INVESTIGATING COGNITIVE AND METACOGNITIVE STRATEGY USE DURING AN ENGLISH PROFICIENCY TEST

Wenxia Zhang and Meihua Liu
Tsinghua University, China

Abstract

This paper reports on the results of a study of cognitive and metacognitive strategy use and its effect on the students' test performance at the tertiary level in a Chinese EFL context. A 18-item survey involving 526 undergraduate non-English majors revealed that: (1) the students had a medium use of both cognitive and metacognitive strategies during the test; (2) cognitive and metacognitive strategy use was closely related to each other, but neither was a predictor for the other; and (3) though cognitive and metacognitive strategy use significantly correlated with the students' performance in certain parts of the proficiency test, only the metacognitive strategy of evaluating one's performance proved to be a positive predictor of the students' performance in listening and reading comprehension and the overall written test. Based on the results, some implications and suggestions for future research are discussed.

Keywords: Strategy use; Cognitive; Metacognitive; Test performance; Tertiary

INTRODUCTION

Since 1970s, much research has been done to identify what might be good language learning strategies and to establish a relationship between these and successful language learning (Abraham & Vann, 1987; Bremner, 1999; Naiman, Fröhlich, Stern & Todesco, 1978; Gu & Johnson, 1996; Rubin, 1975; Wang, 2007). Implicit in the research on language learning strategy use is the assumption that strategic behaviors can exert potential causal effect on achievement and performance in second/foreign language.

Direct all correspondence to: Wenxia Zhang, Department of Foreign Languages Tsinghua University Beijing, 100084, China Phone/Fax No.: 86-10-62795346 E-mail: wxzhang@mail.tsinghua.edu.cn
Meihua Liu, Department of Foreign Languages Tsinghua University Beijing, 100084, China Phone. 86-10-62772459 E-mail: ellenlmh@yahoo.com

Nevertheless, because of the complex nature of language learning strategies, considerable debate exists about how to define language learning strategies (Ellis, 1994). Even so, most researchers emphasize that language learning strategies must be something that learners consciously select in order to accomplish language tasks and that language learning strategy use involves some degree of consciousness, awareness, and intentionality (Cohen, 1998; O'Malley & Chamot, 1990; Oxford, 1990; Lan & Oxford, 2003; Wen, 1993, 1995, 1996). Though classified into various categories, cognitive and metacognitive strategies are considered important language learning strategies by numerous researchers (O'Malley, Chamot, Stewner-Manzares, Kupper & Russo, 1985; Oxford, 1990; Skehan, 1989; Wong-Fillmore, 1976, 1979). According to these researchers, cognitive strategies are more directly related to the individual learning tasks, which include making predictions, translating, summarizing, linking with prior knowledge or experience, applying grammar rules, and guessing meaning from contexts; metacognitive strategies involve thinking about the learning process, planning for learning, monitoring of comprehension or production, and self-evaluation of learning.

A major study in the 1980s was conducted by O'Malley et al., (1985) in the United States. Based on interviews with secondary-school ESL learners, interviews with their teachers and observations, O'Malley et al. (1985) uncovered twenty-six strategies, among which, nine were metacognitive strategies (advance organizers, directed orientation, selective attention, self management, advance preparation, self-monitoring, delayed production, self-evaluation, and self-reinforcement) and sixteen were cognitive strategies (repetition, resourcing, directed physical response, translation, grouping, note-taking, deduction, recombination, imagery, auditory representation, keyword, contexualization, elaboration, transfer, inferencing, and questions for clarification). In addition, the researchers found that intermediate-level students tended to use a greater proportion of metacognitive strategies, while the beginning level learners emphasized more the actual handling of data and direct learning processes, which was later confirmed by Chamot and El-Dinary's (1999) study. The research also revealed that the most frequently used strategies were concerned with rote learning, not transformation or engagement with the learning material. Greater strategy use tended to be linked with activities which were less complex conceptually. The most strategy generating activities were vocabulary learning, pronunciation and oral drills. Fewer strategies were used in more complex activities like analysis, inferencing and making oral presentations.

Using a think-aloud method to investigate strategy development over time on a variety of language tasks, Chamot and Küpper (1989) discovered more metacognitive strategies related to listening, such as advance organization, selective attention, monitoring, problem identification, and self-evaluation. They stated that more skilled listeners were more purposeful in their approach to the task, monitored their comprehension for overall meaning, and effectively employed their prior and linguistic knowledge while listening. These more skilled listeners especially used the written listening comprehension questions to establish a topic framework for what they were to hear and utilized what they knew about the topic to predict possibilities. Using this framework, these listeners concentrated on important upcoming content while continuing to use relevant information to help them understand, confirm, and revise their predictions when necessary as they went along. The researchers, thus, declared that this unique combination of strategies marked the strategic approach of the more skilled listener.

In order to investigate the relationship between listening strategy use and language proficiency, Vandergrift (1996, 1997) targeted novice-level and intermediate-level high school learners of French by way of structured interviews, stimulated recall and think-aloud protocols. Analyses of structured interviews (Vandergrift, 1996) revealed that the number of total strategies as well as the number of distinct metacognitive strategies increased by course level and that females tended to report a greater number of metacognitive strategies than their male peers. Think-aloud protocols (Vandergrift, 1997) uncovered that novice-level listeners heavily relied on elaboration, inferencing, and transfer and overcame their limited knowledge of French by using cognates and extralinguistic clues such as sound effects to construct meaning of a text. The researcher argued that the constraints on processing at the novice level were so great that there was little attentional room for metacognitive strategies such as monitoring. By contrast, intermediate-level listeners were able to process larger chunks of information and employed over twice as many metacognitive strategies as their novice-level peers. This finding was further confirmed by Peters' (1999, cited in Vandergrift, 2003) study which also discovered that the more skilled listeners were the more successful in linguistic inferencing and engaged in less elaboration. In a later study of 36 junior high school core French students based on the taxonomy of listening strategies and the think-aloud method, Vandergrift (2003) found that students used almost all previously identified cognitive and metacognitive strategies. With regard to the differences in strategy use, the more skilled listeners utilized metacognitive strategies, primarily comprehension monitoring, more

frequently than their less skilled peers and appeared to be more able to verify continually and correct their comprehension when listening. The more skilled listeners also reported using questioning and elaboration more than twice as often as their less skilled counterparts. The less skilled listeners engaged in more direct translation and their approach seemed to involve primarily bottom-up processing, which might impede the development of a conceptual framework and efficient construction of meaning.

Focusing on the relationships between test taker's reported cognitive and metacognitive strategy use and patterns of performance on language tests, Purpura (1997) examined the putative effects of strategy use on second language test performance in a construct validation study. Administering an 80-item cognitive and metacognitive strategy questionnaire and a 70-item standardized language test to 1,382 students in Spain, Turkey and the Czech Republic, and using structural equation modeling as a primary analytical tool, he found that metacognitvie strategy use had a significantly positive and direct effect on cognitive strategy use but had no significantly direct impact on SL test performance. The researcher also discovered that cognitive strategy use had no significant, direct effect on reading ability, but influenced reading indirectly through lexico-grammatical ability. To be specific, the comprehending processes had no significant, direct impact on reading or lexico-grammatical ability, and the retrieval processes yielded a small, but significant positive effect on lexico-grammatical ability; while the memory processes had a significantly direct negative effect on lexico-grammatical ability. Alternatively, the more the test takers invoked the memory strategies in a speeded test situation, the worse they performed on the test, while the less they utilized them, the better they performed. These findings further confirmed the implication that the relationships between strategy use and second language proficiency are extremely complex, and at times very subtle, given the multidimensional nature of the constructs involved and the number of possible interactions that could occur between and among various variables (Chamot, Kűpper & Impink-Hernandez, 1988; Wesche, 1987).

As discussed above, the relationship of the use of language learning strategies and success in a second/foreign language, as well as other variables, has been the focus of a huge body of research over the past decades. However, research on strategy use and students' performance in real tests has been few (Purpura, 1997, 1998), which merits further research. Situated in a Chinese EFL learning context, the present research sought to examine the use of cognitive and metacognitive strategies during an English proficiency test and its effect on the students' test performance. To achieve this purpose, the following research questions were formulated.

- What is the broad profile of cognitive and metacognitive strategy use during the test?
- What is the relationship between cognitive and metacognitive strategy use?
- What is the effect of cognitive and metacognitive strategy use on the students' test performance?

RESEARCH METHODOLOGY

This paper reports on part of a study which investigated students' perceptions of and the strategies they employed during a school-based English proficiency test (Zhang & Liu, 2007).

Context

As a top 1 or 2 university in China, the present target university in Beijing is famous for its outstanding students who are generally better than most other university students in different areas of learning, including English. Consequently, undergraduate non-English majors at this University are exempt from the College English Test band 4 (CET-4) (a national English proficiency and exist test for undergraduate non-English majors). Nevertheless, in order to graduate on time, they have to pass its own English Proficiency Test I (TEPT1) which, developed by the Department of Foreign Language of the University and authorized by the Bureau of Education in 1999, has been existent for 10 years since 1996 and is correspondingly more difficult than the CET-4. As an exit and proficiency test, the TEPT1 consists of two components: written (85 points) and oral (15 points) tests, the written component of which has three parts: listening comprehension (30 points), reading comprehension (40 points), and writing (15 points). The test is administered on the 8th Sunday of each 18-week long term and it is up to students to decide when to take the test during their 4-year university time.

Participants

This study involved 526 undergraduate non-English majors with an average age of 19.4, who were in different study years and majored in various areas such as business management, financing, criminal law, chemistry, and Chinese literature.

Instrument

Along with a 60-item Perception of the TEPT1 2005, a 37-item self-developed strategy survey based on interview results, was administered to the students, which covered (a) a 4-item memory strategy use questionnaire, (b) a 8-item cognitive strategy use questionnaire, (c) a 7-item compensation strategy use questionnaire, (d) a 10-item metacognitive strategy use questionnaire, (e) a 3-item affective strategy use questionnaire, and (f) a 5-item social strategy use questionnaire. The survey was designed on a 5-point Likert scale ranging from 'Always or almost always used' to 'Never or almost never used' with values 1-5 assigned to the descriptors respectively.

The Cognitive and Metacognitive Strategy Use Scale (CMSUS).

Since the present study reported the results of cognitive and metacognitive strategy use and its effect on the students' performance in the written test, only the development of the items of these two strategy categories is detailed here. As the review of existing studies indicates, both the classification and the use of different strategies vary from person to person and from situation to situation due to the complex nature of language learning. Because of the specific testing situation in which the present research was positioned, the use of both cognitive and metacognitive strategies might be different from that often reported in non- or fake testing situations. Therefore, prior to the study, an retrospective interview was held to a group of 15 students who had taken the proficiency test in the preceding semester to elicit any strategy they might have had used during the test. The interview resulted in 81 individual strategies. Primary analysis of the data deleted 18 strategies which were used to prepare for the test. To avoid redundancy and repetition, some strategies were further left out and 37 remained. Further analysis with an inter-rater reliability of .91 (the two researchers read and categorized each individual strategy, with the result being compared and computed in terms of inter-rater reliability) categorized these 37 strategies into six groups with Oxford's (1990) classification as the base model. The product was then used in the present research.

Background Information

The background questionnaire was designed to obtain information about participants' name, gender, and study year.

Performance in the TEPT1 2006

All the participants' scores (total score and scores in different parts of the written test) were collected as their performance in the test.

Procedure

The written part of the TEPT1 2006 was held for two hours on the 8th Sunday morning of the second term of the academic year 2005-2006. As soon as a student finished the test, s/he was asked to fill in the survey in about 20 minutes. Altogether, 547 questionnaires were collected, of which 526 were valid for statistical analyses.

Data Analysis

Both the cognitive and metacognitive strategy use questionnaires were subjected to a factor analysis with varimax rotation to determine the component structure that most adequately represented the constructs underlying each of the measures. Correlational analyses revealed the associations among the overall measures and their subcomponents, such that highly correlated dimensions of the constructs could be identified. For each measure, the mean, standard deviation, median, mode, maximum, and minimum were calculated to determine how frequently the students used the strategies during the TEPT1 2006. Then, the relationship between the use of the strategies and the students' performance in different parts of the TEPT1 2006 were investigated. Finally, multiple regression analyses served to reveal potential predictors for both cognitive and metacognitive strategy use and the students' test performance.

RESULTS AND DISCUSSION

Factor Analysis of the Cognitive and Metacognitive Strategy use Questionnaire

A factor analysis with varimax rotation for the cognitive strategy use questionnaire (CSUQ) yielded two factors, analyzing and reasoning (CSUQ1) and creating structure for input and output (CSUQ2), a finding that is consistent with the view held by the researchers. The first factor (CSUQ1) consisted of six items (1-6) implicative of the sense of analyzing sentence structure and reasoning in terms of linguistic, contextual and world knowledge, which accounted for 90.33% of the total variance. Two items (7 and 8) indexed the second factor (CSUQ2) which meant to create structure

for input and output by taking notes and highlighting and accounted for 9.67% of the total variance.

Likewise, a factor analysis with varimax rotation for the metacognitive strategy use questionnaire (MSUQ) served to reveal its underlying components. A three-factor solution emerged, which is also consistent with the researchers' expectation. There were four items (9-12) included in the first MSUQ component (MSUQ1), centering one's attention, which accounted for 68.99% of the total variance. All of the MSUQ1 items made reference to centering one's attention during the test by reading/listening carefully to test instructions, reading each question carefully, looking for key words, and looking for clues. Four items (13-16) reflected the second MSUQ component (MSUQ2), arranging and planning, and accounted for 23.37% of the total variance. Two items (17 and 18) comprised the third MSUQ component (MUSQ3), evaluating one's performance, which intended to make as few mistakes as possible by monitoring and checking and accounted for 7.64% of the total variance. The results are summarized in Table 1.

TABLE 1
Varimax Rotated Loadings for Factor Analysis
of the Cognitive and Metacognitive Strategy Use Questionnaire (N = 526)

Item	CSUQ1	CSUQ2	MSUQ1	MSUQ2	MSUQ3
1. I analyze its structure when coming across a difficult sentence.	.632	.135			
2. I break up run-on sentences into smaller parts to understand them better.	.602	.102			
3. I eliminate certain answers when answering multiple-choice questions.	.608	.043			
4. I use linguistic knowledge to help deduce when answering questions.	.473	.442			
5. I use world knowledge to help deduce when answering questions.	.612	.328			
6. I use the context to help deduce when answering questions.	.711	.213			
7. I jot down information in the margin while answering questions.	.173	.825			
8. I highlight some sentences or phrases while answering questions.	.162	.784			
9. I read/listen to test directions carefully.			.530	.230	.066
10. I read every question carefully during the test.			.668	.053	.025
11. I look for keywords when			.780	.027	.115

answering questions.			
12. I look for clues when answering questions.	.799	.019	.070
13. I manage to understand each question during the test.	.238	.545	.167
14. I scan the test first and then develop a plan for completing the test.	.132	.700	.038
15. I answer easy questions first during the test.	.126	.434	-.148
16. I brainstorm before answering essay questions.	-.134	.650	.262
17. I try to make as few mistakes as possible during the test.	.495	-.214	.542
18. I double-check my answers when I complete the test.	-.151	.347	.775

Note: MSUQ1 = centering one's attention; MSUQ2 = arranging and planning
MUSQ3 = evaluating one's performance
CSUQ1 = Analyzing and reasoning; CSUQ2 = Creating structure for input and output

The loadings in Table 1 reveal that all of the items within a subcomponent of the CSUQ were significantly highly correlated with that subcomponent. The six items included in the CSUQ1 were related to the CSUQ1 with coefficients ranging from .473 to .711; the two items in the CSUQ2 related to the CSUQ2 with a range of coefficients from .784 to .825. Further support was suggested by the significant coefficients between the CSUQ and its two components: the CSUQ1 (r = .945, p < .01), and the CSUQ2 (r = .749, p < .01), as shown in Table 2.

Likewise, all of the items within a subcomponent of the MSUQ were significantly correlated with that subcomponent. The four items included in the MSUQ1 were related to the MSUQ1 with coefficients ranging from .530 to .799; the four items in the MSUQ2 related to the MSUQ2 with a range of coefficients from .434 to .700; and the two items in the MSUQ3 correlated with the MSUQ3 with a range of coefficients from .542 to .775. Further support was implied by the significant coefficients between the MSUQ and its three components: the MSUQ1 (r = .740, p < .01), the MSUQ2 (r = .774, p < .01), and the MSUQ3 (r = .574, p < .01), as reported in Table 2.

TABLE 2
Correlations among the CSUQ, the MSUQ and their Subcomponents

	CSUQ	CSUQ1	CSUQ2	MSUQ	MSUQ1	MSUQ2
CSUQ1	.945**	1				
CSUQ2	.749**	.492**	1			
MSUQ1	.692**	.671**	.479**	.740**	1	
MSUQ2	.263**	.220**	.261**	.774**	.235**	1
MCSUQ3	.330**	.356**	.161**	.574**	.264**	.266**

Note: ** < .01

Meanwhile, the CSUQ1 was significantly positively correlated with the CSUQ2 (r = .492, p < .01). The MSUQ1 was also significantly related to the MSUQ2 (r = .235, p < .01) and the MSUQ3 (r = .264, p < .01), so did the MSUQ 2 and the MSUQ3 (r = .266, p < .01), though the coefficients were not that high. Namely, students with high scores on one CSUQ/MSUQ subscale tended to score higher on other CSUQ/MSUQ subscales. Students who analyzed and reasoned more often tended to create structure for input and output more frequently during the test; students who centered their attention more frequently tended to arrange and plan and evaluate their performance more often during the test.

Broad Profile of Pognitive and Metacognitive Strategy use

Assessing to what extent the students used cognitive and metacognitive strategies during the test required the determination of the means, standard deviations, medians, modes, maximums, and minimums of the CSUQ, the MSUQ and their subscales. The total score of the CSUQ/MSUQ revealed a respondent's use range of cognitive/metacognitive strategies during the test; the higher the score, the more frequently the respondent reportedly used the strategies.

There were eight items on the CSUQ. A total score of more than 32 for the scale implied high use of the cognitive strategies during the test, a total score of 24 to 42 signified medium use, and a total score of less than 24 indicated low use. Likewise, a total score of more than 24 for the 6-item CSUQ1 suggested high use of analyzing and reasoning, a total score of 18 to 24 indicated medium use, and a total score of less than 18 reflected low use. For the 2-item CSUQ2, the score ranges for high, medium and low use of creating structure for input and output respectively were: more than 8, 6-8, and less than 6. The results are summarized in Table 3.

Similarly, a total score of more than 40 for the 10-item MSUQ implied high use of the metacognitive strategies during the test, a total score

of 30 to 40 signified medium use, and a total score of less than 30 suggested low use. Likewise, a total score of more than 16 for the 4-item MSUQ1/MSUQ2 indicated high use of centering one's attention/arranging and planning, a total score of 12 to 16 was implicative of medium use, and a total score of less than 12 was reflective of low use. For the 2-item MSUQ3, the score ranges for high, medium and low use of evaluating one's performance respectively were: more than 8, 6-8, and less than 6. The results are reported in Table 3.

TABLE 3
Statistical Analyses of the Cognitive
and Metacognitive Strategy Use Questionnaire (N = 526)

Strategy category (most to least used)	Frequency of strategy use				
	Mean/range	Standard deviation	Median	Mode	Range
CSUQ	28.85/medium use	5.08	29	32	9-40
CSUQ1	21.82/medium use	3.86	22	24	7-30
CSUQ2	7.02/medium use	1.91	7	8	2-10
MSUQ	32.04/medium use	5.13	32	30	10-47
MSUQ1	14.81/medium use	2.72	15	16	4-20
MSUQ2	11.24/medium use	2.95	11	12	4-20
MSUQ3	6.02/medium use	1.44	6	6	2-10

Within a possible range of 8 to 40, the actual range for the CSUQ for the present study was 9 to 40, with a mean of 28.85 (SD = 5.08). This result, coupled with the CSUQ median (29) and mode (32), which all exceeded the scale midpoint of 24 but fell below 32, indicates medium use of the cognitive strategies by the participants during the test. The CSUQ1 had a score range of 7 to 30 (the possible range was 6 to 30), a mean of 21.82, a median of 22, and a mode of 24; the CSUQ2 had a range of 2 to 10 (the same as the possible range), a mean of 7.02, a median of 7, and a mode of 8. Apparently, all of the subscale scores exceeded their scale midpoints (18 and 6 for the CSUQ1, and the CSUQ2 respectively). Namely, the participants had a medium use of the cognitive strategies of analyzing and reasoning, and creating structure for input and output during the test. This finding further confirms the result of the CSUQ data.

With a possible range of 10 to 50, the MSUQ had a score range of 10 to 77, a mean of 32.04 (SD = 5.13), a median of 32, and a mode of 30, all of which were larger than the scale midpoint 30 but smaller than 40. This result suggests a medium use of the metacognitive strategies by the correspondents during the test. Meanwhile, the MSUQ1 had a range of 2 to 10 (the same as the possible range), a mean of 14.81, a median of 15, and a mode of 16; the MSUQ2 ranged from 4 to 20 (the same as the possible range), with a mean

of 11.24, a median of 11, and a mode of 12; both the possible and actual range of the MSUQ3 were 2 to 10, which had a mean of 6.02, and a median and mode of 6. It is clear that all of the subscale scores (slightly) exceeded their scale midpoints (12, 12 and 6 for the MSUQ1, the MSUQ2 and the MSUQ 3 respectively). That is, the learners reported having a medium use of the metacognitive strategies of centering attention, arranging and planning, and evaluating one's performance, though they used the first strategy—centering attention more frequently during the test. This finding further confirms the result of the MSUQ data.

Correlation Between Cognitive and Metacognitive StrategyU and Students' Test Performance

Correlational analyses revealed the relationship between cognitive and metacognitive strategy use and students' test performance (see Table 4).

TABLE 4
Correlation between cognitive and
Metacognitive strategy use and students' test performance (N = 526)

	CSUQ	CSUQ1	CSUQ2	MSUQ	MSUQ1	MSUQ2	MSUQ3
MSUQ	.610**	.581**	.451**	1			
MSUQ1	.692**	.671**	.479**	.740**	1		
MSUQ2	.263**	.220**	.261**	.774**	.235**	1	
MSUQ3	.330**	.356**	.161**	.574**	.264**	.266**	1
Listening	.044	.039	.035	.023	.046	-.040	.099*
Reading	.095*	.089*	.071	.066	.075	-.015	.118**
Writing	-.036	-.057	.028	.038	-.028	.059	.072
Total	.048	.033	.063	.060	.043	.004	.132**

Note: ** < .01; * < .05

Table 4 shows that the CSUQ, the MSUQ and their subscales were significantly positively correlated with certain test scores: the CSUQ and the CSUQ1 significantly correlated with the students' reading test scores (r = .095 and .089 respectively, $p < .05$); the MSUQ3 highly related to the students' scores in listening (r = .099, $p < .05$) and reading (r = .118, $p <$ .01) parts of the test and the overall written test (r = .132, $p < .01$). That is, the more frequently the correspondents utilized the overall cognitive strategies and/or the cognitive strategy of analyzing and reasoning, the better they performed in the reading part of the proficiency test (TEPT1 2006); the more frequent user of the metacognitive strategy of evaluating one's

performance tended to score higher in the listening and reading parts of the test and the overall written test.

Meanwhile, some of the measured scales were negatively correlated with the students' scores in certain parts of the TEPT1 2006 though the coefficients were not high: the CSUQ, the CSUQ1 and the MSUQ1 negatively related to the students writing scores (r = -.036, -.057 and -.028 respectively); and the MSUQ2 inversely correlated with the students' listening and reading scores (r = -.040 and -.015 respectively). Namely, the more frequently the participants employed the overall cognitive strategies, the cognitive strategy of analyzing and reasoning, and/or the metacognitive strategy of centering one's attention, the worse they performed in the writing test; the more frequent user of the metacognitive strategy of arranging and planning tended to achieve less in the listening and reading tests.

In addition, the CSUQ and its two subscales were significantly positively correlated with the MSUQ (r = .610, .581, and .451 respectively, $p < .01$), the MSUQ1 (r = .692, .671, and .479 respectively, $p < .01$), the MSUQ2 (r = .263, .220, and .261 respectively, $p < .01$), and the MSUQ3 (r = .330, .356, and .161 respectively, $p < .01$). The students who used the cognitive strategies more frequently tended to deploy the metacognitive strategies more often during the test, though the coefficients between the CSUQ1, the CSUQ2, and the MSUQ2 and the MSUQ3 were not that high.
The analyses so far clearly support the conclusion that the use of cognitive strategies was closely related to the use of metacognitive strategies and that the use of both cognitive and metacognitive strategies was correlated with the students' test performance to a certain degree.

THE REGRESSION MODEL

The results of the correlational analyses discussed previously produce various bivariate relationships. However, it is worth noting that except for the correlations between the CSUQ and the MSUQ, others were not so strong, with coefficients rarely exceeding .20. Further, bivariate analyses could not indicate the influence of one variable on another. Hence, multiple regression analyses with a stepwise method were conducted which could provide better clues. The results are presented in Table 5, which reports coefficients from the regression models, as well as their levels of significance. As can be seen, all the coefficients were statistically significant.

TABLE 5
Regression Coefficients and Significance

	Listening comprehension			Reading comprehension			Total		
MSUQ3	β	*t*	p	β	*t*	p	β	*t*	p
	.099	2.24	.025	.119	2.72	.007	.131	2.989	.003

Partially consistent with Purpura (1997)'s findings, regression analyses revealed that neither the cognitive strategy use nor the metacognitive strategy use was a predictor for the other. As to their effect on test performance, only the MSUQ3 among the measured variables was included in the model in terms of listening comprehension, reading comprehension and overall performance in the written test, as shown in Table 5. Alternatively, only the MSUQ3 proved to be a predictor of the students' performance in listening comprehension, reading comprehension and the written test. Because the predictor was positive in all three cases, the more frequently the students evaluated their performance when doing listening and reading during the test, the more they achieved in these two parts. The case was the same with the overall written test.

CONCLUSION AND SUGGESTIONS FOR FUTURE RESEARCH

Several conclusions concerning the study of cognitive and metacognitive strategy use during an English test can be drawn from the results of this study.

First, the significantly high coefficients indicate that the subscales of the CSUQ (CSUQ1 and CSUQ2) and the MSUQ (MSUQ1, MSUQ2 and MSUQ3) yielded by factor analyses were important subscales. These subscales were also significantly positively related to each other. For example, a learner who utilized the strategy of analyzing and reasoning (CSUQ1) more frequently tended to be a more frequent user of the strategy of creating structure for input and output (CSUQ2). S/he also tended to use the strategy of centering one's attention (MSUQ1) more frequently.

Second, statistical analyses show that the participants had a medium use of the overall cognitive strategies and its two sub cognitive strategies—analyzing and reasoning, and creating structure for input and output during the test; so did they of the overall metacognitive strategies and its three sub metacognitive strategies—centering attention, arranging and planning, and evaluating one's performance.

As to the correlations among the measured variables, most of the measured variables were significantly correlated with one another, but only the MSUQ3 (evaluating one's performance) proved to be a positive predictor of the students' performance in the reading test, listening test and

the overall written test. The CSUQ and the MSUQ proved to be no predictors for each other.

Though regression analyses revealed only one predictor of the students' performance in certain parts of the written test, correlational analyses showed both cognitive and metacognitive strategy use was closely related to the students' performance in some parts of the test. That is, it may be useful for the students to better know and use these strategies in order to perform better in tests. Hence, it would be better for EFL teachers to instruct these strategies in class so that students become aware of them and may (sub)consciously utilize them when taking tests (Lan & Oxford, 2003). And as indicated by the results of correlational analyses, the knowledge of cognitive strategies may contribute to a better understanding and use of metacognitive strategies; and vice versa.

Despite that the present research adopted a large-scale survey to investigate Chinese EFL learners' use of cognitive and metacognitive strategies during a proficiency test, inferences drawn from the results of this study are limited by the nature of the particular sample selected, which solely consisted of students at one university in Beijing. Replication of the study with language learners with backgrounds in different learning contexts is necessary to determine how well the results may be generalized to other EFL learners and to explore whether relationships between the measured variables are stronger or weaker. In addition, as the survey used in the present study was developed out of the interview result, some individual strategies might not have been included in the survey, which needs to be further investigated. Future research can also explore the use of strategies of other categories such as affective and compensation strategies during a test and its effect on students' test performance. It will be also interesting to examine the relationship between proficiency in English and cognitive and metacognitive strategies use because it might be the case that learners with various proficiency levels may have different preferences for strategies. Furthermore, future research should look into potential interactions between test-taking strategy use and other student characteristics such as learners' beliefs concerning language learning, learning styles, and personality traits. For example, it would be interesting to know which students are the most prone to employ strategies during an English test. Research on these issues would promote our understanding of language learning from the learners' perspectives and deepen our insight into this important issue.

THE AUTHORS

Wenxia Zhang is professor of English at the Department of Foreign Languages, Tsinghua University, China. Her major research interests include EFL teaching and learning, language testing and EFL writing.

Meihua Liu is lecturer of English at the Department of Foreign Languages, Tsinghua University, China. Her research interests mainly include second/foreign language teaching and learning, classroom research, and second language writing.

REFERENCES

Abraham, R. G., & Vann, R. J. (1987). Strategies of two language learners: a case study. In A. Werden and J. Rubin (Eds.), *Learner strategies in language learning* (85-102). London: Prentice Hall International.

Bremner, S. (1999). Language learning strategies and language proficiency: investigating the relationship in Hong Kong. *The Canadian Modern Language Review, 55* (4), *496-514*.

Chamot, A. U., & El-Dinary, P. B. (1999). Children's learning strategies in language immersion classrooms. *The Modern Language Journal, 83, 319-338*.

Chamot, A. U., & Küpper, L. (1989). Learning strategies in foreign language instruction. *Foreign Language Annals, 22, 13-24*.

Chamot, A. M., Küpper, L., & Impink-Hernandez, M. (1988). *A study of learning strategies in foreign language instruction: Findings of the longitudinal study*. McLean, VA: Interstate Research Associates.

Cohen, A. D. (1998). Strategies and processes in test taking and SLA. In L. F. Bachman & A. D. Cohen (Eds.), *Interfaces between second language acquisition and language testing research* (pp. 90-111). Cambridge: Cambridge University Press.

Ellis, R. (1994). *The study of second language acquisition*. Oxford: Oxford University Press.

Gu, Y., & Johnson, R. K. (1996). Vocabulary learning strategies and language learning outcomes. *Language Learning, 46, 643-679*.

Lan, R., & Oxford, R. L. (2003). Language learning strategy profiles of elementary school students in Taiwan. *IRAL, 41, 339-379*.

Naiman, N., Fröhlich, M., Stern, H. H., & Todesco, A. (1978). The good language learner. *Research in Education Series, 7*. Ontario Institute for Studies in Education.

O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in language acquisition*. Cambridge: Cambridge University Press.

O'Malley, J. M., Chamot, A. U., Stewner-Manzanares, Kupper, L., & Russo, R. P. (1985). Learning strategies used by beginning and intermediate ESL students. *Language Learning, 35* (1), *21-46*.

Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. New York: Newbury House/Harper & Row.

Purpura, J. E. (1997). An analysis of the relationships between test takers' cognitive and metacognitive strategy use and second language test performance. *Language Learning, 47, 289-325*.

Purpura, J. E. (1998). Investigating the effects of strategy use and second language test performance with high- and low-ability test takers: a structural equation modeling approach. *Language Testing, 15* (3), *333-379*.

Rubin, J. (1975). What the 'good language learner' can teach us. *TESOL Quarterly, 9, 41-51*.

Skehan, P. (1989). *Individual differences in second language learning*. London: Edward Arnold.

Vandergrift, L. (1996). Listening strategies of core French high school students. *The Canadian Modern Language Review, 52* (2), *200-223*.

Vandergrift, L. (1997). The comprehension strategies of second language (French) listeners. *Foreign Language Annals, 30, 387-409*.

Vandergrift, L. (2003). Orchestrating strategy use: toward a model of the skilled second language listener. *Language Learning, 53* (3), *463-496*.

Wang, D. (2007). How ESL learners with different proficiency levels handle unfamiliar vocabulary in reading. *Indonesian Journal of English Language Teaching, 3* (1), *72-98*.

Wen, Q. (1993). *Advanced level English learning in China: the relationship of modifiable learner variables to learning outcomes*. Unpublished Ph. D thesis, Hong Kong University.

Wen, Q. (1995). Differences in strategy use between successful and unsuccessful learners. *Foreign Language Teaching and Research, 3, 61-66*.

Wen, Q. (1996). Structure, characteristics and monitor of the English learning strategy use system. *Foreign Language Research, 1, 56-60*.

Wesche, M. (1987). Second language performance testing: the Ontario Test of ESL as an example. *Language Testing, 4, 28-47*.

Wong-Fillmore, L. (1976). *The second time around: cognitive and social strategies in second language acquisition*. Unpublished Ph. D dissertation. Stanford University.

Wong-Fillmore, L. (1979). Individual differences in second language acquisition. In C. J. Fillmore, W-S. Y. Wang and D. Kempler (Eds.), *Individual differences in language ability and language behavior*. New York: Academic Press.

Zhang, W., & Liu, M. (2007). Students' perspectives on a school-based English proficiency test. *The Journal of Asia TEFL, 4* (3), 27-50.