工作记忆与外语可理解性输入

Working Memory and Foreign Language
Comprehensible Input

徐 方 著

工作记忆与外语可理解性输入

Working Memory and Foreign Language Comprehensible Input

徐　方　著

工作记忆与外语可理解性输入

Working Memory and Foreign Language
Comprehensible Input

徐 方 著

中国海洋大学出版社

·青岛·

Preface

Of the four language skills, speaking, listening, reading and writing, listening is the most critical and difficult for foreign language learning. Thus, how to make foreign language learners' listening comprehension achievements improve quickly within a short period of time becomes the indispensible issue in the field of foreign language research. The book includes two experiments. The main aim of Experiment 1 is to probe whether chunking is the important factor in influencing working memory's capacity. The main aim of Experiment 2 is to investigate whether working memory is an important cognitive factor that influences EFL listening comprehension achievements, and to examine the relationship between the improvement in working memory and the input comprehensible. Having recognized the role of working memory in EFL listening comprehension, we also try to find out some effective ways to make up for the individual working memory capacity limitation and hence guide EFL teaching and learning.

Experiment 1:

This experiment was to investigate the effect of systematic classroom chunking practice on listening comprehension of Chinese EFL learners. After the experiment, we conclude that chunking is the good method to improve working memory's capacity.

The participants were 117 first-year non-English majors. They were divided into two homogeneous groups (one is the control group and the other is the experimental group). At the beginning of the semester when the experiment began, a pretest showed that the English proficiency of the two groups was similar. The two groups

received identical instruction except that the experimental group received an extra training on chunking. A questionnaire was also conducted to investigate some variables and the results showed that the two groups were identical in this respect. At the end of the semester, a posttest was conducted. Test items included listening comprehension, cloze, fast reading, reading in depth, vocabulary and structure. The result reveals that vocabulary is positively correlated to fast reading, reading in depth, listening, cloze and total score respectively. They are $p = 0.021$, $p = 0.007$, $p = 0.008$, $p = 0.033$, and $p = 0.000$. Variables' sig values are all less than 0.05, which shows that the students' capacity in fast reading, reading in depth, listening and cloze from the experimental group was affected by vocabulary depth through learning the theory of chunking.

Experiment 2:

To measure the participants' short-term memory, a converted version of Call's (1985) short-term memory span test was administered. To assess the participants' EFL listening skill, a listening comprehension test was designed and administered. The data collected were then analyzed statistically with the assistance of the software SPSS 21.0. The conclusion is as follows:

In the four listening subtests, short-term memory for sentences in context, short-term memory for 40 isolated sentences, short-term memory for 25 random words, and short-term memory for 25 random digits, memory for sentences in isolation or chosen from running discourse is the best predictor of listening success. Therefore, according to the order (from the most to the least) that memory factors influence listening comprehension achievements, it is: isolated sentences > sentences in context > random words > random digits.

Memory for syntax, as measured by the sentence and probe subtests, proved to be the best predictor of listening skill in the subtests. The results of the study indicated that memory for syntactically arranged words is an important part of proficiency in listening comprehension; therefore, it can be deduced that syntax also plays an integral part in rendering input comprehensible. Attempting to comprehend target language input when syntactic structures are unfamiliar might be likened to trying to recall target language content words arranged in random order.

At the same time, memory for random words and digits appeared to account for only a small portion of the variance in listening scores. This difference can more

clearly explain what makes the input comprehensible. When students are provided with input at the "*i* + 1" level, they use "key vocabulary items (nouns, verbs, adjectives and sometimes adverbs)" that are familiar to them in order to comprehend the global meaning conveyed by the input. Context (linguistic and non-linguistic) helps make sense of unfamiliar words which can afterwards become part of the student's familiar vocabulary. According to this explanation, comprehensible input is defined according to content word vocabulary.

The purpose of this book is to make a theoretical investigation on the contribution that working memory (short-term memory) may make to the EFL listening comprehension process, and to emphasize the relationship among auditory working memory (short-term memory), listening comprehension and comprehensible input. To achieve this intention, listening comprehension, chunking, short-term memory and working memory will be defined separately, the distinction between short-term memory and working memory will also be elaborated, the relationship between chunking and short-term memory will be analyzed, and the importance of working memory (short-term memory) for listening comprehension and of comprehensible input will in turn be further discussed. Then, two experiments will be carried out. Experiment 1 is composed of pretest, two final examinations and posttest questionnaire. Finally, the experimental results will be analyzed with the assistance of the software SPSS 21.0 to discover whether chunking is the important factor in improving capacity of working memory. Experiment 2, an empirical research, consisting of a pretest, four short-term memory subtests and a listening comprehension test, will be conducted to measure the contribution of short-term memory for each of four types of auditory input to differences in standardized listening scores. Finally, the experimental results will be analyzed with the assistance of the software SPSS 21.0 to find out how much of the variance in the listening comprehension scores could be expounded by the four independent variables measured by the subtests. The organization of the book comes as follows:

Chapter 1 serves as a general introduction, giving brief discussion on the origin, aim, methodology and design of the book.

Chapter 2 covers the nature and development of the concept of listening comprehension, chunking, working memory and short-term memory. The difference between short-term memory and working memory is elaborated. The relationship between chunking and short-term memory is analyzed. Krashen's Input Hypothesis

is briefly expounded. The relationships between Krashen's Input Hypothesis and listening comprehension, between working memory and EFL listening comprehension are also expatiated in this chapter.

Chapter 3 describes the methodology, including the operational definition of the variables, the participants, the instruments and the experimental procedures. The hypotheses are to be tested by the results of our quantitative analyses.

Chapter 4 discusses the experimental results. Interpretations, inferences and conclusions of the experiment are drawn later in this chapter.

Chapter 5 states pedagogical implications, including relationships between speaking and listening, listening materials, the speaker, the listener, and relationships between working memory (short-term memory) and EFL teaching and learning.

Chapter 6 concludes the book by suggesting how to overcome the limited capacity of working memory (short-term memory). Also in this chapter, the limitations of this research and suggestions for further research are involved.

The participants in the preceding studies were from other language backgrounds, not Chinese-speaking English learners. Thus, on the basis of previous research, the two experiments will test chunking as the important factor in working memory capacity and test short-term memory span for various types of auditory input related to Chinese-speaking English learners' listening comprehension. The investigation is anticipated to prove the previous findings in the Chinese EFL learning setting, and to increase the growing data base of information about input variables that augment or hinder comprehension. The following are three suggestions. The first one is about how to overcome the limited capacity of working memory (short-term memory), that is, how to make up for the limited capacity of working memory (short-term memory) is a way to improve listening comprehension; the second one is how to improve listening comprehension for a listener; the third is how to improve listening comprehension for a listener through listening material.

1. How to overcome the limited capacity of working memory

(1) Applying chunking to vocabulary memorization in listening comprehension

According to empirical studies, chunking helps to reduce the number of items

in working memory (short-term memory) and increase the capacity of working memory (short-term memory). Furthermore, chunking is the first step in establishing associations between different items. This type of association will facilitate the recall of information from long-term memory. Chunking decreases the number of items in working memory (short-term memory) and shortens the time that it takes to rehearse those items. This improves the probability that all the items will be effectively transferred into long-term memory.

(2) Employing chunking strategy and increasing working memory (short-term memory) capacity

Chunking strategy is employed to enlarge information load of individual units and to increase the capacity of the working memory (short-term memory). As for this, there are chiefly two reasons.

① Chunking can make each information unit rich and lessen the burden of working memory (short-term memory) by diminishing amounts of information units.

② When all the information is grouped into several large chunks, and information in each chunk is closely related to each other, representations in each large corresponding chunk of long-term memory will be excited. It is widely admitted that working memory (short-term memory) can retain about $7 + 2$ chunks. And information capacity of each chunk counts on the size of each chunk.

Meanwhile, there must be three preconditions for chunking.

① Sufficient time.

② The nature of information in each chunk.

③ Corresponding chunks in the long-term memory before chunking (Liu, 2005).

(3) Making use of chunking in skill building

Chunking functions as both a triggering device and a code-building device for our memory. The triggering aspect of chunks depends on the strength of a chunk or group of associative chunks. Since chunks are organized in a hierarchical style, the most memorable will be made up of information that is most connected to the individual effort to learn (Servan-Schreiber & Anderson, 1990). Code-building is often achieved through replication of chunks or relevant information that lets the participant to remember chunks for future use. As students establish a system of codes (i.e. chunks), patterns begin to occur with which they are able to associate with other chunks and

finally develop larger and larger stores of information (Koch & Hoffmann, 2000). At last, students are capable of building skills that are more complicated than simple rules yet easy enough to be retained in memory improving skill in a given capacity.

Another point that must be contained in any effective instructional effort is repetition. Just as our memories are arranged and retained in chunks, they are emphasized through repeated exposure to ideas, concept or expertise. In one aspect, chunking offers a way for repetition to the extent that the chunks are developed as bits of information and put or combined into a chunk.

(4) Raising students' chunking awareness and improving their ability to chunk language

Educating students to recognize chunks is just the beginning of helping them change input to intake. The next step is needed for us teachers to activate these items in the classroom and offer students with chances to use these items.

(5) Applying the schema theory in listening comprehension

The schema theory which has attracted great attention in recent years is actually a study of long-term memory. According to it, new information should be associated with one's previous knowledge and experience in order to be learned or incorporated into long-term memory. Making full use of the schemata in our memory can help remedy the limited capacity of working memory (short-term memory). Working memory (short-term memory) is very important to the construction of the meaning of the speech input. In this way, all the previous knowledge retained in the learner's long-term memory including vocabulary learned before, or knowledge about the world (schemata), which is related to the topic or title, will be aroused. This will help comprehension and overcome the limited capacity of working memory (short-term memory).

(6) Practice improves total capacity

A change in processing efficiency is supposed to be more specific to a particular process. Therefore, changes in the efficiency of a process are often supposed to arise from practice or some instructional intervention. In fact, intensive practice in some simple tasks, such as Stroop-type tasks, leads to big changes in the speed of answering that are characteristically explained in accordance with changes in

efficiency of underlying processes (Cohen, Dunbar & McClelland, 1990; Schneider & Shiffrin, 1977). Intensive practice in reading might similarly result in greater efficiency in several component processes of comprehension; the time spent in out-of-school reading is associated with reading skill in fifth-grade students, accounting for about 9% of the variance in one research (Anderson, Wilson & Fielding, 1988). Total capacity is supposed to be easily influenced by such intervention. Although it is feasible to interpret practice effects in accordance with a change in total capacity, the explanation would have to be more complicated. In order to improve total capacity, the practice would have to use more activation or extra processes and structures, quite apart from resulting in any efficiency increase in the originally targeted processes.

(7) Long-term working memory as an alternative to Capacity Models of working memory in everyday skilled performance

Ericsson & Kintsch (1995) put forward that skillful memory performance is due to the employment of long-term working memory, which is a more competent working memory with quicker way to long-term memory than usual working memory. Characteristic working memory withdrawals from long-term memory take 1-2 seconds, while long-term working memory withdrawals take around 400 megaseconds (McNamara & Kintsch, 1996). This quick retrieval occurs as a result of employing hints in short-term memory to stimulate withdrawal structures that directly withdraw items from long-term memory. Experts are likely to employ long-term working memory to avoid short-term memory processing limitations, because experience within a specific domain result in enriched knowledge structures and items withdrawal tactics. Long-term working memory withdrawal structures and tactics may be especially crucial to working memory task performance, owing to the demand to shift attention continuously between processing and storage tasks. Long-term working memory would permit a participant to more effectively retrieve the words from long-term memory that were no more obtainable in short-term memory. Therefore, a person employing tactics would seem to possess larger working memory capacity.

2. How to improve listening comprehension for a listener

Firstly, offer background knowledge and linguistic knowledge, such as intricate

sentence structures and verbal words and expressions, as needed. Require the students to learn to make use of context and title to augment comprehension.

Secondly, assist students to cultivate the skill of listening with anticipation, listening for specific information, listening for gist, interpretation and inference, listening for intended meaning, listening for attitude, etc., by affording various tasks and exercises at different levels with different intents.

Thirdly, provide and try to gain as much feedback as possible. During the course, the teacher should fill the gap between input and students' reply and that between the teacher's feedback and students' reaction so as to make listening purposeful. This not only promotes error correction, but also gives encouragement. It can aid students to heighten their confidence in their ability to tackle listening problems. Students' feedback can assist the teacher to judge where the class is going and how it should be instructed.

Fourthly, improve memory methods. As for the problem of improving English listening, many listeners only see the one side of listening more and practicing more, whereas they don't pay enough attention to another side of improving listening methods such as improving the effect of working memory. One of the important reasons why many listeners' listening level still remains at the original level is the inappropriate memory method. After listening level is converted from low stage to high stage, the listener should adjust his/her thinking style and memory model in listening properly, be good at finding out various note-taking styles that are helpful to brain memory according to his/her own actual condition and learn how to associate working memory with long-term memory scientifically.

3. How to improve listening comprehension for a listener through listening materials

The listening materials involve almost any area of life. The content is usually not well organized. In many situations, listeners can't predict what speakers are going to say. At the same time, for many learners, listening to a taped message is more difficult than reading the same message since listeners can't control the pace of presentation of the material. Therefore, we propose some suggestions below:

Firstly, present students with different kinds of input, such as lectures, radio news, films, TV plays, announcements, everyday conversations, interviews, story-telling,

English songs, and so on.

Secondly, attempt to discover visual aids or draw pictures and diagrams related to the listening topics to aid students to guess or imagine actively.

Thirdly, grade listening materials according to the students' level, and offer authentic materials rather than idealized filtered samples. At the lowest proficiency levels, listening materials that offer very familiar and/or predictable content and that are connected with students' interests will be best, if students will be able to take advantage of their knowledge of the world to assist them in comprehension when their linguistic skills are deficient. The materials should progress step by step from semi-authenticity that shows most of the linguistic features of natural speech to total authenticity. That is to say, "$i + 1$" input is important for the low level students to improve comprehension.

The design of listening exercises in the high and low grades should have obviously different requirements. Multiple-choice is one of the common patterns of listening exercises at present. The comprehension point in multiple-choice listening test materials is usually partial or local because many answers are a certain digit, word, phrase, or sentence of listening materials so as to lead to partial limit of listening comprehension. In the teaching of listening of juniors and seniors, listeners' listening emphasis should be changed from surface-level memory to deep-level comprehension. The main direction of teaching in this period is to guide listeners to comprehend the listening content on the basis of memory; focus of attention is to improve students' understanding and generalizing ability in listening. Therefore, the exercise patterns at this stage should be changed from the original multiple-choice (objective exercises) first to subjective exercises first. This can guide students to change their thoughts, to spread the angle of working memory (short-term memory) and to expand the scope of working memory (short-term memory) by exercise patterns. What is more, if the styles of listening exercises always remain the same, listeners will feel bored because of the identity and repetition of exercise patterns. This can't arouse the listeners' initiative and enthusiasm so as to cause the listening level to remain at the original level. This is one of the reasons why listeners often feel that their listening levels don't improve.

Fourthly, knowledge of structure is an important part of listening proficiency although most published materials underscore listening for the meaning of the passage rather than listening for the structure that clearly embodies the meaning.

Knowledge of vocabulary is not enough to enable students to become good listeners; they must also be able to make use of syntax to aid them to identify the relationships among the words they have heard and to keep utterances in memory long enough to comprehend them. Formal exercises concentrating on the recognition of syntactic structures are fundamental to the development of this skill. As soon as students have been familiar with the vocabulary and structure that are the immediate targets of instruction, they are prepared to begin acquisition activities by listening to input at the "$i + 1$" level for global meaning. Students would profit from a formal introduction to the syntactic structures of the target language, taught at first for recognition before they are required to listen for meaning so that they could make use of this knowledge to process comprehensible input more efficiently and to acquire the target language more quickly.

Contents