

THE CONTRIBUTION OF BRAIN DOMINANCE TO READING SKILL OF IELTS

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Abstract : A popular theory in neuroscience, brain dominance, has influenced on education since studying of human brain plays important role to improve quality of teaching and learning outcomes. The purpose of this study is to find out the significant correlation between brain hemispheric dominance and reading skill of IELTS, and to identify the significant difference among students at the same level who have different categories of brain dominance in reading skill of IELTS. Students' score in reading of IELTS and categories of brain dominance in the basis of personal traits and cognitive styles from 114 students of three different universities at the context of EFL were correlated and analyzed in Pearson Chi-Square, Kruskal –Wallis, and Mann-Whitney. The findings show that there is significant correlation between two variables. Different categories of brain dominance influence on students' reading skill of IELTS. Findings of this study support what the theorists of brain dominance claim that individuals who have different brain dominance tend to be different in doing specific tasks.

Keywords : *Brain dominance, Left-right hemisphere, Reading skill, IELTS*

INTRODUCTION

English language teaching becomes an essential part of educational tradition in Indonesia. Functions of English as an international language, medium of global communication, a tool to support economic development and an integral part of globally political aspects provide opportunity to worldwide people in learning English as a first, second, and foreign language. To facilitate English learners from diverse groups in transforming language proficiency, theoretical aspects of English teaching and learning are developed to find out suitable context based on ongoing innovation in educational practice. Collaborating two fields of study to provide a perspective in psychological aspects of the learners can be a key point to identify the students' potentials and needs. Neuroscience and education are two interdisciplinary studies. Understanding of how human brain works can provide information to curriculum designers, teachers, lecturers, learners and other educational practitioners to achieve

learning and teaching goals. To maximize students' capacity in learning specific skills in English, characteristics of the brain need to be explored. Hart (1983), states that teaching without understanding how the brain works can be similarized to designing a glove with no sense of what hand looks like. In teaching, classrooms are places of learning and in thinking; the brain is organ of mind.

One of popular theories in neuroscience, brain dominance personalities, from which many psychologists stand on the idea that each individual is different in terms of doing specific tasks based on what brain dominance they possess. Dubin (2001), states that brain cells are classified into two main hemispheres that are differently and specifically functioned to respond visual signals transmitted to the brain processor from eyes. In specific function of brain hemisphere, Steinberg (1993), states that the brain consists of certain structures and functions. Left hemisphere controls language, logical and analytical

operation, and higher mathematics while right hemisphere is superior at recognizing emotions, recognizing faces, and taking in the structures of things without deep analysis. Contrastive works of brain is also claimed by Schwartz (2010) that classifies the different function of left and right brain. The right brain is more visually inclined, intuitive, qualitative, synthetic, inductive, enriched, integrated, connected, nonjudgmental, big picture-oriented, simultaneous, emphatic, subjective, metaphorical, unbounded, and process-driven than the left brain, which is more verbal, rational, quantitative, analytical, deductive, simplified, specialized, separated, critical, goal-oriented, sequential, systematic, objective, literal, rule-bound, and outcome driven.

The two primary factors that may influence an individual's brain hemisphere-related cognitive styles are their genetic makeup and their surroundings. Certain geneticists believe that there may be a relationship between the two halves of the brain's unique structure and the synthesis of enzymes as a result of inheritance (Gardner, 1993). The roles that each hemisphere of the brain performs are influenced by environmental variations (Hall, 2005). Each person's brain dominance can be altered based on the habits that primarily engage their left and right brains. According to Goswami (2004), deaf individuals who practice sign language can use their brain's auditory processing or hearing function to analyze visual or spatial stimuli. Despite having a dominant hearing capacity due to genetic factors, blind persons can learn to read and distinguish objects when they are forced to do so by harsh environmental conditions.

According to Chomsky (2006), there are three biological system components that contribute to each person's unique language development when it comes to the brain and language. They are "principles, experience, and genetic factors not unique to the faculty of language." Genetic factors have the capacity to impact

human brain activation, as language development and performance are determined by the biological neural circuitry of brain cells. The human mind uses a brain mechanism called "universal grammar" to develop language competency, which is derived from an innate linguistic understanding. Chomsky does not, however, say which areas of the human brain are involved in language processing. Rather than the way language is processed in the human brain, he concentrates on "language competence or knowledge of language." His assertion contrasts with that of Saussure (1959), who asserts that the true goal of linguistic research is to distinguish between "extraneous events (parole)" and phenomena connected to language understanding ("la langue"). The process of producing and perceiving language is determined by an understanding of grammatical rules or language structure linked to human experience. But in his thesis, he fails to acknowledge the role that a sophisticated brain system plays in language use. According to Lieberman (2000), "a functional language system (FLS) through distribution of physical activity in many parts of the complex human brain" governs "language, which is a learned skill." The FLS controls the flow of language perception and production, which are unique to the human brain. "Other aspects of cognition, motor control, and emotion" are connected to it.

The idea of brain dominance personalities can be used as a variable to get a different understanding of how people execute particular English proficiency tasks. One of the four language skills is reading, which can be divided into two categories: basic reading and reading comprehension. While reading comprehension is the process of reading to grasp such bits of text, initial reading is the process of learning how to read by joining a set of letters into a word (Williams, 2005). According to Grobe and Stoller (2002), reading is the ability to deduce

meaning from a text and apply this knowledge correctly. Put another way, reading is the outcome of the interaction between the reader's linguistic proficiency and impressions of the visual symbols that express language. Reading is a strategic process that requires the reader to have a variety of abilities and processes in order to anticipate textual information, pick important information, arrange and mentally summarize information, track comprehension, fix comprehension breakdowns, and align comprehension output with reader objectives. Diverse individual cognitive types and preferences may lead to varying outcomes in students' IELTS reading proficiency.

In accordance to a previous related study, there was a significant difference in reading scores between students with different brain dominance. Students who were 17 and 18 years old scored higher on the reading test than students with the left brain, but students who were 21 years old and older did not significantly differ in listening, speaking, reading, or writing skills (Tendero, 2000). In the general and academic reading modules of the IELTS exam, brain dominance and reading comprehension were found to be significantly correlated by Khabiri and Heidari (2010). Nevertheless, their results did not indicate which brain dominance was primarily responsible for the IELTS reading competence. The results of the earlier study were contradictory because some of the data indicated conflicting conclusions. Oflaz (2011) discovered that students with the right brain performed better while writing in response to open-ended questions and when displaying instructions and visual performances that were explained in the vocabulary section. The left-brained kids performed better in the speaking and reading sections because they were adept at solving problems logically. Since whole brain children could use both sides of their almost equal brains, their scores demonstrated balanced results. Brain dominance was found to be strongly

correlated with learning styles in language learning strategies, and learning styles and strategies had an impact on one another (Dulger, 2012).

The purpose of this study is to find out the significant correlation between brain dominance and reading skill of IELTS and the significant difference among students who have different categories of brain dominance in reading skill of IELTS. The findings on this study are expected to provide theoretical contribution in understanding of how brain dominance, that is associated to personal traits and cognitive styles, contributes to difference gained score of students in reading skill of IELTS.

RESEARCH METHOD

The present study employed the quantitative approach of correlational research to investigate the existence and extent of a relationship between two variables: brain dominance and IELTS reading skill. Five categories were identified for the first variable, brain dominance: strong left brain, moderate left brain, medium brain, moderate right brain, and strong right brain. The students' individual earned score was used to determine the second variable, which was the reading portion of the IELTS. The proper test of IBM Statistical Package and Service Solution (SPSS 20) was used to examine the data from two variables in order to determine the degree of significance for the correlation between the variables and the distinction between the brain dominance categories. This study was carried out in the English department at three separate universities in South Sulawesi, Indonesia: Universitas Islam Negeri Alauddin in Gowa, a state university; and Universitas Muslim Indonesia and Universitas Muhammadiyah, two private universities.

Population and Sample

Silalahi (2012), states that population is units of selected sample that can be organism, individuals or groups, society,

organization, things, objects, phenomena, or reports which have unambiguous definition of its characteristics. The population of this study consisted of the students at the second semester, English department, in three different universities; 75 students in Universitas Islam Negeri Alauddin Gowa from two classes, 325 students in Universitas Muhammadiyah Makassar from ten classes, and 148 students in Universitas Muslim Indonesia from five classes. Total population was 548 students. A sample is a small proportion of a selected population for observation and analysis. The way of taking the sample of this research was random sampling. The sample consisted of 39 students from Universitas Islam Negeri Alauddin Gowa, 34 students from Universitas Muhammadiyah Makassar, and 40 students from Universitas Muslim Indonesia. Total sample was 114 students, 20.8% of total population.

Technique of Data Collection

Following target population observation, two classes from each university were randomly selected to receive brain dominance tests. Crane (1989) created the alert scale of cognitive style, which served as the basis for the test's 21 questions. For every question, students were instructed to select one of two possibilities. The original English test was translated into Indonesian in order to prevent students from misinterpreting the meaning of the words on it. In order to accurately gauge students' preferences regarding the position of brain dominance, the researcher conducting the brain dominance test provided thorough explanations for each item on the test. Reading tests were given to the students who had passed the brain dominance exam in order to determine their scores on the IELTS reading component.

Technique of Data Analysis

Students' brain dominance was categorized according to their particular

instruction on the test's initial source, which was Western Michigan University's alert scale of cognitive style, which was created in 1989 by Dr. Loren D. Crane. There were 21 questions on it. Respondents who chose option "A" for numbers 1, 2, 3, 7, 8, 9, 13, 14, 15, 19, 20, 21 and option "B" for numbers 4, 5, 6, 10, 11, 12, 16, 17, 18 received one point each. Then, the score was computed to categorize brain hemispheric dominance based on the following classification:

- 0-4 : Strong Left Brain
 - 5-8 : Moderate Left Brain
 - 9-13 : Middle Brain
 - 14-16 : Moderate Right Brain
 - 17-21 : Strong Right Brain
- (The Alert Scale of Cognitive Style by Crane, 1989)

Scoring system of reading test was adopted from reading performance band score criteria from IELTS Essential (2015), IDP education. It is described in the following table:

Table 1. The IELTS nine-band scale

Band 9 expert user	Has fully operational command of the language: appropriate, accurate and fluent with complete understanding
Band 8 very good user	Has fully operational command of the language with only occasional unsystematic inaccuracies and Inappropriate. Misunderstandings may occur in unfamiliar situations. Handles complex detailed argumentation well.
Band 7 good user	Has operational command of the language, though with occasional inaccuracies, inappropriacies and Misunderstandings in some situations. Generally Handles complex language well and understands detailed reasoning.
Band 6 competent user	Has generally effective command of the language despite some inaccuracies, inappropriacies and

	Misunderstanding. Can use and understand fairly Complex language, particularly in familiar situations.
Band 5 modest user	Has partial command of the language, coping with overall meaning in most situations, though is likely To make many mistakes. Should be able to handle Basic communication in own field.
Band 4 limited user	Basic competence is limited to familiar situations. Has frequent problems in understanding and Expression. Is not able to use complex language.
Band 3 Extremely limited user	Conveys and understands only general meaning in Very familiar situations. Frequent breakdowns in Communication occur.
Band 2 intermittent user	No real communication is possible except for the most basic information using isolated words or short formulae in familiar situations and to meet Immediate needs. Has great difficulty in understanding spoken and written English.
Band 1 non user	Essentially has no ability to use the language beyond possibly a few isolated words.
Band 0 did not attempt the test	No assessable information provided.

IELTS Essential (2015).

IBM Statistical Package for the Service Solution (SPSS) Statistics 20 was used to analyze test data. Shapiro-Wilk and the One-Sample Kolmogorov-Smirnov Test were employed to determine the normality of the data. Homogeneity testing, employing the Levene Test and Analysis of Variance (ANOVA), were not utilized as the results of the normality test indicated that the data were not regularly distributed. The Pearson Chi-Square test was used to examine the relationship between brain dominance and the IELTS reading score. The Kruskal-Wallis and Mann-Whitney tests were employed to see whether there were any significant

differences between the various brain dominance categories and the IELTS reading competence.

FINDINGS & DISCUSSIONS

Brain Dominance

Analysis of students' brain dominance showed that from total of 114 samples, in Universitas Muslim Indonesia 12 students whose score ranged from 5 to 8 were categorized as moderate left brain, 20 students whose score ranged from 9 to 12 were categorized as middle brain, and 8 students whose score ranged from 14 to 15 were categorized as moderate right brain. In Universitas Muhammadiyah Makassar, 9 students whose score ranged from 5 to 8 were categorized as moderate left brain, 18 students whose score ranged from 9 to 12 were categorized as middle brain, 6 students whose score ranged from 14 to 15 were categorized as moderate right brain and two students whose score ranged from 17 to 18 were categorized as strong right brain. In Universitas Islam Negeri Alaudin, 12 students whose score ranged from 5 to 8 were categorized as moderate left brain, 22 students whose score ranged from 9 to 12 were categorized as middle brain, 4 students whose score ranged from 14 to 15 were categorized as moderate right brain and 1 student whose score was 17 was categorized as strong right brain. From three different universities, no one obtained score which could be categorized as strong left brain. Since only 3 students obtained unrepresentative strong right brain, they were excluded in the next analysis. The distribution of students' classification in brain dominance is described in the following figure:

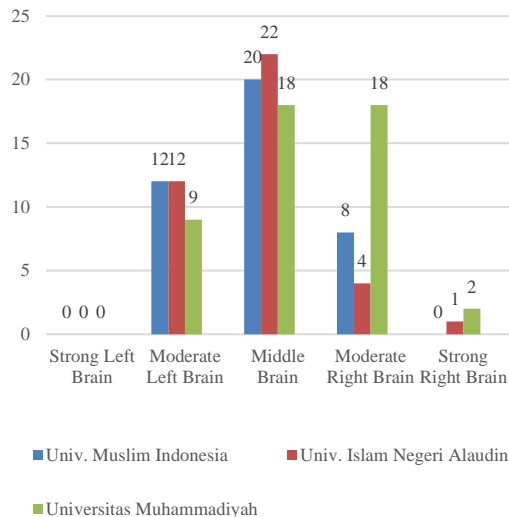


Figure 1. Histogram of Brain Dominance Distribution

Reading Skill of IELTS

Output of reading analysis showed that 2 students obtained score 2.5 (extremely limited user), 54 students obtained 3.50 (limited user), 46 students obtained 4 (limited user), and 9 students obtained 4.50 (modest user). Total of samples was 111, mean 3.77, minimum score 2.50, and maximum score 4.50. The description of students' gained score in reading of IELTS is described in the following figure:

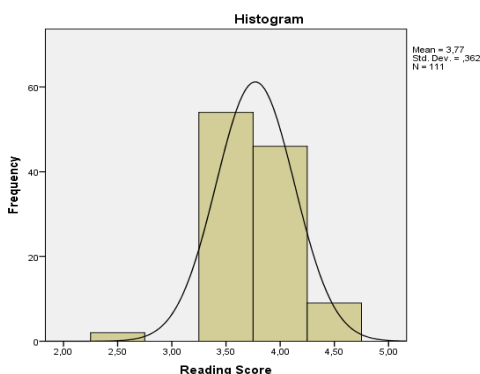


Figure 2. Histogram of Students' gained Score in IELTS

The Correlation between Brain Dominance and Reading Skill of IELTS

An examination of the Pearson Chi-Square analysis revealed a Chi-Square value of 15. 239 at degree of freedom 6, where P value (0.018) < 0.05. H0 was

rejected, indicating a substantial association between brain dominance and IELTS reading proficiency. Output of Pearson Chi-Square analysis is described in the following table:

Table 2. Analysis of Pearson Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15,239 ^a	6	,018
Likelihood Ratio	16,782	6	,010
Linear-by-Linear Association	5,720	1	,017
N of Valid Cases	111		

The Difference among Categories of Brain Dominance to Reading Skill of IELTS

Using statistical analysis, the data were calculated into a normality test to determine the suitable SPSS test analysis in order to find a significant difference between the three groups of brain dominance to reading competence on the IELTS. Shapiro-Wilk and Kolmogorov-Smirnov were employed in this investigation. The results of the normalcy test indicated that the moderate left brain in the Kolmogorov-Smirnov test had a statistic value of 0.406 and a P value of (0.000) < 0.05. It is possible to deduce that the moderate left-brain IELTS reading score was not distributed regularly. The middle brain displayed a P value of (0.000) < 0.05 and a statistic value of 0.251. It is possible to conclude that the IELTS reading middle brain score was not normally distributed. The right moderate brain displayed a statistical value of 0.333 and a P value of (0.000) < 0.05. Conclusion: The moderate right brain score on the IELTS reading test did not follow a normal distribution. The moderate left brain in the Shapiro-Wilk test had a statistic value of 0.656 and a P value of (0.000) < 0.05. It is possible to deduce that

the moderate left-brain IELTS reading score was not distributed regularly. The middle brain displayed a P value of (0.000) < 0.05 and a statistic value of 0.776. It is possible to conclude that the IELTS reading middle brain score was not normally distributed. The right moderate brain displayed a statistical value of 0.762 and a P value of (0.000) < 0.05. Conclusion: The moderate right brain score on the IELTS reading test did not follow a normal distribution. A non-parametric test was employed as the normalcy analysis revealed that the data belonging to the three brain dominance groups were not regularly distributed. Mann-Whitney and Kruskal-Wallis were employed in this investigation. The output of normality test is described in the following table:

Table 3. Output of Normality Test

Brain Dominance Group		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Reading Score	Moderate Left	,406	33	,000	,656	33	,000
	Middle	,251	60	,000	,776	60	,000
	Moderate Right	,333	18	,000	,762	18	,000

Output of Kruskal-Wallis test showed that Chi-Square value was 10.695, P value (0.005) < 0.05. H0 was rejected and it could be concluded that there was significant difference among three categories of brain dominance to reading skill of IELTS. Analysis of Kruskal-Wallis is described in the following table.

Table 4. Output of Kruskal-Wallis Test

	Reading Score
Chi-Square	10,695
df	2
Asymp. Sig.	,005

The Mann-Whitney test was employed instead of post-hoc analysis to examine in detail any significant differences between the three groups of brain dominance. Z value was -0.901, P value (0.368) > 0.05, according to the Mann-Whitney output comparing the middle brain and moderate left brain. After accepting H0, it was possible to draw the conclusion that there was no discernible difference between the moderate left brain and middle brain when it came to the IELTS reading portion. Output of Man-Whitney test is described in the following table:

Table 5. Output of Mann-Whitney test to the difference between moderate left brain and middle brain.

	Reading Score
Mann-Whitney U	890,500
Wilcoxon W	1451,500
Z	-,901
Asymp. Sig. (2-tailed)	,368

When comparing the moderate left brain to the moderate right brain, the Mann-Whitney test revealed a Z value of -3.101 and a P value (0.002) < 0.05. Since H0 was rejected, it was possible to draw the conclusion that there was a significant difference in the reading portion of the IELTS between the two groups of brain dominance, moderate left brain and moderate right brain. Output of Mann-Whitney is described in the following table:

Table 6. Output of Mann-Whitney test to the difference between moderate left brain and moderate right brain.

	Reading Score
Mann-Whitney U	154,500
Wilcoxon W	715,500
Z	-3,101
Asymp. Sig. (2-tailed)	,002

When comparing the moderate right brain to the middle brain, the Mann-Whitney test revealed a Z value of -2.798 and a P value of (0.005) < 0.05. After H0

was rejected, it was possible to determine that there was a considerable difference in the reading portion of the IELTS between two distinct types of brain dominance: moderate right brain and middle brain. Output of Mann-Whitney is described in the following table:

Table 7. Output of Mann-Whitney test to the difference between middle brain and moderate right brain.

Mann-Whitney U	327,000
Wilcoxon W	2157,000
Z	-2,798
Asymp. Sig. (2-tailed)	,005

Discussion

The data analysis was already presented. It demonstrates that there is a strong relationship between brain dominance and the IELTS reading section. The idea of brain dominance, which holds that the left and right brains govern different tasks, is supported by this research. According to Brown (2000), right brain folks tend to more synthesizing, fluid, and spontaneous while left brain individuals are more analytical, organized, and structured when reading. In their analysis of brain patterns associated with particular tasks, Nielsen et al. (2013) discovered no relationship between personality traits and brain hemisphere. According to McGilchrist (2009), distinguishing between two hemispheres specifically is oversimplifying brain activity, which entails intricate interactions between distinct brain regions. Certain mental processes in the left and right hemispheres of the brain interact to transfer and convey information. These processes are known as left and right brain activities. Despite current research suggesting that a person's cognitive preference is unrelated to their level of brain activity, the brain dominance exam is still constructed with the specific characteristics of the students in mind. The results of this study show that students'

varied tastes have an impact on their IELTS reading proficiency.

CONCLUSION

Analysis of 111 students, three groups of brain dominance, in context of English as a foreign language shows that there is significant correlation between brain dominance and reading skill of IELTS and different categories of brain dominance results different output of gained score. These findings indicate that brain dominance play significant contribution to reading skill of IELTS and support a popular theory in neuroscience that brain dominance determines how individuals do specific tasks. Different ways of reading text possibly result different quality and strategy of understanding items on it. Each individual tends to be dominant or balanced in terms of brain hemispheric personality. The distribution of brain dominance is dominated by middle brain students who have capacity to combine contrastive characteristics of left and right brain.

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