary deconstructs the direct constituents of a sentence, making each word presents right and clear.

In Chinese grammar, segmental ambiguity has a close link with a word boundary. Ambiguity is a complicated linguistic phenomenon which results from the contradiction of syntactical structure and meaning, and this is a grammatical system reflection mixed by external syntax and internal semantics (Zhu, 1980). It is common of all languages to have contradictory points, and we can discover that many interfaces of a language, including pronunciation, vocabulary, sentence, meaning, context, have some ambiguity. In the process of resolving ambiguity, learners will use a great number of cognitive resources. Necessarily and importantly, language ambiguity is an indispensable factor to analyze the acquisition and processing of a second language by non-native learners.

Generally speaking, there are two types of grammatical ambiguities in Chinese, structural ambiguity and semantic ambiguity (e.g. Huang & Liao, 1991; Shao, 2007; Xing & Wang, 2003; Zhu, 1980). Structural ambiguity is not obvious in a phrase or a sentence, but readers or listeners can easily understand the meaning of text or speech well. On the other hand, semantic ambiguity needs more linguistic clues to resolve, such as contexts and pragmatics. Structural and semantic ambiguity in Chinese text cannot be resolved by marking the boundary between ambiguous words: more linguistic clues are needed to resolve the ambiguity. However, segmental ambiguity in Chinese text can be resolved by directly marking boundaries between ambiguous words.

Segmental ambiguity is a common phenomenon in Chinese reading. We can use stress and

pause to resolve the sort of ambiguity in speech, but how to resolve it in Chinese text without word boundary? Native speakers of Chinese almost do not have difficulties to resolve segmental ambiguity and understand the meaning of it in reading. Theoretically, the abilities and skills of the second language of advanced L2 learners are largely close to native speakers. What performances will L2 learners show when they resolve segmental ambiguity in Chinese reading? Will they successfully understand the meaning of segmental ambiguity? One of the purposes of this article is to analyze and discuss how advanced L2 learners of Chinese resolve segmental ambiguity.

## **Literature Review**

Segmental ambiguity is a common language phenomenon in Chinese text and the core of the resolution is to segment the word boundary correctly. The effect of word-word space text reading and resolutions on Chinese ambiguous segmentation strings are the two sides to discuss in this article.

### *Chinese word-word space reading experiments for L2 learners*

A large number of studies focus on recognition and acquisition of Chinese words as a second language (e.g. Chen, & Peng, 1999; Everson, 1998; Feng, 2003; Gan, 2009; Yang, 2000; Zhang, 2008; Zhu, 1991). The studies on the effects of word-word space in sentence reading are designed by empirical researches, but these findings do not reach an agreement.

Conducting reaction time research is an effective experimental approach to observe participants' processing results in second language acquisition. The reaction time of reading Chinese text with word-word space is faster than that without space (e.g. Bai, Tian & Yan et.al, 2009; Bassetti & Lu, 2016; Gao & Jiang, 2015; Perea & Wang, 2017; Rayner, Fischer & Pollatsek, 1998; Rayner & Pollatsek, 1996; Shen et.al, 2012), this result indicates that word-word space can help L2 learners of Chinese read text and they spend less time in reading. Oppositely, word-word space does not significantly increase the reading speed during L2 learners' Chinese reading, and the incorrect space between words decreases their reading speed (e.g. Bassetti, 2005; Everson, 1986; Gao, 2004; Inhoff & Liu, 1997). A lot of elementary and intermediate L2 learners participate in Chinese segmentation experiments, and the results show that word-word space facilitates participants' reading speed and they acquire the meaning of Chinese texts faster than those texts without word-word space (e.g. Feng, 2020; Jiao & Yu, 2011; Li, 2019; Song, K., 2014; Song, Y., 2014; Tian, 2009; Wang, 2011; Xu, 2017).

There are two different opinions regarding Chinese word-word space reading by L2 learners. Some researchers claim that word-word space facilitates L2 learners' reading, and others do not

find a contradictory experimental result. These linguistic experiments aim at finding whether the word-word space in Chinese text can promote L2 learners' reading and decrease the reading time. However, different participants, different materials and different operational procedures might as well make a difference. In this case, more efforts are needed to test the effect of word-word space reading in L2 Chinese.

#### *Resolutions on ambiguities of Chinese segmentation by L2 learners*

There is no word-word space in Chinese text, and only having a boundary between two characters. Such as this string 太平淡 (tai ping dan), only three characters, but we can divide it into two absolutely different words, 太平 (which means "peaceful") and 平淡 (which means "ordinary"). The string shares a common character 平 but has two segmental results, 太平/淡 and 太/平淡. This sort of segmental ambiguity is overlapping ambiguity. And another sort of segmental ambiguity is combinatorial ambiguity. For example, a frequent word in our life, 电影院 (dian ying yuan, which means "cinema") is a three-character string. If there are some characters before or after this string, which becomes a longer string, it will have two possibilities to segment this three-character string. One is 电影 (which means "film"), and another one is 电影院. Obviously, there are also two results of the combinatorial ambiguity, ……/电影/院…… and ……/电影院/……. The correct segmentation of overlapping and combinatorial ambiguity is extremely important to acquire the exact meaning of segmental ambiguity in Chinese reading. However, knowledge of syntactic and semantic, and knowledge of context and pragmatics are all necessary for readers to resolve these two sorts of segmental ambiguities.

Different length of overlapping and combinatorial segmental ambiguity can be divided into two or more words, because of the different amount of characters in these ambiguous strings. Three-character overlapping ambiguity can be divided into two words, such as the above-mentioned string 太平淡. Four-character overlapping ambiguity can be divided into three words, such as 如今天气 (ru jin tian qi) string into 如今 (which means "now"), 今天 (which means "today") and 天气 (which means "whether"). The four-character overlapping string shares two common characters. Five-character overlapping ambiguous segmentation can be divided into four words, such as 排演戏剧院 (pai yan xi ju yuan) string into 排演 (which means "drill", here it is a verb), 演戏 (which means "act", here is a verb), 戏剧 (which means "drama") and 剧院 (which means "theatre"). The five-character overlapping string shares three common characters. The segmentation of combinatorial ambiguity is a little different from the segmentation of overlapping ambiguity. Two-character combinatorial ambiguity, such as 将来 (jiang lai) into 将 (which means "in the future"), or 将来 (which means "in the future"). Three-character combinatorial ambiguity 会议室 (hui yi shi) into 会 (which means "can"), 会议 (which means

“meeting”), or 会议室 (which means “meeting room”). Four-character combinatorial ambiguity 出版物品 (chu ban wu pin) into 出 (which means “out”), 出版 (which means “publish”), 出版物 (which means “publication”), or 出版物品 (which means “publication” or “publish subjects”).

Researchers often use a quantitative standard, a possible number of word combinations (PNWC), to distinguish the inner difference of segmental ambiguity. In real Chinese text and daily communication, PNWC from 1 to 3 approximately arrives at 99% (Liang, 1987; Liu, 2000). Previous studies took PNWC as an independent variable, and this independent variable has three different levels (Yang & Jiang, 2012; Yang, W. & Yang, Z., 2016). Concretely, PNWC of these following overlapping ambiguities, 太平淡, 如今天气 and 排演戏剧院 are 1, 2 and 3; PNWC of these following combinatorial ambiguities, 将来, 会议室 and 出版物品 are 1, 2 and 3. Using PNWC to discuss the difference of segmental ambiguity is a clear and objective way to the present research question. Some studies have analyzed the structure of segmental ambiguity in Chinese and discussed the resolution of the two sorts of segmental ambiguities by native speakers of Chinese (Gan, Palmer, & Lua, 1996; Li, Gao & Huang et al., 2003; Ma, Li, & Rayner, 2014; Yen, Radach & Tzeng et al., 2012), but few studies have taken L2 learners of Chinese as participants to resolve these segmental ambiguities. Proficiency levels of L2 learners of Chinese and PNWC are both significant in the solutions on overlapping ambiguity by pencil-paper test among beginners and intermediate learners, and the error rate is different in these two sorts of participants' segmentations (Yang & Jiang, 2012). Beginners of L2 Chinese use the bottom-up approach to segment the overlapping and combinatorial ambiguities, and intermediate learners take the top-down strategy to deal with these two kinds of ambiguities (Yang, W. & Yang, Z., 2016).

#### *Limitations of previous studies*

Recognition of word and resolution of segmental ambiguity in Chinese reading are very important for L2 learners to clearly understand the meaning of the text. Previous researches have confirmed that resolution of segmental ambiguity plays an important role in reading comprehension among beginners and intermediate L2 learners of Chinese. Advanced L2 learners of Chinese read more texts and the possibility of resolving segmental ambiguity is higher than beginners and intermediate learners of Chinese. However, we do not know the real situation that how advanced L2 learners of Chinese divide the boundary between words and resolve the segmental ambiguity now. Previous studies only have observed the other two stages learners except for the advanced stage. Learners who at an advanced stage have mastered a great number of Chinese linguistic knowledge and they understand an appropriate way to a segment word boundary. If advanced learners of Chinese read word-word space text in the experiment, will they act like beginners or

intermediate learners? How will advanced L2 learners segment the word-word space on Chinese segmental ambiguous strings?

Word frequency is another key factor in many psycholinguistic experiments, and some studies take it as an independent variable which has been taken as high frequency and low frequency (Crossley et al., 2019; Durrant & Doherty, 2010; Ellis, 2002; Gablasova, Brezina & McEnery, 2017; Gass & Mackey, 2002; Hulstijn, 2002). A corpus can be a word frequency calculator to tell researchers the probability and quantity of a word. If the word frequency is high, L2 learners may be easier to recognize and segment word boundary in a short time. If the word frequency is low, they possibly will spend much time in recognizing words and segmenting word boundary. Learners will be more familiar to a word with higher word frequency. However, some related studies do not pay much attention to the word frequency of experimental materials. Besides, in psycholinguistic experiments, the familiarity of words and the number of Chinese characters has been taken as an important factor which can decide the final results. A good research design is fundamental for every empirical study, word frequency and the familiarity of words are very critical in segmental ambiguity experiment for L2 learners of Chinese.

Considering these limitations, we have designed two experiments on Chinese segmentation and resolution of segmental ambiguity for advanced L2 learners of Chinese. Below are the two research questions of this study:

1. Will the word-word space facilitate the reading speed of advanced L2 learners of Chinese?
2. What are the differences between the resolutions on ambiguities of Chinese segmentation by advanced L2 learners?

## **Method**

### *Experiment 1: reaction time of word-word space reading*

Experiment 1 aimed at acquiring a fact that whether there is a significant effect on reaction time when were advanced L2 learners reading word-word space text?

### *Participants*

Participants were 20 (m = 9, f = 11) advanced L2 learners of Chinese ranged in age from 21 to 32 ( $M = 25.35$ ,  $SD = 3.03$ ), the average time of Chinese studying was 4.73 years, who were all graduate students enrolled in master's projects in China. These non-native participants came from a variety of countries. All of the L2 participants used alphabetic orthography in their native languages, and they were accustomed to reading word-word space text. All of them achieved a minimum of *Hanyu Shuiping Kaoshi* (Test of Chinese as L2, HSK) level 5, and some of them

achieved HSK level 6. HSK is a standardized Chinese language levels testing system for L2 learners administered by *Hanban* (Confucius Institute Headquarters) affiliated to the Ministry of Education of the central Chinese government.

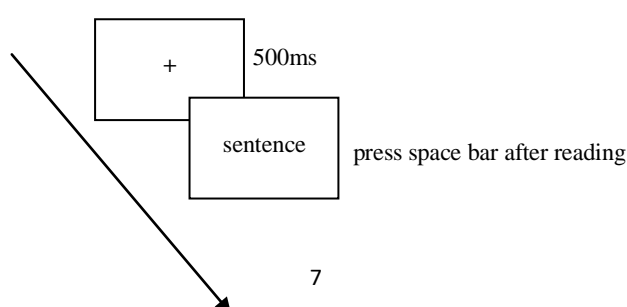
### *Design and materials*

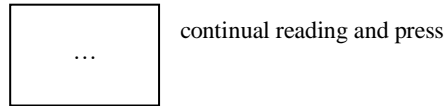
Experiment 1 had three independent variables, text presentation, length and difficulty of the sentence. Every variable in experiment 1 had two levels. Text presentation was divided into word boundary or not having a word boundary. Length of sentences was divided into short sentences or long sentences. There are two conditions of difficulty of sentences, easy or difficult sentences. The dependent variable of experiment 1 was reaction time (milliseconds, ms) of sentence reading.

All of the materials were chosen from a senior Chinese language textbook, and 10 advanced L2 Chinese learners (HSK Level 6), who were not as participants in experiment 1 to judge the difficulty of all experimental sentences marked from 1 (very easy) to 6 (very difficult). After judgment, we checked the difficulty of words and grammar in the sentences according to HSK. If the difficulty value was higher than the average point, then the sentence was a difficult sentence. If lower than the average point, the sentence was an easy sentence. We counted the total characters and average of all material sentences, a long sentence has more characters than the average of the number of characters, and shorter sentence had fewer characters than the average of the number of characters.

### *Procedures*

We used E-prime 2.0 to program, display the experimental materials, and collect data. Participants were given instructions for the experiment and a description of the apparatus, and each of the participants finished the experiment individually in 60 minutes, they had a 3-minute break after reading 10 sentences. Every participant read 80 Chinese sentences, including the eight different types of sentences. There were 300 milliseconds between each sentence's presentation. The participants read silently and acquire the meaning of the sentence, and then pressed the space bar and waiting 300 milliseconds, continually read the next sentence. Before the formal experiment, each participant operated a group of related test to know the procedures.





**Figure 1.** The illustration of a trial in Experiment 1

*Results*

A 2×2×2 within-subjects ANOVA was conducted with sentence reading reaction time as the dependent variable and word boundary (word-word space/no space), sentence length (short/long) and sentence difficulty (easy/difficult) as the independent variables (Table 1). The results indicated that there was a significant main effect for a word boundary ( $F(1,152) = 7.035, p < .05$ ), with having no word-word space text presenting significantly more reaction time than that of having word-word space text. There was also a significant main effect for length ( $F(1,152) = 208.386, p < .05$ ) and difficulty ( $F(1,152) = 21.423, p < .05$ ). The long sentence presented significantly more reaction time than that of a short sentence, and difficult sentence presented significantly more reaction time than that of an easy sentence. There were no two/three-way interaction effects among the three independent variables.

**Table 1.** Descriptive statistics of the three independent variables in Experiment 1 (n = 20)

Sentence conditions							
nws-s-e	ws-s-e	nws-s-d	ws-s-d	nws-l-e	ws-l-e	nws-l-d	ws-l-d
<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>
( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )	( <i>SD</i> )
11025	9925	12490	11317	19493	17105	24036	21779
3331	3070	3746	3481	5645	4127	5101	3811

Average reaction time

(*nws-s-e*: non-word space, short and easy sentences; *ws-s-e*: word-word space, short and easy sentences; *nws-s-d*: non-word space, short and difficult sentences; *ws-s-d*: word-word space, short and difficult sentences; *nws-l-e*: non-word space, long and easy sentences; *ws-l-e*: word-word space, long and easy sentences; *nws-l-d*: non-word space, long and difficult sentences; *ws-l-d*: word-word space, long and difficult sentences)

*Experiment 2: resolutions on ambiguities of Chinese segmentation*

The resolution on segmental ambiguity is one of an efficient way to study how L2 learners process and acquire Chinese. The purpose of Experiment 2 was to observe whether the PNWC had a significant effect or not in the resolution of two types of segmental ambiguity by advanced L2 learners of Chinese.



### *Participants*

The participants in Experiment 2 were the same as those in the Experiment 1.

### *Design and materials*

Experiment 2 was a single factor within-subjects design, and the PNWC was the independent variable which including 3 levels. The dependent variable was the error number of segmental ambiguity. We used ANOVA to operate and analyze data. The most important point in this experiment was the selection of segmental ambiguity. We choose some words that may become a part of overlapping and combinatorial ambiguity from *New Edition of HSK Vocabulary Syllabus* which had been edited by *Hanban*. The syllabus totally contained 5,000 words from HSK level 1 to level 6. Most of the experimental words are distributed from HSK level 3 to 5 and are frequent to L2 learner of Chinese in daily use. To make sure that each of participants understands the words of materials of Experiment 2, they had conducted a vocabulary test. There was no significant difference ( $t(35) = 1.99, p > .05$ ) between the frequency of the 12 overlapping ambiguities ( $M = .0242, SD = .0728$ ). There was also no significant difference ( $t(35) = 2.15, p > .05$ ) between the frequency of the 12 combinatorial ambiguities ( $M = .0147, SD = .0213$ ).

### *Procedures*

The overlapping or combinatorial ambiguous string always exists in a complete sentence, and the string is one of the components to construct the sentence. Single overlapping or combinatorial ambiguous string cannot be segmented correctly and properly except in a complete sentence. Therefore, we offered 24 Chinese segmentation ambiguous sentences as experimental materials. A test paper with 30 sentences was distributed to all of the participants, including 12 overlapping ambiguities sentences, 12 combinatorial ambiguities sentences and 6 sentences which completely did not contain any ambiguities from a Chinese textbook for senior L2 learners. After getting the test paper, each participant read the guideline which was written in Chinese to understand how to do the pencil-paper test. Then participants used *divide* to mark the boundary between two words. We gave an example on the test paper, if someone of the participants did not know the procedure, he or she could ask us in Chinese or English to for help. We prepared 20 test papers which were printed in different sequences of the 30 sentences for 20 participants. All participants sat in a quiet classroom to take part in the pencil-paper test, and they were not allowed to ask any questions and look into dictionaries during the test.

### *Results*

The statistics were only calculated on the segmentation error of segmental ambiguous strings in

Experiment 2. For overlapping ambiguity (Table 2), errors were significantly different by the PNWC ( $F(2, 28) = 15.601, p < .05$ ). Repeated contrasts tests were conducted to access which of the PNWC differed from one another. The results indicated that errors were significantly different when the PNWC is 3. Generally speaking, the errors increased with the number of PNWC. For combinatorial ambiguity (Table 3), errors were also significantly different by the PNWC ( $F(2, 28) = 8.263, P < .05$ ). Similarly, the results indicated that errors were significantly different when the PNWC is 3 too. But differently, when the PNWC is 2, the combinatorial ambiguity had fewer errors by dividing the boundary between words.

**Table 2.** Comparison of segmental errors in overlapping ambiguous strings (n = 20)

	PNWC = 1		PNWC = 2		PNWC = 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Errors	1.30	1.22	1.50	1.00	3.35	1.93

**Table 3.** Comparison of segmental errors in combinatorial ambiguous strings (n = 20)

	PNWC = 1		PNWC = 2		PNWC = 3	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Errors	1.30	.92	.60	.88	2.00	1.86

## Discussion

In the present study, word boundary in-text facilitated the participants' reading speed and decreased their reaction time. The space between words helped L2 learners in understanding Chinese text quickly (e.g. Bai, Tian & Yan et.al, 2009; Gao & Jiang, 2015; Perea & Wang, 2017; Shen et.al, 2012). Moreover, the effect of word-word space in reading helps beginners, intermediate and advanced L2 learners of Chinese reading texts. Space between words in a text made every single word clear to learners. Reading word-word space text, L2 learners had more time to integrate word information and acquired the whole meaning in a short time. As for the length and difficulty of a sentence, word-word space also played an important role in the two aspects. Word-word space had a close link to the syntactic structure in cognitive processing. The syntactic structure was an explicit form to semantic structure (Huang & Liao, 1991; Shao, 2007). The meaning of a word was a fundamental element to understand the text. Word-word space offered an indispensable clue that helps L2 learners to recognize word quickly. Word processing was a crucial step in language comprehension. For L2 learners of Chinese, dividing the right boundary between words in the text was the first and very important step before word processing. Considering this facilitating effect, Chinese language teachers can use word-word space approach

in reading teaching, especially when the reading content was very difficult for learners.

The pencil-paper test indicated that not only the PNWC has a significant effect in the resolution of segmental ambiguity, but also there were other linguistic factors that jointly affected the decision of L2 speakers in the resolution of segmental ambiguity (Yang, W & Yang, Z, 2016). The errors between the two types of segmental ambiguity were different. There were two obvious trends in the resolution of overlapping and combinatorial ambiguity. One of the reasons was the form structure of the two types of segmental ambiguity. For overlapping ambiguity, the explicit form was a collocation of words. It was very important in the resolution of overlapping ambiguity to recognize words and understand how to collocate each neighboring Chinese character. In summary, vocabulary played an important role in the resolution of overlapping ambiguity, and the form structure was a string which took a character (morpheme) as a core to expand in a line at right or left. If the PNWC was longer, more knowledge of vocabulary was needed. For combinatorial ambiguity, the external structure was a string which took an unambiguous word as a core to expand in a line to the right. Using a lexical way to resolve this type of ambiguity was not enough. The knowledge of syntax, semantics and pragmatics were also needed. To resolve the two types of segmental ambiguity, participants did not only use linguistic knowledge but also fully took their cognitive resources to recognize the exact word in ambiguous strings.

If we observed the syntactic structure of the two types of segmental ambiguity, we can discover that the arrangement between words was different. In overlapping ambiguity, one character (morpheme) combines with another character (morpheme) which before it or after it, two characters form into a word which is clear and unambiguous. Relying on lexical information to divide the word boundary in overlapping ambiguity was an easy and appropriate approach. In combinatorial ambiguity, an unambiguous string is enclosed in an ambiguous string, and the lexical information cannot be discovered from words in the string. To divide the word boundary in combinatorial ambiguity, the participants must consider the information between two or more words in strings, and analyze the neighboring characters and words. The two types of segmental ambiguity need different approaches to resolve, because of the difference of the syntax-semantics interface.

A semantic clue is a necessary linguistic point to understand the text (Huang & Liao, 1991; Shao, 2007). Learners construct the links between words to acquire the meaning of the text. Before getting the meaning of a sentence, learners firstly need to recognize and segment each word in Chinese text, and then use collocation rules of words in the language to understand the whole meaning of a sentence. In any segmental ambiguities, the ambiguous string matches with unambiguous string. The possibility of collocation and arrangement are to be considered when

segment the ambiguous string. Meaning of each word in an ambiguous string is a clear clue to segment ambiguity.

There are more possibilities for the collocation of words in segmental ambiguity if the PNWC is longer. Words formed a certain context for learners to discover useful information and acquire the best collocation in an ambiguous string. The context in an ambiguous string can be divided into the information of vocabulary and of the sentence. Context information of vocabulary means that every character in the ambiguous string can be combined to a single word. Learners have a little more difficulties in recognizing words if a character has more possibilities with other characters coming to be a word. Context information of sentence aims at telling learners that the types of segmentation of Chinese ambiguous strings, and helping them to find the exact word in a sentence in recognizing and segmenting word in Chinese text. Knowledge of syntax, semantics, vocabulary and pragmatics are all indispensable for L2 learners to resolve the segmental ambiguity.

## **Conclusion**

The research goal of these two experiments is to indicate that word boundary can also help advanced L2 learners of Chinese reading texts fast and resolve the segmentation of Chinese ambiguous strings correctly. The present study used reaction time experiment and pencil-paper test to acquire participants' Chinese as a second language processing experimental data, and showed that word boundary is an important point for L2 learners to process Chinese texts. Without any doubt, the first step to understanding the meaning of a text in reading is to recognize a word in a non-word space text. Understanding every word is a basic work in reading, and dividing the boundary between words offers convenience for L2 readers to sentence parsing. For solving segmental ambiguity, Chinese segmentation in the ambiguous string is the only way for resolution. Word-word space approach, which shows the boundary between words in Chinese text, combines with the knowledge of syntax, semantics, pragmatics and context is an appropriate means for teachers in Chinese reading teaching. Teaching with this approach, the purpose is to simplify the sentence parsing for learners to read.

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## Appendix

### I - Materials of Experiment 1

Type	Sentence
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SE1	等饭后上冰激凌、水果、点心时，可以吸烟。
SE2	原来她昨夜作了一个梦，梦见那幽静的池塘上落花纷纷，在报道着春光迅速流逝的消息。
SE3	以几个朝代为一段，也于叙述之中顾到古、中、近、现之分，五种生产方式之别的为一种。
SE4	现在想起来感到多么惭愧啊！
SE5	突然他唉哟一声蹲了下去，原来一脚踢在一块石头上，鞋子张了“嘴”。
SE6	这种状况，最终将会妨碍我们对他作深入的、正确的认识和评价。
SE7	欧洲具有悠久的宗教文化传统，迄今它仍是世界上宗教活动最为活跃、影响最为广远的地区之一。
SE8	在甲午中日战争前已有的行业中，棉纺、火柴、造纸、印刷、碾米等工业行业，略有发展。
SE9	太阳第一线光白云雾里漏出来，河水吻着，好像万点破碎的镜片。
SE10	王宏芒已 85 岁了，耳聋眼瞎，一时竟不知是谁来了。
SE-11	她带我去参加夏令营，带着我登上高高的山冈，穿过茂密的树林。
SE-12	进了永新城，我们放鞭炮助威，杀声震天，白军吓得到处乱跑。
SE-13	竞争需要诚恳品质。
SE-14	大象公公说自己最近一直打喷嚏，流清水鼻涕。
SE-15	打喷嚏时干嘛不用手帕捂住口鼻呢？
SE-16	此处，居住环境恶劣，长期在外流浪，也很容易做出铤而走险的事。
SE-17	比如，在法制比较健全的国家，对于国家公务人员兼职从事赢利性活动都有严格限制。
SE-18	砍一棵白菜竟要有几道工序，花费不少时间。
SE-19	美国鬼子来了，咱们女工上班路过美国兵营，美国兵就拦着我们开玩笑，不让我们走。
SE-20	说也有趣，旧书新读或古书今读，却也得到一些对于思考今天的新问题的新启发。
SD1	她连忙从办公桌的抽屉里取出几本厚厚的业务登记册，迅速地翻动着。
SD2	所以马克思曾写道：“蜘蛛进行着与织工相类似的工作，蜜蜂建筑自己的蜂房可以使一些建筑师惭愧。”
SD3	边潮洲回到车班的表现，有人投来赞许的目光，有人射来怀疑的一瞥，有些甚至讽刺说：“拉兹，你真会捞世界！”
SD4	实际上，道教吸引信徒的地方就在于它能为人们决疑惑，断吉凶，扶疾病，祈求福禄寿，以及念咒驱鬼等等。
SD5	袁术乘孙坚妻吴氏扶柩(chèn)归里之机，派兵关路拦截，抢去传国玺(xǐ)。
SD6	世界舆论认为，一九七八年是中国外交活动最活跃的一年，而中美建交是中国外交胜利的顶峰。
SD7	火柴工业的第一个工厂是商人叶成忠(澄衷)于一八九〇年创办的燮(xiè)昌火柴公司。
SD8	他坦率地向我致歉，我觉得他以诚相待，也就打消了顾虑，并在他的邀请下去了他的家。
SD9	少时风浪暂歇，龙船拢岸。

SD10	当国民党到鞍山时，老包曾干脆歇工到大街去蹬过三轮车。
SD-11	“青年先锋号”除了定期走访乘客、上门征求意见外，还每天出两次乘客评议台，请乘客提意见和建议，直接监督。
SD-12	乘人之危，大捞一把，本身就是否定自己人格的完整，否定自己是一个诚恳自尊的人。
SD-13	李玉平虐待继母，致人死亡，情节恶劣，后果严重，触犯了刑法第182条的规定，已构成虐待罪，应追究刑事责任！
SD-14	我为求生存，也应该动动脑筋，再迷恋过去，未免糊涂！
SD-15	其实，说这类话的人，正在糊涂着，只是自以为明白罢了。
SD-16	他这一番话说得戴维和麦迪两个人都糊涂了。
SD-17	黄绍竑(hóng)以既辞去第十五军军长兼职，又由柳州到桂林休养。
SD-18	割完稻子，砍白菜、摘花生、扳棒子、拔萝卜。
SD-19	新中国邮票问世最长不过40来年，价格何以会像一匹脱缰的野马？
SD-20	目前意大利武装部队中，军官所占百分比之高恐怕是举世无匹的。
LE1	我差点没哭出来，急忙推开窗，向海洋开发研究所家属宿舍大院里的大池塘张望，面对这黑黝黝的一潭死水嘟囔起来：“爸爸，谁不知道这池塘受了污染，把鱼放进去还能活吗？”
LE2	大青山抗日根据地是在绥远北部，陶林、武川、固阳以北，在归绥失陷不久以后，我八路军XXX支队即在该地创立了一块广大的抗日根据地，这一根据地之创立对敌寇巩固平绥线占领之威胁，对敌继续西犯企图之威胁是非常之大的。
LE3	蔡韦同志在该书中，对中国革命是否要以马克思主义为指导；共产主义是否适合中国国情；中国是否要进行无产阶级革命、实行无产阶级专政；以及要不要在中国建立布尔什维克式的无产阶级政党等三次论战的主要问题，以相当丰富的史料进行了综合、分析，叙述亦较为清晰。
LE4	以几个朝代为一段的书或讲义，未必把每一朝代都同等地叙述了；以古、中、近、现分期的，以纪事本末为体的，又未必一定抹煞朝代，沾都不敢沾。
LE5	虽然也曾有过短暂的疑问，总觉得杨小姐常常张冠李戴，但最终还是非常惭愧，下决心把她说过的作品都找来啃一啃。
LE6	“这么多年来，不论是我拿枪放哨的时候，还是蹲在战壕里准备冲锋的时候，我都常常回忆起那一天，我永远也忘不了那一天！”
LE7	另一方面，辩护人也有一定的义务，这就是辩护人在进行辩护的时候必须以事实和法律为根据，永远不得作出妨碍法院实现审判权任务的行为。
LE8	他带有讽刺意味地说道：“只有伟大的德国思辨哲学家们才杜撰出某种与追求幸福不同的而且是独立的抽象的意志，某种只是想象的意志。”
LE9	例如，他长时期以扶病之身忘我地刻苦地工作，他受到来自内部的沉重打击而忍辱负重，继续战斗，他深感身心疲乏却仍鞭策自己将“生命溶化在大众的里面”，都是具体的、生动的表现。

LE10	哥伦比亚《新边疆》周刊说：“如果年终需要选出一个一九七八年国际政治舞台上最活跃的政府的话，中国政府会赢得这一头衔。”
LE11	肉紧张了，有肉票；菜紧张了，有菜证，甚至小小的火柴紧张了，也可以凭本供应，虽然数量极少，但怎么也有用的……不过，这只维持了谁都不愿意长久保持的尚属贫穷范围的温饱。
LE12	记得我刚到高炉不久，一天清早，铁口自动漏铁了，红色的铁水从炉台喷到地面，满屋都是火焰，到处听到爆炸声，高炉被迫停止生产了。
LE13	他们生了气，把家里所能拿出来东西都卖成钱，置了辆破车，凑了一匹老马和一头瞎驴，组织了两个剩余劳动力，到邯郸去了。
LE14	他要求党政军三个方面整理出专题材料后，征求地方院校的历史教授和专家的意见，然后由他亲自向党中央作出报告。
LE15	第三天，赵焕章向父亲深情地看了一眼，就夹上剧本走了，坐了十六个小时的火车和汽车，风尘仆仆、马不停蹄地来到作者的家乡荣成县，征求公社干部的意见，征求社员们的意见。
LE16	对夫妻吵架、婆媳不和，多做些劝解的工作；只要态度诚恳和气，道理讲得透彻，这样的场合批评一下，人家也比较容易接受。
LE17	他的恶劣作风影响了子女，前妻生的儿子李玉平、女儿李玉芝从来不把罗庆美当母亲看待，1981年以来，对继母从嫌弃发展到虐待。
LE18	他指出：“一批老同志以实际行动，带头废除领导职务终身制，推进干部制度的改革，这件事在党的历史上值得大书特书。”
LE19	黑格尔的这些话是说得很尖锐的，它有丰富的含蕴，也很有力量，可以启发我们想起许多科学的和不科学的态度、方法和作风。
LE20	他们从“四星级”、“五星级”宾馆的做法受到启发，决定把一项项教育内容，用一颗颗红星标志出来，十项教育内容定为十颗星。
LD1	小小的日记本，他们不放心藏在枕头下、被套里、镜框后、大衣柜中的羽绒服兜里、锁进抽屉里，生怕被好奇心强的家长窥视自己青春期的秘密或者根本没有什么可值得保密的流水帐。
LD2	以生产熊猫、雪人等异型冰激凌而闻名北京的北京华升食品厂，重视食品卫生，严格执行食品卫生标准，在前不久由轻工部、北京市有关部门联合组织的理化指标、微生物指数的检测中，取得全部合格的好成绩。
LD3	刘表曾与手下文人草写了一份奏章，颇具才思，弥衡不屑一看，把奏章撕得粉碎，随手弃之于地，要过纸笔，重新拟写，辞义可观。
LD4	有人用拳头狠狠叩击自己的脑门；有的揪住胸襟，拼命撕着衣裳；有人双手捂腹，在地上打滚，也有的……看到这个奇特的场面，费拉克松了口气，心里坦然了许多，他抬起右手，把指头插进茂密的发根里，抓了抓，嘴角边挂了一丝隐隐的笑意。
LD5	鉴于我国目前血吸虫病疫情严重，现有血吸虫病病人一百五十多万人，其中晚期病人五十五万，钉螺面积

	三十五点五亿平方米，病畜一百一十九万多头，近亿人受到威胁，抓紧血防科技工作是当务之急。
LD6	在敌寇进占台怀时，首先遭受了重大的打击，现在边区四周，每日都在进行剧烈的连绵的战斗，以拉锯式的战争形势，互相进退，敌寇在边区四周，修筑了绵密的道路网与碉堡，企图在经济上摧毁边区，和逐渐的向内地推进，然而边区并没有因此受了严重的威胁，一直到今日，敌人的这一企图，也没有完成。
LD7	我们再看美国“纽约先驱论坛报”在十月六日一篇评论中的话，它指出：美国在竞赛中遭到严重失败的原因，是很明显的，就是“苏联决不允许任何东西来妨碍它最优先地注意科学研究”；它又说，“苏联所需要的，是一个全国性的科学研究和发展计划，这个计划的规模之宏大和具有远见，要能与（美国的）曼哈顿计划相匹敌。”
LD8	他带有讽刺意味地说道：“只有伟大的德国思辨哲学家们才杜撰出某种与追求幸福不同的而且是独立的抽象的意志，某种只是想象的意志。”
LD9	他（她）们助人为乐的热心肠、驱鬼逐怪惩凶扶善的广大神通，以及他们所拥有的奇奇怪怪的宝贝，强烈地吸引着人们成仙道。
LD10	在这一年中，我停止了一切娱乐，谢绝了一切应酬，但命运有时会给人开开玩笑，虽然我的主课中国古典文学与基础课中国历史都名列前茅，但在最后一门“古代汉语”时，竟然头脑发热，提早一个半小时洋洋自得出了考场，哪知漏做了一大题，白白丢了三十分。
LD-11	后来，朱元璋对他所以参加起义军，作了坦率的自白：“朕当是时二十有四，盘桓避乱，终不宁居，遂托身行伍”，又说：“吾起寒微，因天下乱不得已入行伍中”，在他与刘基论兴亡之道时也提到了“盗贼蜂起，群雄角逐，窃据州郡，朕不得已从戎，欲图自全。”
LD-12	在维也纳小组的活动中，那种真诚而坦率的学术气氛，使得作者在回忆这段生活时仍然充满着眷恋：“维也纳小组的特点是：讨论采取坦率的非独断主义的态度。”
LD-13	你忘了，几年前在南部有许多孕妇，怀胎九月中，她们也闭着眼梦想孩子长大的那一天，却没想到吃了滴滴纯净的沙拉油，孩子生下来是瞎的、黑的！
LD-14	赌博是一种极端恶劣的坏行为，是剥削阶级用来贪财取利的一种手段，在新社会里，已在法律上明文规定禁止，每个人都应当自觉地遵守；有志气的青年更应该带头不参加赌博和其他变相赌博，并且应积极劝阻别人不要赌博，以改变旧社会遗留下来的不良风尚；如果发现赌博成性、以聚赌为生的赌徒赌棍，更是应该坚决予以揭发，为社会除害。
LD-15	文字虽然不拒绝替社会上任何阶级服务，但在阶级社会中，由于被压迫阶级所处的恶劣的经济和政治地位，再加上统治阶级故意把持和垄断，实际上他们没有条件学会使用文字的。
LD-16	他们希望党和政府继续带领人民将改革事业引向深入，同时也希望党和政府拿出切实措施，用社会主义思想牢固占领农村阵地，遏制个人主义和自私自利倾向的蔓延，抵制赌博迷信等等陈旧现象的泛滥，深入开展精神文明建设，净化社会风气，建设文明

	安定的社会生活环境。
LD-17	现在我们有些团的基层组织会议开的太多，而内容贫乏枯燥，且许多会议的时间拖的很长、也有不少团的基层干部和积极分子兼职过多，担任社会工作过多，或者分配给他们的工作超出他们力所能及的范围，影响青年农民的休息和睡眠。
LD-18	将凤凰池拦了前路，麒(qí)麟(lín)阁顶杀后门，便有那汉相如献赋难求进；贾长沙痛苦谁俦(chóu)问；董仲舒对策无公论。
LD-19	至于柏林市也是一匹不容忽视的“黑马”，它所打的一张“政治牌”已足以令人倾心，再加上它所表现出的准备精细，是可以令北京、悉尼两市担心的。
LD-20	例如：李××，原为某市量具刀具厂计划组统计员，他利用掌握签订援外合同的部分职权，与××省流窜犯王×相勾结，冒用××物资局等几十个单位的名义，私开空白介绍信和实物收据，将价值二十一万元的国家统配计划的援外物资，转手倒卖给一些社队办企业，他们从中以“中间费”、“办公费”、“补贴费”、“招待费”等名目，非法获利一万八千余元。

Type	Sentence
SE11	她带我去参加夏令营，带着我登上高高的山冈，穿过茂密的树林。
SE12	进了永新城，我们放鞭炮助威，杀声震天，白军吓得到处乱跑。
SE13	竞争需要诚恳品质。
SE14	大象公公说自己最近一直打喷嚏，流清水鼻涕。
SE15	打喷嚏时干嘛不用手帕捂住口鼻呢？
SE16	此处，居住环境恶劣，长期在外流浪，也很容易做出铤而走险的事。
SE17	比如，在法制比较健全的国家，对于国家公务人员兼职从事赢利性活动都有严格限制。
SE18	砍一棵白菜竟要有几道工序，花费不少时间。
SE19	美国鬼子来了，咱们女工上班路过美国兵营，美国兵就拦着我们开玩笑，不让我们走。
SE20	说也有趣，旧书新读或古书今读，却也得到一些对于思考今天的新问题的新启发。
SE-1	等饭后上冰激凌、水果、点心时，可以吸烟。
SE-2	原来她昨夜作了一个梦，梦见那幽静的池塘上落花纷纷，在报道着春光迅速流逝的消息。
SE-3	以几个朝代为一断，也于叙述之中顾到古、中、近、现之分，五种生产方式之别的为一种。
SE-4	现在想起来感到多么惭愧啊！
SE-5	突然他唉哟一声蹲了下去，原来一脚踢在一块石头上，鞋子张了“嘴”。
SE-6	这种状况，最终将会妨碍我们对作深入的、正确的认识和评价。

SE-7	欧洲具有悠久的宗教文化传统，迄今它仍是世界上宗教活动最为活跃、影响最为广泛的地区之一。
SE-8	在甲午中日战争前已有的行业中，棉纺、火柴、造纸、印刷、碾米等工业行业，略有发展。
SE-9	太阳第一线光自云雾里漏出来，河水吻着，好像万点破碎的镜片。
SE-10	王宏芒已85岁了，耳聋眼瞎，一时竟不知是谁来了。
SD11	“青年先锋号”除了定期走访乘客、上门征求意见外，还每天出两次乘客评议台，请乘客提意见和建议，直接监督。
SD12	乘人之危，大捞一把，本身就是否定自己人格的完整，否定自己是一个诚恳自尊的人。
SD13	李玉平虐待继母，致人死亡，情节恶劣，后果严重，触犯了刑法第182条的规定，已构成虐待罪，应追究刑事责任！
SD14	我为求生存，也应该动动脑筋，再迷恋过去，未免糊涂！
SD15	其实，说这类话的人，正在糊涂着，只是自以为明白罢了。
SD16	他这一番话说得戴维和麦迪两个人都糊涂了。
SD17	黄绍竑(hóng)以既辞去第十五军军长兼职，又由柳州到桂林休养。
SD18	割完稻子，砍白菜、摘花生、扳棒子、拔萝卜。
SD19	新中国邮票问世最长不过40来年，价格何以会像一匹脱缰的野马？
SD20	目前意大利武装部队中，军官所占百分比之高恐怕是举世无匹的。
SD-1	她连忙从办公桌的抽屉里取出几本厚厚的业务登记册，迅速地翻动着。
SD-2	所以马克思曾写道：“蜘蛛进行着与织工相类似的工作，蜜蜂建筑自己的蜂房可以使一些建筑师惭愧。”
SD-3	边潮洲回到车班的表现，有人投来赞许的目光，有人射来怀疑的一瞥，有些甚至讽刺说：“拉兹，你真会捞世界！”
SD-4	实际上，道教吸引信徒的地方就在于它能为人们决疑惑，断吉凶，扶疾病，祈求福禄寿，以及念咒驱鬼等等。
SD-5	袁术乘孙坚妻吴氏扶柩(chàn)归里之机，派兵关路拦截，抢去传国玺(xǐ)。
SD-6	世界舆论认为，一九七八年是中国外交活动最活跃的一年，而中美建交是中国外交胜利的顶峰。
SD-7	火柴工业的第一个工厂是商人叶成忠(澄衷)于一八九〇年创办的燮(xiè)昌火柴公司。
SD-8	他坦率地向我致歉，我觉得他以诚相待，也就打消了顾虑，并在他的邀请下去了他的家。
SD-9	少时风浪暂歇，龙船拢岸。
SD-10	当国民党到鞍山时，老包曾干脆歇工到大街去蹬过三轮车。
LE11	肉紧张了，有肉票；菜紧张了，有菜证，甚至小小的火柴紧张了，也可以凭本供应，虽然数量极少，但怎

	么也有用的……不过，这只维持了谁都不愿意长久保持的尚属贫穷范围的温饱。
LE12	记得我刚到高炉不久，一天清早，铁口自动漏铁了，红色的铁水从炉台喷到地面，满屋都是火焰，到处听到爆炸声，高炉被迫停止生产了。
LE13	他们生了气，把家里所能拿出来的东西都卖成钱，置了辆破车，凑了一匹老马和一头瞎驴，组织了两个剩余劳动力，到邯郸去了。
LE14	他要求党政军三个方面整理出专题材料后，征求地方院校的历史教授和专家的意见，然后由他亲自向党中央作出报告。
LE15	第三天，赵焕章向父亲深情地看了一眼，就夹上剧本走了，坐了十六个小时的火车和汽车，风尘仆仆、马不停蹄地来到作者的家乡荣成县，征求公社干部的
LE16	对夫妻吵架、婆媳不和，多做些劝解的工作；只要态度诚恳和气，道理讲得透彻，这样的场合批评一下，人家也比较容易接受。
LE17	他的恶劣作风影响了子女，前妻生的儿子李玉平、女儿李玉芝从来不把罗庆美当母亲看待，1981年以来，对继母从嫌弃发展到虐待。
LE18	他指出：“一批老同志以实际行动，带头废除领导职务终身制，推进干部制度的改革，这件事在党的历史上值得大书特书。”
LE19	黑格尔的这些话是说得尖锐的，它有丰富的含蕴，也很有力量，可以启发我们想起许多科学的和不科学的态度、方法和作风。
LE20	他们从“四星级”、“五星级”宾馆的做法受到启发，决定把一项项教育内容，用一颗颗红星标志出来，十项教育内容定为十颗星。
LE-1	我差点没哭出来，急忙推开窗，向海洋开发研究所家属宿舍大院里的大池塘张望，面对这黑黝黝的一潭死水嘟囔起来：“爸爸，谁不知道这池塘受了污染，把鱼放进去还能活吗？”
LE-2	大青山抗日根据地是在绥远北部，陶林、武川、固阳以北，在归绥失陷不久以后，我八路军XXX支队即在该地创立了一块广大的抗日根据地，这一根据地之创立对敌寇巩固绥远占领之威胁，对敌继续西犯企图之威胁是非常之大的。
LE-3	蔡伟同志在该书中，对中国革命是否要以马克思主义为指导；共产主义是否适合中国国情；中国是否要进行无产阶级革命、实行无产阶级专政；以及要不要在中国建立布尔什维克式的无产阶级政党等三次论战的主要问题，以相当丰富的史料进行了综合、分析，叙述亦较为清晰。
LE-4	以几个朝代为一段的书或讲义，未必把每一朝代都同等地叙述了；以古、中、近、现分期的，以纪事本末为体的，又未必一定抹煞朝代，沾都不敢沾。
LE-5	虽然也曾有过短暂的疑问，老觉得杨小姐常常张冠李戴，但最终还是非常惭愧，下决心把她说过的作品都找来啃一啃。
LE-6	“这么多年来，不论是我拿枪放哨的时候，还是蹲在战壕里准备冲锋的时候，我都常常回忆起那一天，我永远也忘不了那一天！”



LE-7	另一方面，辩护人也有一定的义务，这就是辩护人在进行辩护的时候必须以事实和法律为根据，永远不得作出妨碍法院实现审判权任务的行为。
LE-8	他带有讽刺意味地说道：“只有伟大的德国思辨哲学家们才杜撰出某种与追求幸福不同的而且是独立的抽象的意志，某种只是想象的意志。”
LE-9	例如，他长时期以扶病之身忘我地刻苦地工作，他受到来自内部的沉重打击而忍辱负重，继续战斗，他深感身心疲乏却仍鞭策自己将“生命溶化在大众的里面”，都是具体的、生动的表现。
LE-10	哥伦比亚《新边疆》周刊说：“如果年终需要选出一个一九七八年国际政治舞台上最活跃的政府的话，中国政府会赢得这一头衔。”
LD11	后来，朱元璋对他所以参加起义军，作了坦率的自白：“朕当是时二十有四，盘桓避乱，终不宁居，遂托身行伍”，又说：“吾起寒微，因天下乱不得已入行伍中”，在他与刘基论兴亡之道时也提到了“盗贼蜂起，群雄角逐，窃据州郡，朕不得已从戎，欲图自全。”
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	国家统配计划的援外物资，转手倒卖给一些社队办企业，他们从中以“中间费”、“办公费”、“补贴费”、“招待费”等名目，非法获利一万八千余元。
LD-1	小小的日记本，他们不放心藏在枕头下、被套里、镜框后、大衣柜中的羽绒服兜里、锁进抽屉里，生怕被好奇心强的家长窥视自己青春期的秘密或者根本没有什么可值得保密的流水帐。
LD-2	以生产熊猫、雪人等异型冰激凌而闻名北京的北京华升食品厂，重视食品卫生，严格执行食品卫生标准，在前不久由轻工部、北京市有关部门联合组织的理化指标、微生物指数的检测中，取得全部合格的好成绩。
LD-3	刘表曾与手下文人草写了一份奏章，颇具才思，弥衡不屑一看，把奏章撕得粉碎，随手弃之于地，要过纸笔，重新拟写，辞义可观。
LD-4	有人用拳头狠狠叩击自己的脑门；有的揪住胸襟，拼命撕着衣裳；有人双手捂腹，在地上打滚，也有的……看到这个奇特的场面，费拉克松了口气，心里坦然了许多，他抬起右手，把指头插进茂密的发根里，抓了抓，嘴角边挂了一丝隐隐的笑意。
LD-5	鉴于我国目前血吸虫病疫情严重，现有血吸虫病病人一百五十多万人，其中晚期病人五点五万，钉螺面积三十五点五亿平方米，病畜一百一十九万多头，近亿人受到威胁，抓紧血防科技工作是当务之急。
LD-6	在敌寇进占台怀时，首先遭受了重大的打击，现在边区四周，每日都在进行剧烈的连绵的战斗，以拉锯式的战争形势，互相进退，敌寇在边区四周，修筑了绵密的道路网与碉堡，企图在经济上摧毁边区，和逐渐的向内地推进，然而边区并没有因此受了严重的威胁，一直到今日，敌人的这一企图，也没有完成。
LD-7	我们再看美国“纽约先驱论坛报”在十月六日一篇评论中的话，它指出：美国在竞赛中遭到严重失败的原因，是很明显的，就是“苏联决不允许任何东西来妨碍它最优先地注意科学研究”；它又说，“苏联所需要的，是一个全国性的科学研究和发展计划，这个计划的规模之宏大和具有远见，要能与（美国的）曼哈顿计划相匹敌。”
LD-8	他带有讽刺意味地说道：“只有伟大的德国思辨哲学家们才杜撰出某种与追求幸福不同的而且是独立的抽象的意志，某种只是想象的意志。”
LD-9	他（她）们助人为乐的热心肠、驱鬼逐怪惩凶扶善的广大神通，以及他们所拥有的奇奇怪怪的宝贝，强烈地吸引着人们成仙道。
LD-10	在这一年中，我停止了一切娱乐，谢绝了一切应酬，但命运有时会给人开开玩笑，虽然我的主课中国古典文学与基础课中国历史都名列前茅，但在最后一门“古代汉语”时，竟然头脑发热，提早一个半小时洋洋自得出了考场，哪知漏做了一大题，白白丢了三十分。

## II- Instruction of Experiment 1

### 欢迎你参加实验!

实验首先在电脑屏幕上出现一个红色“+”号注视点，提醒你开始实验，并集中注视电脑屏幕。接着呈现一个句子，请你认真阅读句子，阅读完句子以后，请你按空格键进入下一个句子。

明白上述指导语后，请你坐好，将手放在键盘上，准备进行实验。

现在请你按空格键开始练习，然后进入正式的实验。

## III- Vocabulary Test of Experiment 2

学术	高兴	评价	演员	小说	认真	专业	我们	职业	清澈
聘用	汉语	平淡	本科	公司	天鹅	问题	演唱	质量	性能
教授	兴趣	获得	敬重	读者	片酬	意思	功夫	打扫	规定
研究	发展	物品	音乐	原子	历史	工作	成语	正式	帮助
新年	计算	福利	化学	能力	播放	手	教室	毛衣	打扮
人才	讲座	时候	戏剧	准备	音像	外交	结合	国家	精彩
触摸	如今	产品	自然	人员	语体	暖和	美丽	污泥	排演
收音机	空气	地板	奇妙	书籍	资料	时间	运动	做事	歌曲
上市	物质	修订	汉语	剧院	法案	既然	产生	父母	精致
现象	电影	民族	待遇	会议	分子	安全	出版	按钮	天气

## IV- Materials of Experiment 2

Type	Sentence	Ambiguous string	PNWC
Overlapping ambiguous sentences	我 <u>校外聘</u> 汉语教师授课认真，获得了同学们的好评。	校外聘	1
	这部小说 <u>太平淡</u> 了，不能吸引读者的阅读兴趣。	太平淡	
	清澈的水面上有几只 <u>白天鹅</u> 向我们游过来。	白天鹅	
	她 <u>本科学</u> 的是音乐专业，因为她想成为一名音乐老师。	本科学	2
	他是公司的 <u>专职工作</u> 人员，享有公司规定的福利待遇。	专职工作	
	<u>如今天气</u> 已转暖了，可以不用穿那厚厚的毛衣了。	如今天气	
	收音机里正在 <u>播放学生</u> 们演唱的新年歌曲。	播放学生	
早上下了雨，她现在正在 <u>打扫地板</u> 上留下的污泥。	打扫地板		

	这种物质的原子 <u>结合成分子</u> 的时候，会产生一种奇妙的化学现象。	结合成分子	3
	上个月的 <u>法国会议</u> 是关于外交法案修订的问题。	法国会议	
	那位演员下周要去 <u>排演戏剧</u> 院新编的剧目。	排演戏剧	
	要想解决这个问题，必须从 <u>中国民族</u> 发展史方面进行研究。	从中国民族	
Combinatorial ambiguous sentences	那位教授 <u>将来</u> 给我们做一场学术讲座。	将来	1
	他骑在 <u>马上</u> ，高高兴兴地向我们走来。	马上	
	我在父母的帮助 <u>下去</u> 了国外读书。	下去	
	请 <u>把手</u> 抬高一点儿，这样才能触摸到按钮。	把手	
	请把 <u>会议室</u> 的门窗打开，让空气流通。	会议室	2
	运动会上，他们表演的 <u>团体操</u> 十分精彩。	团体操	
	这个 <u>研究所</u> 要发展壮大，必须引进人才。	研究所	
	国家大剧院昨天演出了那部著名的 <u>音乐剧</u> 。	音乐剧	3
	学校里的 <u>教职员</u> 工都很敬重我们的老校长。	教职员	
	制片厂给出的 <u>电影片酬</u> 是按照演出时间来计算的。	电影片酬	
	只有 <u>安全性能</u> 符合要求的产品才可以上市。	安全性能	
		他们的 <u>出版物品</u> 不仅有书籍，还有各种音像资料。	出版物品
Non-ambiguous sentences	最近几年，汉语热成了学界的一个热门话题。	/	
	既然是小的东西，必然匠心独运，自然精致，势必玲珑可爱。		
	“实至名归”是成语，意思是质量高了，名气自然就大了。		
	还有一种准备功夫必得说一说，就是养成正确的语言习惯。		
	汉语的书面正式语体和英文的正式语体很不一样。		
	“迷你”源于英文 mini，它具有极强的构词能力。		