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## **Learning Strategies and Student Performance on a Computer-based English Listening Test**

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### **Abstract**

This study aimed to investigate how Thai advanced and non-advanced university students used cognitive and metacognitive strategies when performing a computer-based listening test, and whether there were relationships between the strategies employed and their performances on the test. The subjects were fourth-year Chulalongkorn University students. The instruments included a computer-based listening test, questionnaires and interviews. The computer-based listening test was created based on the frameworks derived from analyses of the listening constructs. Both qualitative and quantitative methods were employed to analyze the data. The strategies used by the more proficient group and those used by the less proficient were compared. Interviews were conducted with representative students from each group for more in-depth data.

The results showed significant differences in the use of the strategies by the two groups. There was greater and more appropriate use of the two strategies by the advanced group than the non-advanced group. Moreover, no significant relationship between the use of the cognitive strategies and the performance of the students in either

group was found. Yet, the data showed a significant negative relationship between the use of metacognitive strategies and the high-ability listeners' performance.

## **I. Introduction**

Of all the four language skills, listening is viewed as the most difficult by Thai learners of English (Chirdchoo & Wudthayagorn, 2001). The reasons that account for its difficulty vary. In Chirdchoo & Wudthayagorn, students claimed that the listening skill was more difficult than the reading skill due to their having less control over the input. The intricate processes of decoding a listening input increased the degree of difficulty. Researchers, including Buck (2001), have claimed that listening comprehension involves complicated cognitive processing that requires students' knowledge in both linguistic and non-linguistic areas. In other words, both bottom-up and the top-down processes are believed to play an important role.

Studies on learner strategies that help ESL and EFL learners to effectively cope with listening input are considered necessary. Among a wide range of learner strategies lie the cognitive and the metacognitive strategies that are often discussed and studied by researchers. The cognitive and the metacognitive strategies are claimed to account for one's success in learning a language. Past literature revealed positive relationships between the use of learner strategies and language performance. For example, Najar (1998) revealed that successful learners are usually those who are active and responsible for their learning. Not only do successful learners possess various kinds of learning strategies, but they are also able to select appropriate strategies for each situation. The importance of both cognitive and metacognitive strategies on learning processes is supported by the work of other researchers (Derry & Murphy, 1979; O'Malley & Chamot, 1990; Oxford, 1990; Wenden, 1991; Thompson & Rubin, 1996; Rubin, Quinn & Enos, 1998; Suwapap, 1998; Purpura, 1999; Brown, 2002).

Literature and research studies on learner strategies are prevalent, but the findings of past studies on the relationships

between the learner strategies and language performance are rather diverse. They seem to vary according to participants and skills. Also, their studies usually discuss a single cognitive strategy or a single metacognitive strategy such as prior knowledge (Alba & Hasher, 1983; Byrnes, 1984; Wanprakob, 1995), translation of a text (Cohen & Aphek, 1979 in Virtual Assessment Center (VAC), 2004). Most importantly, the studies on learner strategies in relation to the listening skill have not gained much attention, compared to other skills.

Studies of learners' use of the cognitive and the metacognitive strategies in relation to students' performance on a computer-based listening test will be of great benefit to the field as supported by Kim, Kim & Shin (2001) since no research has been done on the effects of multimedia and test takers' listening strategies on computer-based test performance.

## **II. Objectives of the Study**

The two main objectives of the study were as follows: 1) to investigate the relationships between the use of cognitive and metacognitive strategies and performance of fourth-year Chulalongkorn University students on a computer-based listening test, and 2) to compare the nature of cognitive and metacognitive strategies used across high- and low-listening-ability groups

## **III. Methodology**

### **A. Population and samples**

The population was fourth-year students from the Faculty of Commerce and Accountancy, Chulalongkorn University. The subjects were from academic year 2005 and were chosen on a voluntary basis. The pilot study involved 34 students, whereas 186 students participated in the main study. The scores they achieved from the computer-based listening test were used to categorize them into the high- and the low-listening-ability groups. The criteria were set at or above 1 Standard Deviation for the proficient group and at or below -1 Standard Deviation for the non-proficient group. Finally, there were 30 students who met the criterion of the high-listening-ability group, while 36 students

were put into the low-listening-ability group. The remainder of the students was classified as intermediate students, and the data obtained from this group of students were only used to elicit students' views towards the computer-based listening test.

## **B. Research instruments**

The research instruments consisted of two listening tests, two questionnaires, and retrospective interviews.

1. The CULI Test of English for Professional and International Communication (CULI Test PIC) served as an established test and was used to validate the computer-based listening test that the researcher developed.

2. A computer-based listening test was developed to measure students' listening ability and to elicit students' use of strategies. The test consisted of four parts with 50 questions. The program also incorporated a questionnaire containing targeted strategies that the students had to choose. The reliability coefficient of the test was .836.

3. Questionnaires were divided into two types. One aimed to elicit students' views towards the computer-based listening test, while the other asked students to reflect on their use of strategies to answer each question. The latter was integrated into the computer program and was shown on the computer screen after students answered every fifth question. Following analysis of the strategy frameworks proposed by various researchers (Derry & Murphy, 1979; Oxford, 1990; Wenden, 1991; Thomson & Rubin, 1996; Purpura, 1999; Brown, 2002; National Capital Research Language Center (NCLRC), 2004), the researcher came to the conclusion of the framework used in this study as follows.

(a) Cognitive processes:

1. Analyzing and reasoning processes

1.1 inferencing: concluding from the context, where the information is not obvious

- 1.2 making generalization (concluding): concluding from the context, where the information is obvious. This includes generalization and hypothesis formation by using the context e.g. organization, tones, etc.
- 1.3 translating: translating what they hear in L2 to their L1
- 1.4 previewing: using pictures or questions to predict the answers

## 2. Knowledge associating processes

- 2.1 recombining: recombining meaningful phrases, patterns or small chunks of L2 that they know and making certain semantic connections between or among elements
- 2.2 linking with prior knowledge: linking to their past experience or their background knowledge concerning the topic they hear
- 2.3 applying the rules: using the rules that they have learned or mastered

## 3. Information retrieving processes

- 3.1 repeating: repeating or imitating the input they hear so that they can remember what is said
- 3.2 taking notes: taking notes so that the information is noted down and can be retrieved

## (b) Metacognitive processes:

### 1. Planning processes

- 1.1 planning: selecting what is to be listened to

### 2. Monitoring processes

- 2.1 assessing situation: determining which approaches to use

### 3. Evaluating processes

- 3.1 evaluating: evaluating their own performance

4. Retrospective interviews to confirm their answers concerning their use of strategies were conducted with eleven students from the high-listening-ability group and another ten from the low-listening-ability group.

### **C. Data Collection**

The research was divided into two main stages: the pilot study and the main study. During the pilot study, the computer-based test underwent a validating process before it was used in the main study. The main study investigated the relationships between the two strategies and the students' performance. Also, differences in how the two groups of students used their strategies were carefully examined. The strategies that the students applied were elicited from the answers they chose on the strategy questionnaire which was integrated into the computer program. The questionnaire required the students to provide their answers concerning the strategies that they used for every question item. The retrospective interviews with randomly selected students were conducted to counterbalance their answers on the questionnaire. During both stages, the questionnaire, which was designed to draw students' opinions about the computer-based listening test, was distributed.

### **D. Data Analysis**

#### **1. Test Validation and Pilot Study**

The validation processes of the computer-based listening test and the questionnaires were both qualitative and quantitative in approach, namely specification of constructs, consultation with experts, trials on a comparable group of students, and statistical analyses.

#### **2. Main study**

(a) A Pearson correlation coefficient was used to examine the relationships between two types of learner strategies (the cognitive and the metacognitive strategies) and students' performance on the computer-based listening test.

(b) A t-test was used to investigate the differences between the mean scores of the strategies used by the advanced and the non-advanced groups.

(c) Interviews with 21 representatives were coded and analyzed.

#### IV. Results

The results of the study are presented based on the two hypotheses.

1. Hypothesis 1: There are significant relationships between cognitive and metacognitive strategies and student performance on the computer-based listening test.

To test the hypothesis, the scores of the high-ability group on the EIL CBT and the scores gained from their use of the cognitive and the metacognitive strategies were analyzed to find a correlation between the two variables. Similarly, the scores of the low-ability group on the test and the scores of their cognitive and the metacognitive strategies were calculated. The results are presented in the following table.

Table 1: Correlation between Students' Use of Strategies and their Proficiency

	<i>Advanced Students'</i>	<i>Non-advanced Students'</i>
	<i>Total scores</i>	<i>Total scores</i>
Cognitive Strategies	.290	-.114
Metacognitive Strategies	-.437*	-.116
Cognitive and Metacognitive Strategies	.228	-.124

P\* < .05

The data show no significant relationships between the use of the cognitive strategies and the proficiency scores of both the advanced and the non-advanced groups. The correlation coefficient between the cognitive strategies and the advanced listeners' total scores is .290, whereas that of the non-advanced listeners is -.114. There is also no relationship between the



metacognitive strategies used and the proficiency scores of the non-advanced group ( $r = -.116$ ). However, the figures illustrate a significant negative relationship between metacognitive strategy use and the scores of the high-ability group ( $-.437, p < .05$ ).

When both strategies are taken into consideration at the same time, the data reveal no significant relationship between the use of both strategies and the scores of the students from both groups. The Pearson correlation coefficient of the advanced students' total scores and their use of the two strategies is  $.228$ , whereas that of the non-advanced group is equal to  $-.124$ .

2. Hypothesis 2: There are significant differences in the nature of cognitive and metacognitive strategy use across the high- and the low-listening-ability groups.

A t-test was used to test this hypothesis and the results confirm significant differences in the use of both cognitive and metacognitive strategies of the students with different listening abilities.

**Table 2: Comparison of the Use of Strategies by Advanced and Non-advanced Students**

Strategies	Total Strategy Scores	Advanced 30 students		Non-advanced 36 students		t
		$\bar{X}$	S.D.	$\bar{X}$	S.D.	
1. Analyzing and reasoning	52	26.50	8.47	17.89	7.26	-4.387**
1.1 Inferencing	15	5.63	4.06	5.22	3.34	-.444
1.2 Concluding	37	20.87	6.93	12.67	6.72	-4.851**
1.3 Translating	-	-	-	-	-	-
1.4 Previewing	-	-	-	-	-	-
2. Knowledge associating	24	4.43	3.35	4.89	3.46	.542
2.1 Recombining	2	0.57	0.77	0.69	0.71	.693
2.2 Linking to Prior Knowledge	17	2.80	3.08	3.81	3.09	1.320
2.3 Applying Rules	5	1.07	1.34	0.39	0.80	-2.543*
3. Information retrieving	17	9.17	4.75	2.83	3.33	-6.352**
3.1 Repeating	1	0.23	0.43	0.25	0.44	.155
3.2 Taking notes	16	8.93	4.78	2.58	3.30	-6.358**
Cognitive strategies	93	40.10	9.86	25.61	7.57	-6.594**
4. Planning	6	1.07	1.55	0.19	0.58	-3.127**
4.1 Planning	6	1.07	1.55	0.19	0.58	-3.127**
5. Monitoring	-	-	-	-	-	-
5.1 Assessing Situation	-	-	-	-	-	-
6. Evaluating	-	-	-	-	-	-
6.1 Evaluating	-	-	-	-	-	-
Metacognitive strategies	6	1.07	1.55	0.19	0.58	-3.127**
Cog+meta	99	41.17	9.56	25.81	7.52	-7.146**

P\* &lt; .05, P\*\* &lt; .01

The table shows the total strategy scores that the majority of the experts assigned to each sub-strategy when they selected the strategies for the test. Two strategies underlying the analyzing and reasoning processes, translating and previewing from pictures or answer choices, are not presented because the majority of the experts did not agree with their use. Also, strategies 5 and 6, monitoring and evaluating processes, were not marked by the majority of the experts; therefore, no scores were assigned.

The table illustrates significant differences in the use of the cognitive and the metacognitive strategies by the advanced students and their counterpart ( $t = -7.146$ ,  $p < .01$ ). The mean of the cognitive and the metacognitive strategy scores of the advanced students is 41.17, whereas that of the non-advanced group is 25.81. The S.D. of the strategy scores of the advanced students is 9.56, while that of the non-advanced students is 7.52.

If each sub-category is considered, the strategies that were relied on more by the high-listening-ability group than the low-listening-ability group when taking the EIL CBT were 1.2 concluding ( $t = -4.851$ ,  $p < .01$ ), 2.3 applying rules ( $t = -2.543$ ,  $p < .05$ ), 3.2 taking notes ( $t = -6.358$ ,  $p < .01$ ), and 4.1 planning ( $t = -3.127$ ,  $p < .01$ ).

### 3. Data from the retrospective interviews

All advanced students reported an automatic process of decoding the listening input. Most of the time, they automatically understood the information they heard. The interviews support the data shown in Table 2. Firstly, the high-listening-ability group concluded or made generalizations from the text a great deal. This is related to their ability to automatically decode an auditory input. Secondly, they found that the grammatical rules helped them choose the correct answers, especially in part 1 of the test that involved short statements. Also, they could refer to their notes although sometimes they did not choose to report on the use of the note taking strategy because they could remember the details. Lastly, they sometimes planned what information they would like to listen to if they were accommodated to do so; for example, when answer choices were shown on the screen and they were asked to put the answers in order, they would plan what to listen to.

The low-listening-ability group used the concluding strategy differently from those in the high-listening-ability group, who generally concluded from the overall main ideas. Instead, the low-ability group's conclusions were based on chunks of words they heard. Therefore, this is why this strategy was often used with recombining words. Moreover, translating and previewing from pictures and answers was often found helpful for the students in

this group. As the process of understanding the verbal messages was not immediate for them, translating was triggered to assist them to generate meanings. "Previewing" was also heavily relied on due to their inability to understand the listening input. This resulted in their making a guess by using pictures and answer choices. Information retrieving processes were not thought useful by the low-listening-ability students. In fact, they found that they could not take notes effectively and correctly. "Planning" was the only metacognitive strategy these students used although few made use of it.

## **V. Discussion**

The findings show no significant relationships between cognitive strategies and the performance of the students in both groups ( $r_{\text{high}} = .290$ ;  $r_{\text{low}} = -.114$ ). However, in relation to metacognitive strategies, a significant, negative relationship is found only between the high-listening-ability group and their use of the metacognitive strategies ( $r = -.437$ ). The reasons underlying the research findings might be attributed to the level of proficiency of the proficient group, the listening comprehension processing and other factors, concerning factors affecting choice of strategies (Oxford, 1993) and those affecting language performance (Bachman, 1990). Moreover, as the automaticity of input processing comes into play, there will not be much room for the use of the strategies. The negative relationship between the high-ability listeners and their use of the metacognitive strategies might not be clear enough to conclude that metacognitive strategies are not useful. It is due to the focus of the research study on the most important strategies. This concurs with Chesterfield & Chesterfield (1985), in Purpura (1999), who supported the proposition that the use of the metacognitive strategies usually comes last. From the findings, it is more justifiable to conclude that cognitive strategies are more readily employed by proficient students taking computer-based listening tests than metacognitive strategies.

The second hypothesis supposes how the two groups of students made use of the strategies. The findings reveal more appropriate and greater use of the two strategies by the high-

ability listeners, confirming prior research in the past such as Abraham & Vann (1987), Chamot, Küper & Impink-Hernandez (1988), Kaylani (1996), Hoang (1999), and Liu (2004). When each sub-strategy is considered, the high-ability group used the concluding ( $t = -4.851$ ), the rule application ( $t = -2.543$ ), the note taking ( $t = -6.358$ ), and the planning strategies ( $t = -3.127$ ) significantly differently from the other group. The concluding strategy was relied on the most by both the experts and the proficient students. It can be related to their ability to comprehend the input automatically and in real time.

The degree of their use of the two strategies was not the only difference. The approach of how they used the strategies, according to the interviews, also shows apparent distinctions. For example, the non-proficient students made use of the recombining strategy as they could only listen in small chunks, rather than in longer strings of input. Then, they concluded from the words they heard, unlike the proficient group, who concluded from the overall input they heard. Their use of the other strategies such as linking to prior knowledge and note taking was also ineffective. Their lack of linguistic knowledge was the main source of their inappropriate use and insufficient information, leading to their wrong judgment of what the accurate answer is as compared to the advanced listeners. The research results emphasize Bachman's (1990) framework of the factors affecting language learner performance as Bachman illustrates language competency accounts for the biggest part of the performance whereas the cognitive abilities take a much less significant role.

## **VI. Conclusion**

This study attempts to fill what has been missing in research concerning the relationships of the cognitive and the metacognitive strategies and students' listening performance. Several implications can be drawn from the findings. Firstly, the study adds more insight into our understanding of cognitive and metacognitive strategies by emphasizing that their use may not affect students' proficiency as much as other language skills, such as the reading skill. Although no relationships were found, this

does not mean that cognitive and metacognitive strategies are of no benefit. In fact, the significance of the strategy use lies in the students' appropriate and effective use of cognitive and metacognitive strategies together with their automaticity in decoding auditory messages as well as their linguistic ability.

Secondly, for teachers who want to train their students to use cognitive and metacognitive strategies with the hope that their listening proficiency will increase or they will do well on a listening exam, the study implies that the use of the strategies alone does not help increase their listening comprehension. Linguistic knowledge such as vocabulary, phonology, and structures must be developed in concert with the use of the cognitive and the metacognitive strategies. To train students to be proficient listeners, teachers must have them practice until they possess the ability to automatically decode listening input. This studies findings also suggest advanced listeners are those who are able to use both top-down and bottom-up approaches appropriately.

Thirdly, for test writers and administrators who would like to integrate computer-based tests into their institutions, several thoughts must be considered. First of all, the design process must be based on good interface design principles. These refer to all elements of a software program that users see and interact with such as user control, clear navigation aids, design integrity, design consistency and simplicity, and error prevention. Also, the quality of the computer and other equipment must be checked to avoid any negative effects on students' performance.

### **The Author**

Chatraporn Piamsai is a Ph.D. candidate in the English as an International Language Program, Chulalongkorn University. She received an M.A. in TESOL from Michigan State University, USA in 1998. Since then she has worked as a language instructor at Chulalongkorn University Language Institute. Throughout her career, she has put her interests in both language teaching and language assessment and evaluation. The research areas of her interest include those involving learner strategies and language testing, which are the main area of her dissertation.

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