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L2 Learners' Strategy Preference in Metaphorical Test Performance: Effects of Working Memory and Cognitive Style

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Abstract

Although investigating the factors that influence test scores is important, a majority of stakeholders show a paucity of attention towards individual learner differences due to having large classes of L2 learners. This study sought to explore the possible effect of working memory and cognitive style on L2 learners' metaphorical test performance. The study was conducted in 2 phases. The first phase was quantitative, and the second consisted of a series of case studies using "think-aloud protocol" and "retrospection." In the statistical phase, aimed at shedding light on the effect of the cognitive style of field (in)dependence (FI/FD) on metaphorical test performance, 80 senior undergraduates majoring in English Translation were selected through a truncated test of TOEFL adopted from Barron (2004). Metaphorical test performance was analyzed through recognition, text-based true-false, and scripturally implicit questions, refined by conducting factor analysis. Moreover, the participants' cognitive style of FI/FD was identified via GEFT. In the qualitative part, after analyzing the verbal reports of 8 informants, the participants' strategy preferences were examined. Results revealed the impact of the cognitive style of FI/FD and working memory on the participants' strategy preferences. Due to the advent of learner-centered approaches, this study has some implications for L2 pedagogy discussed in the paper.

Keywords: metaphorical test performance, working memory, cognitive style of field (in)dependence (FI/FD)

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INTRODUCTION

Not only being a linguistic device to add color to texts, metaphor is an important feature of our thinking and education (Jensen, 2006). All the same, within the framework of L2 research, virtually several empirical works from the cognitive science (e.g., Gibbs, 1994; Lakoff & Johnson, 1980; Lakoff & Turner, 1989; Turner, 1996) show that metaphor is not a sheer linguistic or rhetorical figure but a fundamental part of people's ordinary thought. One overarching consideration is that various definitions have been proposed for metaphor.

Kövecses (2002, p. 4) defines metaphor as "understanding one conceptual domain in terms of another conceptual domain" called *conceptual metaphor*. Technically speaking, based on Kövecses, every conceptual metaphor "consists of two conceptual domains, in which one domain is understood in terms of another" (p. 4). The source domain is a more concrete or physical concept that helps us draw metaphorical expressions. The target domain is a more abstract concept that is understood this way. Thus, *argument*, *love*, *idea*, and *social organizations* are all target domains, and *war*, *journey*, *food*, and *plant* are all source domains.

From another angle, Lakoff (1993) believes that, the same as our linguistic system, the system of our conceptual metaphor is unconscious, automatic, and used without any effort. In fact, Tendahl and Gibbs (in press) argue that particular key words from the source domain may activate a conceptual metaphor that involves understanding one conceptual domain in the light of another conceptual one and, accordingly, the inference occurs. The aforementioned model is in congruence with Lakoff and Johnson's (1980) model of conceptual mappings.

Just the same, through proposing conceptual blending theory, Fauconnier and Turner (2002) introduced another major development, which is of paramount importance in cognitive linguistics relevant to metaphor. Through extending this theory to the realm of metaphorical language, metaphorical meaning is captured by a blended space having in common some structure from both source and target domains (Tendahl & Gibbs, in press).

We have been long cognizant of the significance of individual learners' differences in the realm of L2 learning, and thus, various methodologies have been sought to make L2 learning a more pleasant

experience. Of such variables, the cognitive style of field (in) dependence (FI/FD) and working memory (WM) have been suggested as potentially important in L2 learning. Thus, it is worth mentioning that there are, to say at least, three main benefits of knowing the aforementioned differences:

- L2 learners who are conscious of their style make better use of L2 learning opportunites.
- L2 learners learn better when they are provided with L2 learning opportunities that enhance their learning preferences.
- L2 learners work better with new learning styles when they are given guided opportunities to practice them.

This study is based on the premise that an awareness of such individual differences as WM and the cognitive style of FI/FD in L2 learning will make L2 educators and program designers, in all probability, more sensitive to the roles of these differences in L2 teaching. Although quantitative studies can provide certain results in the realm of test performance, we tended to carry out this research through conducting both a quantitative and qualitative research study. The first phase of the current study included quantitative interpretations regarding the effect of the cognitive style of FI/FD on L2 learners' metaphorical test performance. And, in the second phase, the association of WM in metaphorical test performance was investigated retrospectively. In essence, due to the fact that verbal reports can clearly provide an account of L2 learners' conceptual performance, they seem a promising tool in data collection.

LITRETURE REVIEW

Metaphor has been viewed and investigated from different angles. To consider the source of metaphor in literature and art is an idea among lay people because they think creating metaphor is the work of poets and artists. To take metaphor in literature and art is the belief of the classical view of metaphor, but it is only partially true from the current view. Nevertheless, by introducing the contemporary view of metaphor developed by Lakoff and Johnson (1980) in their seminal book *Metaphors We Live By*, the ideas changed dramatically.

The new view bases metaphor on the everyday and ordinary conceptual system. On the other hand, the classical view regards metaphor as a matter of language not thought. The classical view defines metaphors as poetic linguistic expressions in which words are used outside of their normal meaning. In contrast, metaphors are a matter of thought in the contemporary view. They are not just poetic expressions. Therefore, they are conceptual and part of the ordinary system of thought and language.

Yet on a closer look, L2 pedagogy has piqued L2 educators' interest in understanding L2 learner differences. One is the attempt to match the kind of instructional activities to L2 learners' preferred styles. Therefore, determining the factors influencing L2 test scores has long been focused in different scientific enquiries (e.g., Alderson, 1991; Anivan, 1991; Salmani-Nodoushan, 2006, 2009).

As for cognitive styles, one such area that has received attention from L2 researchers (Altun & Cakan, 2006; Daniels, 1996; Ford & Chen, 2001) is the cognitive style of FI/FD, which has possibly the widest application to the educational concerns. According to Brown (2000), FD learners pay attention to the whole of a learning task containing many items and rely on the surrounding field. On the contrary, FI learners pay attention to particular items and perceive objects as separate from the field. In a nutshell, as it is evident from Ford and Chen's (2001) claim, FD learners concentrate first on making the overall picture of the subject area, and then, consider the details. Therefore, FD learners have a tendency to undertake global strategies, whereas FI learners focus first on the individual parts of an object.

The other important dimension of individual L2 learner differences is the WM of L2 test-takers. Then, by introducing a memory model including a sensory store, short-term memory (STM), and long-term memory (LTM), Miller (1956) has stated that the incoming information is first registered in the sensory store. Then, a limited amount of this information passes into the STM, and information not attended to is lost. In the absence of rehearsal, the information in STM will decay, but rehearsed information is saved in LTM.

To rein in the ubiquitous role of WM, one can find various definitions regarding this kind of memory. Miyake and Shah (1999) believe that WM is a construct to perform cognitive tasks. In the same line, Baddeley (2002) considers WM as a concept in cognitive psychology. Regarding the latter, Baddeley refers to WM as processes

that temporarily store a limited amount of information. Thus, WM is closely interwoven to a central component named the *central executive* and three subsystems named the *phonological loop*, *visuo-spatial sketch pad*, and the *episodic buffer*.

Regarding studies on storing information in WM, Alptekin and Ercentin (2009) compared the performance of L2 readers and their amount of storage. Investigating the relationship between L2 reading, literal, and inferential understanding, they portrayed WM as a significant factor affecting reading, especially in the case of inferential comprehension. This study jumped on the bandwagon of Kintsch (1998) who found out that inferential reading was more difficult than literal one due to the heavier demands it placed on WM.

It is worth mentioning that reviewing the miscellaneous research studies conducted in the field of metaphor (e.g., Amanzio, Geminiani, Leotta, & Cappa, 2007; Blasko, 1999; Charteris-Black, 2000; Charteris-Black & Ennis, 2001; Delfino & Manca, 2007; Leavy, McSorley, & Bote′, 2007) reveals the pervasive use of metaphor in different domains. Metaphor comprehension has also been a matter of enquiry in neuropsychology since the late 1970s. In this regard, Blasko (1999, cited in Chiappe & Chiappe, 2007) found a link between WM capacity and metaphor comprehension. By studying 163 male and female individuals, Blasko found that the high WM individuals produced deeper interpretations of metaphors. This study closely interrelated with the one by Chiappe and Chiappe (2007) who believed in the effectiveness of WM capacity as an important factor in metaphor processing in line with the fact that high WM capacity individuals could make better interpretations of metaphors.

In their study of L2 learners' explanations of conceptual metaphor and cognitive style variables, Boers and Littlemore (2000), through using the Riding's (1991) computer-assisted test, asked a group of 71 students of Business and Economics in the University of Brussels to explain three conceptual metaphors. Then, Boers and Littlemore classified the participants' cognitive styles into analytic/holistic and imagers/verbalizers. The results revealed that the holistic thinkers tended to blend their conception of the target domain with the source domain, and the imagers were more likely to refer to images to explain the metaphors.

True as it may seem, due to lack of any clear methodology, one may speculate that L2 research domain has had its main focus of

attention on the comprehension processes of metaphorical language, rather than the production side. Hence, the production side lacks the attention it rightfully deserves. With all this amount of emphasis laid on such vital and fruitful areas as the comprehension side of metaphorical language (Harris, Friel, & Mickelson, 2006), most advanced L2 learners are likely to experience moments of difficulty reading a passage replete with metaphors.

Possibly, metaphor and its understanding have been a mind-boggling concern for L2 learners. Still more, because the majority of L2 learners study in the environment of a whole class and often in a large one, in designing L2 tests and curriculum, there is lack of attention on the characteristics of L2 learners as individuals and the great difficulties understanding a metaphorical sentence. Therefore, it stands to good reason to have an investigation into such a field as metaphor test performance.

PUPRPOSE OF THE STUDY

In sum, there is a shortage of studies documenting the effect of the cognitive style of FI/FD and WM on metaphorical use of language in recognition and text-based tests of metaphor. Therefore, one would spot areas of neglect in this research area, whereas, according to Kövecses (2002), metaphor has an important role in human thought and understanding. In addition, metaphor can make our social, cultural, and psychological reality. Furthermore, qualitative studies, to the best of the present researchers' knowledge, have been rarely used to investigate these phenomena. It is, then, from this standpoint that the present researchers depart.

With regard to the above considerations, four major questions were raised and pursued to be answered in the present study:

1. Is there any difference between the performances of FI/FD learners on recognition test of metaphor?
2. Is there any difference between the performances of FI/FD learners on text-based true-false test of metaphor?
3. Is there any difference between the performances of FI/FD learners on text-based scripturally implicit test of metaphor?

4. Is there any difference between FI/FD learners, their strategy preferences, and their WM activities towards performance on recognition and text-based tests of metaphor?

METHOD

The present study was divided into two main sections: The first was a statistical phase, and the second made use of "think-aloud protocol" and "retrospective analysis." The two aforementioned phases of the study are delineated separately in the following parts.

Quantitative Research

Participants

For the purpose of the first phase, 80 senior undergraduates majoring in English Translation were selected from the University of Isfahan, Shahrekord University, and Shahid Chamran University of Ahvaz. The participants were selected in line with their mean scores and standard deviations, from a pool of 110 students through a truncated form of a TOEFL test adopted from Barron (2004). In the current study, the reliability coefficient of this test was pretty high (Cronbach's alpha = .82). The participants were both male and female, and their age range was from 21 to 26. The reason for the selection of the abovementioned L2 participants was that they had passed a course on *Application of Metaphorical Expressions in Translation/Language*. Therefore, it was assumed that these undergraduates had familiarity with tropes.

Instrumentation

For the present study, the materials were as the followings: The first one was a truncated form of a TOEFL test adopted from Barron (2004; the Listening section was removed) to gauge the participants' proficiency knowledge. The test consisted of 30 structure questions and 30 reading comprehension questions. As to the validity of the test, two experts in the field inspected the test and confirmed its validity.

The second material was a paper-and-pencil test of GEFT adopted from Witkin, Raskin, Oltman, and Karp (1971) to assess the participants' cognitive style of FI/FD. GEFT required the participants to separate an item (e.g., a simple geometric shape) from a background (e.g., a more

complex shape). In this test, the participants who managed to recognize the hidden figures from the fields were regarded as FI learners, and those who failed to do this task were designated as FD learners. Of the vital importance is that Witkin et al. (1971) reported a Spearman-Brown reliability coefficient of .82 for their instrument. It should be mentioned that the reliability of GEFT was also examined for the current study via Cronbach's alpha, which turned out to be .78.

Through a handful of recommendable tests in the literature to assess the cognitive style of FD/FI, trying to jump on the bandwagon of Altun and Cakan's (2006) reasons for choosing GEFT in their study, there were three reasons for applying GEFT in the current study. First, due to being a nonverbal test and asking a minimum level of language skill, GEFT was an easy task to perform. Second, the psychometrical properties of the instrument had been investigated and accepted as quite reasonable. In addition, GEFT needed an individualized approach for data collection and could be administered to an entire sample at once.

The third material was the metaphor tests consisting of three parts: recognition, text-based true-false, and text-based scripturally implicit questions from the books *English Idioms in Use* (McCarthy & O'Dell, 2002) and *Idioms Organiser* (Wright, 1999), given to the participants in order to investigate their metaphorical performance. The metaphor tests consisted of 15 multiple-choice recognition questions of metaphor and three passages as text-based part of the tests. Each passage consisted of five true-false and five scripturally implicit questions. Thus, every passage included 10 questions, and the total number of the questions regarding the passages was 30. Every correct answer had one score. Concerning the true-false questions, each item was followed by three answers: true, false, and not given. In addition, the scripturally implicit questions were 15 open-ended sentences to be completed by one of the alternatives presented in the form of a multiple-choice test. The monumental characteristic of scripturally implicit questions, according to Alderson (2000), is that the aforementioned questions require the test-takers to integrate text information with their background knowledge to find the correct responses to the questions.

In order to refine the test items prior to using them, factor analysis was conducted. The 60 items of the metaphor tests were subjected to principal components analysis (PCA) using SPSS (Version 16). Prior to performing the PCA, the suitability of the data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of

many coefficients of .3 and above. The Kaiser-Meyer-Oklin value was .618, exceeding the recommended value of .6 (Kaiser, 1970/1974) and Bartlett's Test of Sphericity (Bartlett, 1954) reached statistical significance, supporting the factorability of the correlation matrix.

The PCA revealed the presence of five components with eigenvalues exceeding one, explaining 28.41%, 8.64%, 7.8%, 5.03%, and 4.24% of the variance, respectively. An inspection of the screeplot revealed a break after the third component. Therefore, using Catell's (1966) screeplot, it was decided to retain the three components for further investigation. This was further supported by the results of parallel analysis.

The three-component solution explained a total of 44.85% of the variance. To aid in the interpretation of the three components, Oblimin rotation was performed. The rotated solution revealed the presence of a simple structure (Thurstone, 1947), with the three components showing a number of strong loadings. The interpretation of the three components showed 15 items loading on components 1, 2, and 3, respectively. The results of this analysis supported the use of the recognition, text-based true-false, and text-based scripturally implicit questions as separate constructs, respectively. It should be noted that the items that were not loaded on the three main components were eliminated, and there was a weak negative correlation between the components (r = -.28).

Data Collection Procedure

Overall, the quantitative research consisted of three phases: assessing proficiency, cognitive style, and metaphorical test performance, each with its own specific procedures. To collect the data, first, the TOEFL test was administrated to the participants. As Table 1 shows, according to the proficiency mean score (M = 26) and the standard deviation (SD = 11) assessed by SPSS, 80 participants from among 110 ones whose scores were from 15 to 37 were selected.

Second, in order to assess the participants' cognitive style of FI/FD, the participants were given GEFT. This test contains three sections, including 25 figures. The participants were asked to identify eight simple shapes labeled A to H in the complex figures. The criterion for the participants' dichotomization was 11. Those who got scores above 11 were considered as FI participants, and those below 11 were considered as FD participants. It should be mentioned that the seven

figures in the first section of the test were just for the purpose of familiarizing the participants with the test procedure, and they were not considered in scoring the test. Thus, the scores in GEFT ranged between 0-18. It took 10 min to conduct the second and third sections. It is worth mentioning that every GEFT had a code, and the participants were identified through that code during the test.

Table 1: The TOEFL score and standard deviation of the TOEFL test

	N	**Min**	**Max**	**Mean**	***SD***
Scores	110	6.00	46.00	26.26	11.36

As the last part of the data collection, in order to assess the participants' metaphorical test performance, the metaphor tests consisting of recognition, text-based true-false, and text- based scripturally implicit questions were given to the participants according to their code for GEFT. The participants were required to choose their alternatives by putting a check mark (√) in the answer-sheets distributed among them.

The data collected (i.e., the scores on the English metaphor tests and GEFT) were subjected to inferential statistics. As for the quantitative phase, the researchers, using SPSS, ran one-way multivariate analysis of variance (MANOVA) to compare the groups and to see if there was any significant difference among them. Concerning the qualitative phase, it was based upon applying "think-aloud protocol" and "retrospective analysis." The data obtained and the discussions related to the quantitative and qualitative results are elaborated separately in the following parts.

RESULTS

The raw data gathered from the FI/FD participants in the three kinds of metaphor tests (i.e., recognition, text-based true-false, and text-based scripturally implicit questions) were submitted to SPSS, and the subsequent computations were made as presented in Table 2.

In the recognition test of metaphor, the mean score for the FD participants was less than the FI participants. Although statistically significant, the actual difference in the two mean scores was small, almost less than two scale points. In the text-based true-false test of

metaphor, the mean score for the FD participants was more than the FI participants, which indicated the FD participants had a better performance. At last, in the scripturally implicit test of metaphor, the mean score for the FD participants was more than the FI participants. Although statistically significant, the actual difference in the two mean scores was small, almost less than one scale point.

Table 2: Estimated marginal means

Dependent Variables	Cognitive Style	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Recognition	FD	8.15	.40	7.35	8.96
	FI	9.94	.44	9.05	10.83
True-False	FD	10.47	.45	9.57	11.38
	FI	8.33	.50	7.33	9.33
Scripturally	FD	9.38	.19	9.00	9.77
Implicit	FI	8.63	.21	8.21	9.06

In order to compare the FD and FI participants and to analyze the mean differences between the aforementioned groups in all the three kinds of metaphor tests, one-way MANOVA was applied. In this study, the abovementioned metaphor tests were recognized as the dependent variables, and the cognitive style of FI/FD was recognized as the two levels of the independent variable. To test for multivariate normality, we calculated Mahalanobis distances. In order to decide whether a case was an outlier, we compared the Mahalanobis distance value against the critical value reported by Pallant (2007, p. 280) through the chi-square critical value table. According to Pallant (2007), individuals whose mah-1 scores exceed those critical values are considered outliers. In Table 3, Mahalanobis distance value is 17.76.

In the current study, Mahalanobis distance value (17.76) was larger than the critical value (16.27). Thus, there were multivariate outliers in this study. Through looking at the data file, one of the cases exceeded the critical value of 16.27, suggesting the presence of one multivariate outlier. Because there was only one person and his score was not too high, we left this person in the data file.

Table 3: Residual statistics

	Minimum	Maximum	Mean	SD	N
Predicted Value	1.00	1.89	1.45	.19	80
Std. Predicted Value	-2.28	2.19	.00	1.00	80
Standard Error of Predicted Value	.06	.22	.10	.03	80
Adjusted Predicted Value	1.00	2.09	1.45	.20	80
Residual	-.87	.75	.00	.45	80
Std. Residual	-1.87	1.61	.00	.98	80
Stud. Residual	-2.08	1.70	-.001	1.00	80
Deleted Residual	-1.09	.84	-.001	.48	80
Stud. Deleted Residual	-2.13	1.73	.000	1.01	80
Mahalanobis Distance	.50	17.76	2.96	3.07	80
Cook's Distance	.00	.26	.01	.03	80
Centered Leverage Value	.00	.22	.03	.03	80

In the next stage, the assumption of linearity between the dependent variables was checked. To test whether the data violated the assumption of homogeneity of variance-covariance matrices, Box's Test of Equality of Covariance Matrices was studied. The Box's M *Sig*. value was .116, which was larger than .001; therefore, this assumption was not violated as shown in Table 4:

Table 4: Box's test of equality of covariance matrices

Box's M	10.65
F	1.70
***df*1**	6
***df*2**	3.95
Sig.	.11

To test equal variances, the next box to consider is the Levene's Test of Equality of Error Variance shown in Table 5:

Table 5: Levene's test of equality of error variances

	F	***df*1**	***df*2**	***Sig.***
Recognition	1.48	1	78	.226
True-False	.19	1	78	.658
Scripturally Implicit	1.62	1	78	.206

$p < .05$

In the *Sig*. column, none of the variables are less than .05. In fact, they did not record significant values. Therefore, equal variance was

assumed, and the assumption of the equality of variance was not rejected. In order to see whether there were statistically significant differences among the groups on a liner combination of the dependent variables, the set of multivariate tests of significance was studied. One of the most commonly reported statistics, according to Pallant (2007), is Wilk's Lambda as presented in Table 6:

Table 6: Multivariate tests[b]

Effect		Value	*F*	Hypothesis *df*	Error *df*	*Sig.*	Partial Eta Squared
Intercept	Pillai's Trace	.98	2.22E3[a]	3.00	76.00	.000	.98
	Wilks' Lambda	.01	2.22E3[a]	3.00	76.00	.000	.98
	Hotelling's Trace	87.97	2.22E3[a]	3.00	76.00	.000	.98
	Roy's Largest Root	87.97	2.22E3[a]	3.00	76.00	.000	.98
Cognitive Style	Pillai's Trace	.15	4.74[a]	3.00	76.00	.004	.15
	Wilks' Lambda	.84	4.74[a]	3.00	76.00	.004	.15
	Hotelling's Trace	.18	4.74[a]	3.00	76.00	.004	.15
	Roy's Largest Root	.18	4.74[a]	3.00	76.00	.004	.15

a. Exact Statistics
b. Design: Intercept + Cognitive Style

The Wilk's Lambda value was .842, with a significant value of .004 that is less than .05; therefore, there was a statistically significant difference between the FI/FD participants in terms of their metaphorical performance. Because a significant result was obtained on the multivariate test of significance, there was a chance to investigate further in relation to each of the dependent variables. Thus, the Test of Between-Subject Effects output box should be studied. Due to a number of separate analyses, Pallant (2007) suggests a higher alpha level to reduce the chance of a type I error. The most common way is to apply what is known as Bonferroni adjustment. In its simplest form, this involves dividing the original alpha level of .05 by a number of analyses that the researchers intend to do.

Upon looking for any values less than .017 (i.e., our new adjusted alpha level) in Table 7, the *Sig*. column for all the three dependent variables in the row labeled with the independent variable (i.e., cognitive

style) pinpointed a significant value less than the cut-off point (with the *Sig.* values of .004, .002, and .011). Thus, the significant difference between the FI/FD participants was on all kinds of the metaphor tests.

Table 7: Tests of between-subjects effects

Source	Dependent Variable	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Cognitive Style	Recognition	63.11	1	63.11	8.79	.004	.10
	True-False	91.01	1	91.01	10.01	.002	.11
	Scripturally Implicit	11.06	1	11.06	6.70	.011	.07
Error	Recognition	559.77	78	7.17			
	True-False	708.97	78	9.08			
	Scripturally Implicit	128.73	78	1.65			
Total	Recognition	7049.00	80				
	True-False	8039.00	80				
	Scripturally Implicit	6692.00	80				
Corrected Total	Recognition	622.88	79				
	True-False	799.98	79				
	Scripturally Implicit	139.80	79				
a. R Squared = .10 (Adjusted R Squared = .09)							
b. R Squared = .114 (Adjusted R Squared = .102)							
c. R Squared = .079 (Adjusted R Squared = .067)							

The importance of the impact of the cognitive style of FI/FD on metaphorical performance was also evaluated using the effect size statistics provided in the final column. Utilizing commonly used guidelines (.01 = small, .06 = moderate, .14 = large) proposed by Cohen (1988: 284-287), this value of .101 for the recognition test of metaphor is considered somehow a large effect and represents 10.1% of the variance explained by the cognitive style of FI/FD. The aforementioned Partial Eta Squared for the text-based true-false test of metaphor was .114, which is

again considered somehow a large effect and which represents 11.4% of the variance. Finally, for the scripturally implicit test of metaphor, the Partial Eta Squared was .079, which is considered quite a moderate effect and which represents 7.9% of the variance.

Qualitative Research

To collect meticulous data from the "think-aloud protocol" and "retrospective analysis," as Ghonsooly and Barghchi (2011) mentioned in their qualitative study, there are some key points pertaining to the number of participants and the criterion for their selection. Gathering verbal reports about the mental processes arising while doing a kind of cognitive activity stems from two myths. First, eloquent participants should be taken into account, the reason of which may lie in the fact that they are able to report their thought processes clearly. The second important concern for researchers is to make a choice between the participants' L1 and L2. We opted for the participants' L1 because, true as it may seem, most L2 learners express moments of difficulty thinking in English when they are engaged in comprehending metaphors. Furthermore, based on Ghonsooly and Barghchi (2011), insisting on the participants to use L2 in their verbal reports, researchers would miss some important facts about the cognitive tasks.

Participants

Eight L2 participants (i.e., four FD participants with high scores in the text-based test of metaphor and four FI participants with high scores in the recognition test of metaphor) were chosen to take part in this section. They were selected from the pool of the participants in the first phase of the study. To glean the data, the criterion was the participants' metaphoric performance and their cognitive style of FI/FD.

Procedure

Due to the participants' lack of familiarity with this type of experiment, an investigation into the cognitive processes arising in the L2 learners' WM started with the pre-experimental training to the participants, answering their potential questions and eliminating the ambiguities they would face. In the pre-experimental training, the participants were kept

posted that the main aim of the test was to understand their thought processes by listening to their recorded voices later. In order to take a wide perspective on the cognitive tasks, we asked the participants to verbalize as many thought processes as possible. As an attempt to remedy the potential shortcomings, one of the researchers verbalized his thought process as an example. It should be mentioned that the applied scheme in the current study was somehow similar to the one used by Ghonsooly and Barghchi (2011) with some minor modifications.

Having finished the task, the participants were asked to go back to their reported strategies and comment on what they did. This aforementioned "retrospective" activity could be regarded as a useful measure. Because the information about the questions and the way of their understanding were still in the participants' WM, doing "retrospection" immediately after the "think-aloud protocol" could be recognized as having an enormous influence. The point about this fact is the nearest to the view taken by Ghonsooly and Barghchi (2011). As they noted, spending more time between the completion of a task and retrospection would force the participants to retrieve information from their LTM, that is of little use for researchers. The processing strategies are classified in Tables 8 and 9:

Table 8: FI learners' processing strategies

Strategy	Example
Applying **reprocessing**, the learners go back, reread a sentence, and try to think more about that metaphor.	e.g., *I knew all Justin's stories were exaggerated. I saw through him the first time I met him.*/I will go back to the beginning and reread it.
Applying **L1 equivalent**, the learners try to find an equivalent for that metaphor in their mother tongue.	e.g., *even if you are going to have some bad luck, it isn't the end of the world.*/For the feeling of hopelessness in L1.
Applying **mental mappings**, particular keywords from the source domain may activate a conceptual metaphor that involves understanding one conceptual domain in the light of another conceptual one, and accordingly, the inference occurs.	e.g., *keep your head down.*/The boss is in a bad mood. So, when somebody has his head down, he only pays attention to his own work not to make the boss angry.
Conceiving the two domains of metaphor (i.e., source domain and target domain) **as distinct domains**, the learners try to understand metaphors.	e.g., *it will be a cold day in hell before I see her again.*/Cold day and hell, it is not possible to have a cold day in hell. So I think it shows impossibility of something.
Referring to images, the learners try to	e.g., *my sister is a dreamer. She goes*

explain the metaphors.	*through life with her head in the cloud./*let me imagine that. When I dream . . . .
Focusing on the separate parts, the learners try to get the meaning of metaphors.	e.g., *one minute she is on top of the world; the next she is very depressed./*To be depressed and on top of the world, two separated parts with different meanings.
Note taking, highlighting metaphors, and underlining, the learners try to separate what they did not understand form the rest.	e.g., let me highlight this part in order to separate it from the rest and focus on it more later.

Table 9: FD learners' processing strategies

Strategy	Example
Applying the background and world knowledge, the learners try to draw inferences from the text and comprehend it.	e.g., based on what I know about the meaning of *down* and *dumps*, when *somebody feels down in the dumps*, makes me think that it must refer to low energy or unhappiness.
Having read the passage and **gain a holistic understanding** of each passage, the learners try to answer the questions.	e.g., Ok, I will read the text to get a total understanding of the metaphors mentioned. Then, I will answer the questions.
Applying **deduction**, the learners try to come to a conclusion and use what is perceived from the text in a logical way.	e.g., *doing run-of-the mill tasks/*I don't know its meaning, but I know it must be about a state or mood of doing a task. Because John stayed in that company for a couple of years, it should show the mood of boredom.
Applying conceptual blending theory, metaphorical meaning is captured by a blended space having in common some structure from both source and target domains.	e.g., let me consider job as a ladder. When somebody is at the very bottom of that, he is novice and does not have a good position.
Applying **previewing**, the learners attempt to form a gist of the entire passage and get an idea of what it is about.	e.g., Ok, I will read it once to see what it is about.
Monitoring statement problem identification at sentence level, the learners identify a problem.	e.g., *Then, I realized he had fallen for a good friend of mine. They had fallen head over heels in love./*I don't know the second sentence, too.

DISCUSSION

In brief, the results of the study indicate that the cognitive style of FI/FD is a source of systematic variance in metaphor test performance. According to the results of the recognition test, there was a significant difference in the mean scores of the FD and FI learners. Thus, the difference between these two groups may be attributed to the cognitive style of FI/FD in a way that the FI learners performed better in the recognition test of metaphor. Therefore, the first null hypothesis of this study is rejected:

- H_{01}: There is no difference between the performance of the FI/FD learners on the recognition test of metaphor.

Also, the effect of the cognitive style of FI/FD was significant based on the mean scores of the text-based true-false test of metaphor. This means that the FD learners outperformed the FI ones in such questions. Therefore, the second null hypothesis of the current study is also rejected:

- H_{02}: There is no difference between the performance of the FI/FD learners on the text-based true-false test of metaphor.

The third significant difference was between the mean scores of the FD/FI groups in the sciptally implicit test of metaphors. In fact, the FD learners outperformed the FI ones in answering the scripturally implicit questions of metaphor. Thus, the third null hypothesis below is rejected:

- H_{03}: There is no difference between the performance of the FI/FD learners on the text-based scripturally implicit test of metaphor.

The argument made in this study is nearest to the view taken by Boers and Littlemore (2000) who explain that the possibility of different approaches towards conceptual metaphors may be related to different cognitive styles. This closely interrelates with their notion that the analytic L2 learners, or the FI learners, are more likely to conceive the two domains of metaphor (i.e., source and target domains) as distinct domains, whereas the holistic L2 learners, or the FD learners, are less

able to ignore the irrelevant context. In the former, FI learners use the approach of mapping across two distinct domains of source and target, which is in accord with Lakoff and Johnson's (1980) model of conceptual metaphor. Regarding the latter, using the model of blending or conceptual integration of different domains, Fauconnier and Turner (1994, 1995, 1998) believe that FD learners conceive the source and target domains of metaphors as an integrated entity.

However, different L2 learners with different cognitive styles apply various strategies, albeit with a preference for one, and their preferred strategies match aspects of their cognitive styles. Therefore, they process conceptual metaphors in different ways.

A plane of this work attests to Oxford and Anderson's (1995) hypothesis, explaining that holistic individuals study the whole picture of a problem, whereas analytic individuals focus on the separate parts of the problem. As in the current study, the FD participants focused on the text-based tests of metaphor consisting of true-false and scripturally implicit questions, whereas the FI participants outperformed on the recognition test of metaphor. In addition, the findings of the present study support the claims of researchers like Salmani-Nodoushan (2006) who claim that the cognitive style of FI/FD could be a factor affecting L2 learners' performance on such different reading task types such as true-false—because holistic L2 learners should read the passage, gain a holistic understanding of each passage, and then answer the questions, they outperform their analytic counterparts on true-false tasks.

Another plane of this study pinpoints the significance of L2 learners' WM in metaphor comprehension. As Baddeley (2002) acknowledges, it appears to be compelling evidence pointing to the fact that, through using central executive, FI learners have the ability to suppress the irrelevant information, whereas, through using the visuo-spatial sketch pad as one of the highly fruitful and important dimensions of WM, FD learners maintain the visual and special information.

Viewed from this angle, the current study follows Alptekin and Ercentin's (2009) viewpoint illustrating that WM is a significant factor affecting inferential comprehension. In addition, this study jumps on the bandwagon of Chiappe and Chiappe (2007) who believe in the effectiveness of WM capacity as an important factor in metaphor processing based on the fact that high WM capacity individuals could make better interpretations of metaphors. Therefore, the current study naturally follows the fact that L2 learners with different cognitive styles

process conceptual metaphors in different ways—through using different subcomponents of their WM. Based on the claims of Chiappe and Chiappe (2007), high WM capacity individuals could make better interpretations of metaphors. It is based on the premise that WM capacity is an important factor in metaphor processing.

CONCLUSIONS AND IMPLICATIONS

Being at the nexus of mind and language, metaphor manifests itself in a unanimous agreement among several scholars (Gibbs, 2006; Lankton, 2002; Roberts & Kreuz, 1994) who believe that the mind is metaphorical in nature. Everyday verbal or written communication, in line with its abundant uses of metaphor, is a testimony to so many occurrences of metaphorical language, and one cannot deny the main role of metaphor in the mental structure of thought.

Based on the pervasiveness of metaphor, L2 learners need to develop awareness of metaphor and strategies to comprehend this ilk of metaphorical language. MacLennan (1993) also advocates explicit classroom attention to metaphor and claims that metaphor is an integral part of language because learning the metaphorical patterns may pave the way for the acquisition of vocabulary. Also, L2 teachers should suggest some activities to help L2 learners develop strategies for comprehending metaphors.

What is more, the identification of the precise role of individual L2 learner differences and the way these differences debilitate or facilitate L2 learners' metaphorical test performance are all of paramount importance. From another angle, different L2 learners apply various strategies, albeit with a preference for one and their preferred strategies match the aspects of their cognitive styles. For instant, L2 teachers can expect FD learners to face difficulties when the aforementioned learners are required to focus and maintain attention on text-based tests of metaphor in which both relevant and irrelevant stimuli are available. Therefore, it requires greater attempt to structure classroom and curriculum content to facilitate learning.

The current study highlighted the above fact and might have opened a new path to this process, but many more case studies of this type are required to obtain definitive results. As it was noticed, the "think-aloud" procedure seems a promising tool to reveal some of the

mysteries. Therefore, test developers do not need to stick to fixed tests to measure metaphors.

Last but not least, although quantitative studies can provide certain results in the realm of test performance, we tended to provide an avenue for future studies through conducting both a quantitative and qualitative study. This study was based on the premise that an awareness of individual differences in L2 learning would make L2 educators and program designers, in all probability, more sensitive to the roles of these differences in L2 teaching.

Bio-data

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