AN EMPIRICAL STUDY ON THE DIFFERENCES IN MENTAL REPRESENTATION CONSTRUCTION BETWEEN FRESHMAN AND SOPHOMORE ENGLISH MAJORS

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Abstract
Based on two sets of studies on individual differences in mental representation construction, the present study investigates whether high proficiency Chinese English majors are better at mental representation construction than those with low proficiency by comparing their performances in summary writing in Chinese after reading a passage in English. Statistical analyses show that such differences do exist in that the sophomores picked out more main and subsidiary points than the freshmen. The qualitative analyses show there are differences between the two groups in such high-level processes as integration and comprehension monitoring. It is possible that there is an element of working memory capacity effect. The role of suppression mechanism is analyzed through its possible link with these processes of reading. Pedagogical implications are also discussed as directions for future research.

Key words
mental representation construction integration comprehension monitoring working memory suppression mechanism

1 About the present study
1.1 Introduction to the topic
As we all know, to read is to comprehend and there are different levels of comprehension. Researchers generally follow the three-level division of comprehension identified by van Dijk and Kintsch and interpreted by Kintsch and Dijk: a linguistic level of representation, a conceptual level of representation, which includes the macrostructure and microstructure of a textbase, and a level equivalent to the situation model based on the view that comprehension is a meaning representation in one's mind. Other researchers may use a different term to refer to situation model such as mental model, script, and referential representation. Just and Carpenter in the present study used the term mental representation. Structure will be used. Given that individuals vary in their reading skills, a difference would be expected between skilled and less-skilled readers in grasping the macrostructure of the textbase and building a mental structure.

As will be discussed in the following, many studies do indicate differences between skilled and less-skilled readers in mental structure construction. The less-skilled readers' failure can be attributed on the one hand to their insufficient linguistic knowledge and inefficient low-level comprehension skills and on the other hand to their deficiency in such high-level comprehension skills as integration, inference and comprehension monitoring. Many readers lack the skill to identify the important points in a text and can
hardly distinguish the important points from the peripheral information as they cannot find the meaning connections between various bits of information in the text. According to Gernsbacher 1990, structure building framework less skilled readers often fail to find the meaning connections between one meaning structure and another and shift too often. As a result, instead of building a coherent mental structure they build many unconnected substructures.

In the process of mental structure building, both integration and inference skills are required. Inference drawing is often based on relevant background knowledge. Comprehension monitoring is sometimes needed to detect whether something has gone wrong with the mental structure built such as inconsistencies between the information extracted. The differences in these high-level skills in mental representation construction however all seem to be related to differences in efficiency of working memory. Working memory capacity which is thought to be caused by efficiency in decoding and other low-level processes. Suppression mechanism important to mental structure construction may also be linked to these skills.

1.2 The rationale for the study

Given the importance of mental representation in reading comprehension and the fact that many studies mainly the studies by Oakhill and his colleagues Oakhill Garnham 1988 Oakhill Yuill 1996 and the studies by Gernsbacher and his colleagues Gernsbacher 1990 Gernsbacher Faust 1991 show individual differences between skilled and less skilled readers in mental representation construction it would be helpful to develop the relevant skills involved in mental representation construction in less skilled readers. As L2 teachers we are particularly interested in its relevance to L2 readers.

However as will be discussed the studies by Oakhill and his colleagues have generally been done on L1 children who are still in the process of developing reading skills whereas L2 readers already possess basic reading skills in L1 reading. We would like to know whether similar differences exist among L2 adult readers and find out how to help the less skilled ones. The studies by Gernsbacher and his colleagues tended to use some empirical methods to investigate the role of suppression mechanism in individual differences and the subjects were generally L1 adults.

For these reasons we would like to conduct a study on two groups of Chinese English majors to address the following with a more naturalistic method:

a. Are the high-level subjects better at mental representation structure construction than the low-level subjects?

b. What might be the causes for the possible differences if there are any?

To address the two research questions we used the research method of summary writing for the reasons that will be discussed in the following. The participants were two groups of English majors from China Pharmaceutical University one group being freshmen and the other group being sophomores with 20 students in each group. We chose English majors as participants for the study as reading seems to be especially important for English majors who need to read many original articles and works. We conducted both a quantitative and a qualitative analysis.

As teachers the researchers hope to draw some pedagogical implications from examination of the results and the underlying causes.

2.1 Literature review

2.1.1 Component studies on individual skill differences

Differences in mental structure construction can be reflected in the component skills. While there are different models to specify the components of comprehension such as integration, inference, working memory and comprehension monitoring are thought to be important and are among those most studied and discussed by Oakhill and his colleagues. Studies by Oakhill and his colleagues tended to focus on individual differences in these component skills. Skilled and less skilled readers were found to differ in various ways one of which according to Oakhill Cain Bryant 2003 is that the skilled
comprehenders form better integrated and more informative mental representations. This is reflected in their different abilities to make inferences, understand structure, and monitor understanding in a series of studies by Oakhill and his colleagues. Oakhill et al. 1996; Garnham et al. 1988; Cain et al. 1996; Johnson and Laird 1982; Oakhill 1984 cited in Oakhill 1993; 228; Oakhill and Yuill 1996; Oakhill and Yuill 1996; 88. wollen all these abilities are related to the readers' different working memory WM capacities.

According to Oakhill et al. 1988, 105%06% integration depends much on the reader's sensitivity to the hierarchical structure of the text as well as the ability to grasp the main ideas of the text and the relations of the ideas in the text. Besides integration often requires drawing either parallel or elaborative inferences or both. In their studies, Oakhill and his colleagues, Oakhill et al. 1982; 1984; Oakhill and Yuill et al. 1986; cited in Oakhill 1993; 227, 229, sometimes combined these two skills. Background knowledge plays a part in inferring implicit information. Oakhill et al. 1984 cited in Oakhill 1993; 228. This study showed the need to use background knowledge in inference but no guarantee of inference with the knowledge. In studying readers' monitoring of comprehension, researchers, Garner 1980 cited in Perfetti et al. 1996 as cited in Oakhill and Yuill 1989 tended to adopt an inconsistency or anomaly detection method. Results generally showed that skilled readers were better than less skilled readers at detecting the inconsistencies except that in Ehrlich 1996. Ehrlich et al. 1996; following Flavel et al. 1987 cited in Ehrlich 1996; 235 attributed his results to a task effect too easy or too difficult a task does not result in monitoring.

The role of WM in mental structure building can be presumed due to its supposed involvement in both storage and processing claimed by researchers. For many researchers, WM plays an important linking role. Perfetti et al. 1988; 126 verbal efficiency theory explains the relationship between decoding WM and other high-level reading processes that inefficient decoding can affect high-level reading processes by taking up the limited WM resources usually used for these processes. Linderholm 2002; 260 stated clearly that individual differences in WM are important to comprehension differences due to its role in various integration skills. This view has something in common with the above-mentioned view of Oakhill et al. 1996. However, Oakhill and his colleagues did not attach importance to the role of decoding to WM. Later they, Oakhill et al. 1996; 228 attribute an independent role to WM as a separate skill in comprehension. This may be due to the fact that WM can be measured and has been found to be related to comprehension in some studies. Daneman et al. 1980 cited in Yuill et al. 1989.

Following Daneman et al. 1980, pioneering study on WM researchers have either used a verbal task of a reading span test or a non-verbal task of digital span as a measure of WM. Oakhill et al. 1989 held it better to use a non-verbal measure independent of comprehension and found the role of such a non-verbal measure of WM in skill differences. Their second experiment in this study used an anomaly resolution task to study the relationship between working memory and comprehension. They varied the memory loads by varying the distances between the anomaly and the resolution and the sequence of their appearance. This study thus showed both the independent role and the linking role of WM.

Oakhill and his colleagues Seineur et al. 2003 cited in Oakhill et al. 2003; 245 later admitted that a verbal measure of WM tends to be a better indicator of reading comprehension. In that case, a question arises as to whether there is need to measure WM separately given that such a measure is often dependent on comprehension. Another question is: What makes for WM if decoding is not so important as claimed by Oakhill and his colleagues? 2003. These are questions that we need to consider in designing our own study. Oakhill and Yuill following Tunmer 1989 cited in Oakhill and Yuill 1996; 227 suggested that the readers’ practice of reading especially their attempts to understand long and/or complex sentences increases the efficiency of verbal WM. Cain et al. 1994 cited in Oakhill and Yuill 1996; 227. This study showed the positive effects of reading on comprehension and thus a possible indirect effect on verbal WM. Based on their remediation studies, Oakhill and Patel 1991; Yuill et al. Oakhill et al. 1988 cited in Oakhill and Yuill 1996; 3399. Oakhill and Yuill also suggested that training in specific strategies such as inference strategies could decrease the processing demands.
22 Structure building theory and studies

Unlike Oakhill and his colleagues who focused on component skills of comprehension Garnsbacher explicitly proposed a theory of mental structure building and conducted many studies with colleagues based on the theory.

According to Garnsbacher 1990 a reader goal in comprehension is to build a coherent mental representation or structure which involves three processes foundation laying information mapping and structure shifting. The building blocks of mental structures are memory cells which are activated by incoming information due to two mechanisms enhancement and suppression. The causes for individual differences are the process of shifting and the mechanism of suppression. Poor comprehenders failure to build a coherent structure in the fact that they shift too often. Instead of building a coherent structure they build too many substructures which are not related to each other. This can be attributed to their inefficient suppression mechanism rather than their enhancement mechanism.

Garnsbacher et al conducted several studies to investigate the mechanism of suppression in mental structure building. These studies examined lexical access Garnsbacher Faust 1991 Garnsbacher Varner Faust 1990 anaphoric reference Garnsbacher 1989 cited in Garnsbacher Robertson 1999 1621 syntactic parsing Garnsbacher Robertson 1996 cited in Garnsbacher Robertson 1999 622 1623 and metaphor understanding Garnsbacher Keysar Robertson Werner 2001. They were mostly done by using artificial experiments with individual sentences as materials and primes preceding targets to see if the prime has the suppression effect. All these studies point to the role of the mechanism of suppression some of which such as the lexical access studies show individual differences between skilled and less skilled readers in suppression ability Garnsbacher 2004 found similar differences between skilled and less skilled readers during narrative comprehension. The series of their experiments showed the introduction of a new character during the narration mainly interfered with less skilled readers identification of the main character mentioned previously.

23 Combinational studies

In recent years there have been some studies that make use of the results of both studies among which are Walter form resolution study 2004 and Frey homonym task study 2005. Both of these studies were done on L2 learners and the subjects were older than the subjects in the studies by Oakhill et al. Walter studies showed partial relationship between W M and comprehension skill differences.

Frey 2005 suggests a possible link between W M and suppression mechanism in that suppression mechanism may share resources with other processes based on her findings in a homonym task that L2 subjects were less efficient in suppression mechanism than L1 subjects in L2 reading.

Thus a link can possibly be formed between suppression mechanism and component skills of comprehension studied by Oakhill et al through the medium of W M. Given that mental representation construction requires the connection of current information and previous information stored it is understandable that W M plays an important role.

The present study is also an attempt to combine the results of the two sets of studies. As the product of successful mental structure building should be a coherent mental structure we would like to know what the actual product looks like and find individual differences through the subjects summaries. We would also like to probe into some possible reasons by analyzing some component skills.

3 The present study

31 Participants

The participants in the study were two groups of English majors 20 in each group from China Pharmaceutical University. Group 1 consisted of freshmen and Group 2 of sophomores. We did not conduct a separate test of their English level but presumed that one year university study should make some difference between sophomores and freshmen. The study was conducted about one month after the
freshmen entered university. Though there may be some exceptions, we chose high-level students from each grade because we wanted to have two comparatively uniform groups and did not want low-level students to negatively affect the performance of the whole group. The sophomores were chosen based on their performances on their previous reading exams. We had meant to use the freshmen's national entrance examination results as the criterion, but gave up due to the fact that they came from different provinces and that both the exam papers and the total scores were different. The freshman participants were good students recommended by their teachers instead.

3.2 Method

The method we adopted for this task was to ask the participants to write a summary. While many studies used free written recall tasks as a measure of reading comprehension, we adopted summary writing partly for the reason that it has been found that summaries contained significantly more main ideas than the recall protocols" in a study conducted by Riley. Lee 1996 173 comparing recall and summary protocols as measures of second language reading comprehension.

More importantly, a summary both reflects the macrostructure of the text and reflects a reader's own interpretation, and is therefore an indicator of the reader's own mental structure building. Indeed, as Kintsch 1990 163 mentioned, summaries are assumed to be "a function of the way information is structured in memory."

However, both free written recall and summary writing require writing ability, which may be hard for L2 readers. Chances are that an L2 reader may understand the text but find it hard to express the ideas comprehended. There is thus the possibility of reading ability being contaminated by writing ability and the validity of the task is thus affected. To ensure the validity, following Alderson 2000 36, we asked the participants to write the summary in their native language Chinese.

Translation has traditionally been held to be a means of reflecting one's comprehension and used as a language testing procedure. In Buck 1992 study on its effectiveness as a language testing procedure, he found that translation could indeed test comprehension. Chang 2006 compared a translation task and the immediate recall in the measure of L2 readers' comprehension and found the former task provided more evidence of comprehension than the latter as there is a memory effect with the latter task.

We hold that writing the summary in the participants' native language not only avoids the contamination effect of writing but also better tests their comprehension as we believe memory effect could still be possible in summary writing. There is the possibility that the reader copies a point from the text without necessarily understanding it.

In analyzing the data, we translated the participants' summary back into English. Our translation was done on a literal translation basis.

3.3 Material

The reading passage was an expository text chosen from a book of IELTS examination papers. See Appendix 1. We chose an expository text for two reasons. Firstly, many academic materials are of an expository type. Secondly, the understanding of expository material as is held by Robeck and Wallace 1990 361 requires the reader to "differentiate specific and general topics, define relationships between the main topic and subordinate topics, and learn to compare and evaluate evidence that support the main ideas presented" all of which are essential to mental structure building.

In case the content of the text should bias any group of participants in terms of background knowledge, we were cautious to choose a text that is neutral in content. The passage was composed of three sections discussing various aspects related to the concept of role. The whole passage was 990 words in length.

3.4 Procedures

We had planned to conduct the task with the two groups together. But as they did not have a
common free time we did it separately. We gave them the task after briefly explaining the purpose of the study. We gave them 20 minutes to read the passage and told them to take notes if necessary as the material would be collected before they wrote the summary. By asking them to write the summary based on the notes we meant to get some ideas about their focus during reading from their notes. After the material was collected, they were given 20 minutes to write the summary in Chinese.

3.5 Scoring

Rather than score the summary holistically, we gave separate scores to the major points and subsidiary points included in the summary as we believed successful mental representation should first all involve the grasping of the major and the subsidiary points indicative of the macrostructure of the text. In assigning scores, we did not follow quantity of idea units adopted by many researchers. We hold that idea units are not equal in weight and cannot give a completely accurate picture of comprehension. Instead, we assigned each score to a major or a subsidiary point identified. We ignored slight misunderstandings but if the misunderstandings were serious enough to distort the meaning completely, we did not count that point in.

The criteria for the major and the subsidiary points came from the judgements of a native expert on reading. See Appendix 2. All the summaries were scored by the present writer by rating and rerating and the reliability was above 75.

3.6 Results

Mann-Whitney U Test was performed to compare group differences. The results are summarized in the following table.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Median Group A</th>
<th>Median Group B</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Points Y1</td>
<td>150</td>
<td>300</td>
<td>0.0002</td>
</tr>
<tr>
<td>Subsidiary Points Y2</td>
<td>300</td>
<td>650</td>
<td>0.001</td>
</tr>
</tbody>
</table>

As can be seen from the table, the median of group A is lower than that of group B for both main points and subsidiary points. There is very strong statistical evidence that group A is different from group B in both outcomes. p < 0.002 for main points and p < 0.001 for subsidiary points.

This statistical analysis provides a positive answer to our first research question. The sophomores are overall better at mental structure building as they picked out more major and subsidiary points in their summaries and therefore had a better awareness of important information—an indication of their integration ability. Given that a summary is not just made of separate sentences but is a coherent discourse reflecting mental structure building, we need to make a qualitative analysis of the students’ summaries.

If we take a closer look at their summaries, we find that the summaries by the sophomores are in general more structured, more informative and better integrated than those of the freshmen in that many of them included not only major points and subsidiary points but also some supporting information and that they were able to categorize various information into different levels. They distinguished major points from peripheral information but paid more attention to the information at the macrolevel. As a group they were more sensitive than the freshmen to the macrostructure of the text, which was hierarchically arranged.

The most obvious differences in their summaries seem to be with Section C. In terms of the one major point for this section, only two freshmen identified it whereas nine sophomores included this point in their summaries. The total number of subsidiary points identified by the sophomores versus that by the freshmen is 16 to 2. Note checking showed that another sophomore noted down both the main point and the two subsidiary points in this section. More importantly, six other sophomores identified the topic of this section or part of the topic, which should be at a higher level than the main point from a hierarchical point of view. With regard to the key word “ambiguity” in this section, there were 18 sophomores but only 4 freshmen who correctly identified or inferred its meaning. Five sophomores specifically and
correctly identified the referent of the second “his” in the first sentence of Section C whereas no freshman specified this referent.

There are some differences between the two groups in the number of inferences drawn as well. The sophomores showed much more instances of inferences of causal logical relations 11 versus 1 and a few more instances of drawing of appropriate elaborative inferences 13 versus 10. In addition to smaller numbers of inferences drawn, some inconsistencies were found in seven freshman summaries. There are also nine cases of the activation of wrong background knowledge found in the freshman summaries.

3.7 Discussion

In this part we will discuss the differences between the two groups in four components of comprehension: integration, inference, comprehension monitoring and background knowledge.

3.7.1 Integration

As has been mentioned above, there were differences between the two groups in sensitivity to the hierarchical structure of the text particularly with Section C. The freshman summaries give us the impression that much irrelevant information was activated but failed to be suppressed. We would like to use a few examples to illustrate our point.

The following are the English versions of the last section of some freshman summaries.

In addition, his role assignment may bring pressure and a sense of crisis. They may not play their given roles well because they are not clear about their roles which may result in their life being in a mess, their difficulty and annoyance etc. A10

If the play background is not certain, it is not necessarily bad for the audience. This gives them enough freedom to exercise their imagination. On many occasions, the interpretation of a role is given by the audience. But if it really lacks categorization, it may result in uncertainty in analyzing the roles. Lack of clarity of the things associated with the background or the role may lead people to analyze roles in incorrect ways, resulting in unavoidable consequences of one kind or another. A15

Lack of certainty in the role may cause unnecessary trouble. Role definition is needed but not absolutely necessary to an individual or others concerned. If individual occupied space is not definite and different from others, there will be a degree of role ambiguity. Individual freedom of behavioral conventions may also result in role ambiguity. The description of job ethics rarely completes the role definitions except by lowering the standard. The middle and higher management say little which makes the subordinates not clear about their duties. Lack of role definition also results in insecurity, lack of confidence and worry of an individual himself. So an individual should have a clearer role in his interaction circle. A17

For A10, it seems a false meaning of “role ambiguity” role assignment was activated and failed to be suppressed which resulted in a meaning structure built out of role assignment and the ill consequences of role assignment. The student did not mention the term role assignment or talk about role assignment in the previous sections but ended the previous paragraph with “But it will be too bad if one is not clear about his role or is not clear about his different roles in different situations.” He may have many of the above mentioned problems. Presuming that the student should know the linking function of “this” there is a natural link between the last section and the previous bit of information could only be made by assuming that the student understood role ambiguity assignment as being the cause for the individual lack of clarity in their roles as the idea of not being clear about one’s roles was expressed in both bits of information.

An analysis of the context in A15 summary and the student notes leads us to conclude that the student wrongly took “role set” as meaning play background whereas in paragraph one his interpretation was role background. In both cases, a false meaning of set was activated possibly due to the similarity in form to the word setting. In the last section, his false activation coupled with the words “certain,” not necessarily bad,” and “freedom” in the original article and the student elaborative inference formed a different meaning structure.
Student A17 knew the meaning of the key term "role ambiguity" but still failed to grasp both the main point and the subsidiary points of this section. While he/she talked about the causes and consequences of role ambiguity, they did not correspond to the original information. Rather several different structures were built. On the one hand, the meanings of such words and phrases as "occupation", "virtue", "complete", "lower" and "scale" were wrongly triggered and failed to be suppressed. On the other hand, such expressions as "middle and higher management" and "say little" were wrongly connected.

More interestingly, the complete summary of one student, A5, was about the importance of group on an individual. Please refer to the Appendix 3.

All these freshmen seemed to show a suppression problem with this section. This problem is especially serious with Student A17, who showed this problem in two other places. On the other hand, suppression problem is while less severe can still be found among sophomores. For instance, one student, B17, version showed a wrong meaning of "ambiguity" sense of guilt was activated and failed to be suppressed and therefore a complete different meaning structure was built out of this sense of guilt.

Two sophomores, B1 and B6, took role ambiguity to mean uncertainty about one's own role of either the focal person or the members of the role set rather than about the role of the focal person which seemed directly attributed to their wrong identification of the referent for the pronoun "his" as being either that of the focal person or that of a member of his role set. Then when they discussed the ill consequences of role ambiguity, they did not make clear the consequences of role ambiguity on the members of the role set but rather implied the same effects on both.

Three places in other sections caused suppression problems to both groups with sophomores slightly better. They were: The word "nature" wrongly triggered as meaning human nature or personality in the sentence "dress has often been used as a role sign to indicate the nature and degree of formality of any gathering and occasionally the social status of people present" "make it clear" taken to mean be clear about in "it is often important that you make it clear what your particular role is at a given time" and different interpretations of "a combination of the role expectations that the members of the role set have of the focal role".

3.7.2 Inference

As far as elaborative inferences are concerned, there was one student in each group who created a completely different meaning structure of the last section out of elaborative inferences, which can be shown from their versions.

One may only have one identity, but one identity may mean several roles. For instance, a headmaster can be an amicable friend, the idol of the teachers, the policy maker of the school development, and an elder to stimulate the students. People should notice this in human interaction so as to avoid unnecessary misunderstandings or even conflict.

Different roles may behave in similar ways and therefore cause misunderstandings. For instance, a manager can scold his employees severely but a teacher can also scold his students severely. Yet the teacher and the manager are two completely different roles. The definition of a role sometimes also depends on the individual's thoughts, personality and even confidence and ambition.

Therefore the definition of a role must incorporate various aspects. B12

While both these versions were not completely groundless, they did not touch on the actual topic role ambiguity. Such inappropriate use of elaborative inferences corresponds to van Dijk and Kintsch's point that elaborative inferences can be used to "cover up an inability to recall details of an original text" and that elaborations can also distort a text. This inability may result from either failure to comprehend in the first place or failure to recall.

On the other hand, there were students in both groups who made appropriate elaborative inferences. For example, a sophomore, B6, elaborated on the point of "place being a role sign" with the inference that a boss will always be taken as a boss rather than a friend in an office by his employees no matter how casual he is dressed and a freshman, A4, elaborated on the point that "a uniform is a sign of
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clear role definition” with an inference that We are like goods attached by price tags. Such inferences are relevant to the passage and can certainly enrich the meanings.

However, neither group showed many instances of appropriate elaborative inferences. While there were a few more instances of sophomores’ drawing of appropriate elaborative inferences, we can hardly say the inferences drawn are qualitatively different. The one difference seemed to be that the point of the uniforms as role signs for policeman. The elaborative inference by the one freshman A19 was more straightforward than the versions by three sophomores. The freshman simply added the detail that for example in the police station the police uniform is the sign of a policeman. Whereas the three sophomores’ versions are as follows respectively:

It is hard to imagine that a policeman performs his duty on the streets and fight against disobedience of law in casual clothes B9.

You can hardly recognize a policeman when he wears casual clothes B11.

People also seldom ask way from a policeman who does not wear a uniform B15.

There were some differences in bridging inferences between the two groups. As is mentioned above the sophomores were much better with respect to causal logical relations compared to the freshmen in terms of the number. We cannot safely conclude though that the sophomores are good at making such bridging inferences. After all 11 is not a big number. What is more among the 11 bridging inferences made by sophomores of causal logical relations were fairly obvious. They were related to different roles in relation to different people and 3 related to lack of role signs making people insecure because they do not know whom they are faced with both points being obvious. The one bridging inference by a freshman was also an obvious one related to different roles in relation to different people.

When the logical connections were not obvious the sophomores did not show their superiority. This can be shown in the fact that no student made the bridging inference between “the importance of using role signs to indicate one role” and “role expectations from others” in Section B and that only one sophomore B4 made the bridging inference between the idea that “one plays multiple roles” in Section A and “the need to indicate one role” in Section B.

However, the two groups did seem to show a difference in identifying the referent of the second “his” in the first sentence of Section C which is the one major point of this section. Besides the five sophomores who specifically and correctly identified it as referring to the focal person two other sophomores B1 and B6 identified it but in a wrong way which we already touched on in 11. A few other sophomores and freshmen who included this point simply did not specify the referent. The sophomores thus seem to have a better awareness for bridging inference as far as the identification of this referent is concerned.

In one place the freshmen showed a deficiency in inferring the meaning of a word from context. The fact that only four freshmen correctly identified the meaning of the word “ambiguity” in Section C suggested that for most freshmen this was a new word. But such words as “uncertainty” “unclear” and “lack of clarity” gave clear clues about the meaning of ambiguity and it seems few of them were able to make use of these clues to infer the meaning of the word. On the other hand only two sophomores misunderstood it which may show their knowledge of the meaning of the word or their inference ability. The freshmen did show a deficiency in this inference though.

37 Comprehension monitoring

Unlike in an experimental situation where the purpose is to detect inconsistency in an artificial text and comprehension monitoring can be tested more directly we tried to infer the subject’s comprehension monitoring ability through inconsistencies in their summaries. Some inconsistencies were found in some freshmen’s summaries. Firstly four of them confused dress and uniform and took them as one role sign. Other instances of inconsistencies were shown in A5’s use of group which can be seen in Appendix 3 and A15’s use of role background and play background in the first paragraph and the last paragraph respectively to refer to role set. Student A12 stated that lack of ambiguity may have some negative
consequences while in the previous sentence he talked about the negative consequences of role ambiguity.

Admittedly comprehension monitoring involves more than detecting inconsistencies. More importantly it involves assessing one’s success in comprehension which is something that cannot be analyzed totally based on the informant’s summaries. But as van den Broek and Kremer 2000 suggest, it should be related to one’s standard for coherence. It can be presumed that L2 readers’ standards might be less stringent than that of L1 readers although more skilled readers might be better.

Take A16 for example. The following is the first paragraph of his summary.

Every one of us establishes a close relationship with people around us and the surroundings. Any individual has distinct characteristics and has unique roles that he plays in life.

The two sentences were simply listed together rather than showing the inner relationship between roles and relationship with people around the individual. A similar problem seemed to be shown in Student A4’s sentences. Following that our role relations are more mysterious and profound. Rolesigns however play a very important role here. While the logical link here seemed to be that role signs can reveal role relations it was not so obvious. This might have something to do with the Chinese mode of thinking which is more implicit rather than explicit.

374 Background knowledge

As the topic is neutral there should be no overall differences in the domain knowledge between the two groups. While background knowledge is very important in inference drawing it does not necessarily follow that more inferences drawn mean more background knowledge as can be seen from the previous discussion on elaborative inferences and bridging inferences.

However we did find that a few freshmen structure building problems seemed to be related to inappropriate or wrong background information activated. One freshman A19 stated at the very beginning that in society people of different abilities play different roles. While ability may be an important factor in role differences such as in occupations what determines one’s roles according to the author is one’s relations to others. The inappropriate background knowledge activated in this context caused the student to conclude that Those who play important roles tend to be the most outstanding focal person in a team. Student A9 showed the same wrong knowledge in expressing the idea that a capable person shapes the focal role expected by people. Two freshmen A10 and A2 blamed the act of role judgement itself for the confusion of roles or role ambiguity while in this passage it is “roles without signs” that cause the confusion. The problem with these students is that their common sense did not fit the reading passage.

The following version of A3 also shows that wrong background knowledge was activated.

You must be clear what role you play in this society. This requires you to handle your relations well with others.

Whether you handle your relations well with others should have nothing to do with whether you can be clear about what role you play in this society.

The above mentioned fact of a few freshmen confusing uniforms and dress may also show their background knowledge inappropriately activated. While they are both something that one wears what the author emphasizes in the passage is their different functions.

4 General discussion and conclusion

The above analyses show the better performance of sophomores as a group in mental structure construction and thus provide a positive answer to our first research question. Their advantages over freshmen are mainly in such high level processes as integration and comprehension monitoring. As to the causes which our second research question addresses we assume a possible role of WM in the differences for both skills besides other factors. We did not conduct a separate test on WM for reasons that verbal WM is found to be a better indicator of comprehension and that verbal WM is dependent on
comprehension. Thus we are not talking about direct causality but about the linking role of W M.

The overall differences between the two groups in mental structure construction and the differences in integration can be explained by Gernsbacher’s framework. Many freshmen showed a tendency to shift too frequently from one meaning structure to another or to impose a meaning structure that is not relevant, which could be a cause for their failure to grasp the main and the subsidiary points of the text and consequently the failure to build a coherent mental representation. According to Gernsbacher, overly frequent shifting is caused by inability to suppress irrelevant information. An analysis of the student summaries shows that such irrelevant information was sometimes activated by elaborative inferences drawn to compensate for their inadequate decoding and insufficient comprehension, both of which we feel are related to W M. This is most obvious with Section C of the text, which seemed to cause more decoding and comprehension problems for the freshmen and make higher demands on their W M. Many sentences in this section were quite long and complex, and the syntactic parsing may have added to the processing difficulty for lower-level readers and may have consumed their limited W M resources, making it hard for them to connect information from various parts and to form a coherent structure for this section. Besides, the information was more compact and the meaning connections were not so obvious in this section as compared to the other two sections. The extra demands of timed reading coupled with the difficulty of this section conform to the “tough circumstance” which Walter 2004 claims is likely to differentiate readers in W M. The sophomores slightly better ability in identifying the referents as shown above should also help them integrate various bits of information.

Some freshmen seemed to show a problem with comprehension monitoring as their summaries included inconsistencies. We suppose that this failure to monitor comprehension may again be related to extra demands imposed on W M in L2, particularly for those less skilled readers who are less efficient in other comprehension skills and therefore do not have the time and resources to monitor their comprehension. Another reason is related to the mental structure building itself. According to Gernsbacher (1990), the fact of poor readers building too many structures or substructures is itself will make it hard for them to access the recently comprehended information, thus resulting in their poor ability to notice the incoherence between information in mental structure building. The fact that a few freshmen showed less stringent standards for coherence should help explain their failure to monitor. We also found instances of freshmen with wrong background knowledge causing the confusion between dress and uniform.

This and a few other instances of activation of inappropriate or wrong background knowledge remind us that background knowledge can be a double-edged sword. It can be helpful to comprehension if correct knowledge is activated appropriately. But it can also prevent the reader from correctly appreciating the information in the text itself and disrupt the structure building when the knowledge is wrong or in conflict with the text.

What we can conclude from the few instances of inference drawn by either group is that inference drawing may be a skill that L2 readers even those more skilled ones are comparatively deficient at. Seen from another perspective, the less skilled readers’ use of elaborative inferences might be to compensate for insufficient comprehension and might be an indicator of their lower skills in mental structure building.

It is worth noting that the relationships between W M and comprehension are reciprocal. On the one hand, better working memory should improve comprehension due to its linking role to other skills important to comprehension. On the other hand, better comprehension should increase the efficiency of W M. Given that the sophomores had had one year of intensive training in English including reading skills through some courses and that the freshmen had just entered university, it is possible that they had some differences in comprehension skills. Following the logic of the remediation studies by Oakhill et al. discussed above, the improvement of sophomores’ comprehension skills should decrease the processing demands of W M. Besides having such courses as comprehensive English course and reading course, they had done some extracurricular reading after class, which most freshmen would not had the chance to do in secondary school. According to Oakhill and Yulis 1996, the practice of reading itself should help increase their efficiency in syntactic parsing and thus indirectly increase the capacity of W M. We feel
that the practice of reading by sophomores should also increase their efficiency in decoding due to their increased exposure to print. The improvement of W's mental capacity may be reflected in a more efficient mental structure building approach.

5 Pedagogical implications

Given that the less skilled L2 readers are less sensitive to the hierarchical structure of the information in the text and make less use of textual and lexical cues, as teachers we need to develop their sensitivity to the hierarchical structure and train their ability to make use of such cues. The students need to be taught how a major point can be developed by subsidiary points and how to find the meaning connections between information. One way of doing this is using the technique of text mapping as suggested by Miller and Perkins (1990). By which the teacher shows the meaning relationships between main points in a visual format. In this way the hierarchical structure of the ideas can be shown clearly to the students.

As bridging inferences are often required in mental structure building, we can train our students by developing their awareness of coherence. This can be done by giving them some thought-provoking questions that require them to bridge information, particularly in finding the referential continuity and underlying causality. With regard to elaborative inferences, which both skilled and less skilled L2 readers seem to be deficient at, the students should be given some practice to expand their thinking. While they should be encouraged to learn to draw some elaborative inferences to enrich the mental representation, L2 readers—especially the less skilled ones—should also be reminded that when they are drawing an elaborative inference, it should be relevant to the textbase and therefore can be traced to a source. For once irrelevant information is activated, it may be hard for an L2 reader to suppress it.

More importantly, given that W's mental capacity plays a very important role in both structure building and monitoring and that decoding is closely related to W's mental capacity, it is necessary for us to train the students in speed decoding. No doubt the less skilled readers need to enlarge their vocabulary, however, this is not enough. For knowing a word does not necessarily result in rapid decoding. They need to be pushed to read more rapidly with practice. They should also be encouraged to read extensively after class, which is a way to enlarge vocabulary and to develop comprehension skills as well. We believe that extensive reading can also expand one's background knowledge. Above all, it is a way to get the readers accustomed to reading and thus a "Matthew effect" can be achieved.

6 Suggestions for further research

A few points of interest might be worth noting and examining in the future. First, as explained above, the freshman participants were recommended by their teachers, which we have to admit is a drawback. The reading section of a proficiency test such as TOEFL or IELTS can be conducted to both groups in selecting the samples. Second, the text was well structured. While the result seems to suggest that skilled readers are better able to grasp the macrostructure of the text in building mental structure, it is also important to know whether they are equally well in building mental structures when dealing with a less well structured text. Third, we could not find out whether the sophomores are better at suppressing irrelevant information although we presume they might be better due to more efficient W's mental capacity. What was found out was that less irrelevant information was activated and then used in structure building by some sophomores. We cannot be sure whether there are some students who activated the irrelevant information in the first place but then suppressed it in structure building. Some experimental methods might be used on some points where inappropriate information may be activated to investigate the mechanism of suppression. Fourth, some sophomores did not have enough time to finish the summary, which raises the issue of whether a time limit should be set on summary writing itself. Our observation is that perhaps no time limit should be set as sophomores may have more to include in their summary. Finally it is worth noting that there might be an effect of translation by asking the students to use Chinese to write the summary. There is the likelihood that the Chinese mode of thinking may have an effect when the students use Chinese to write the summary. This may have something to do with bridging inferences.

References

Appendix 1  Reading Material

The Concept of Role Theory

Section A

Any individual in any situation occupies a role in relation to other people. The particular individual with whom one is concerned in the analysis of any situation is usually given the name of focal person. He has the focal role and can be regarded as sitting in the middle of a group of people with whom he interacts in some way in that situation. This group of people is called his role set. For instance, in the family situation an individual's role set might be shown as in Figure 6.

![Image of a diagram illustrating a role set with relationships to various other roles such as parents, wife, wife's parents, children, child A, child B, friends, and neighbors.]

Figure 6 The role set should include all those with whom the individual has more than trivial interactions.

Section B

The definition of any individual's role in any situation will be a combination of the role expectations that the members of the role set have of the focal role. These expectations are often occupationally defined. Sometimes even legally so. The role definitions of lawyers and doctors are fairly clearly defined both in legal and in cultural terms. The role definition of a film star or bank manager are also fairly clearly defined in cultural terms rather clearly perhaps.

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Individuals often find it hard to escape from the role that cultural traditions have defined for them. Not only with doctors or lawyers is the required role behaviour so constrained that if you are in that role for long it eventually becomes part of you [part of your personality]. Hence there is some likelihood that all accountants will be alike or that all blondes are similar — they are forced that way by the expectations of their role.

It is often important that you make it clear what your particular role is at a given time. The means of doing this are called [rather obviously] [role signs]. The simplest of role signs is a uniform. The number of stripes on your arm or pipe on your shoulders is a very precise role definition which allows you to do certain very prescribed things in certain situations. Imagine yourself questioning a stranger on a dark street at midnight without wearing the role signs of a policeman.

In social circumstances [dress has often been used as a role sign to indicate the nature and degree of formality of any gathering and occasionally the social status of people present.] The current trend towards blurring these role signs in dress is probably democratic [but it also makes some people very insecure.] Without role signs [who is to know who has what role?]

Place is another role sign. Managers often behave very differently outside the office and in it [even to the same person.] They use a change of location to indicate a change in role from [stay boss to friend.] Indeed [if you wish to change your role you must find some outward sign that you are doing so or you won't be permitted to change the subordinate will continue to hear you as his boss no matter how hard you try to be his friend.] In very significant cases of role change [from bachelor to married man] the change of role has to have a very obvious sign [hence rituals.] It is interesting to observe [for instance] [some decline in the emphasis given to marriage rituals.] This could be taken as an indication that there is no longer such a big change in role from single to married person [and therefore no need for a public change in sign.]

In organizations [office signs and furniture are often used as role signs.] These and other perquisites of status are often frowned upon but they may serve a purpose as a kind of uniform in a democratic society [roles without signs often lead to confused or differing expectations of the role of the focal person].

Section C

Role ambiguity results when there is some uncertainty in the minds [either of the focal person or of the members of his role set] as to precisely what his role is at any given time. One of the crucial expectations that shape the role definition is that of the individual [the focal person himself.] If his occupation of the role is unclear [or if it differs from that of the others in the role set] [there will be a degree of role ambiguity.] Is this bad? [Not necessarily.] [For the ability to shape one's own role is one of the freedoms that many people desire but the ambiguity may lead to role stress which will be discussed later on.] The virtue of job description is that they lessen this role ambiguity. Unfortunately [job descriptions are seldom complete role definitions except at the lower end of the scale.] At middle and higher management levels [they are often a list of formal jobs and duties that say little about the more subtle and informal expectations of the role.] The result is therefore to give the individual an uncomfortable feeling that there are things left unsaid [in] to heighten the sense of role ambiguity.

Looking at role ambiguity from the other side [from the point of view of the members of the role set] [lack of clarity in the role of the focal person can cause insecurity [lack of confidence [irritation and even anger among members of his role set]]]. One list of the roles of a manager identified the following [executive] [planner] [policy maker] [expert] [controller of rewards and punishments] [counsellor] [friend] [teacher] [If it is not clear [through role signs of one sort or another] which role is currently the operational one [the other party may not react in the appropriate way — we may in fact [hear quite another message if the focal person speaks to us [for example] as a teacher and we hear her as an executive.]

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Appendix 2  The Expert Criteria for Scoring

<table>
<thead>
<tr>
<th>Major Points</th>
<th>Subsidiary Points</th>
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</thead>
<tbody>
<tr>
<td>1 An individual in any situation has a role in relation to other people</td>
<td>1 Focal person defined</td>
</tr>
<tr>
<td>2 Individual role can be defined in terms of the combined role expectations of the role set</td>
<td>2 Role set defined</td>
</tr>
<tr>
<td>3 Hard to escape from culturally defined roles</td>
<td>3 Occupationally defined</td>
</tr>
<tr>
<td>4 Role at a particular time indicated by role signs</td>
<td>4 Legally defined</td>
</tr>
<tr>
<td>5 Role ambiguity when the role is left unclear</td>
<td>5 Culturally defined</td>
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<td></td>
<td>6 Role becomes part of personality</td>
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<td></td>
<td>7 Uniforms allows certain behavior</td>
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<td></td>
<td>8 Dress indicates formal vs informal</td>
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<td>9 Place office and furniture indicates status</td>
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<td></td>
<td>10 Cause focal person is unclear about role</td>
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<tr>
<td></td>
<td>11 Result insecurity among members of role set</td>
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</tbody>
</table>

Appendix 3  The Summary of A5

Any individual may occupy a place and play a role in society. You can be a “focal person” whether your status is humble or high. This focal person is in a focal position with regard to many people. Around him are his teachers, friends, and neighbors. There can be a broad range. This group of people is called “role set.”

The type of group you are in is closely associated with the country and cultural traditions you are in. Things around you can all have an influence on you. Each group therefore has their own features. These features can roughly fall into several categories. Uniforms. Uniforms can show clearly your identity or status. An outsider can see clearly which group you are in. Location. The place you are in. For instance, a manager makes us feel differently when he is in and out of his office. In the unit those who know him rarely or never take him as their friend. In some organizations, office signs and furniture may become the sign of a group.

Of course not everyone knows clearly which group one is in, or it may be hard to decide because his role and his position are not clear or he may be somewhat different from the others in his group. This may bring pressure to his work. But it is not necessarily bad for you may find a group that best suits you.