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Learning Strategies as Bias Factors in Language Test Performance: A Study

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ABSTRACT

The present study investigated the EFL students' learning strategies as bias factors in their performances on the English grammar and reading comprehension tests. To this end, 158 intermediate EFL learners were selected from among 324 language learners of a private language institute in Urmia (Iran) as the participants of the study based on their results on a proficiency test. Second, the selected participants respectively received: Oxford's (1990) Strategy Inventory for Language Learning (SILL), the grammar test of the study, and the reading comprehension test of the study for the assessment of their learning strategies, English grammar test performance, and English reading comprehension test performance during 3 sessions in a 10-day period. The standard multiple regression was employed for data analysis. The results showed that, the learners' cognitive strategies had a significant positive correlation with their grammar test results. Moreover, there were significant positive correlations between the learners' metacognitive strategies and cognitive strategies and their performance on the reading comprehension test. Based on these results, it was argued that, the learners' learning strategies significantly contributed to the explanation of their test performance and may be regarded to be systematic sources of test bias. The results of the present study may have useful practical implications for the EFL teachers and syllabus designers. Moreover, these results may provide certain theoretical guidelines for second language testing specialists.

Keywords: *Individual Learner Differences, Learning Strategies, Test Bias, Test Performance, Test Validation*

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1. Introduction

There is considerable variation among language learners regarding their success in language acquisition (Ellis, 2004). This variation is limited to the rate of acquisition for the children who are acquiring their native language. That is, although children differ in the speed of acquiring their mother tongue, they achieve perfect mastery of every aspect of that language (Bley-Vroman, 1988; Clark, 2009). However, this is not true for second language learners. As Bley-Vroman (1988) noted, most of these learners do not achieve a native-like competence in the use of the second language. According to him:

The general characteristics of foreign language learning tend to the conclusions that the domain-specific language acquisition of children ceases to operate in adults, and in addition, that foreign language acquisition resembles general adult learning in fields for which no

domain-specific learning system is believed to exist (p. 25).

Therefore, in the case of second language acquisition, the variation involves both the learners' rate and ultimate level of achievement (Ellis, 2004, 2008). According to Ellis (2004), the differences in achievement among second language learners may stem from three general sets of factors including: *social*, *cognitive*, and *affective* factors. As he further argued, since the cognitive and affective factors lie inside the language learner, the researchers have investigated them as individual learner differences. These differences are "enduring personal characteristics that are assumed to apply to everybody and on which people differ by degree" (Dörnyei, 2005, p. 4). They are "factors specific to individual learners which may account for differences in the rate at which learners learn and their level of attainment" (Richards & Schmidt, 2010, p. 278).

Horwitz (2000) noted that, the investigation of the individual learner differences has always been a major concern in the field of applied linguistics. However, as she argued, there has been an evolutionary and noticeable change regarding the terms that are used to refer to these differences. According to her:

The terms good and bad, intelligent and dull, motivated and unmotivated have given way to a myriad of new terms such as integratively and instrumentally motivated, anxious and comfortable, field independent and field sensitive, auditory and visual (p. 532).

As Ellis (2008) stated, the investigation of individual learner differences has been motivated by different purposes. According to him, some of the studies have tried to identify the language learners who are likely to be more successful in studying certain foreign languages in comparison with the others (e.g. Carrol, 1981). Other studies have tried to determine the relationship between different individual characteristics and second language acquisition (e.g. Glikzman, Gardner & Smythe, 1982). Finally, a number of studies have investigated the individual learner differences as potential sources of bias in language learners' test performance (e.g. Hansen & Stanfield, 1981). That is, these differences have been examined as *systematic* sources that influence the validity of the inferences that are made based on the test results (Bachman, 1990).

A review of the related literature (e.g. Bialystok, 1990; Chamot & Rubin, 1994; Cohen, 1998; Oxford, 1989, 1990; Winne, 1995) shows that, among the individual learner differences, learning strategies have been extensively investigated by the SLA researchers. However, most of the studies of the learning strategies have investigated them as good language learners' characteristics (e.g. Huang & Van Naersson, 1985; Naiman, Fröhlich, Stern, & Todesco, 1978; Rubin, 1975) and have ignored their role as test bias factors. Moreover, the few studies which have dealt with this issue (e.g. Purpura, 1997) have focused on the correlation between these strategies and certain proficiency tests. That is, they have not provided sufficient information about the contribution of each of these variables to the explanation of the variance in the results of different tests of language components including the grammar and reading comprehension tests. In the English

as a Foreign Language (EFL) context of Iran, the empirical studies of the learning strategies have followed a similar trend. More specifically, there is a lack of research regarding the role of the learning strategies as sources of test bias in the results of the tests of the second language.

The present study was an attempt to deal with the mentioned gaps of the literature regarding the learning strategies. Based on this aim, it investigated the role of Iranian intermediate-level male EFL learners' learning strategies as test bias factors in their performance on the grammar and reading comprehension tests of English. Following this line of research, the study tried to answer the following research questions:

1. Is there any relationship between the EFL learners' learning strategies and their grammar test performance?
2. Is there any relationship between the EFL learners' learning strategies and their reading comprehension test performance?

2. Review of the Related Literature

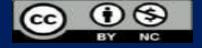
2.1. Learning Strategies

Learning strategies have been defined by several SLA researchers. According to Oxford (1989, p. 237), these strategies are the "behaviors or actions which learners use to make language learning more successful, self-directed and enjoyable". Subsequently, she noted that, effective learner strategies "make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations" (Oxford, 1990, p. 8). Similarly, Weinstein, Husman, and Dierking (2000) stated that, learning strategies "include any thoughts, behaviors, beliefs, or emotions that facilitate the acquisition, understanding, or later transfer of new knowledge and skills" (p. 727). Ellis (2008) pointed out that, these strategies "define the approach learners adopt in learning a second language and are influenced directly by learners' explicit beliefs about how best to learn" (p. 703).

In providing a comprehensive definition of these strategies, Oxford (1999) stated that, learner strategies involve:

Specific actions, behaviors, steps, or techniques that students use to improve their own progress in developing skills in a second or foreign language. These strategies can facilitate the internalization, storage, retrieval, or use of the new language (p. 518).

Moreover, in a more specific definition of these strategies, Cohen (1998) argued that:



Language learning strategies include strategies for identifying the material that needs to be learned, distinguishing it from other material if need be, grouping it for easier learning (e.g., grouping vocabulary by category into nouns, verbs, adjectives, adverbs, and so forth), having repeated contact with the material (e.g., through classroom tasks or the completion of homework assignments), and formally committing the material to memory when it does not seem to be acquired naturally (whether through rote memory techniques such as repetition, the use of mnemonics, or some other memory technique) (p. 5).

As Bialystok (1990) and Oxford (1990, 1993, 1996) pointed out, a consideration of all of the provided definitions of the learning strategies shows that, learners employ these strategies in a conscious way in order to achieve certain goals in language learning. Similarly, Cohen (1998) stated that, the learner strategies are “learning processes which are consciously selected by the learner” (p. 4).

2.2. The Taxonomies of Learning Strategies

As Ellis (2008) stated, the taxonomies provided by Oxford (1990), and O’Malley and Chamot (1990) are two of the most commonly employed learner strategy taxonomies. According to him, Oxford’s (1990) taxonomy is “hierarchical, with a general distinction made between direct and indirect strategies, each of which is then broken down into a number of subcategories” (p. 705). In defining these strategies Oxford (1990) stated that:

Direct strategies require the mental processing of the language whereas indirect strategies provide indirect support for language learning through focusing, planning, evaluating, seeking opportunities, controlling anxiety, increasing cooperation and empathy and other means (p. 181).

In this taxonomy, the direct strategies include: *memory*, *cognitive*, and *compensation* strategies and the indirect strategies include: *metacognitive*, *affective*, and *social* strategies.

The second taxonomy by O’Malley and Chamot (1990) includes three categories of strategies including: *cognitive*, *metacognitive*, and *socio-affective* strategies. According to Ellis (2008), in this taxonomy:

Cognitive strategies are the strategies involving the analysis, transformation, or the synthesis of learning materials. On the other hand, Metacognitive strategies are the strategies involving an attempt to regulate learning through planning, monitoring, and evaluating.

Finally, socio-affective learning strategies are the strategies concerning the ways in which learners interact with the other users of the second language (p. 705).

2.3. Test Bias

According to Bachman (1990), the individuals’ scores on different tests may be influenced by both a group of personal characteristics such as cognitive style and ambiguity tolerance, and a number of group characteristics including race and ethnic background. As he further noted, unlike the random factors which have an unpredictable and transient effect on the learners’ scores, the personal or individual characteristics influence the learners’ scores regularly. However, as he explained, these characteristics are not part of the language ability that the language tests measure, and as a result, are regarded to be *systematic* sources that influence the validity of the inferences that are made based on the test results. As he stated, the “systematic differences in test performance that are the result of differences in individual characteristics other than the ability being tested” (p. 271) are sources of *test bias*. In other words, a test or a single test item is biased “if its scores are consistently too high or too low, for an individual test taker or a group of test takers” (Richards & Schmidt, 2010, p. 53).

As Bachman (1990) pointed out, the studies of test bias are essential in the field of language testing since they provide a better understanding of the validity of the language tests. According to him, these studies “raise questions about the extent to which language abilities as constructs are independent of the content and context of the language use elicited in their measurement” (p. 279). Moreover, as he explained, these studies may help us judge about the measurement value of the different tests as instruments for testing the language ability. Furthermore, as he noted, they may help us to determine the characteristics of successful language learners and the role of the individual learner differences in the process of language acquisition. Finally, as Farhady (1982) argued, these studies may help us redefine the construct of *language ability*.

2.4. Learning Strategies as Bias Factors in Language Tests

An investigation of the related literature of the learning strategies shows that, some of the empirical studies of these strategies have examined their use by the language learners in the process of language acquisition. Riazi and Rahimi (2005)

investigated Iranian EFL learners' learning strategy use. The results of this study showed that, the learners "used metacognitive strategies with a high frequency; cognitive, compensation, and affective strategies with a medium frequency, and memory and social strategies with a low frequency" (p. 103). Gerami and Madani Ghareh Baighlou (2011) explored the successful and unsuccessful Iranian EFL students' use of the learning strategies. Based on the results, "successful EFL students used a wider range of learning strategies and different from those often preferred by their unsuccessful peers" (p. 1567).

Furthermore, some of these studies have focused on the effects of the strategy instruction on the learners' use of strategies and language learning. Ahmadi and Mahmoodi (2012) examined the effects of strategy instruction on Iranian junior high schools students' strategy use. The results of this study showed that, strategy instruction significantly contributed to the participants' use of different learning strategies. Rasouli, Mollakhan, and Karbalaee (2013) investigated the effect of metacognitive strategy training on EFL students' listening comprehension. Based on the results of the study, the researchers argued that "metacognitive strategy training can advance Iranian EFL learners from the beginning level to a higher level of listening comprehension" (p. 115).

However, few studies have examined the learning strategies as test bias factors. Moreover, these studies have investigated the relationship between the learning strategies and certain proficiency tests. Purpura (1997) explored the relationship between the foreign language students' learning strategies and their performance on a standardized language test. The results of the study showed that, there were significant positive correlations between the learners' employed strategies and their second language test performance. Ajideh and Gholami (2015) examined the relationship between foreign language learners' learning strategies and their standardized language test performance. The results of this study revealed that "only cognitive, memory and metacognitive strategies accounted for a statistically significant portion of the variance in test performance" (p. 183).

As this review of the empirical studies shows, there is not sufficient information regarding the role of learning

strategies as bias factors in various language tests. That is, there is a lack of research regarding the role of the learning strategies in the explanation of the variance in the results of different language tests. Based on this lack of research, the present study investigated the role of Iranian EFL learners' learning strategies as bias factors in their performance on English grammar and reading comprehension tests.

3. Methodology

3.1. Design of the Study

As Creswell (2011) pointed out, the correlational research design takes two main forms including; the *explanatory design* and the *prediction design*. In explaining the prediction design he stated that:

The purpose of the prediction design is to identify variables that will predict an outcome or criterion. In this form of research the researcher identifies one or more *predictor* variables and a *criterion* or *outcome* variable. A predictor variable is a variable which is used to make a forecast about an outcome in correlational research....The outcome being predicted in correlational research, however, is called the criterion variable (p. 341).

An examination of the purpose, data collection, and data analysis of the present study shows that, it employed a quantitative approach and was conducted based on a predictive correlational design in which the learning strategies were the predictor variables and the learners' performances on language tests were the criterion variables.

3.2. Participants

In the present study, 158 intermediate EFL learners were selected from among 324 language learners of a private language institute in Urmia (Iran) as the participants of the study based on their results on the Objective Placement Test (Lesley, Hansen, & Zukowski, 2003). The selected participants: were male, ranged in age from 15 to 26, and had 2 to 3 years of language studies in the language institute. They were from Urmia and were native speakers of Azeri. In order to select these participants, first the researchers determined the mean value of the 324 language learners' results on the proficiency test of the study. Second, they selected the learners whose score were within 1 Standard Deviation (SD) below and above the mean value of the group.

3.3. The Instruments and Materials of the Study



The following instruments and materials were employed in the present study:

3.3.1. Proficiency Test

The determination of the proficiency level and the homogeneity of the selected participants are essential in order to guarantee the validity of the inferences that are made based on the results of the empirical studies in the field of second language acquisition (Mackey & Gass, 2016). The present study tried to determine the relationship between the intermediate EFL learners' learning strategies and their test performance. Based on this aim, the Objective Placement Test (see Appendix A), from *New Interchange Passages Placement and Evaluation Package* (Lesley, Hansen, & Zukowski, 2003) was employed in order to select the participants of the study. This test consisted of four parts: Listening, Grammar, Vocabulary, and Reading. The Listening section involved 20 recorded items. The Grammar section had 30 items. The Vocabulary section consisted of 30 items and the Reading section had 20 items.

3.3.2. The Learning Strategy Inventory

Based on the aims of the study, Oxford's (1990) Strategy Inventory for Language Learning (SILL) was employed in order to assess the participants' learning strategies (see Appendix B). According to Oxford (1990), the items of this questionnaire represent six categories of strategies including: *memory, cognitive, compensation, metacognitive, affective, and social* strategies. This questionnaire involves 50 items that are scored on a 5-point Likert scale (i.e. 1= Never or almost never true of me; 2= Usually not true of me; 3= Somewhat true of me; 4= Usually true of me; 5= Always or almost always true of me). As Oxford (1990) stated, the higher scores in each category show a higher rate of the use of the relevant strategies by the learners. Moreover, as Oxford (2001) argued, the results of various empirical studies have shown that, the reliability and validity indices of SILL are satisfactory.

3.3.3. The Grammar Test

In order to determine the selected participants' grammar test performance, a 40-item researcher-made multiple-choice grammar test was employed in the present study (see Appendix C). The items of this test were based on the reading texts of *Intermediate Select Readings* (Lee & Gundersen, 2011). That is, the researchers extracted the grammar points of these

reading texts and developed the test items based on these points. In order to guarantee the reliability and validity of this test, the researchers piloted it with 75 male EFL learners with similar characteristics to selected participants. Since the test items were based on intermediate-level reading texts (i.e. texts of *Intermediate Select Readings*) their content validity was guaranteed. However, in order to determine the empirical (concurrent) validity of the test, the results of the selected 75 learners on this test were correlated with their results on the grammar section of the Objective Placement Test, (Lesley, Hansen, & Zukowski, 2003). The results of the analysis showed that, the empirical validity index of the test was .78 which, as Harris (1969) stated, is regarded to be satisfactory for researcher/teacher-made tests. Moreover, a test-retest method was employed for determining the reliability of the test items. That is, the selected learners took the test twice during a one month period and their results were correlated. Based on the results, the reliability index of the grammar test was .84 which, as Harris (1969) stated, is regarded to be satisfactory for researcher/teacher-made tests.

3.3.4. The Reading Comprehension Test

In order to investigate the participants' reading comprehension test performance, a 40-item researcher-made multiple-choice reading comprehension test was employed in this study (see Appendix D). The passages of this test were selected from among the reading texts of *Intermediate Select Readings* (Lee & Gundersen, 2011). All of the passages were approximately between 150 and 200 words in length. Each of these passages was accompanied by 5 multiple-choice reading comprehension questions. In order to guarantee the reliability and validity of this test, the researchers piloted the test with 75 male EFL learners with similar characteristics to the selected participants. Since the reading texts of this test were selected from the source textbook of the study, its content validity was guaranteed. However, in order to determine the empirical (concurrent) validity of the test, the results of the selected 75 learners on this test were correlated with their results on the reading comprehension section of the Objective Placement Test, (Lesley, Hansen, & Zukowski, 2003). The results of the analysis showed that, the empirical validity index of the test was .79 which, as Harris (1969) stated, is regarded to be satisfactory

for researcher/teacher-made tests. Moreover, a test-retest method was employed for determining the reliability of the test items. That is, the selected 75 learners took the reading test twice during a one-month period and their results were correlated. Based on the results of the data analysis, the reliability index of the test was .82 which is regarded to be satisfactory for researcher/teacher-made tests (Harris, 1969).

3.4. The Procedure of the Study

In this study, first, 158 intermediate EFL learners were selected from among 324 language learners of a private language institute in Urmia (Iran) as the participants of the study based on their results on the Objective Placement Test (Lesley, Hansen, & Zukowski, 2003). Second, the SILL (Oxford, 1990) was administered to the selected participants of the study in order to assess their learning strategies. It took the participants about 25 minutes to answer the items of this questionnaire. Third, the participants received the grammar test of the study for the assessment of their performance on the second language grammar tests. This test took about 45 minutes of the class time. Finally, the participants took the reading comprehension test for the determination of their reading comprehension test performance. It took the participants about 65 minutes to answer the items of this test. The questionnaire and tests of the study were administered to the selected participants during 3 sessions in a 10-day period. The researchers employed the Statistical Package for the Social Sciences (SPSS) Version 20 for the data analysis of the study.

4. Data Analysis and Discussion

4.1. Results

The first research question of the study tried to determine the relationship between the EFL learners' learning strategies and their grammar test performance. Based on the aims of this research question, a Standard Multiple Regression test was run between the participant's results on the learning strategy inventory and their performance on the grammar test of the study. In the regression analysis, first, the assumption of multicollinearity had to be checked. In order to check this assumption, the collinearity diagnostics including *Tolerance* and *Variance Inflation Factor* (VIF) were determined. According to Pallant (2007):

Tolerance is an indicator of how much of the variability of the specified independent is not explained by the other independent variables in the model. If this value is very small (less than .10), it indicates that the multiple correlation with other variables is high, suggesting the possibility of multicollinearity. The other value given is the VIP, which is just the inverse of the Tolerance value (1 divided by Tolerance). VIF values above 10 would be a concern, indicating multicollinearity (p. 156).

The Tolerance and VIF values of the regression model for the grammar test are provided in Table 1 below:

Table 1: The Collinearity Diagnostics of the Learners' Learning Strategies and Grammar Test Performance

Model	Tolerance	VIF
Memory Strategies	.890	1.124
Cognitive Strategies	.747	1.338
Compensation Strategies	.913	1.096
Metacognitive Strategies	.722	1.386
Affective Strategies	.924	1.083
Social Strategies	.810	1.234

As Table 1 shows, all of the Tolerance values of the model were more than 0.10, and all of the VIF values were less than 10. Therefore, the multicollinearity assumption was not violated. Moreover, in order to determine the outliers, the Mahalanobis distance value was checked. As Pallant (2007) noted, for a model with 6 independent variables this value should not exceed "22.46" (p. 157). The results of *residuals statistics* for this model are provided in Table 2 below:

Table 2: The Residuals Statistics of the Regression Model of the Learners' Learning Strategies and Grammar Test Performance

	Minimum	Maximum	Mean	Std. Deviation	N
Mahal. Distance	1.252	15.518	5.962	2.790	158
Cook's Distance	.000	.110	.008	.015	158

As Table 2 shows, the maximum value of the Mahalanobis distance (15.518) was less than 22.46, and therefore this assumption was not violated. Finally, in order to check the remaining assumptions, the maximum value of Cook's distance was checked. As Pallant (2007) noted, this value should be less than 1. According to Table 2, the maximum value for the Cook's distance (.110) was less than 1 and therefore none of the assumptions was violated. Since all of the assumptions of the Multiple Regression were present, the regression model of the learners' learning strategies and grammar test performance was evaluated. Table 3 below provides the summary of this model: Table 3: The Regression Model Summary of the Learners' Learning Strategies and Grammar Test Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.630	.397	.373	5.827

According to Table 3, this model explains 0.397 (i.e. *R Square* value) of the variance of the learners' performance on the grammar test. That is, this model explains 39.7 percent (*R Square* value multiplied by 100, by shifting the decimal point two places to the right) of the variance in the grammar test performance. However, in order to check the statistical significance of the predictive power of the model, the results of the ANOVA test of the model had to be checked. The results of this test are provided in Table 4 below:

Table 4: The ANOVA Test of the Regression Model of the Learners' Learning Strategies and Grammar Test Performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3370.490	6	561.748	16.546	.000
Residual	5126.478	151	33.950		
Total	8496.968	157			

As Table 4 shows, the predictive power of the model was not equal to 0 since the p-value of the ANOVA test .000 (marked as *Sig.*) was less than the level of significance .05.

Finally, in order to determine the contribution of each of the independent variables to the prediction of the variance of the grammar test results, the *Standardized Coefficients* had to be checked. These results are provided in Table 5 below:

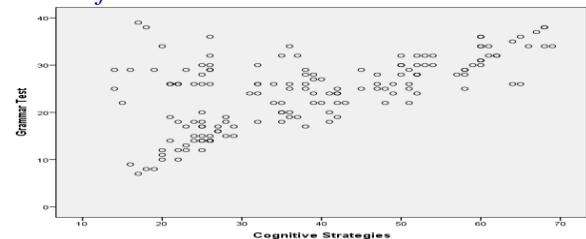
Table 5: The Coefficients of the Regression Model of the Learners' Learning Strategies and Grammar Test Performance

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	14.261	3.437		4.149	.000
Memory Strategies	.095	.053	.121	1.802	.074
Cognitive Strategies	.289	.036	.595	8.136	.000
Compensatory Strategies	-.092	.083	-.073	-1.104	.271
Metacognitive Strategies	.075	.056	.106	1.339	.183
Affective Strategies	-.138	.079	-.116	-1.758	.081
Social Strategies	-.066	.085	-.055	-.781	.436

An examination of Table 5 shows that, the largest Beta coefficient is .595 which is for the Cognitive Strategies variable. Therefore, it can be argued that, this variable makes the strongest unique contribution to explaining the results of the grammar test when the variance explained by all of the other variables in the model is controlled. Moreover, since the p-value for this variable .000 (marked as *Sig.*) was less than the level of significance .05, it was argued that, this variable made a statistically significant unique contribution

to the prediction of the grammar test results. The significant contribution of the Cognitive Strategies to the explanation of the results of this test is graphically depicted in Figure 1 below:

Figure 1: The Correlation between the Learners' Cognitive Strategies and Grammar Test Performance



The second research question of the study tried to determine the relationship between the EFL learners' learning strategies and their reading comprehension test performance. Based on the aims of this research question, a Standard Multiple Regression test was run between the participant's results on the learning strategy inventory and their performance on the reading comprehension test of the study. In the regression analysis, first, the assumption of multicollinearity had to be checked. The Tolerance and VIF values of the regression model for the reading comprehension test are provided in Table 6 below:

Table 6: The Collinearity Diagnostics of the Learners' Learning Strategies and Reading Comprehension Test Performance

Model	Tolerance	VIF
Memory Strategies	.894	1.118
Cognitive Strategies	.966	1.035
Compensation Strategies	.919	1.088
Metacognitive Strategies	.881	1.135
Affective Strategies	.929	1.077
Social Strategies	.818	1.222

As Table 6 shows, all of the Tolerance values of the model were more than 0.10, and all of the VIF values were less than 10. Therefore, the multicollinearity assumption was not violated. Moreover, in order to determine the outliers, the Mahalanobis distance value was checked. The results of *residuals statistics* for this model are provided in Table 7 below:

	Minimum	Maximum	Mean	Std. Deviation	N
Mahal. Distance	1.252	15.518	5.962	2.790	158
Cook's Distance	.000	.101	.007	.012	158

As Table 7 shows, the maximum value of the Mahalanobis distance (15.518) was less than 22.46, and the maximum value for the Cook's distance (.101) was less than 1. Therefore, none of the assumptions was violated. Since all of the assumptions of the Multiple Regression

were present, the regression model of the learners' learning strategies and reading comprehension test performance was evaluated. Table 8 below provides the summary of this model:

Table 8: The Regression Model Summary of the Learners' Learning Strategies and Reading Test Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.583	.340	.314	10.511

According to Table 8, this model explains 0.340 (i.e. *R Square* value) of the variance of the learners' performance on the reading comprehension test. That is, this model explains 34.0 percent (*R Square* value multiplied by 100, by shifting the decimal point two places to the right) of the variance on the reading comprehension test performance. However, in order to check the statistical significance of the predictive power of the model the results of the ANOVA test of the model had to be checked. The results of this test are provided in Table 9 below:

Table 9: The ANOVA Test of the Regression Model of the Learners' Learning Strategies and Reading Comprehension Test Performance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	8608.543	6	1434.757	12.985	.000
Residual	16683.944	151	110.490		
Total	25292.487	157			

As Table 9 shows, the predictive power of the model was not equal to 0 since the p-value of the ANOVA test .000 (marked as *Sig.*) was less than the level of significance .05.

Finally, in order to determine the contribution of each of the independent variables to the prediction of the variance of the reading comprehension test results, the *Standardized Coefficients* had to be checked. These results are provided in Table 10 below:

Table 10: The Coefficients of the Regression Model of the Learners' Learning Strategies and Reading Comprehension Test Performance

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	-8.787	5.470		-1.606	.110
Memory Strategies	-.063	.095	-.046	-.660	.510
Cognitive Strategies	.106	.050	.142	2.116	.036
Compensatory Strategies	.222	.149	.102	1.486	.139
Metacognitive Strategies	.710	.094	.534	7.579	.000
Affective Strategies	.205	.141	.099	1.450	.149
Social Strategies	.187	.152	.090	1.228	.222

According to Table 10, the largest Beta value is .534 which is for the Metacognitive Strategies variable. Therefore, it can be argued that, this variable makes the strongest unique contribution to explaining the results of the reading test when the variance explained by all other variables in the model is controlled. Moreover, since the p-value for this variable .000 (marked as *Sig.*) was less than the level of significance .05, it was argued that this variable made a statistically significant unique contribution to the prediction of the reading test results. Furthermore, based on the results, the Cognitive Strategies (Beta=.142, Sig=.036) was the second variable that made a significant contribution to the results. The significant contributions of these variables to the explanation of the results of this test are respectively depicted in Figures 2 and 3 below:

Figure 2: The Correlation between the Learners' Metacognitive Strategies and Reading Comprehension Test Performance

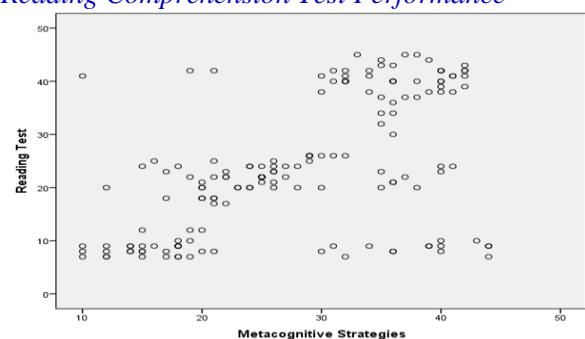
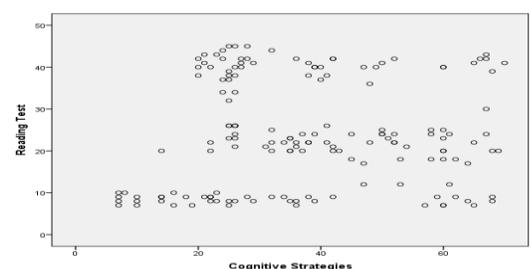
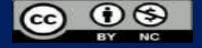


Figure 3: The Correlation between the Learners' Cognitive Strategies and Reading Comprehension Test Performance



4.2. Discussion

The first and the second research questions of the study tried to determine the relationship between the learners' learning strategies and their performance on the grammar and reading comprehension tests. More specifically, they tried to determine how much of the variance in the learners' results on these tests can be explained by the learners' learning strategies. The results of the data analysis regarding the grammar test showed that, the learners' Cognitive Strategies made the strongest unique significant contribution to explaining the variance in the results of this test. These



results are in line with the results of the studies by Mangubhai (1991), and Purpura (1997) who have reported significant positive correlations between the learning strategies and second language test performance.

According to Oxford (1993), the cognitive strategies are beneficial for the acquisition of the various aspects of the second language including its grammar since they enable the learners to focus on the different kinds of structural patterns and learn their use. Moreover, as Winne (1995) stated, the cognitive strategies are very helpful for the acquisition of the grammar points since they facilitate the learners' cognitive processing of the second language grammatical structures and enable them to use these structures in a native-like way. Furthermore, as Randi and Corno (2000) argued, the cognitive learning strategies motivate the learners to use their learnt words in different kinds of structures and help them to practice the grammatical points of the target language. Finally, as Wenden and Rubin (1987) noted, the learners' cognitive strategies are useful for the acquisition of the grammatical points since they motivate the learners to practice their acquired grammar points in their interactions with the other users of the language.

Based on these issues, it can be argued that, in the present study, the participants with higher degrees of cognitive strategy use had a better performance on the grammar test in comparison with the others since they were able to consciously focus on the different kinds of second language structures and learn them. Moreover, these learners were able to process the grammatical structures more efficiently in comparison with the other learners and employed their learnt grammatical structures in their writing and speaking tasks in the classrooms. Therefore, it can be concluded that, the learners' cognitive strategies may be a systematic source of test bias and affect their performance on the grammar tests of the second language.

The results of the data analysis regarding the reading comprehension test showed that, the learners' Metacognitive Strategies and Cognitive Strategies were respectively the first and the second variables that made significant contributions to explaining the variance in the results of this test. These results are in line with the results of the studies by

Mangubhai (1991), Brown and Perry (1991), Purpura (1997), and Ajideh and Gholami (2015) who have reported significant positive contributions of learning strategies to the explanation of the variance in the results of second language tests.

According to Huang and Van Naersson (1985), the language learners who are able to employ the various metacognitive strategies are motivated to read indiscriminately in the second language and as a result are familiar with different genres of the reading texts. As they explained, this kind of familiarity helps the learners to be able to deduce the meaning of the different kinds of texts better than the other learners. Moreover, as Wenden and Rubin (1987) noted, the metacognitive strategies encourage the learners to try to understand the meanings of new vocabulary items based on their surrounding context and help them to grasp the main idea of the different parts of the texts in a better way. Furthermore, as Ehrman (1990) stated, the cognitive strategies motivate the learners to process the reading texts of the second language similar to the native speakers and help them to understand both the explicit and implicit ideas that are expressed in different kinds of comprehension texts. Finally, as Ehrman and Oxford (1989) stated, the cognitive strategies motivate the learners to summarize the different parts of the reading texts in their minds and help them to draw inferences about the content of each of these text parts.

According to Spolsky (1973), the reading test challenges the language learners' ability to: understand the underlying ideas of the different parts of the passage, judge about the meanings of various second language words based on their context, understand the meaning that is connoted by the passage, and recognize the writer's intended messages.

Based on these issues, it can be argued that, in the present study, the learners with higher degrees of metacognitive and cognitive strategy use had a better performance on the reading test in comparison with the others since they: were familiar with the different reading genres and could deduce the meanings of the different parts of the comprehension texts, were able to guess the meanings of new words of the texts based on their surrounding context, were able to deduce the explicit and implicit ideas of the texts, and were able to summarize the texts and

infer the writer's intended messages. Therefore, it can be concluded that, the language learners' metacognitive and cognitive learning strategies may be systematic sources of test bias and affect their performance on the reading tests of the second language.

Finally, it should be noted that, the results of the present study do not support the results of the studies by Bialystok (1981) and Politzer and McGroarty (1985) who could not find any significant correlations between the learning strategies and second language test performance.

According to Ehrman and Oxford (1989), language learners' age is one of the variables that determine their use of different learning strategies. Moreover, as Schmidt and Watanabe (2001) stated, the learners' motivation may have an impact on their strategy use. Furthermore, as Littlemore (2001) argued, the students' learning styles may determine their strategy use. In addition, the learners' strategy use may depend on their educational major (Peacock & Ho, 2003) and language learning beliefs (Ehrman, 1990). Finally, the learners' strategy use may be influenced by their gender (Kaylani, 1996), the language being learnt (Chamot, O' Malley, Kupper, & Impink-Hernandez, 1987), the context of language learning (Chamot, Kupper, & Impink-Hernandez, 1988), and the task type (Chamot et al., 1987; Chamot et al., 1988).

According to Ellis (2008), the factors that affect the language learners' strategy use may also affect the relationship between their learning strategies and performance on different kinds of language tests. Based on these issues, it can be argued that, the difference between the results of the present study and the studies by Bialystok (1981) and Politzer and McGroarty (1985) may be related to the characteristics of their participants including: age, motivation, learning styles, beliefs, educational major, and language learning experience. Moreover, this difference may be related to the social and situational factors of these studies including: the learners' gender, the language being learnt, the context of language learning, and the task types of the participants.

5. Conclusion

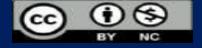
The present study investigated the relationship between the EFL learners' learning strategies and their performances on the grammar and reading comprehension tests. The results of the study showed that,

the learners' cognitive strategies had a significant positive correlation with their grammar test results. Furthermore, there were significant positive correlations between the learners' metacognitive strategies and cognitive strategies and their performance on the reading test. Based on these results, the EFL teachers are recommended to determine their students' learning strategies by the means of reliable and valid strategy inventories (e.g. SILL). The knowledge of the learners' strategy use will enable the teachers to provide their learners with appropriate instruction regarding the cognitive and metacognitive strategies. Moreover, the EFL syllabus designers are recommended to include certain sections in the EFL textbooks in which the learners receive suitable instruction regarding the various kinds of learning strategies. Furthermore, they have to design certain tasks in which the learners are required to employ certain learning strategies for the completion of the task. Finally, as Skehan (1989) noted, the language testing specialists are recommended to adopt a research-then-theory approach in the studies of individual learner differences in order to provide more information regarding the random, non-linear, and context-specific role of these differences in the explanation of the variance in the results of different measures of the second language.

However, it should be noted that, there is a need for various empirical studies of individual learner differences in different learning contexts and educational settings in order to make wide-reaching conclusions about the role of these differences as test bias factors. For instance, the future studies should investigate larger samples including both male and female second language learners. Moreover, they should involve language learners from different age groups. The investigation of these personal attributes may help to answer certain questions regarding the differential development of language ability based on the learners' age and gender (Bachman, 1990). Furthermore, the future studies should involve language learners from different mother tongues, and language proficiency levels in order to provide more information regarding the non-linear and variable role of the individual learner differences in the explanation of the variance in second language tests.

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Appendices

Appendix A: A Sample of the Proficiency Test

Part I. Listening

Situation 1: Tony and Alex are talking where Meriko comes in

- Are meeting for the first time
 - Tony and Alex
 - Tony and Meriko
 - Alex and Meriko
 - Tony, Alex, and Meriko

Situation 2: A woman is ordering food at a restaurant

- She.....
 - usually has soup
 - is getting the soup
 - stopped eating salad
 - likes soup, not salad

Part II. Grammar

- "Where are the stamps?"

"..... on the desk."

 - Their
 - They're
 - There are
 - They
- My office isdowntown.
 - on
 - near
 - close
 - at

Part III. Vocabulary

- I use my computer to my household bills.
 - make
 - place
 - pay
 - change
- Could you please help me.....the groceries.
 - put away
 - throw out
 - hang up
 - turn off

Part IV. Reading Comprehension

Passage 1: Meditation

You observe a person in meditation. On the surface, he appears to be asleep, but he's simply in a trance- a kind of half sleep in which the person is conscious but able to ignore the situation around him. For the meditator, the ability to concentrate is so strong that everything around him- sounds, smells, movement- seems to fade in importance. At the same time, decision making and deep thinking are often greatly improved.

- In this reading, *meditation* refers to a person's.....
 - state of mind
 - intelligence
 - physical condition
 - ability to sleep
- Meditation doesn't help a person.....
 - hear better
 - think deeply
 - make decisions
 - ignore smells

Appendix B: A Sample of SILL

Directions

This form of the Strategy Inventory for Language Learning (SILL) is for students of English as a second or foreign language. You will find statements about learning English. Please read each statement. On the separate worksheet, write the response (1, 2, 3, 4, 5) that tells how true of you the statement is.

- Never or almost never true of me
- Usually not true of me
- Somewhat true of me
- Usually true of me
- Always or almost always true of me

Part A

- I think of relationships between what I already know and new things I learn in English.
- I use new English words in a sentence so I can remember them.
- I connect the sound of a new English word and an image or picture of the word to help me remember the word.
- I remember a new English word by making a mental picture of a situation in which the word might be used.
- I use rhymes to remember new English words.
- I use flashcards to remember new English words.
- I physically act out new English words.
- I review English lessons often.
- I remember new English words or phrases by remembering their location on the page, on the board, or on a street sign.

Appendix C: A Sample of the Grammar Test

Directions: Please read the following sentences and choose the best answer that completes each sentence.

- I was delighted when I found my old watch. I for it for some time.
 - would look
 - have looked
 - would have looked
 - had been looking
- I enjoy the small children because they are very eager to learn.
 - teach
 - to teach
 - teaching
 - will teach
- I remember Tehran very well..... I and my family left there when I was five years old.
 - since
 - whether
 - even though
 - so that
- This house is for my family. We have to move to a larger place.
 - too small
 - so small
 - small enough
 - such small
- Janet thought that she that woman some time ago since her face was very familiar.
 - may have met
 - could meet
 - could have met
 - might meet

Appendix D: A Sample of the Reading Comprehension Test

Passage 1

While you'll never be able to anticipate every question you might be asked in an interview, you can get a head start by developing strong, concise answers to commonly used questions. Most interviewers will ask similar questions like these to gain knowledge about a candidate's abilities and qualifications and compatibility with the job and the company.

- Tell me about yourself. This is often the opening question in an interview. It is also one of the most difficult if you are not prepared. Remember, the interviewer does not want to hear about your hometown or your hobby. This question calls for your one-minute commercial that summarizes your years of experience and skills and your personality in the context of the job for which you are interviewing. Get to the point and sell your professional self. Develop a few brief sentences that demonstrate you have what it takes to do the job—experience, proven results, and desire to contribute.

The key to answering any question about you versus your competition is using specifics. "Everybody is going to speak in generalities. So you need something that will make you stand out a bit," said Linda, a teacher in Springfield, Ohio. Give real examples that show them you are best-suited for the job. Linda says she would point out her achievements and accomplishments throughout her career that are relevant to the open position, as well as her experiences in dealing with different types of students and teaching situations. Pinpoint the qualities you have that are truly valuable to the company.

- The purpose of this article is to.....
 - help job interviewers ask good questions
 - help people answer interview questions well
 - help people identify their job skills
 - show what happens at a job interview
- In line 6 the word it refers to.....
 - An interview
 - Your hometown
 - "Tell me about yourself"
 - The opening question in an interview
- When you are asked to tell an interviewer about yourself you should.....
 - say everything you can think of about your background and interests
 - say a few things that show you can do the job
 - tell the interviewer you can do the job
 - summarize your hobbies and interests
- Why does the author quote a certain person in the article?
 - The author wants to add humor to the article
 - The author wants to show what you shouldn't do at a job interview
 - The author does not have enough experience to provide his own examples
 - The author wants to use specific examples to support the main idea
- What is the best title for this passage?
 - Answering two common interview questions
 - How to show your job skills
 - How to interview somebody
 - The difficulties of an interview