

THE EFFECT OF GENDER ON HEMISPHERIC DOMINANCE AND THE USE OF COGNITIVE STRATEGIES AMONG IRANIAN EFL UNDERGRADUATES

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ABSTRACT

The purpose of the present study is to investigate the relationship between gender and cognitive strategies as well as two types of styles which are pertinent to cognitive learning styles, namely, left brain and right brain dominance among EFL (English as a Foreign Language) learners at Shiraz Azad University. This research targets at figuring out preferences of applying these styles and strategies by males or females among the above-mentioned university students. Therefore, 60 EFL university learners majoring in 'English Translation' at the intermediate level of proficiency studying at Shiraz Azad University are selected as the sample of the study. They are chosen based on the convenience sampling which consists of 60 sophomores. Then, two instruments for collecting data are administered. First, Brain Dominance Survey (Davis et al., 1994) has been used to discover the hemispheric preferences of the participants. Then, Oxford's (1990) Strategy Inventory for Language Learning (SILL) is administered to identify the language learning strategies used by the same participants. This research targets at figuring out the differences between two genders in relation to the application of cognitive strategies and two cognitive styles. After administering the above-mentioned instruments, it is revealed that there is no significant difference between males and females and applying the cognitive strategies; but, in accordance with preferences of two cognitive styles, namely, left-brain and right-brain dominance, findings indicate that males are more right-brain dominant and females are more left-brain dominant.

KEYWORDS: Gender - Cognitive styles - Left/ right brain dominance - Cognitive strategies

INTRODUCTION

Language learning styles and strategies are among the main factors that help determine how well our students learn a second or foreign language. Just as learners possess various cognitive style preferences, which may change depending on circumstances, they may employ different learning strategies depending on the situation. When learning a second language (L2), the learner might select the best strategies (e.g. actions or behaviors) for apprehending, internalizing, and using the

L2 (Oxford, 1990). Good L2 learners, according to Rubin (1987), are willing and accurate guessers; have a strong drive to communicate; are often uninhibited; willing to make mistakes; focus on form by looking for patterns and analyzing; take advantage of all practice opportunities; monitor their speech as well as that of others; and pay attention to meaning.

On the other side, understanding brain behavior has been a significant phase of exploring the learning process. Brain behavior has especially been associated with learning styles and personality traits (Saleh, 2001). Investigation an individual's brain behavior and relating it to his performances has been primarily in the form of examining functions of the various parts of the individual's brain. Studies tapping this area of research preferred various terminology such as brain hemisphericity, brain dominance, split brain research, hemisphere specialization research, or lateralization in the research literature (Saleh, 2001; Baynes & Long, 2007). Basically, the tendency of an individual to process information through left or right hemisphere (or even both in combination) has been the focus of such studies.

The human brain is a complex organ responsible for intelligence, senses, movement, and behavior (National Institute of Neurological Disorders and Stroke, 2007, p. 1). The halves of the brain – the 'right brain' and the 'left brain' – perform different functions and communicate information with each other through a band of nerves that connect them. The right side of the brain controls most of the movement and functions of the left side of the body, and the left side of the brain controls most of the movements and functions of the right side of the body. People may hear that someone is a 'right-brained' or 'left-brained' individual. This is called 'brain dominance,' meaning that an individual has a natural preference for processing information on one side of the brain. The right side is considered the intuitive or spontaneous side, while the left side is logical. Knowing an individual's brain dominance can help one understand his/her 'ways' of thinking, behaving, speaking, and functioning. Also, it can help parents and educators tailor activities to a child's natural learning preferences.

Right-brain characteristics include creativity, the ability to see patterns, spatial awareness, and the understanding of how things relate to one another in different contexts. One may find that individuals with this brain dominance are good at recognizing faces, places, and objects (Sousa, 1995, p. 88). These individuals seem to 'have a knack for':

- a) "Out-of-the-box" thinking
- b) Art, including the ability to draw, paint, sculpt, etc.
- c) Imaginative thinking
- d) Music, including the ability to play instruments with ease or to recognize a song melody and play it back upon "hearing it"

Left-brain characteristics include a gift for language, analytical skills, and mathematical concepts such as time and sequence. One may find that individuals with this brain dominance are good with letters, numbers, and words (Sousa, 1995, p. 88). These individuals seem to 'have a knack for':

- a) Language skills including reading, writing, and speaking
- b) Math
- c) Logic and reasoning

How can educators help the right brain/left brain students?

For many students, particularly those who are 'right-brained', a visual, such as a picture or 3-D model, can help them better understand a concept. Another way to help "right-brained" students is to pair music with learning. Teachers can have students make up a song about history facts and sing it to the melody of a familiar song such as "On Top of Old Smoky." Also, teachers can permit these students see, feel, and touch things. 'Right-brained' students also seem to thrive when doing group or hands-on activities, such as: a) shared learning, b) group discussions, c) role-play/simulations, and d) experiments. (Quantum Learning, 1999, p. 31)

To help 'left-brained' students, teachers can provide information in very logical sequences – for example, they can make (numbered) lists for them. Another way to help students with a left-brain preference is to give them typed or printed directions. Their teachers can permit these students do their work step by step. 'Left-brained' students seem to thrive when following plans and having structure with activities, such as: a) analysis, b) research, c) realistic projects, and d) worksheets. (Quantum Learning, 1999, p. 31)

Before proceeding to different stages of the research, it is appropriate to provide a greater representation of the functions of the left and right hemispheres of the brain. The following table (adapted from Torrance, 1980) presents a list of the functions of the left and the right hemispheres of the brain:

Table 1: Left and right brain characteristics (adapted from Torrance, 1980)

<u>Right brain dominance</u>	<u>Left brain dominance</u>
Intuitive	brain Intellectual
Remembers faces	Remembers names
Responds to demonstrated, illustrated, or symbolic instructions	Responds to verbal instructions and explanations
Experiments randomly and with less restraint	Experiments systematically and with control
Makes subjective judgments	Makes objective judgments
Fluid and spontaneous	Planned and structured
Prefers elusive, uncertain information	Prefers established, certain information
Synthesizing reader	Analytic reader
Reliance on images in thinking and remembering	Reliance on language in thinking and remembering
Prefers drawing and manipulating objects	Prefers talking and writing
Prefers open-ended questions	Prefers multiple choice tests
More free with feelings	Controls feelings
Good at interpreting body language	Not good at interpreting body language
Frequently uses metaphors	Rarely uses metaphors
Favors intuitive problem solving	Favors logical problem solving

As seen in Table 1, the two hemispheres are associated with different functions. However, both hemispheres work together, though at most times one is more involved in some mental functions than the other. The left hemisphere carries out more mental functions for some people, who are classified as 'left hemisphere dominant' and vice versa. Most people in the world use their right hands. For instance, *sodium amobarbital* tests have shown that more than 95 % of right-handed

people have their speech localized in the left hemisphere while about 70 % of the left-handed people exhibited the same pattern. The remaining 30 % or so show evidence of bilateral speech representation (Springer & Deutsch, 1998, p. 130). This relationship, however, is not symmetrical. This does not mean that the opposite holds true for left-handed people. Left hemisphere is dominant for more than 60 % of left-handed people.

Speech sounds are processed in the left hemisphere, while music and non-linguistic sounds, such as animal sounds and noise are processed in the right hemisphere. As far as human vocal language is concerned, the left hemisphere deals with semantic, syntactic and pragmatic information while the right hemisphere is more engaged in limited words. Besides, some of the language related processes take place in the right hemisphere. For instance, understanding the meaning of intonation (e.g. rising tone of a question), interpreting emotional intentions (e.g. anger, sarcasm), or understanding social meanings (e.g. whispering) are credited for being located outside of the traditional language areas (i.e. left hemisphere) (Steinberg et al., 2001).

Left hemisphere is known to process verbal, abstract, analytical information in a linear, sequential manner. It concentrates on differences and contrasts, sees small parts that represent the whole, and is concerned with reasoning abilities such as mathematics and language. Therefore, left brain has a local nature. On the other hand, right hemisphere processes non-verbal, concrete, and spatial information. Right brain gives attention to similarities in patterns, and looks at from a holistic perspective. For that reason, right brain is found to have a global bias. Artistic abilities such as music and graphics are among the functions of the right brain. However, it is necessary to bear in mind that the right and the left hemispheres are not completely independent and there are fibers (*corpus callosum*) that connect these halves, but a person is believed to rely on one halve of the brain more than the other, and his brain dominance is assumed to determine his preferences, style, personality characteristics, or even career choices.

Strategy

Strategy refers to a detailed plan for achieving success in situations such as war, politics, business, industry or sport,” and, of course, learning (Cambridge Advanced Learner's Dictionary & Thesaurus, 2014). Thus, plan fullness or goal-orientation is an essential part of any definition of “strategy.”

Language Learning Strategies

Within the field of foreign/second language teaching, the term language learning strategies has been defined by eminent researchers in the field. Tarone (1983) defined a learning strategy as “an attempt to develop linguistic and sociolinguistic competence in the target language – to incorporate these into one’s interlanguage competence” (p. 67). Later, Rubin (1987) stated that learning strategies “are strategies which contribute to the development of the language system which the learner constructs and affect learning directly” (p.22). Also, O’Malley and Chamot (1990) defined learning strategies as “the special thoughts or behaviors that individuals use to help them comprehend, learn, or retain new information” (p. 1). Furthermore, Oxford (1990) expanded the definition of learning strategies and defined them as “specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and

more transferable to new situations" (p. 8). Finally, Dansereau (1985) defined learning strategies as a "set of processes or steps (used by a learner) that can facilitate the acquisition, storage, and /or utilization of information" (p. 210).

Learning strategies have been differently classified, but one classification which is more comprehensive is based on the work of Oxford. Language learning strategies are the often conscious steps or behaviors used by language learners to enhance their own learning (Oxford, 1990, 1993). Six categories of strategies were identified by Oxford (1990) in her Strategy Inventory of Language Learning (SILL):

Memory-Related Strategies

They help learners link what they are learning in the target language with already existing information; they are measured in this study by items 1-9 in the SILL.

Cognitive Strategies

They involve reasoning, analysis, summarizing, and reorganizing information; they are measured by items 10-23 in the SILL.

Compensation Strategies

They help learners make up for missing knowledge; they are measured by items 24-29 in the SILL.

Metacognitive Strategies

They help learners to think about their own thinking, about how they are learning the new material; they are measured by items 30-38 in the SILL.

Affective Strategies

They consist in boosting one's self-confidence and willingness to learn; they are measured by items 39-44 in the SILL.

Social Strategies

They consist in asking for clarifications and relying on the society to get more information about the material learned; they are measured by items 45-50 in the SILL.

Oxford (1990) summarized her view of LLS by listing twelve key features as they: a) contribute to the main goal, communicative competence, b) allow learners to become more self-directed, c) expand the role of teachers, d) are problem-oriented, e) are specific actions taken by the learner, f) involve many aspects of the learner, not just the cognitive, g) support learning both directly and indirectly, h) are not always observable, i) are often conscious, j) can be taught, k) are flexible, l) are influenced by a variety of factors. (Oxford, 1990, p. 9)

Taxonomies of Language Learning Strategies

Many scholars in the field such as Rubin (1987), O'Malley and Chamot (1990), and Oxford (1990) have classified language-learning strategies. However, most of these attempted to classify

LLS reflect more or less the same categorization without any drastic changes. In this study, only Oxford's (1990) taxonomy of LLS will be handled, the two others are not taken into consideration by the researcher.

Oxford's Classification of Language Learning Strategies

Among all the existing learning strategy taxonomies, Oxford (1990) provided the most extensive classification of LLS developed so far. However, when analyzed, her classification is not something completely different from the previously discussed ones. On the contrary, Oxford's taxonomy overlaps with O'Malley's (1985) taxonomy to a great extent. For instance, the cognitive strategies category in O'Malley's classification seems to cover both the cognitive and memory strategies in Oxford's taxonomy. Moreover, while O'Malley puts socio-affective strategies in one category, Oxford deals with them as two separate categories. Yet, a significant difference in Oxford's classification is the addition of the compensation strategies, which have not been treated in any of the major classification systems earlier.

Generally speaking, Oxford's taxonomy consisted of two major LLS categories, the Direct and Indirect Strategies. Direct strategies are those behaviors that directly involve the use of the target language, which directly facilitates language learning. Oxford (1990) resembles the direct strategies to the performers in a stage play, whereas she takes after the indirect strategies to the director of the same play. While the performers work with the language itself, they also work with the director who is responsible for the organization, guidance, checking, corrections, and encouragement of the performers. These two groups work hand in hand with each other and they are inseparable.

Direct strategies are divided into three subcategories: *Memory, Cognitive and Compensation Strategies*.

Memory Strategies: Oxford and Crookall (1989) defined them as "techniques specifically tailored to help the learner store new information in memory and retrieve it later" (p. 404). They are particularly said to be useful in vocabulary learning which is "the most sizeable and unmanageable component in the learning of any language" (Oxford, 1990, p. 39). Memory strategies are usually used to link the verbal with the visual, which is useful for four reasons:

1. The mind's capacity for storage of visual information exceeds its capacity for verbal material.
2. The most efficiently packaged chunks of information are transferred to long-term memory through visual images.
3. Visual images might be the most effective mean to aid recall of verbal material.
4. Visual learning is preferred by a large proportion of learners (Oxford, 1990, p. 40).

Memory strategies also refer to those that focus on relating what we study to our background knowledge, using new words in a sentence to remember them, connecting the sound of a new word to a picture of it, making mental pictures, using rhymes, flashcards, acting out words, reviewing, and remembering locations of new words.

Cognitive Strategies: The second group of direct strategies refers to the cognitive strategies, which are defined as "skills that involve manipulation and transformation of the language in

some direct way, e.g. through reasoning, analysis, note taking, functional practices in naturalistic settings, formal practice with structures and sounds, etc.”(Oxford and Crookall, 1989, p. 404). Cognitive strategies are not only used for mentally processing the language to receive and send messages, they are also used for analyzing and reasoning. What is more, they are used for structuring input and output. However, if learners overuse the cognitive strategies, this might cause them to make mistakes when they generalize the rules they have learned without questioning them, (that is, when they overgeneralize them) or when they transfer expressions from one language to another, generally from their mother tongue to the target language (that is, when negative transfer occurs), (Oxford, 1990). Cognitive strategies consist of those that focus on saying, trying, practicing, using words in different ways, starting conversations, watching TV, reading for pleasure, writing notes, skimming, looking up words, finding patterns, making summaries when studying English.

Compensation Strategies: Compensation strategies help learners to use the target language for either comprehension or production in spite of the limitations in knowledge. They aim to make up for a limited repertoire of grammar and, particularly vocabulary. When learners are confronted with unknown expressions, they make use of guessing strategies, which are also known as inference. When learners do not know all the words, they make use of a variety of clues either linguistic or non-linguistic so as to guess the meaning. Compensation strategies are not only manipulated in the comprehension of the target language, but they are used in producing it. They enable learners to produce spoken or written expressions in the target language without complete knowledge of it. Moreover, compensation strategies are those that focus on making guesses, using gestures, making up new words, not looking up all words while reading, and finding alternative words.

The second group of strategies, that is, *indirect strategies*, consists of three subcategories as well: *Metacognitive*, *Affective*, and *Social Strategies*.

Metacognitive Strategies: Metacognitive strategies are defined as “behaviors used for centering, arranging, planning, and evaluating one’s learning. The ‘beyond the cognitive’ strategies are used to provide ‘executive control over the learning process’ (Oxford and Crookall, 1989, p. 404). Metacognitive strategies go beyond the cognitive devices and provide a way for learners to coordinate with their own learning process. They provide guidance for the learners who are usually “overwhelmed by too much ‘newness’ – unfamiliar vocabulary, confusing rules, different writing systems, seemingly inexplicable social customs, and (in enlightened language classes) non-traditional instructional approaches” (Oxford, 1990, p. 136). Having encountered so much novelty, many learners lose their focus, which can be regained through the conscious use of metacognitive strategies. Furthermore, metacognitive strategies are those that focus on finding ways to use English, learning from English mistakes, paying attention, trying hard to improve, organizing time in order to study better, looking for people to talk to in English, looking for opportunities to read, having clear goals for improving, and thinking about self progress.

Affective Strategies: Oxford and Crookall (1989) defined affective strategies as “techniques like self-reinforcement and positive self-talk which help learners gain better control over their

emotions, attitudes, and motivations related to the language learning (p. 404). Knowing how to control one's emotions and attitudes about learning may influence the language learning process positively since it will make the learning more effective and enjoyable. It is also known that negative feelings can hinder progress. The control over such factors is gained through the manipulation of affective strategies. In addition, affective strategies refer to those that focus on relaxing, encouraging oneself, rewarding oneself, noticing one's nervousness when studying the language, writing down feelings in a language learning diary, and sharing feelings

Social Strategies: Since language is a form of social behavior, it involves communication between and among people. They enable language learners to learn with others by making use of strategies such as asking questions, cooperating with others, and empathizing with others. Yet, their appropriate use is extremely important since they determine the nature of communication in a learning context. Social strategies, also, refer to those that focus on asking for repetition or clarification when not understanding, asking to be corrected, practicing, asking for help, asking questions in English, and trying to learn about the target language culture.

LITERATURE REVIEW

In the last three decades, many researchers have studied language learning strategies and factors related to choice and use of these strategies such as learners' level of language proficiency, motivation, learning style, cultural backgrounds, gender, nationality and context of language learning (Chamot, 2005; Cohen, 1998; Ehrman and Oxford, 1989; Ellis, 1994; Griffiths, 2003; Oxford and Nyikos, 1989; and Rahimi, et al., 2008). Moreover, some research studies indicate that a number of factors influence the L2 learner's choice of strategies such as motivation, gender, cultural background, attitudes and beliefs, age and L2 stage, learning style and also tolerance of ambiguity (Oxford, 1990, 1994).

Also, language learning literature presents a significant amount of research on variables affecting language learning. Especially the learner-related variables have been the subjects of study for many researchers (Brown, 2001; Cohen & Dörnyei, 2002). Johnson (2001) introduces such variables in three categories of individual differences: cognitive, affective, and personality. According to this division, intelligence, and aptitude (ability specific to language learning and different from general intelligence) represent the cognitive differences among learners. Affective differences are related to feelings, and are mainly associated with motivation and attitude. As the term suggests, personality variables are concerned with the personality of the learner, and whether a person is extrovert or introvert can be given as one of the distinguishing characteristics of a learner. However, variables that affect language learning may sometimes not be classified or termed in exactly the same words, and the factors assumed to influence learning may be expressed differently. For instance, in the same fashion, Cohen & Dörnyei (2002) draw attention to age and gender, language aptitude, motivation, learning styles, learner strategies as the foremost variables to be influential in language learning.

Literature on language learning has established relationships between the cited variables and achievement in learning a language. Attitude and motivation, as affective factors, have been

found to influence success in language learning (Ehrman et al., 2003). Similarly, learning styles of learners have been subjects of study and found to be effective on language learning achievement, especially in parallel with learning strategies (Nam & Oxford, 1998; Cohen, 2001; Ehrman et al., 2003).

Among others, learner strategies are also reported in the literature as a noteworthy part of the learner differences, and motivation, styles and strategies are often found to be influential on each other (Nunan, 1990; Cohen, 1995; Cohen et al., 1995; Nunan, 1997; Nam & Oxford, 1998; Wenden, 1998; Chamot & El-Dinary, 1996; Ehrman et al., 2003; Cohen, 2001; Van Blerkom & Van Blerkom, 2004). As a consequence, such investigations on learner variables naturally constitute an indication of focusing more on the learner, and have served understanding the nature of language learning better. Interest in individual differences of a learner led to investigating what methods or techniques are used by the individual in learning a language. Therefore, studies have attempted to differentiate among language learners in terms of strategy usage (O'Malley & Chamot, 1990, p. 149; Stern, 1992, p. 259). Such investigations put forward that studies concentrating on the 'good language learner' contrast with the previous traditional understanding that some people are successful in language learning only because they have an inherent ability for language learning.

Strategy-Based Instruction Research

SBI has been defined as a "learner-centered approach to teaching that focuses on explicit and implicit inclusion of language learning and language use strategies in the second language classroom" (Cohen and Weaver, 1998, p. 1 cited in Reyandya and Jacobs, 1998). Ever since researchers realized the importance of LLSs, there has been a growing call for the teaching of strategies in language learning classrooms across the world. As one leading researcher has said, "unlike most other characteristics of the learner, such as aptitude, attitude, motivation, personality, and general cognitive style, learning strategies are readily teachable" (Oxford and Nyikos, 1989, p. 291). To increase L2 proficiency, some researchers and teachers have provided instruction that helped students learn how to use more relevant and powerful learning strategies. In ESL/EFL studies, positive effects of strategy instruction emerged for proficiency in speaking (Chamot, Küpper, O'Malley, Manzanares & Russo, Stewner, 1985; Dadour & Robbins, 1996) and reading (Park Oh, 1994), although results for listening were not significant (O'Malley et al., 1985). Chamot et al. (1996), Cohen et al. (1995), and Cohen and Weaver (1998) investigated the effects of strategy-based instruction among native-English-speaking learners of foreign languages and found some positive results. In other studies, strategy-based instruction led to increased EFL learning motivation (Nunan, 1997) and, among native-English-speaking learners of foreign languages, greater strategy use and self-efficacy (Chamot et al., 1996). The most effective strategy instruction happens when a given strategy might be useful, as well as how to use and evaluate it, and how to transfer it to other related tasks and situations.

A vast number of studies have been conducted with respect to gender-related differences in LLS use. In a study of adult language learners, Ehrman and Oxford (1989) found that when compared with males, females reported significantly greater use of language learning strategies in four categories: general study strategies, functional practice strategies, strategies for searching for and

communicating meaning, and self-management strategies. In another study, Oxford and Nyikos (1989) found that females, when contrasted with males, used language-learning strategies significantly more often in three of five strategy factors: formal rule-based practice strategies, general study strategies, and conversational input elicitation strategies. Ehrman and Nyikos (1989) stated that the results obtained from their study fully support the findings of other studies concerning the effect of sex on second language learning. They asserted that some other variables such as female superiority in verbal aptitude and social orientation, and possible sex differences in integrative motivation, in addition to psychological type play a role in these sex differences.

Kaylani (1996) also reported significant differences in strategy use between males and females. Among the strategy categories used in the SILL, female students used significantly more memory, cognitive, compensation, and affective strategies than male students. There was no significant difference in the use of metacognitive and social strategies between the two genders. The findings of Green and Oxford (1995) also indicated higher levels of strategy use by females than by males. Fourteen strategies, some of which are the use flashcards to remember words, reviewing English lessons often, connecting words and locations, skimming and reading carefully, seeking L1 words similar to L2 words, making summaries of information, etc., were used significantly more often by females in that study, although only one (watching TV programs and video movies in English) was used significantly more often by males.

From another point of view, studies which have been conducted on hemispheric dominance also reveal significant differences according to different variables. In a study conducted by Saleh (2001), it is reported that students majoring in education, nursing, communication, and law were right-brain dominant, while the students majoring in business/commerce, engineering, and science were left-brain dominant.

According to different contexts, the results are significantly different from those of a study conducted in a large university in the southern part of the United States (Saleh, 2001). Brain dominance results of Saleh's (2001) study were as follows: 28.9% of the 429 graduate and undergraduate students were left-brain, 24.94% right-brain, and 46.15% whole brain dominant. It is reminded in the same study that these results suggest a shift in brain dominance as compared to the earlier studies showed a left-brain dominance of a majority of the students in western schools.

RESEARCH QUESTIONS

Is there a significant relationship between gender and the use of cognitive strategies?

Is there a significant relationship between gender and being right-brained or left-brained?

METHODOLOGY

Participants

This study was conducted on 90 undergraduates (36 males, & 54 females) studying at Shiraz Azad University. They were homogenized by Nelson proficiency test (Fowler and Coe, 1976). After being homogenized by Nelson proficiency test, the number of participants was reduced to

60 (24 males, 36 females). They are chosen based on the convenience sampling which consists of 60 sophomores majoring in 'English Translation'.

Instrument

As the study aimed at investigating the relationship between gender and brain dominance and also gender and the use of language learning strategy, two instruments were administered to collect data. First, Brain Dominance Survey (Davis et al., 1994) was used to discover the hemispheric preferences of the participants. Next, Oxford's (1990) Strategy Inventory for Language Learning (SILL) was administered to identify the language learning strategies used by the same participants.

Procedure of the study

The data obtained through the questionnaires were analyzed on the computer by using SPSS statistical program. Descriptive statistics such as frequency, mean, standard deviation and percentage were reported. The significance level has been determined as $p < .05$. Besides, to determine whether there are gender differences in the learning strategy preferences of the participants, an independent samples *t*-test was conducted. The SILL was devised by Rebecca Oxford (1990) as an instrument for assessing the frequency of the use of language learning strategies by students at the Defense language Institute in California.

There are two versions of the SILL: one for native speakers of English (80 items) and another for learners of English as a second or foreign language (50 items). The SILL is the only language learning strategy instrument that has been extensively field-tested for reliability and validated in multiple ways (Oxford & Burry-Stock, 1995). According to Ehrman and Oxford (1990), SILL has consistently scored above 0.90 using Cronbach alpha, which indicates high internal reliability. Also the content validity of the instrument is very high (As cited in Salehi, 2011). The version of the SILL used in this study is a 5-point Likert type of scale ranging from 1 [never or almost never true of me] to 5 [always or almost always true of me]. It consists of 50 items divided into six subscales: Memory, Cognitive, Compensation, Metacognitive, Affective, and Social strategies. The reliability coefficient Cronbach alpha of (SILL) was found to be 0.91, based on estimations from the present study which showed that it was highly reliable.

The participants were required to write the answers on a separate answer sheet. After all, the answers were completed, the values assigned to each item in each section were added and then divided into the number of items in each section. The same procedures were repeated for each section and values ranging between 1 and 5 were obtained. These values showed the profile of a learner, in other words, the strategy groups employed by the learner and their frequency. It took students around 25 minutes to respond to the questions. The SILL contains six parts. Each part is related to one category of strategies: statements one through nine refer to memory strategies, statements ten through twenty three refer to cognitive strategies, statements twenty four through twenty nine refer to compensation strategies, statements thirty through thirty eight refer to metacognitive strategies, statements thirty nine through forty four refer to affective strategies, and statements forty five to fifty refer to social strategies. Table 2. summarizes the number of items related to each strategy type.

Table 2: Strategy grouping according to the six strategy types

Strategy Types	Items	Total
Memory	1-9	9
Cognitive	10-23	14
Compensation	24-29	6
Metacognitive	30-38	9
Affective	39-44	6
Social	45-50	5

Relationship between Brain Dominance and Strategy Use

The Brain Dominance Survey (Davis et al., 1994) originally divided the right and left brain dominance into 11 degrees each depending on the answers given to the questions. Left brain dominance is reflected by minus sign (-), while plus sign (+) reflects the right brain dominance degrees. Considering the Brain Dominance Survey specifications, the researcher expects to find out brain dominance degrees to be illustrated in the form of (+1 to +11) right brain and (-1 to -11) left brain dominance degrees. Thus, it is hoped to find sufficient frequencies to be able to do some correlations between a specific brain dominance degree and gender variable.

RESULTS AND DISSCUSSION

The questionnaire, the Strategy Inventory for Language Learning was administrated with the purpose of identifying students' language learning strategies. In order to determine whether there was a statistically meaningful relationship between gender and the language learning strategy preferences of the students, the Pearson correlation was computed. A *t*-test was conducted to find whether there were any differences in the preference of learning strategies between males and females.

The Analysis of the Strategy Inventory for Language Learning Strategies

The purpose of using the Strategy Inventory for Language Learning is to identify the language learning strategy preferences of the students who participated in this study. The questionnaire consisted of 50 items, which identified the strategy preferences of the respondents. The strategies were grouped under the main six categories: cognitive, memory, compensation, metacognitive, affective, and social strategies. The results of the descriptive statistics conducted to identify the general tendency of strategy preferences of the participants are given below:

Table 3. shows that the most preferred strategy, with a mean score of 41.30 is the one related to cognitive strategies. Memory strategies ranked the scored with an average of 28.50. The third place in the ranking order was taken by the affective strategies with a mean score of 25.15. Social strategies ranked the fourth with an average of 21.10. The mean scores of the compensation and the metacognitive strategies 20.25 and 19.85 respectively were ranked the fifth and the sixth.

Table 3: Descriptive Statistics Concerning Language Learning Strategy Preferences

Language Learning Strategies	Min.	Max.	Mean	Std. Deviation
Cognitive	31	52	41.30	5.55
Memory	22	34	28.50	3.38
Affective	14	38	25.15	6.70
Social	16	33	21.10	4.08
Compensation	12	29	20.25	4.36
Metacognitive	11	36	19.85	6.76

The means and standard deviations reported in Table 3. revealed that the three most frequently-used are the cognitive, memory and social strategies; and the three least frequently-used are the metacognitive compensation and affective strategies.

Table 4: Independent Sample *t*-test

Strategy	Gender	N	df	Mean	Std. Deviation	Std. Error Mean	t	p
Memory	Male	24	58	27.33	3.44	0.70	-0.671	0.505
	female	36		27.91	3.20	0.53		
Cognitive	Male	24	58	42.16	5.53	1.13	0.729	0.469
	female	36		41.16	4.97	0.82		
Compensatory	Male	24	58	18.58	2.48	0.51	-0.084	0.933
	female	36		18.63	2.52	0.42		
Metacognitive	Male	24	58	27.54	3.27	0.68	-0.049	0.961
	female	36		27.58	3.22	0.54		
Affective	Male	24	58	18.04	2.62	0.54	0.460	0.647
	female	36		18.38	3.00	0.50		
Social	Male	24	58	17.87	3.40	0.69	-0.050	0.960
	female	36		17.91	2.99	0.50		

An independent samples *t*-test was conducted in order to find whether there was a significant difference in the language learning Strategy preferences of the male and female participants. According to Table 4., the results showed that there was no statistically significant difference between the strategy preferences of the two genders.

Brain Dominance

The students' hemispheric preferences were investigated according to 'Brain Dominance Survey (Davis et al., 1994)' in order to make it vivid that males were more left-brain dominant or females and also, men were more right-brain dominant or females. The results indicated that the participants vary in terms of brain dominance types.

Table 5: Gender/hemisphere Cross Tabulation to find the Hemisphere Preference in Males and Females

Gender	Hemisphere preference		Total
	Left	Right	
Males	6 (25%)	18 (75%)	24 (100%)
Females	28 (77%)	8 (22%)	36 (100%)
Total	34 (56%)	26 (43%)	60 (100%)

According to Table 5., the number of Right-Brain Dominant students was 26, which constituted 43% of total. Thirty four students were found to be Left-Brain Dominant, that was, 56% of all. The findings in this table revealed that among sophomores, men were more right hemisphere-oriented and women were more left hemisphere-oriented.

CONCLUSION

According to table 1., it was revealed that the three most frequently-used strategies are cognitive, memory and social strategies; and the three least frequently-used are the metacognitive, compensation, and affective strategies. The results of descriptive statistics conducted to identify the general tendency of strategy preferences of the participants in this study indicated that cognitive strategies were favored the most by sophomores with the mean score of 41.30, while metacognitive strategies were disfavored by them since their average was 19.85. Furthermore, due to answer the first research question, an independent samples *t*-test was conducted in order to find whether there was a significant difference between gender and the use of language learning strategies. The results showed that there was no statistically significant difference between the strategy preferences of the two genders. To answer the second research question, the researcher administered 'Brain Dominance Survey' in order to investigate whether there is a significant difference between gender and being right-brain or left-brain dominant. The findings indicate that men are more right-brain dominant and women are more left-brain dominant.

Limitation of the study

The first limitation of the current study refers to its restriction to one academic field of study. However, the results might be applicable to other students studying other fields of study at different colleges or universities. Another limitation is that individual characteristics of students, except gender, have not been taken into account while identifying and analyzing their learning strategies. Motives underlying this research into brain dominance and language learning strategies were the investigation of whether there is a relationship between gender and brain dominance. One can conduct a study in order to investigate the relationship between brain dominance and language learning strategies. So, it appears to be a significant step to be taken in language learning research. Once a relationship between brain dominance and strategy usage is identified, language learning strategies can be taught to learners in accordance with their brain dominance types and learning styles. Certainly, knowing more about the individual variables will provide the curriculum designers, teachers and learners with more opportunities in facilitating the learning process.

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