

The Relationship between Field Dependence and Independence Cognitive Style of Iranian EFL Learners and their Performance in Cognitive ability for Novelty in Acquisition of Language Foreign Test

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Abstract: The present study was carried out with the aim of finding the probable effects of Iranian EFL learners' cognitive styles on their performance in a recent aptitude test, Cognitive Ability for Novelty in Acquisition of Language (CANAL-FT) as applied to foreign language test designed by Grigorenko et al. (2000). The two cognitive styles, i.e. field dependent (FD) and field independent (FI), were considered as independent variables and CANAL-FT as the dependent variable. For the purposes of this research, 126 undergraduate students (95 females and 31 males) all majoring in English at Shiraz Azad University participated in this study. At first, the Group Embedded Figures Test (GEFT, Witkin, 1977) was given to the participants to identify field dependent/independent groups. In the same session, the CANAL-FT was given to the same students who took the GEFT in order to predict the learners' foreign language abilities and success. The result of the study suggests that test-takers' language abilities do not correlate with field dependency. In terms of sex differences and test performance, it was found that females had a significantly better performance than males.

Keywords: field dependence (FD), field independence (FI), cognitive style, aptitude, cognitive ability for novelty in acquisition of language-foreign test (CANAL-FT).

Introduction

Individual differences between language learners which are generally categorized under personality, affective and cognitive factors may account for some of the variations in facility in L2 proficiency (Rastegar, 2003). Recently, language researchers have investigated a number of factors other than language proficiency that can affect language performance. One of these factors is individual attributes of the language learners or their cognitive styles (Salmani-Nodoushan, 2007).

The concept cognitive style refers to the link between personality and cognition that influences how one learns things and how he/she deals with problems (Keefe, 1979). According to Larsen-Freeman (2001), a variety of learner differences are grouped into three main categories: (1) attributes that indicate who learners are (e.g. age, aptitude, personality and social identities); (2)

conceptualization, indicating how they conceptualize second-language acquisition (e.g. motivation, attitude, and beliefs); and (3) actions, indicating what they do (e.g. learning strategies). Only a few of the possible number of cognitive styles have received attention from L2 researchers in recent years.

Sasaki (1993) and Skehan's efforts (1998) aimed to modify the construct of aptitude by relating it to a cognitive view of second language acquisition (Brown, 2005). Aptitude is a very important factor in language teaching process among individual differences and plays a very significant role in L2 learning (Dornyei, 2005). The combination of these two variables (cognitive and aptitude) has an essential effect on assessing the differences among individuals which is the purpose of this study.

Review of Literature

Cognitive style

Performance on language tests, as Bachman (1995) puts it, is affected by factors other than communicative language ability. He grouped them into the following three categories: 1) test method facets, 2) attributes of the test taker that are not considered part of the language abilities we want to measure, and 3) random factors that are largely unpredictable and temporary. Attributes of individuals that are not related to language ability, according to Bachman (1995), are "individual characteristics such as cognitive style and knowledge of particular content areas, and group characteristics such as sex, race, and ethnic background" (p.164). Cognitive processes and affective variables shape how individuals acquire a foreign or second language (L2) and predict how well they are likely to learn one (Ellis, 2008; Robinson, 2005; Skehan, 1998).

Hansen (1995) stated that "Cognitive style measures do not indicate the content of the information but simply how the brain perceives and processes the information" (p. 2). He considered affective variables and cognitive styles together in teacher training programs.

Field Dependence /Independence

Field Dependence and Field Independence is one of the dichotomies of a more broad term "cognitive style" which embraces the "thinking style" and involves the way individuals think, perceive and remember information. The Field Dependence-Independence model, invented by Witkin (1977), identifies an individual's perceptive behavior while he/she is distinguishing object figures from the surrounding field in which the objects are set.

Much research has been done to explore the effect of field dependence/independence cognitive style on foreign language learning. These studies reveal some interesting points about field-dependent/independent students and their difference in mastering language skills and tasks. It

seems that field-independence cognitive style correlates positively and significantly with success in language classrooms (Chapelle & Robert, 1992; Brown, 2000; Salmani-Nodushan, 2009). But field-dependence cognitive style may not be necessarily a disadvantage because field-dependent individuals can perform better in social aspect of language (Dornyei, 2005; Salmani-Nodushan, 2007).

Wyss (2002) argues that there are advantages and disadvantages to field dependent and field independent learning styles important for L2 learning. The field independents excel in classroom learning which involves analysis, attention to details, and mastering of exercises, drills, and other focused activities. The field dependents, in contrast, seem to achieve a higher degree of success in everyday language situations beyond the constraints of the classroom and are capable of performing tasks which require interpersonal communication skills (Wyss, 2002).

Aptitude

Examples of intelligence and aptitude tests are presented in many major psychological measurement and testing texts such as Anastasi and Urbina (1997) and Kalpan and Saccuzo (2005). Aptitude and Intelligence tests are primarily useful for predicting future outcomes or gauging potential for success. Most aptitude tests are comprised of large doses of content devoted to the measurement of cognitive ability constructs that would typically be found on an intelligence test. Historically, aptitude tests were differentiated from intelligence tests by providing a broader assessment of abilities than the single IQ scores offered by intelligence tests. In addition, although aptitude test may contain portions that are more obviously achievement related, many intelligence tests require acquired knowledge on the part of examinee (Patel, 2013).

The two best-known tests used for measuring linguistic aptitude are the Modern Languages Aptitude Test (MLAT), developed by Carroll and Sapon in 1959 and the Pimsleur- Language Aptitude Battery (PLAB), developed by Pimsleur in 1966. Skehan (1989) explains the differences between the two batteries with different backgrounds of the authors, Carroll's being in psychology and Pimsleur's being in linguistics.

After the publication of the MLAT and the PLAB tests, the language teachers and linguists' initial interest in the area of aptitude measurement slowly began to fade. This drop of interest coincided with the development of communicative approaches to language teaching, which made measuring abilities to perform context-reduced activities irrelevant (Brown, 2005).

In the 90s, only few isolated attempts at research on aptitude are worth mentioning: Harley and Hart (2002), Sasaki (1993) and Skehan's efforts (1998) to modify the construct of aptitude by relating it to a cognitive view of second language acquisition (Brown, 2005). The authors who follow the renewed course of aptitude exploration are Grigorenko, Sternberg and Ehrman, who devised a new dynamic aptitude battery based on Sternberg's theory of intelligence (2000).

Cognitive Ability for Novelty in Acquisition of Foreign Language Test (CANAL-FT)

An important event in the recent aptitude research was the publication of a new L2 aptitude test designed by Grigorenko et al. (2002) called the Cognitive Ability for Novelty in Acquisition of Language as applied to foreign language test (CANAL-FT). The test is based on Sternberg's theory of a three-fold view of intelligence, which consists of analytical, creative and practical metacomponents, necessary for everyday life, and not only related to formal teaching contexts (Sternberg, 2002).

Robinson, (2002) managed to link the individual differences in research with SLA aspects and provided some viable evidence. The most important aspect of his research is the view of aptitude as a dynamic structure, the constituents of which jointly affect the language learning process. Furthermore, these 'clusters of learner variables' are interrelated not only with language learning tasks but also with instructional techniques (Robinson, 2002). This provides a solid basis for continuation of research into aptitude and SLA processes, both in terms of theoretical connection and pedagogically-oriented application.

Objectives of the study

The study seeks to answer the following research questions:

1. Is there any relationship between Iranian EFL students' field dependence/field independence cognitive style and their performance in Cognitive Ability for Novelty in Acquisition of Language-Foreign Test (CANAL-FT)?
2. Is there any difference between male and female students in Cognitive Ability for Novelty in Acquisition of Language-Foreign Test (CANAL-FT)?

Methodology

Participants

126 undergraduate students majoring in English translation and English teaching at Shiraz Azad University were randomly selected to participate in this study. To shed more light on the role of gender, the participants comprised ninety five females (75%) and thirty one males (24%).

Instruments

The following instruments were employed to collect the data:

1. The Group Embedded Figures Test (GEFT), Field dependence/Independence (Witkin et al., 1977)

2. Cognitive Ability for Novelty in Acquisition of Language Foreign Test (CANAL-FT) (Grigorenko et al., 2000)

Data collection procedure

The data were collected during the fall term of 2014-2015. During the data collection phase, the GEFT was administered within 10 minutes and in the same session of 30 minutes; the CANAL-FT was given to the same students who took the GEFT. GEFT is an 18 item instrument which requires the subject to identify a simple geometric shape in a complex figure. Each item has one point. Subjects who correctly identify most of the simple figures are considered field independent while those who cannot do this in the complex figure are considered field dependent. Then, the participants were asked to answer CANAL-FT. It has different subtests including morphology, semantic and syntax as well. Although any kind of mediation or guidance is not provided during the test, the researchers believe that their study is an example of dynamic assessment because it directly measures the amount of learners' language learning during the assessment procedure. According to Stenberg (2002), the test is dynamic because it measures language learning ability while examinees attempt to learn a language. However, at no point during the administration of the test is the examinee offered mediation, either in the form of hints, suggestions, prompts, leading questions or through interaction with another person.

Results and Discussion

In order to answer the first research question, i.e. "is there any relationship between Iranian EFL students' field dependence/field independence cognitive style and their performance in Cognitive Ability for Novelty in Acquisition of Language-Foreign Test (CANAL-FT)?", Pearson Product-Moment Correlation Coefficient analysis was run. The results of the statistical analysis are presented in Table 1

Table 1 Correlation between GEFT and CANAL-FT Correlations

		test1	test2
test1	Pearson Correlation	1	.136
	Sig. (2-tailed)		.129
	N	126	126

test2	Pearson Correlation	.136	1
	Sig. (2-tailed)	.129	

As Table 1 shows, there was no correlation between FD and CANAL-FT. So, the null hypothesis cannot be rejected since $p=12$ and its more than %5.

In order to answer the second research question, i.e. “Is there any difference between male and female students in Cognitive Ability for Novelty in Acquisition of Language-Foreign Test (CANAL-FT)?”, independent sample t-test was run. The results of this statistical analysis are presented in Table 2

Table 2. Independent sample t-test

test	Equal variances assumed	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
2		3.885	.051	6.440	124	.000	2.90051	.45039	2.00907	3.79195

As Table 2 shows, there were statistically significance differences between the two groups, so the null hypothesis is rejected, since $p=.0$ and it is less than %5.

The stem-and-leaf plot in Figure 1 summarizes the two groups' performance in CANAL-FT.

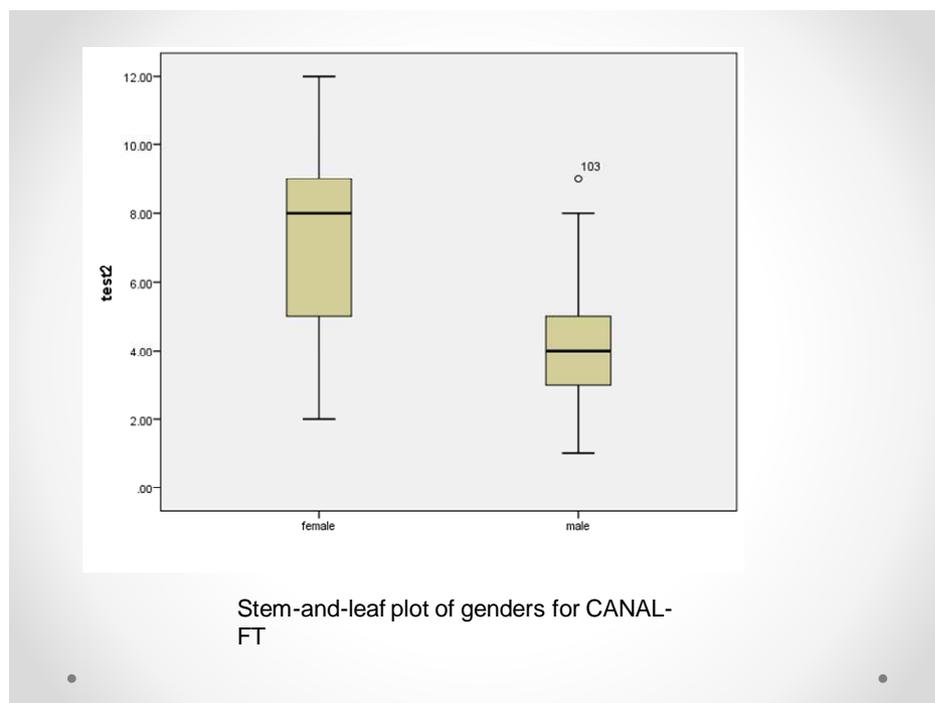


Figure 1. The two groups' performance in CANAL-FT

In this study, two research questions were investigated. First of all, regarding the relationship between field dependence/independence and CANAL-F test performance of EFL students, it was found that there was no significant correlation between these two variables. In contrast to our results, other studies (Chapelle & Roberts, 1992) found a significant correlation between field dependence and scores on L2 tests. In this relation, Hansen and Stansfield (1982) found that there was a low positive correlation between FI and proficiency test. This finding is in line with the study done by Salmani-Nodoushan (2007).

In another study by Stern (1987) significant correlations were obtained between FI and L2 learning for English-speaking grade 12 Canadian learners of French. Many studies have shown that individual characteristics have an important influence on the learning of a foreign language (FL) and that these differences can be tied to various types of learning variables. Foremost among these effects are the roles played by affective, cognitive and metacognitive factors (Horwitz, 2008). Also, Gardner argues that there is a wide range of cognitive abilities, but that there are only very weak correlations among them.

With regard to question 2 that deals with sex differences and test performance, it was found that females had a significantly better performance than males. Females seem to have language functioning in both sides of the brain (Denckla, 2013). Considering these recent findings,

researchers using brain imaging technology that captures blood flow to working parts of the brain analyzed how men and women process language. All subjects listened to a novel. When males listened, only the left hemisphere of their brains was activated. The brains of female subjects, however, showed activity on both left and right hemispheres. This activity across both hemispheres of the brain may result in the strong language skills typically displayed by females. Numerous studies show subtle differences in male and female behavior and in cognitive functions, as well. Men tend to be more aggressive and outperform women on mental tasks involving spatial skills such as mental rotation, whereas women tend to be more empathetic and perform better on verbal memory and language tasks. The study done by Stoet (2008) indicated that women outperform men in multi-tasking paradigms.

Conclusion

It is generally admitted that the application of psychological issues to educational problems has been of crucial importance for the successful teaching and testing process. Educators are expected to pay attention to the exceptional relationship between learners' cognitive functioning and linguistic functioning, as well as to individualize their instruction in order to meet the requirements of particular students. It should take the form of programmed teaching phenomenon, which allows the educators to adapt individual learner differences (IDs), and in which students are able to work at their own pace and use the materials they find comprehensible. It is believed that the knowledge of IDs is essential for a better understanding of the learners' needs and the proper adaptation of teaching methods. Ellis (1994) noticed that L2 learners differ in the rate of acquisition and that this difference is the result of individual factors.

As it is clear from its name, the origin of CANAL-FT is in the cognitive theory and has dynamic simulation-based features. A major underlying idea of this test is that a central ability in foreign language learning requires the ability to cope with novelty and ambiguity (Ehrman & Oxford, 1995). This ability is part of Sternberg's theory of human intelligence (2002). In summary, integrated educational theories, teaching strategies, and other pedagogic tools can be used in meaningful and useful ways to satisfy the students' needs. Gardner himself believes that educators should not follow one specific theory or educational innovation when designing instruction but instead they should employ customized goals and values appropriate to their teaching and student needs. Addressing the multiple intelligences and potential of students can help instructors personalize their instruction and methods of assessment.

Implications

In this study, a clear overview of the current cognitive theories as well as ability measures of foreign language ability was provided. The main contribution of this study is that it provides an overview of contemporary ideas on foreign language learning mechanisms with regard to psychological methods.

Novelty resolution as one of the concepts of Sternberg's experiential facet plays a big role in foreign language acquisition. The dynamic and interactive nature of working memory assessment in the CANAL offers a clear advantage over traditional measures of language aptitude such as the MLAT, which "use only rote, passive measures of short-term memory ability" (Robinson, 2002, p. 660). Pedagogical intervention studies based on the theory were carried out across different levels of schooling (elementary, middle, and high) and across a number of academic subjects (e.g. mathematics, science, language arts, social studies). The triarchic theory of intelligence theory can be used for curriculum development, planning instruction, selection of course activities, and related assessment strategies. Instruction which is designed to help students develop their strengths can also trigger their confidence to develop areas in which they are not as strong. Sternberg's theory has three major implications for educational psychology. First, teaching for all types of intelligence is important because students need to fix their strongest abilities at the same time they work to develop the abilities in which they demonstrate weaknesses. Second, students' strongest abilities are directly connected to their most agreeable learning styles. Teachers should know the learning preferences of their students and use them in an appropriate manner. Third, because these various abilities exist, there should be several assessments of school achievement, not only those that focus on traditional analytical abilities. Sternberg's theory is widely referenced in the psychological and education literature and can be found in virtually any psychology or education textbook.

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