Journal of Language and Translation
Volume 2, Number 1 (pp. 59-77), 2011

The Relationship among EFL Learners' Left/Right Brain Dominance, Autonomy, and Reading Comprehension of the Academic and General Reading Modules of IELTS

Mona Khabiri [1*]; *Mahdis Heidari* [2]

[1] *Islamic Azad University, Central Tehran Branch*

[2] *Islamic Azad University, Central Tehran Branch*

Received: 16 November 2010 ; Accepted: 8 May 2011

ABSTRACT

The purpose of this paper was to see whether any significant relationship exists among EFL learners' autonomy, left/right brain dominance, and reading comprehension of the Academic Reading and General Reading Modules of IELTS examination. To this end, 100 female EFL learners were randomly selected from those who were attending IELTS preparatory courses at a language school in Tehran. All participants filled out the brain dominance and learner autonomy questionnaire. However, 50 participants took the General Reading Module and 50 took the Academic Reading Module of IELTS. Correlation and regression analyses demonstrated that learner autonomy did not have a significant correlation with the participants' performance on the General or Academic Reading Modules of IELTS. However, brain dominance significantly correlated and thus, predicted the participants' performance on both the General and Academic Reading Modules of IELTS.

Keywords: Left brain dominance, right brain dominance, learner autonomy, reading comprehension, General Reading Module of IELTS, Academic Reading Module of IELTS

Introduction

Reading is an important skill and involves a complex process. In fact, it can be thought of as a process simultaneously happening at two levels. According to Fry (cited in Alexander, 1980) at a lower level the reader should get the objective information, that is the facts, which require little interpretation or judgment. Fry maintains that on a higher level, the reader should be able to get subjective information, which is the tone and the mood of the story, unstated ideas, or the overall information. "It might only hint at other situations with which the reader is supposed to be familiar or the reader might be expected to generalize from the specific facts given, in order to get a main idea" (pp. 26-27). Aebersold and Field (1997) write that reading is the result of looking at a text and assign meaning to the written symbols in that text. They further maintain that, "The text and the reader are two physical entities necessary for the reading process to begin. It is, however, the interaction between the text and the reader that constitutes the actual reading" (p. 15).

Highlighting the interactive nature of reading comprehension, Nuttal (1996) maintains that "as a process of communication, reading is a transfer of meaning from mind to mind; writer to reader" (p. 3). Likewise, Fry (cited in Alexander, 1980) maintains that defining comprehension is very difficult but reduced to its simplest elements, we might say that comprehension is a part of the communication process of getting the thoughts that were in the author's mind into the reader's mind. He further asserts that such a process is a difficult one because it involves the transmission of an idea through several imperfect media.

In addition to complexity, reading is indeed a very important skill in learning a foreign language and is one of the four skills which are examined in high-stakes tests of language profi-

Corresponding Author: E-mail: monakhabiri@yahoo.com

ciency like TOEFL and IELTS. Because reading is used in different types of contexts and for different purposes as reading for academic purposes and reading for specific purposes, IELTS designers have designed two different types of reading tests, one for the Academic and one for the General Training Modules, to assess candidates' reading ability.

The Academic Reading and Writing Modules (as the only difference between the two modules is the reading and writing sections) assess whether a candidate is ready to study at an undergraduate or graduate level where the medium of instruction is English. Therefore, admission to undergraduate and graduate courses in many English-speaking countries is based on the results of high stakes tests, IELTS being one of the most popular ones.

However, the General Reading and Writing Modules are not designed to test the full range of formal language skills required for academic purposes, but emphasize basic survival skills in a broad social and educational context. General Module is suitable for candidates who are going to English-speaking countries to complete their secondary education, to undertake work experience or training programs not at degree level, or for immigration purposes.

Due to the importance of the reading skill in learning and assessing a foreign language, many attempts have been made in order to determine and identify factors influencing the complex process of comprehension. The role of brain is undeniable in this process. As a matter of fact reading is a complex series of cognitive processes that involve interactions each step of the way from the processing of visual stimuli to inferring the meaning. Often reading is seen as a single skill that relies on a unitary cognitive process, but many scholars view it as a progressive sequence that moves from visual symbol recognition, to letter-sound correspondence, to phonetic decoding, and eventually to text comprehension (Chall, 1979; Perfetti & Lesgold, 1979).

The reading process is divided into steps including lexical access, selection, and integration (Shaywitz et al., 2000). They maintain that decoding begins as the incoming visual stimulus is compared to stored visual representations in the mental lexicon (termed 'lexical selection'). According to Shaywitz et al. comprehension happens when a mental concept of the meaning is created from the written text. Therefore, brain clearly has an important role in reading comprehension.

Taking the role of brain into consideration, it seems essential to explore the structure of the brain. The brain structure can be divided into two roughly similar mirror-image halves because of the way nerves are connected from the brain to the rest of the body. These two symmetrical left and right halves are called hemispheres and are specialized in different functions (Hellige, 1990). The left hemisphere concentrates on tasks that require verbal strength such as speaking, reading, and thinking and reasoning. The right hemisphere has its own strengths, particularly in non-verbal areas such as spatial understanding, recognitions of patterns and drawings, music, and emotional expression. The way in which information is processed seems somewhat different in each hemisphere. The left hemisphere considers information sequentially, one bit at a time, while the right brain hemisphere tends to process information globally, considering it as a whole (Gazzaniga, 1983; Springer & Deutch, 1989).

Obler (1981) notes that in L2 learning there is significant right hemisphere participation and that "this participation is particularly active during the early stages of learning L2" (p. 458). But this participation to some extent consists of strategies of acquisition. Obler (1981) cites the strategy of guessing at meanings, and of using formulaic utterances, as examples of right-hemisphere activity. Others (Genesee, 1982; Selinger, 1982) also found support for the right-hemisphere involvement in the form of complex language processing as opposed to early language acquisition. Genesee (1982) concludes that "there may be greater right hemisphere involvement in language processing in bilinguals who acquire their L2 late relative to their L1 and in bilinguals who learnt it in informal contexts" (p. 315).

Left or right brain dominance is an important issue in developing a theory of L2 acquisition. As the child's brain matures, various functions become lateralized to the left or right hemisphere. The left hemisphere is associated with logical, analytical thought, with mathematical and linear processing of information. The right hemisphere perceives and remembers visual, tactical and auditory images; it is more efficient in processing holistic, integrative and emotional information. The differences in hemispheric functioning at least suggest the possibility that there may be individual differences in the strengths of each

hemisphere. What we do best in life, then, maybe a function of which side of our brain has the greater strength (Feldman, 1996).

Learner autonomy is another learner characteristic which has been identified by some SLA researchers (for example Talebi, 2009) as influencing reading comprehension. Autonomy is usually defined as the capacity to take charge of, or responsibility for, one's own learning (Holec, 1980). In order to say exactly what 'taking charge' or 'taking responsibility' means in the context of learning, Benson (2001, p. 47) defined and described learner autonomy as the capacity to take control of one's own learning, largely because the construct of 'control' appears to be more open to investigation than the constructs of 'charge' or 'responsibility' and he argued that an adequate description of autonomy in language learning should "at least recognize the importance of three levels at which learner control may be exercised: control over learning management, control over cognitive process, and control over learning content" (pp. 76-103).

Benson (2001) also maintains that, "there is an intimate relationship between autonomy and effective learning" (p. 183). In other words, the development of autonomy implies better language learning. Research findings have provided evidence that autonomy is of general concern in second or foreign language learning (Benson & Voller, 1997; Wenden, 1998). As a result, the trends in language teaching has recently moved towards making learners more autonomous and shifting the responsibility toward the learner (Wenden, 1998).

Consequently, the question that is raised is whether the characteristics associated with different brain dominance will also associate with the degree of learner autonomy or not. On the other hand, inquiry into the comparison between brain dominance and autonomy in predicting learners' reading ability seems also important. These two issues intrigued the researchers to see whether there was a different relationship among EFL Learners' left/right brain dominance, autonomy, and their reading comprehension when the purposes of reading was general vs. academic. The researchers also intended to investigate which of the predictor variables (left/right brain dominance or autonomy) had higher predictability about EFL learners' reading comprehension of the Academic Reading and General Reading Modules of IELTS examination as the predicted variables. Therefore, the following null hypotheses were stated:

$H0_1$: There is no significant relationship between EFL learners' left/right brain dominance and their performance on the Academic Reading Module of IELTS.

$H0_2$: There is no significant relationship between EFL learners' left/right brain dominance and their performance on the General Reading Module of IELTS.

$H0_3$: There is no significant relationship between EFL learners' autonomy and their performance on the Academic Reading Module of IELTS.

$H0_4$: There is no significant relationship between EFL learners' autonomy and their performance on the General Reading Module of IELTS.

$H0_5$: There is no significant difference between the predictability of EFL learners' left/right brain dominance and their autonomy about their performance on the General Reading Module of IELTS reading test.

$H0_6$: There is no significant difference between the predictability of EFL learners' left/right brain dominance and their autonomy about their performance on the Academic Reading Module of IELTS.

Method

Participants

The number of the participants in this research was 100 female EFL learners who were selected on a truly random basis from among those who were determined to sit IELTS examination and were attending preparatory courses at a language school in Tehran. In spite of the researchers' effort and correspondences with authorities in charge of administration of IELTS, they were not able to access real IELTS candidates and use the real IELTS scores. From among the 100 participants, 50 took the reading section of an Academic Module and 50 took the General Module of IELTS mock examination. Moreover, 60 other students who had the same characteristics as the main participants of the study took part in piloting the reading modules of IELTS mock tests, 30

for the Academic Reading Module and 30 for the General Reading Module.

Instrumentation

For carrying out the present research, three instruments were utilized. To measure the reading comprehension of the participants, reading texts of two IELTS mock tests were used, one from a General Module and one from an Academic Module of IELTS examination. Moreover, the brain dominance questionnaire was utilized to measure the degree of left/right brain dominance of the participants. Finally, learners' autonomy questionnaire was administered to measure the degree of autonomy of the participants. Each of these instruments is thoroughly explained hereunder.

Academic and General Reading Modules of Mock IELTS Examination

The reading section of an Academic Module and the reading section of a General Module mock IELTS examination were chosen for measuring the participants' reading comprehension. Both tests consisted of three passages and a total of 40 items and were each piloted with 30 other students who had the same characteristics as the main participants of the study.

In terms of reading, the main difference between the Academic and General Reading Modules of the IELTS lies in the content of the passages. The General Module includes easier texts from social, academic, and work contexts. The Academic Module, however, includes more advanced texts, at an undergraduate or graduate level, from academic sources.

The Learner Autonomy Questionnaire

In order to measure the degree of participants' autonomy in learning, the researchers utilized the questionnaire designed by Zhang and Li (2004, p.23), which included 21 questions with Likert scale. Zhang and Li developed the questions of this questionnaire on the basis of the learning strategies classified by Oxford (1990), Wenden (1998), and O'Malley and Chamot (1990). The questionnaire has proved to have high content validity and reliability. In order to turn the participants' selected choices into scores, the choices A, B, C, D, and E were marked one, two, three, four, and five, respectively (Appendix A).

The Brain Dominance Questionnaire

In order to investigate and measure the participants' brain dominance, the researchers utilized the brain dominance questionnaire designed by Davis (In Davis, Nur, and Ruru, 1994), which consisted of 39 questions with Likert scale including three alternatives for each question. The questions are based on the findings of neuropsychologists and neurolinguists and each question taps on a behavioral or cognitive characteristic of the respondent. The final score for each participant was calculated by counting the number of selected a, b, and c alternatives and using the formula: *{[(" a "s × 1) + (" b "s × 3) + " c "s × 2)] /3} – 13.* If the purpose is to label the participants as left or right brain dominant, the procedure is that those who get a score below 13 are considered as left-brain dominant and those who obtain a score over 13 are called right-brain dominant. However, since for the correlation analysis, the researchers were only interested in the degree of brain dominance, for data analyses the obtained scores were utilized rather than the right vs. left dominant categories (Appendix B).

Procedure

To achieve the purpose of the study and address the questions posed, certain procedures were pursued which are explained hereunder. At first, the Academic Reading and the General Reading Modules were administered each to 30 students during the pilot study. Then 100 female students were randomly selected from those who were attending IELTS preparatory courses at a language school in Tehran, 50 from the participants who intended to attend the Academic Module and 50 from those who wanted to take the General Module. Next, the piloted tests were administered to the participants of the main sample. Sixty minutes was given to the participants to complete the tests.

Then the brain dominance and learner autonomy questionnaires were administered to all participants, right after the exam session was over. One of the researchers was present while participants were responding to the questionnaires to provide further explanations when required. The brain dominance questionnaire took 20 minutes and the learner autonomy questionnaire took 40 minutes for the learners to fill out.

As mentioned earlier, the final score for the brain dominance questionnaire was calculated by

counting the number of selected a, b and c alternatives and putting them in the formula: *{[(" a "s × 1) + (" b "s × 3) + " c "s × 2)] /3} – 13*. The final score could range between 0 and 26. As mentioned before, the participants were not categorized as left- or right-brain dominant, but rather their scores on the brain-dominance questionnaire were taken into consideration as for the researchers the degree of brain dominance was of importance to be correlated with the degree of autonomy and reading comprehension on the two modules of IELTS.

Results

During the first phase of the study which was the pilot study, the two modules of IELTS were piloted and all items went through an item analysis procedure and no item was discarded and they all enjoyed acceptable facility and discrimination indices. After the pilot phase, the randomly selected participants of the study took all the three instruments. In order to test the null hypotheses of the study, the descriptive statistics were obtained and the assumptions of linear correlation were checked, the results of which are presented hereunder.

Checking the Assumptions of Linear Correlation

To run correlation the following assumptions should be checked:

1. Linear relation between each pair of variables
2. Normality of the distribution of the variables
3. Homoscedasticity

The assumptions were checked one by one to see whether running correlation was legitimate or not.

Linear Relation between Each Pair of Variables

To check the linearity of relations, the researchers needed to visually inspect the data through creating scatterplots. Since there were multiple variables in the study, the researchers created a multiple scatterplot for autonomy, brain dominance, and Academic Reading Module of IELTS which is presented in Figure 1.

The inspection of Figure1 shows that there was no kind of non-linear relationship between the scores on autonomy, brain dominance, and

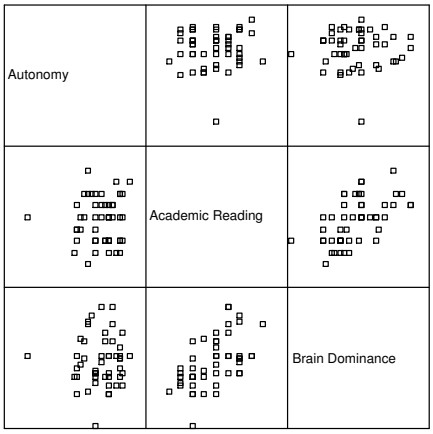

Figure1. Multiple Scatterplot of Autonomy, Brain Dominance, and Academic Reading

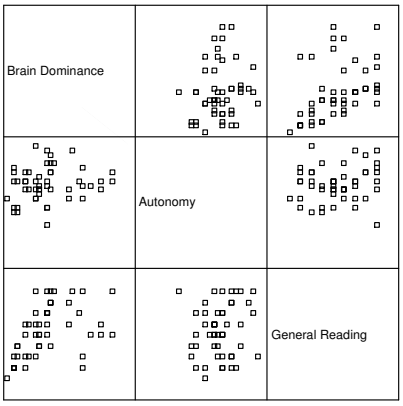

Figure 2. Multiple Scatterplot of Autonomy, Brain Dominance, and General Reading

Academic Reading, such as a U-shaped or curvilinear distribution. It was therefore appropriate to test for a linear relationship in the data by performing a correlation considering this assumption. Figure 2 below demonstrates the multiple scatterplot for autonomy, brain dominance, and the General Reading Module of IELTS which demonstrates the same linearity.

Normality of the Distributions

To check the normality of the distributions, the descriptive statistics of the data were obtained which is demonstrated in Table 1**.**

As demonstrated in Table 1, the distribution of data for brain dominance, Academic Reading Module, and General Reading Module of IELTS came out to be normal as both the skewness and kurtosis ratios fell within the range of -1.96 and +1.96 for these three distributions. However, the distribution of data for autonomy was not normal. Therefore, parametric correlation could not be

run on the participants' scores obtained from the autonomy questionnaire**.**

Homoscedasticity

To check the assumption of homoscedasticity, that is, the assumption that variance of residuals for every pair of points on the independent variable is equal, the researchers examined the residuals plot (Figure 3 and 4).

As demonstrated by Figure 3 and Figure 4, the cloud of data is scattered randomly across the plot and thus the variance is homogeneous. Since the assumptions of correlation were all observed for brain dominance, general reading, and academic reading, the researchers ran Pearson correlation to test the hypotheses of the study.

Testing the First Hypothesis

First, correlation was run between brain dominance and Academic Reading Module of IELTS.

The results are demonstrated in Table 2.

As demonstrated by Table 2 the correlation came out to be significant at 0.01 level (r= 0.55, $p< 0.05$).

According to Table 3, R^2 (or common variance) which is the effect size for correlation came out to be 0.3. Common variances of 25% and above are considered to be large effect size (Cohen, 1992; Larson-Hall, 2010). Moreover, the 95% confidence interval of 0.32-0.72 is a very small confidence interval. Higher power in a study will result in smaller confidence intervals and more precision in estimating correlations. Therefore, the large effect size along with the small confidence interval indicated that the correlation was highly reliable and precise. As a result the researchers were able to reject the first null hypothesis that stated there was no significant relationship between EFL learners' left/right brain dominance and their comprehension of Academic Reading Module of IELTS.

Table 1. Descriptive Statistics of the Data

	No.	Mean	Std. error of the mean	Sd	Skewness	Std. error Skwnss	Skwns Ratio	Kurto-sis	Std. error Kurtss	Kurtss Ratio
Autonomy	100	68.52	0.46	4.63	-1.03	0.24	-4.29	3.51	0.48	7.31
Brain Dominance	100	11.85	0.26	2.66	0.47	0.24	1.96	0.19	0.48	0.39
Academic Reading	50	4.88	0.13	0.9	0.08	0.34	0.24	-0.85	0.66	-1.29
General Reading	50	5.2	0.17	1.17	0.01	0.34	0.03	-1.07	0.66	-1.62

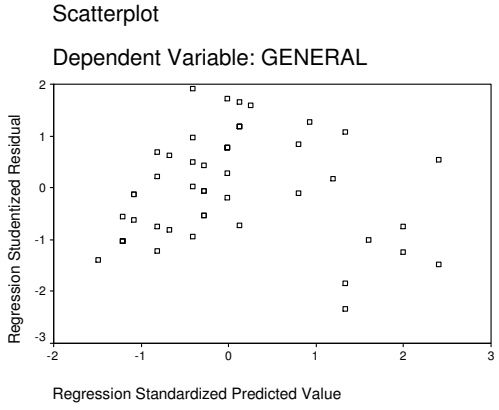

Figure 3. Plot of Studentized Residuals for General Reading Module of IELTS

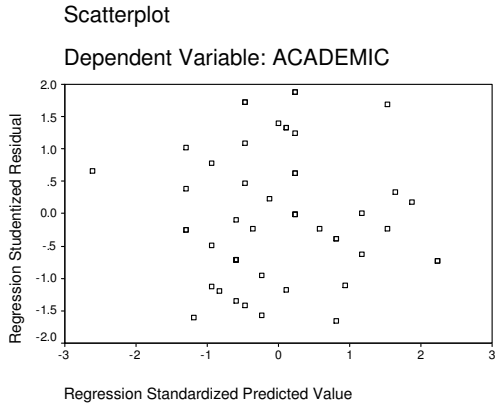

Figure 4. Plot of Studentized Residuals for Academic Reading Module of IELTS

Testing the Second Hypothesis

To test the second null hypothesis of the study, correlation was run between brain dominance and General Reading Module of IELTS. The results are demonstrated in Table 4.

As demonstrated by Table 5 the correlation (r= 0.45) came out to be significant at 0.01 level (p=0.001< 0.05). As Table 5 depicts, R square came out to be 0.2 and the 95% confidence interval 0.2-0.65. R square of 20% is a little bit lower than the 25% which is the large effect size but higher than 0.09 meaning that it is a medium effect size and thus, the correlation was reliable. Moreover, the restricted confidence interval indicated that the correlation was also precise.

Therefore, the researchers were also able to reject the second null hypothesis that stated that there was no significant relationship between EFL learners' left/right brain dominance and their comprehension of General Reading Module of IELTS.

Table 2. Pearson Correlation between Brain Dominance and Academic Reading Module of IELTS

Correlations

		BD	ACADEMIC
BD	Pearson Correlation	1	.550**
	Sig. (2-tailed)	.	.000
	N	50	50
ACADEMIC	Pearson Correlation	.550**	1
	Sig. (2-tailed)	.000	.
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3. Correlation Report

No of cases	R	Sig (2-tailed)	R^2	95% Confidence Interval
50	0.55	0.0005	0.30	0.32 - 0.72

Table 4. Pearson Correlation between Brain Dominance and Academic Reading Module of IELTS

Correlations

		BD	GENERAL
BD	Pearson Correlation	1	.447**
	Sig. (2-tailed)	.	.001
	N	50	50
GENERAL	Pearson Correlation	.447**	1
	Sig. (2-tailed)	.001	.
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Testing the Third Hypothesis

To be able to enter autonomy in the correlation procedure, the data was transformed to check whether the distribution would become normal or not. However, the skewness became worse after transferring the data as the ratio changed from -4.29 to -5.54 meaning that the distribution became yet more negatively skewed. Therefore, the researchers opted for the other solution which is using non-parametric Spearman's rank correlation. The result of the non-parametric correlation between autonomy and Academic Reading Module are demonstrated in Table 6.

As demonstrated by Table 6, neither the Kendall's tau-b nor Spearman's rho came out to be significant for autonomy and Academic Reading Module (r= 0.054, p= 0.614 for the Kendall's tau-b, r=0.069, p= 0.635 for the Spearman's rho). Therefore, the researchers were not able to reject the third null hypothesis stating that there was no significant relationship between EFL learners' autonomy and their comprehension of Academic Reading Module of IELTS.

Testing the Fourth Hypothesis

To test the fourth null hypothesis, the researchers ran non-parametric correlation between autonomy and the General Reading Module of IELTS for the reason explained in the previous section. The results are presented in Table 7.

As demonstrated by Table 7, neither the Kendall's tau-b (r= 0.11, p= 0.28) nor Spearman's rho (r= 0.16, p= 0.28) came out to be significant for autonomy and the General Reading Module. Therefore, the researchers were not able to reject the fourth null hypothesis that stated that there was no significant relationship between EFL learners' autonomy and their comprehension of General Reading Module of IELTS.

Testing the Fifth and Sixth Hypotheses

Since the correlation between autonomy and Academic Reading and General Reading Modules did not become significant, there was no need to run a multiple regression analysis to test the fifth and sixth hypotheses.

That is, since only brain dominance significantly correlated with the two reading modules, the researchers only needed to run a regression analysis for brain dominance, and in case the models came out to be significant, with the ab

sence of a significant correlation between autonomy and the two predicted variables, the researchers would be able to reject the fifth and sixth null hypothesis. The results of the regression analysis are presented hereunder.

In the first regression model brain dominance (BD) was the predictor (independent) variable and the General Reading Module was the predicted (dependent) variable. Table 8 presents the regression model summary including the R and R square.

As reported in Table 8, R came out to be about 0.45 and R square came out to be about 0.2. Table 9 reports the results of ANOVA ($F_{1,48}$= 11.95, p=0.001) which came out to be significant.

Table 10 demonstrates the standardized beta coefficient (B=0.447, t= 3.45, p= 0.001< 0.05) which reveals that the model was significant, meaning that brain dominance could significantly predict the General Reading Module scores of the candidates.

Table 5. Correlation Report

No of cases	R	Sig (2-tailed)	R^2	95% Confidence Interval
50	0.45	0.001	0.2	0.2 - 0.65

Table 6. Nonparametric Correlation between Autonomy and Academic Reading

Correlations

			AUTONOMY	ACADEMIC
Kendall's tau_b	AUTONOMY	Correlation Coefficient	1.000	.054
		Sig. (2-tailed)	.	.614
		N	50	50
	ACADEMIC	Correlation Coefficient	.054	1.000
		Sig. (2-tailed)	.614	.
		N	50	50
Spearman's rho	AUTONOMY	Correlation Coefficient	1.000	.069
		Sig. (2-tailed)	.	.635
		N	50	50
	ACADEMIC	Correlation Coefficient	.069	1.000
		Sig. (2-tailed)	.635	.
		N	50	50

Table 7. Nonparametric Correlation between Autonomy and General Reading

Correlations

			AUTONOMY	GENERAL
Kendall's tau_b	AUTONOMY	Correlation Coefficient	1.000	.115
		Sig. (2-tailed)	.	.280
		N	50	50
	GENERAL	Correlation Coefficient	.115	1.000
		Sig. (2-tailed)	.280	.
		N	50	50
Spearman's rho	AUTONOMY	Correlation Coefficient	1.000	.157
		Sig. (2-tailed)	.	.276
		N	50	50
	GENERAL	Correlation Coefficient	.157	1.000
		Sig. (2-tailed)	.276	.
		N	50	50

Table 8. Model summary – R and R Square

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.447[a]	.199	.183	1.0611

a. Predictors: (Constant), BD

b. Dependent Variable: GENERAL

Although normality of the distributions were checked for correlation in the previous sections, the residuals table (Table 11) also verified the absence of outstanding outliers as the Cook's distance values did not exceed 1 and Mahalanobis distance values did not exeed 15.

Therefore, the researchers were able to reject the fifth null hypothesis. On one hand, no significant correlation was found between the participants' autonomy and General Reading Module of IELTS and on the other hand, the regression analysis model for brain dominance and General Reading Module demonstrated that brain dominance was a significant predictor of General Reading. Therefore, there existed a significant difference between autonomy and brain dominance in predicting the participants' scores on General Reading Module of IELTS.

Next the regression analysis was carried out for Academic Reading Module as the predicted variable and brain dominance as the predictor variable. Table 12 represents R and R square for this regression analysis.

As reported in Table 12, the R came out to be 0.55 and R square came out to be 0.3. Furthermore, the results of ANOVA came out to be significant ($F_{1,48}= 13.56$, $p<0.05$).

Table 13 demonstrates the standardized beta coefficient (B=0.55, t= 4.567, $p< 0.05$) which reveals that the model was significant meaning that brain dominance could significantly predict the candidates' scores on Academic Reading Module of IELTS. Therefore, the researchers were able to reject the fifth null hypothesis as no significant correlation was found between autonomy and Academic Reading Module of IELTS but brain dominance significantly predicted the scores on Academic Reading Module of IELTS.

Finally, although normality of the distributions were checked for correlation in the previous sections, the residuals table also verified the absence of outstanding outliers as the Cook's distance values do not exceed 1 and Mahalanobis distance values do not exceed 15 as demonstrated in Table 14.

Table 9. Regression Output: ANOVA

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.459	1	13.459	11.954	.001[a]
	Residual	54.041	48	1.126		
	Total	67.500	49			

a. Predictors: (Constant), BD

b. Dependent Variable: GENERAL

Table 10. Regression Output: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.667	.748		3.566	.001
	BD	.211	.061	.447	3.457	.001

a. Dependent Variable: GENERAL

Table11. Regression Output: Residuals Statistics

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	4.422	6.459	5.200	.5241	50
Std. Predicted Value	-1.485	2.401	.000	1.000	50
Standard Error of Predicted Value	.1501	.3937	.2030	.0626	50
Adjusted Predicted Value	4.520	6.691	5.214	.5387	50
Residual	-2.396	2.016	.000	1.0502	50
Std. Residual	-2.258	1.900	.000	.990	50
Stud. Residual	-2.324	1.923	-.007	1.012	50
Deleted Residual	-2.538	2.064	-.014	1.0993	50
Stud. Deleted Residual	-2.441	1.980	-.007	1.026	50
Mahal. Distance	.000	5.767	.980	1.372	50
Cook's Distance	.000	.175	.024	.036	50
Centered Leverage Value	.000	.118	.020	.028	50

a. Dependent Variable: GENERAL

Table12. Model summary – R and R Square

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.550[a]	.303	.288	.8064

a. Predictors: (Constant), BD

b. Dependent Variable: ACADEMIC

Table13. Regression Output: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.713	.488		5.558	.000
	BD	.186	.041	.550	4.567	.000

a. Dependent Variable: ACADEMIC

Table14. Regression Output: Residual Statistics

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	3.511	6.053	4.880	.5261	50
Std. Predicted Value	-2.602	2.230	.000	1.000	50
Standard Error of Predicted Value	.1140	.3208	.1540	.0484	50
Adjusted Predicted Value	3.419	6.130	4.881	.5349	50
Residual	-1.311	1.499	.000	.7982	50
Std. Residual	-1.626	1.859	.000	.990	50
Stud. Residual	-1.654	1.879	-.001	1.007	50
Deleted Residual	-1.357	1.531	-.001	.8258	50
Stud. Deleted Residual	-1.685	1.931	.002	1.019	50
Mahal. Distance	.000	6.773	.980	1.435	50
Cook's Distance	.000	.104	.017	.020	50
Centered Leverage Value	.000	.138	.020	.029	50

a. Dependent Variable: ACADEMIC

Discussion

Overall, the analyses of data reported in previous sections yielded that there was no significant relationship between autonomy and Academic Reading Module of IELTS. The correlation between autonomy and General Reading Module of IELTS was not significant either. However, brain dominance significantly correlated with both Academic Reading and General Reading Modules of IELTS. The results of the regression analyses also revealed that brain dominance could significantly predict the scores on Academic and General Reading Modules of IELTS. This indicated that brain dominance was a predictor but autonomy was not a predictor for the reading comprehension of candidates as measured by Academic and General Reading Modules of IELTS.

According to Bakker (1979, 1992) reading begins as a predominantly right hemisphere process with emphasis on strict visual processing when decoding and eventually switching to a more fluid linguistic process involving language centers of the left hemisphere for fluent readers. This supports the findings of the present study in that it shows both hemispheres are involved in reading comprehension and when there is variance in brain dominance there also exists variance in reading comprehension ability.

However, as for the learner autonomy the findings of this study were in contradiction with what is found in the literature. Other studies have found relationship between learner autonomy and reading comprehension (Talebi, 2009) however, in this study learner autonomy did not significantly correlate with academic and general reading comprehension. Since learner autonomy was measured by means of a questionnaire there might have been the possibility that the participants were not truthfully answering the autonomy questionnaire.

Conclusion

The current research aimed at seeking any possible relationship among EFL Learners' left/right brain dominance, their autonomy and their performance on the Academic and General Reading Modules of IELTS. Based on the results of the study, the researchers concluded that significant correlation as well as predictability existed between brain dominance and reading comprehension of General and Academic Reading Modules of IELTS examination. The implication of this study is for teachers who teach preparatory courses for IELTS examination. IELTS candidates also can become aware of the possible relationship between their brain dominance and their performance on this test and find ways of improving their performance. Since in this study, brain dominance came out to be significantly correlated with Academic and General Reading, making the students aware of their brain dominance and how it is related to their reading comprehension might influence their practice and performance on these reading tests.

According to Torrance (1980), left-brain dominants are analytic readers, rely on language in thinking and remembering, favor logical problem solving, and prefer multiple-choice tests. On the other hand, right-brain dominants are synthesizing readers, rely on images in thinking and remembering, favor intuitive problems solving, and prefer open-ended questions. These built-in features of their brains might influence the performance of the learners on the reading or other sections of the high-stakes tests. Although this study was not able to investigate such impacts and merely focused on finding the correspondence between the variation in brain dominance and the variation in reading comprehension, it highlights an important issue in the domain of language teaching and testing which can have implications for those who are involved in this domain. Therefore, one interesting area of further research might be the investigation of the difference between left and right brain dominants in performing on different reading comprehension question types. The results of such a study would indicate which question types are better answered by left brain dominants and which by the right brain dominants if any difference is found.

References

Aebersold, J. A. & M. L. Field. (1997). *From Reader to Reading Teacher*: *Issues and Strategies for Second Language Classrooms*. Cambridge: Cambridge University Press.

Alexader, R. (1980). A Learning-to-learn Perspective on Reading in a Foreign Langauge. *System*, *8*(2), 113-119.

Bakker, D. J. (1979). Hemispheric Differences and Reading Strategies: Two Dyslexics? *Bulletin of the Orton Society, 29*, 84-100.

Bakker, D. (1992). Neuropsychological Classification and Treatment of Dyslexia. *Journal of Learning Disabilites, 25*, 102-109.

Benson, P. (2001). *Teaching and Researching Autonomy in Language Learning*. London: Longman.

Benson, P. & Voller, P. (1997). *Autonomy and independence in language learning*. Longman, London.

Chall, J. (1979). The Great Debate: Ten Years Later, with a Modest Proposal for Reading Stages. In L. Resnick & P. Weaver (Eds.), *Theory and Practice of Early Reading*, *1* (pp. 29-56). Hillsdale, NJ: Lawrence Erlbaum Associates.

Davis, C. E., Nur, H., & Ruru, A. A. S. (1994). Helping Teachers and Students Understand Learning Styles. *English Teaching Forum*, *32*(3). Retrieved on August 28, 2010 from http://www.eca.state.gov/ forum/vols/vol32/no3/p12.htm

Feldman, R. S. (1996). *Elements of Psychology*. New York: McGraw- Hill International Editions.

Gazzaniga, M. S. (1983). Right-Hemisphere Language Following Brain Bisection: A Twenty- Year Perspective. *American Psychologist*, *38*, 525-537

Genesee, F. (1982). Experimental Neuropsychological Research on Second Language Processing. *TESOL Quarterly*, *16*, 315.

Hellige, J. (1990). Hemispheric Asymmetry. *Annual Review of Psychology, 41,* 55-80.

Holec. H., (1980). Learner training: Meeting needs in self-directed learning. In Altman, H. B. & James, C. V., (Eds.), *Foreign language learning: Meeting individual need* (pp. 30-45). Pergamon, Oxford.

Larson-Hall, J. (2010). *A guide to doing statistics in second language research using SPSS*. NY: Routledge.

Nuttal, C. (1996). *Teaching Reading Skills in a Foreign Language*. London: Longman.

Obler, L. (1981). Right Hemisphere Participation in Second Language Acquisition. In K. Diller, (Ed.), *Individual Differences and Universals in Language Learning Aptitude* (pp. 53-64). Rowley, MA: Newbury House.

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

Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. Boston, MA: Heinle & Heinle.

Perfetti, C. A. & Lesgold, A. M. (1979). Coding and Comprehension in Skilled Reading and Implications for Reading Instruction. In L. Resnik & P. Weaver (Eds.), *Theory and Practice of Early Reading* (pp. 20-53). Hillsdale, NJ: Lawrence Wrlbaum Associates.

Selinger, H. W. (1982). *Treatment Assessment of Learning Disabled Children: Is There a Role for Frequently Repeated Neuropsychological Testing?* Retrieved on January 14, 2010 from http://www. sciencedirect.com/ science?_ob=ArticleURL&_ udi = B6VDJ460 8V2W15 &_user= 10&_ coverDate =12%2F31%2F1987&_rdoc=1&_fmt=high&_orig= search&_sort=d&_docanchor=&view=c&_acct=C00 0050221&_version=1&_urlVersion=0&_userid=10 &md5=af694db3bc8cc051e44be21c3d159928/

Shaywitz, B. S., Pugh, L. R., Jenner, A. R., Fulbright, R. K., Fletcher, J. M., Gore, J. C. & Shywitz, S. E. (2000). The Neurobiology of Reading and Reading Disability (dyslexia). In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of Reading Research (pp. 45-86)*. Mahwash, NJ. Lawrence Erlbaum Sociates.

Springer, S. P., & Deutch, G. (1985). *Left Brain, Right Brain* (3rd Ed.). New York: Freeman.

Talebi, S. H. (2009). An Attempt towards Learner Autonomy in L2 (English) an L3 (Arabic) Reading through Cognitive and Metacognitive Reading Strategy Instruction (CMRSI) in L2. *Indian Journal of Applied Linguistics*, *35*(2). 101-112.

Torrance, E. P. (1980). Growing up Creatively Gifted: A 22-Year Longitudinal Study. *Creative Child and Adult Quarterly, 5,*148–170.

Wenden, A. (1998). *Learner Strategies for Learner Autonomy*. Great Britain: Prentice Hall.

Zhang, L. X. & Li X. X. (2004). A Comparative Study on Learner Autonomy between Chinese Students and West European Students. *Foreign Language World*, *4*, 23.

Mona Khabiri

Is Assistant Professor of Applied Linguistics at Islamic Azad University, Central Tehran Branch and the director of Journal of English Language Studies (JELS). She mainly teaches language testing, research methodology, seminar in TEFL issues, and teaching language skills at graduate level and her main areas of interest include teacher education, critical thinking, learner's autonomy, and task- based language teaching and learning. She has published papers in international and national academic journals and presented in several national and international seminars.

Mahdis Heidari

Holds an M.A. degree in TEFL from Islamic Azad University, Central Tehran Branch. She is currently teaching reading comprehension, general English, preprequisite English, and Research courses at Payame Noor University at Sari, Adibe Mazandaran University Sari Branch Ruzbehan, Sariyan, and

Rahiyane Nour in Sari and is particularly interested in conducting research on reading comprehension.

Appendix A

Questionnaires to investigate the Learner autonomy of the subjects:
Direction: In order to investigate the Learner autonomy, will you please circle the one closest answer to the following questions according to your true cases. Thank you very much for your help and patience!

Part I (A. never B. rarely C. sometimes D. often E. always.)

1. I think I have the ability to learn English well. A B C D E
2. I make good use of my free time in English study. A B C D E
3. I preview before the class. A B C D E
4. I find I can finish my task in time. A B C D E
5. I keep a record of my study, such as keeping a diary, writing review etc. A B C D E
6. I make self-exam with the exam papers chosen by myself. A B C D E
7. I reward myself such as going shopping, playing etc. when I make progress. A B C D E
8. I attend out-class activities to practice and learn the language. A B C D E
9. During the class, I try to catch chances to take part in activities such as pair/group discussion, role-play, etc. A B C D E
10. I know my strengths and weaknesses in my English study. A B C D E
11. I choose books, exercises which suit me, neither too difficult nor too easy.

    A B C D E

Part II

12) I study English here due to:
A. my parents' demand
B. curiosity
C. getting a good job, help to my major
D. interest of English culture, such as film, sports, music, etc.
E. C and D
13) I think the learner-teacher relationship is that of:
A. receiver and giver
B. raw material and maker
C. customer and shopkeeper

D. partners
E. explorer and director
14) I think my success or failure in English study is mainly due to:
A. luck or fate
B. English studying environment
C. studying facilities(aids)
D. teachers
E. myself
15) Whether students should design the teaching plan together with teachers or not, my opinion is:
A. strongly agree
B. agree
C. neutral
D. oppose
E. strongly oppose
16) When the teacher asks questions for us to answer, I would mostly like to:
A. wait for others' answers
B. think and ready to answer
C. look up books, dictionaries
D. clarify questions with teachers
E. join a pair/group discussion
17) When I meet a word I don't know, I mainly:
A. let it go
B. ask others
C. guess the meaning
D. B and E
E. look up the dictionary
18) When I make mistakes in study, I'd usually like the following ones to correct them:
A. let them be B. teachers
C. classmates D. others
E. books or dictionaries
19) When I am asked to use technologies that I haven't used before(e. g. internet discussion),
A. I usually try to learn new skills
B. I learn them following others
C.I feel worried, but anyway
D. I put it off or try to avoid it
E. I resist using them
20) 1 think the following way is most useful in my English study:
A. taking notes
B. mechanic memory
C. doing exercises of grammar, translation, words etc.
D. classifying or grouping or comparing
E. group discussion
21) I usually use materials selected:
A. only by teachers
B. mostly by teachers
C. by teachers and by myself
D. mostly by myself
E. only by myself

Appendix B
Brain Dominance Questionnaire

1. I prefer the kind of classes

__a. where I listen to an authority.
__b. in which I move around and do things.
__c. where I listen and also do things.

2. Concerning hunches:

__a. I would rather not rely on them to help me make important decisions.
I frequently have strong ones and follow them.
__b. I occasionally have strong hunches but usually I do not place much faith in them or
__c. consciously follow them.

3. I usually have a place for things, a way of doing things, and an ability to organize information and materials.

__a. Yes.
__b. No.
__c. In some areas of my life, but not in others.

4. When I want to remember directions, a name, or a news item, I usually:

__a. write notes.
__b. visualize the information.
__c. associate it with previous information in several different ways.

5. In note taking, I print:

__a. never.
__b. frequently.
__c. sometimes.

6. I prefer the kind of classes

__a. where there is one assignment at a time, and I can complete it before beginning the next one.
__b. where I work on many things at once.
__c. I like both kinds about equally.

7. When remembering things or thinking about things, I do so best with:

__a. words.
__b. pictures and images.
__c. both equally well.

8. In reviewing instructions, I prefer:

__a. to be told how to do something.
__b. to be shown how.
__c. no real preference for demonstration over oral instruction.

9. I prefer:

__a. dogs.
__b. cats.
__c. no preference for dogs over cats or vice versa.

10. I am:

__a. almost never absentminded.
__b. frequently absentminded.
__c. occasionally absentminded.

11. Do you instinctively feel an issue is right or correct, or do you decide on the basis of information?

__a. decide on the basis of information.
__b. instinctively feel it is right or correct.
__c. I tend to use a combination of both.

12. I have

__a. no or almost no mood changes.
__b. frequent mood changes.
__c. occasional mood changes.

13. I am:

__a. easily lost in finding directions, especially if I have never been to that place before.
__b. good at finding my way, even when I have never been in that area.
__c. not bad in finding directions, but not really good either.

14. I get motion sickness in cars and boats:

__a. hardly ever.
__b. a lot.
__c. sometimes.

15. I generally:

__a. use time to organize work and personal activities.
__b. have difficulty in pacing personal activities to time limits.
__c. usually am able to pace personal activities to time limits with ease.

16. I prefer to learn:

__a. details and specific facts.
__b. from a general overview of things, and to look at the whole picture.
__c. both ways about equally.

17. I learn best from teachers who:

__a. are good at explaining things with words.
__b. are good at explaining things with demonstration, movement, and/or action.
__c. do both.

18. I am good at:

__a. explaining things mainly with words.
__b. explaining things with hand movements and action.
__c. doing both equally well.

19. I prefer to solve problems with:

__a. logic.
__b. my gut feelings.
__c. both logic and gut feelings.

20. I prefer:

__a. simple problems and solving one thing at a time.
__b. more complicated problems, more than one thing.
__c. both kinds of problems.

21. Daydreaming is:

__a. a waste of time.
__b. a usable tool for planning my future.
__c. amusing and relaxing.

22. I prefer classes in which I am expected:

__a. to learn things I can use in the future.
__b. to learn things I can use right away.
__c. I like both kinds of classes equally.

23. I am:

__a. not very conscious of body language. I prefer to listen to what people say.
__b. good at interpreting body language.
__c. good at understanding what people say and also in interpreting body language.

24. In school, I preferred:

__a. algebra.
__b. geometry.
__c. I had no real preference of one over the other.

25. In preparing myself for a new or difficult task, such as assembling a bicycle, I would most likely:

__a. lay out all the parts, count them, gather the necessary tools, and follow the directions.
__b. glance at the diagram and begin with whatever tools were there, sensing how the parts fit.
__c. recall past experiences in similar situations.

26. In communicating with others, I am more comfortable being the:

__a. talker.
__b. listener.
__c. I m usually equally comfortable with both.

27. I can tell fairly accurately how much time has passed without looking at a clock.

__a. Yes.
__b. No.
__c. Sometimes.

28. I like my classes or work to be:

__a. planned so that I know exactly what to do.
__b. open with opportunities for change as I go along.
__c. both planned and open to change.

29. I prefer:

__a. multiple-choice tests.
__b. essay tests.
__c. I like both kinds of tests equally.

30. In reading, I prefer:

__a. taking ideas apart and thinking about them separately.
__b. putting a lot of ideas together before applying them to my life.
__c. both equally.

31. When I read, I prefer to look for:

__a. specific details and facts.
__b. main ideas.
__c. both about equally.

32. I enjoy:
__a. talking and writing.
__b. drawing and handling things.
__c. doing both equally.

33. It is more exciting to:
__a. improve something.
__b. invent something.
__c. both are exciting to me.

34. I am skilled in:
__a. putting ideas in a logical order.
__b. showing relationships among ideas.
__c. both equally.

35. I am good at:
__a. recalling verbal material (names, dates).
__b. recalling visual material (diagrams, maps).
__c. equally good at both.

36. I remember faces easily.
__a. No.
__b. Yes.
__c. Sometimes.

37. When reading or studying, I:
__a. prefer total quiet.
__b. prefer music.
__c. I listen to background music only when reading for enjoyment, not while studying.

38. I like to learn a movement in sports or a dance step better by:
__a. hearing a verbal explanation and repeating the action or step mentally.
__b. watching and then trying to do it.
__c. watching and then imitating and talking about it.

39. Sit in a relaxed position and clasp your hands comfortably in your lap. Which thumb is on top?
__a. Left.
__b. Right.
__c. They are parallel.