



**The Effect of Hemispheric Dominance on Iranian EFL Learner's Creativity in writing by  
1.Hiwa Weisi and 2. Zahra Khaksar**

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**Abstract**

The theory of hemisphericity that gain importance in the recent years, related to the idea that people may prefer to use the mode of cognitive processing which is related to the activity on the part of the left or right cerebral hemisphere. This article aimed at investigating the relationship between Iranian English as a foreign language (EFL) learner's left or right hemispheric dominance and their creativity in EFL writing. The results of the writing section of a TOEFL (2010) was used to select a homogeneous group of 50 junior and senior English translation students at Islamic Azad University, Hamadan Branch. Next the Hemispheric Dominance Test (HDT) by Venkataraman (1988) and also adapted Torrance Test of Creative Thinking (TTCT) that was used for measuring their creativity in English writing and is thought to be the best test to evaluate the creativity dimensions of students in writing (Rabbah, et al, 2013) were administered to obtain the data. Findings of the study indicated that right brain dominant learners had better performance in creativity in writing test. As a conclusion, it can be said that investigating hemispheric dominance from the aspects of curriculum and teaching methods will help teachers to design better syllabuses for improving the creativity of students in writing.

**Keywords:** Hemispheric Dominance. Creative Writing. Hemispheric Dominance Test (HDT). Torrance Test of Creative Thinking (TTCT)



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### **Introduction**

Brain is the most complicated part of the body. According to Steinberg (1993), brain is placed under the skull and composed of almost 10 billion neurons and billions of fibers that connect the neurons. Brain consists of four major parts: the medulla oblongata, the pons Varolli, the cerebellum and the cerebral cortex from the front to the back of it.

Hemispheres in two halves are placed in the cerebral cortex and there is a tissue with the name of the corpus callosum which connects them together. Hemispheres are composed of four parts of frontal, parietal, temporal and occipital lobes. Different functions of the brain are related to different lobes. For example, cognitive functions are processed in the frontal lobe, physical movement processing in the parietal lobe, hearing in the temporal lobe and occipital lobe is responsible for vision processes. Language structures and functions are also involved in some of the areas of hemispheres. Phenomenon in which one of the hemispheres became the dominant one is called hemispheric dominance (Steinberg, 1993 and Lemonick, 1995).

Steinberg (1993) pointed out that brain assigns certain functions and structures to special hemispheres of it. The functions of the left brain are defined by sequence and order in comparison with the functions of the right brain, which has the characteristic features of being holistic (Munzert, 1980). Tendero (2000) mentions that left brain dominance is mostly related to academic success and intelligence, while right brain dominance is related to creativity.

The theory of hemisphericity is related to the activity on the part of the left or right cerebral hemisphere. Recently, the interest toward working on the area of special parts of hemisphere has increased. There exists different interpretations of the hemisphericity term but generally it refers to cognitive information processing and is related to the left or the right hemisphere (Savadkahi, et al. 2013). Shirlin & Ramesh, (2014) defined hemispheric dominance as the extreme use of left or right brain.

According to Joseph (1982) and Kelin, Allen & Schwartz (1998) there is a correlation between hemisphericity and other features of personality, like thinking and reasoning and so they relate it to various fields of education like foreign language learning. Prince (1978) pointed out that people are different with consideration of their hemispheric dominance in their performances. When the child grows up, his/her brain functions become lateralized. Analytical and logical thinking plus linear information processing are usually related to left brain dominance while right brain dominance is mostly related to understanding and remembering visual, integrative and emotional processing.

Children are different in their hemispheric dominance and it has direct effect on their potential for learning, which means that different people use different sides of their brain for cognitive



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information processing (Gibson 2002). Alptekin & Atakan (1990) pointed out that usually one side of brain is specialized for different kinds of activities or tasks.

Obler (1981) explains the Split-Brain Model of Intelligence in which the features of the left-brain and the right-brain hemispheres were clarified. Ellis (1985) through his neurofunctional theory proved that there was a close link between neural anatomy and language function.

Another variable in this study is creativity in writing. Writing is one of four major skills and has an important place in most language classes. It is a necessity for second language learners to write in English for occupational and academic purposes. Writing remains the commonest way for examining the students' performance in the target language that success in which requires an ability to write (Rivers, 1981).

Hadley (2003) defined writing as a means for reformulating and recording knowledge as well as developing ideas. Writing can be considered as an important tool for expressing creativity and personal discovery.

Broadly speaking, creativity refers to the learner's ability for generating new ideas in cognitive processing. Another definition of creativity is "To bring into being or form out of nothing." "The creative process... refers to the sequence of thoughts and actions that leads to novel, adaptive productions" Martin (2000, p. 52). Hull (1943) pointed out that creativity is related to the new ways of looking at existing problems, or of observing new opportunities.

It is possible to find the relations between hemispheric dominance and creativity specially the right brain hemispheric dominance, although, these two features are not completely correlated. Creativity in writing is one of the factors that has important role in learners success in second or foreign language context. According to (Ibnian, 2010) Creative writing is a type of writing in which the person expresses his thoughts and ideas in an imaginative way. The writer tends not just logically and directly presents and explains the facts and realities, but is going to express feelings and emotions as well.

The main goal of this study is finding about whether there is any relationship between Iranian EFL learner's hemispheric dominance, and their creativity in writing.

### **Review of Related Literature**

Regarding the case of hemispheric dominance, several researchers have done some studies in this area like Stevick's (1982) study on hemispheric dominance in which the results have shown that left brained learners are good at word productions and analyzing languages and abstract concepts while right brained learners are more intuitive and can make subjective judgments.



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Bavand Savadkouhi, et al (2013) did a study with the title of The Effect of Hemispheric Dominance on Learning Vocabulary Strategies among Iranian EFL Learners whose results have shown that teaching vocabulary strategies had an important role on student's vocabulary knowledge and the point that left brained learners after receiving instructions on vocabulary strategies did better in learning vocabulary in comparison with right brained learners.

Results of the study by Beck (2001) and Dulger (2012) indicated that left or right dominant preferences identify student's ways of receiving information. These studies have also shown that learners will have higher achievements when they receive instructions suitable for their left or right brain dominance.

Some researchers like, Alptekin and Atakan (1990) and Tendero (2000) found that, there is not a significant relationship between second language proficiency and brain dominance. Opposed to them, Oflaz (2011) and Tufekci and Demirel (2008) worked on the effects of right and left brain dominance on students' academic achievement and learning English and their studies have shown differences between the results of right and left brain students on tests of English.

Alavi and Mireskandari (2014) did a study on the pattern of brain dominance of their ESL learners and how it was related to their use of second language listening comprehension strategies. Their results have shown that there is no relationship between brain dominance and listening strategy use.

Hemispheric Dominance and Teaching Competence– a Study among Student Teachers in Colleges of Education was another study that was done by Shirlin & Ramesh (2014) and the results indicated that most of the participants are left brained learners and so their level of teaching competence is higher than those participants who are integrated and right brained learners.

Breien-Pierson (1988) did a study on the role of hemisphericity in the area of student writing and found out that right brained learners would act better on free and creative writing in comparison with the left-brained learners who prefers writing research papers and book reports.

There have also been some researchers who have worked specifically on the creativity in writing.

Ibnian (2010) in his study investigates whether the use of story- mapping techniques have a role in student's short story writing skills or not. The results have indicated that story mapping techniques was effective for helping students in developing the ability for improving the flexibility, fluency, novelty and the ability for elaborating ideas. Ayasrah and Hamadneh (2010) study have identified student's creative thinking with consideration of gender, type of school, and educational backgrounds of students and the results have indicated differences in participants' creative thinking abilities.



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A study by Long and Hiebert (1985) made a comparison between student's creativity on a writing practice group and an imagery-training group and found out that that the imagery group acts better than the writing practice group on both originality and fluency measures. A similar study by Jampole et al. (1991) has indicated that training and practice in using imagery will increase the student's success in writing creatively.

Working on creative teaching methods like mind mapping, imagery and sensory writing were practiced by Tse and Wong (1995) on eighteen students and the results have shown that student's creativity in writing improved. Although many studies have been done on students' creativity but mostly they were about learners' motivation (Moneta and Siu, 2002) and their level of creativity (Siswono, 2009; Ayasrah and Hamadne, 2010). Only few studies focused on students' creativity in EFL writing (Ibnian, 2010; Ming, 2005).

To the best of our knowledge regarding the relationship between Iranian EFL learners test hemispheric dominance and their creativity in writing, no work has been done yet in Iran and other countries.

### **Research Question**

1. What is the Relationship between Iranian EFL learner's left or right hemispheric dominance and their creativity in writing?

### **Method**

#### **Instrumentation**

##### **TOEFL**

Writing section of TOEFL (2010) was the instrument that was used in this study for the sake of homogenizing the students. It was asked from students to write one essay in 2 or 3 explanatory paragraphs with almost 300 words in 30 minutes. TOEFL Written English Scoring Guide taken from TOEFL Sampler CD (1998) copied by Educational Testing Service (ETS) which consisted of 6 general levels of English Writing achievement was used for scoring. Each level consisted of categories like cohesion, grammatical accuracy, text development, facility with syntax and so on were the measure by which two raters who researcher's colleagues were scored the writing tests.

##### **Hemispheric Dominance Test (HDT)**

The Hemispheric Dominance Test (HDT) that is a revised and adapted version of Davis et al. (1994) Brain Dominance Inventory is a 40 items test with three choices of a, b and c for each item. It was administered to investigate the participants' brain dominance. To put students into groups of left or right hemispheric dominance, first the number of "a", "b", and "c" s in the test



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were calculated. All "a" answers were related to the left-brained learners and all the b's were for the right-brained learners while all the c's were regarded as features of whole-brained learners. Finally all who have higher (a) scores were considered left brain dominant learners and those with higher (b) scores were regarded as right brain dominant learner group and those who got higher (c) scores were considered as whole-brained learners that in this study because the number of whole-brained learners was less were removed from data analysis.

Because Hemispheric Dominance Test (HDT) is a revised and adapted version of Davis et al. (1994) no one yet worked on its reliability and validity but a researcher with the name of Tendero (2000) pilot test it in her classes to make sure that it has clarity of content and instruction and the time allocated for answering the questions is sufficient.

### **Torrance Test of Creative Thinking (TTCT)**

For determining students' creativity in EFL writing, Torrance Test of Creative Thinking (TTCT) was used for the present study. TTCT was developed by Guilford (1967) and Torrance (1965) for assessing students' creativity in writing (Ming, 2005). This test can be used from kindergarten to graduate learners (Ming, 2005). Torrance Test of Creative Thinking is useful for identifying high as well as low creative potential (Millar, 2001). This test has been translated into 35 languages and is the most valid one in comparison with the other creative test (Millar, 2001). Through administering this test researchers were able to measure creativity dimensions of fluency, flexibility, and originality and assign a number from 0 to 10 to student's amount of creativity in writing.

### **Participants**

The participants were a group of 50 junior and senior Iranian EFL students aged between 19- 23 from both genders, who were majoring in translation at Islamic Azad University, Hamadan Branch. They were homogenized based on the results of writing section of TOEFL from among 70 students.

### **Procedures**

To achieve the purpose of study, the following procedures were followed:

Writing section of TOEFL (2010) was the first to be administered. This was done for the sake of homogenizing students. After administering the test and getting the results those students who were outliers and extremes were omitted from the sample and the rest of them were regarded as a final sample. It should be mentioned that the first sample consisted of 70 students and after this pre-test, the outliers and extremes were excluded from the sample and so the sample decreased to 50. In the second step, for investigating student's brain dominance the Hemispheric Dominance



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Test (HDT) was administered. In the next step, In order to identify students' creativity in EFL writing, Torrance Test of Creative Thinking (TTCT) that was developed by Guildford (1967) and Torrance (1965) for assessing students' creativity in writing was administered. It should be noted that both questionnaires were administered by one of the researchers, so that if any question came up she should be able to answer them and clarify the points

The design of this study is ex post facto (correlational). In this design the researcher had no control over what has already happened to students. In this study the brain dominance has been taken as independent variable and students' creativity in writing as the dependent variable.

#### **Results**

This research aimed at investigating whether there is any statistically significant relationship between Iranian EFL learner's brain hemispheric dominance and their creativity in writing.

The data obtained from the administration of writing section of TOEFL (2010), Hemispheric Dominance Test (HDT) and Torrance Test of Creative Thinking (TTCT) were analyzed using the SPSS (version 18) software program.

For homogenizing the participants, after administration of writing section of TOEFL (2010) for ensuring that the grades were the student's true scores, two raters were asked to score the students writings and then the bivariate correlations between the grades was calculated as 83.2 and is shown in table.1 below.

**Table 1: Correlations between the TOEFL (2010) Writing Test Scores**

	Rater 1	Rater 2
Rater 1		
Pearson correlation	1	.832**
Sig.(2-tailed)		.000
N		70
Rater 2		
Pearson correlation	.832	1
Sig.(2-tailed)	.000	
N	70	70

\*\* Correlation is significant at the 0.01 level



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The correlation coefficient between rater1 and rater 2 is significant with an r value of .832 at the  $p < 0.01$  and there is a positive relationship between the grades of two raters.

$$r = 0.832, N = 70, p < 0.01$$

At the next step, Hemispheric Dominance Test (HDT) was administered, after calculating students' scores in HDT; the students were divided between two groups of right brain and left brain dominance, according to the scores that they got. For estimating the internal consistency of items in Hemispheric Dominance Test (HDT), Cronbach's Alpha was used.

**Table 2: Reliability Statistics of HDT**

Cronbach's Alpha	N of items
.947	40

At the next stage, the descriptive statistics of the HDT scores which include the mean and standard deviation calculated and it is shown in table3.

**Table 3: Descriptive statistics for HDT**

	N	Mean	Std. Deviation
Sum	50	15.2057	3.4012

One-sample Kolmogorov- Smirnov test was run as well to check the normality of the data which confirmed the normality of the distributions.

**Table 4: One-sample Kolmogorov-Smirnov of HDT**

		Sum
N		50
Normal Parameters	Mean	15.2057
	Std. Deviation	3.4012
Most Extreme Differences	Absolute	.128
	Positive	.047
	Negative	-.136
Kolmogorov-Smirnov		.859
Asymp. Sig. (2-tailed)		.429





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- a. Test distribution is Normal
- b. Calculated from the data

Later on Torrance Test of Creative Thinking (TTCT) were administered. The reliability and validity has been proved (Rabbah, et al, 2013). In order to have more reliable scores, two raters were asked to score the students test and then the correlations between the grades was calculated and is shown in table 5.

**Table 5: Correlations between Torrance Test of Creative Thinking (TTCT) Scores**

		Rater 1	Rater 2
Rater 1	Pearson correlation	1	.870**
	Sig.(2-tailed)		.000
	N		50
Rater 2	Pearson correlation	.870**	1
	Sig.(2-tailed)	.000	
	N	50	50

\*\* Correlation is significant at the 0.01 level

The correlation coefficient between rater 1 and rater 2 is significant with an  $r$  value of .87 at the  $p < 0.01$  and there is a positive relationship between the grades of two raters.

$$r = 0.87, N = 50, p < 0.01$$

Moreover after adding the grades of two raters, a one-sample Kolmogorov- Smirnov test was also run to check the normality of the data which confirmed the normality of the distributions and the results are shown in table 6.

**Table 6: One-sample Kolmogorov-Smirnov for Torrance Test of Creative Thinking**

	TTCT
N	50



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Normal Parameters	Mean	7.09
	Std. Deviation	2.456
Most Extreme Differences	Absolute	.088
	Positive	.088
	Negative	-.089
Kolmogorov-Smirnov		1.029
Asymp. Sig. (2-tailed)		.199

a. Test distribution is Normal

b. Calculated from the data

Then an independent sample t-test was run which is used for measuring the possible differences between the means of the creativity in writing scores of the two groups of right brain and left brain dominance learners.

By observing the means in group statistics table, right hemisphere dominance learners (8.70) and Left hemisphere dominance learners (7.39), it is obvious that those in higher group act better in creativity in writing test. Std. deviation shows that the group of right hemisphere dominance learners has a wider spread of scores than left hemisphere dominance learners.

In order to become sure whether this difference is significant the second table which is independent sample t- test should be examined.

One of the criteria for using a parametric t-test is the assumption that both samples have equal variance. At first we should examine the Levene's test for equality of variance. If the test statistic  $F$  is not significant, Levene's test has found that the two variances do not differ significantly which means that the  $P$  should be more than 0.05 and then we can report the top line, otherwise the bottom line should be reported. In this case by regarding  $F = .477, p > 0.05$  we can accept the equal variances assumption and the first line should be reported.

$$t(118) = 9.547; P < 0.05$$

So the results proved that students with right brain dominance performed better than those students with left brain dominance. The results of group statistics and independent sample t- test is shown in the following tables.



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**Table 7: Independent Sample T-Test for right and left hemisphere dominance**

Grouping	N	Mean	Std. Deviation	Std. Error Mean
Creativity RHD	26	8.70	1.932	.238
in writing LHD	24	7.39	1.846	.231

	Levene's test for equality of variances		T test for equality of means						
	F	Sig	t	Df	Sig.(2-tailed)	Mean Difference	Std.error Difference	95% confidence interval of the difference	
								Lower	Upper
Creativity in writing									
Equal variances assumed ,	.468	.480	9.536	107	.000	3.304	.336	2.618	4.002
equal variances not assumed			9.543	106.971	.000	3.304	.336	2.617	4.001

### Discussions and Pedagogical Implications

This article aimed at investigating the relationship between Iranian English as a foreign language (EFL) learner's left or right hemispheric dominance and their creativity in EFL writing. The results of present study by comparing the means of learners in right brain dominant (9.70) and left brain dominant groups (6.39) and the correlation that can be said to be significant enough (.491) significant at ( $P < 0.01$ ) made us certain that the right brain dominant learners had better results in creativity in writing in comparison with left brained dominant learner group.



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Regarding these results it can be suggested that because left brained learners are more logical and analytical in comparison with right brained learners, so they trust more on their logic and less on their creativity and their original ideas. But right brained learners are more reflexive and responds intuitively to stimulus and show flexibility and balance in their thoughts and so it could be assumed that their writings could be more creative.

The findings of this study were in line with other studies, like the study of Tendero (2000) and Breien-Pierson's (1988) study in which they believe in the role of hemisphericity in learning and thinking for students writings. Breien-Pierson pointed out that the right-brained students act differently from the left-brained students on writing compositions. Right brained learners prefer to work more on free and creative writing but the left-brained learners are more successful at doing research papers and book reports.

According to (Rabbah, et al, 2013) the creative aspect of language use for all ages contained in the fact that learners' knowledge of language is not just the use of correct sentences and rules because learners can innovate over the rules which is the special feature of right brained learners. The children cannot observe the rules directly. They are learning the rules indirectly from experience and are continuously constructing the rules by themselves actively. Ibnian (2010) emphasizes on the fact that persons strong in right hemisphere dominance have the ability to "analyze one's own use of language, apply rules of language to new and different contexts and more important than that to explain and express one's self in writing" (p.6) but those learners who are left brain dominant sometimes just try to detect patterns, reason deductively and think logically.

Another reason that could be mentioned for better performance of right brain dominant learners in creativity in writing in this study is their ability for manipulating and creating mental images in one's mind (Nolen, 2003) that may have a strong correlation with one's ability in writing. For writing competently a writer should at first clarify the point for him/herself and as (Rabbah, et al, 2013) mentions "The creativity is more needed when a person should comprehend every detail first and then have an idea about something" (p.5)

According to theory of hemisphericity, language learners are different in their cognitive information processing. Generally, it can be said that an understanding of hemisphericity theory broadens teacher's awareness of their students' knowledge and skills of processing and enables them to look at each student from the perspective of his strengths and potential (Tendero, 2000). Teachers by understanding the hemispheric dominance of their students can have more variety in the way of their teaching and giving assignments to students in order to increase their effectiveness in meeting each student's needs. In addition, teachers can use hemisphericity theory acts as a guide for developing classroom activities that address multiple ways of cognitive information processing (Ming, 2005).



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The results obtained in this research lead us to this point that psycholinguistic issues have an effective role in teaching and learning. Teachers, educators and syllabus designers should have this point in mind when designing materials and choosing the kind of activities in their teaching programs to motivate students and to satisfy their needs.

**Conclusion**

The present study was an attempt to investigate the relationship between Iranian EFL learners Hemispheric Dominance and their creativity in writing. The results obtained indicated that there is a positive relationship between being right dominant learner and Iranian EFL learners' creativity in writing.

It has been noted in many studies that left brained learners can have the ability of higher order thinking and problem solving (Brown, 2007; Palincsar&Herrenkol, 2002) in comparison right-brained learners are good at responding to demonstrative instructions and visuals (Bavand Savadkouhi, et al. 2013).

According to these findings, teachers can find the best practical strategies for their own classes and can figure out what kind of activities the students need to improve the part of their brain apart from the dominant one.

With Consideration of individual differences and in this regard their differences in hemispheric dominance on the cognitive information processing; it would be good idea that teachers combine activities that would suit both left and right brain learners. According to Jhaish (2010) by taking into account the students' brain dominance, teachers must not only make use of linear models but also creative models so that learners would be able to use both hemispheres.

The present study had some limitations like the low number of participants. It could be recommended that there would be some other studies on learners with different proficiency levels or the role of other factors like age, sex, socio-economic situation and prior experiences like educational background or even the family levels taken in to account.

Although the most famous test for measuring hemispheric dominance (HDT) , was used in this study it should also be considered that other specialized test for this purpose can be used as well. Other studies can also focus on the role of hemispheric dominance in other kinds of writing test or different language skills.

Finally, it should be pointed out that the results of this study should not be overgeneralized and should be applied with caution.



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