

Gender Gap in Aptitude Test of Iranian EFL Learners

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Abstract. The present study was carried out with the aim of finding gender gap in a recent aptitude test, the Cognitive Ability for Novelty in Acquisition of Language (CANAL-FT) as applied to foreign language test designed by Grigorenko et al. (2002). 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. The CANAL-FT was given to the students in order to predict the learners' foreign language abilities and success. In terms of gender and test performances, it was found that females had a significantly better performance than males.

Keywords: Aptitude, cognitive ability for novelty in acquisition of language-foreign test (CANAL-FT)

1. Introduction

An important event in the recent aptitude research was 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), a test which can be used to help

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students to identify their problems or given extra attention, for grouping, and in predicting job training performance.

Among individual differences in language learners, aptitude seems to be the most controversial and highly disputed one among linguists, firstly because of the apparent difficulty with defining it and setting it apart from general intelligence and secondly due to the ‘undemocratic’ implications it allegedly may have on language teaching and finally, because of a rather limited amount of aptitude research. As a logical result of the measures being used in the prognostication of success/lack of success came the practice of screening learners for desirable ‘amounts’ of aptitude before accepting them on a second language course. Despite some previous doubts regarding its significance, in the last two decades aptitude has been acknowledged as one of the most important factors and predictors of learners’ ultimate success in L2 learning (Dornyei 2005); consequently, interest in research on aptitude and the amount of published materials have grown significantly. Aptitude is a very important factor in the process of language learning. Firstly, linguistic aptitude is a universal human characteristic when L1 acquisition is in question. Secondly, despite the claims that it is undemocratic, aptitude does play a very significant role in L2 learning. The method of aptitude test is used extensively these days in helping employers to select the most appropriate candidate for a specific job role. Finding people with the right skills and attributes is paramount to all successful businesses in both the private and public sectors (Ranta, 2008).

2. Literature Review

2.1. Aptitude

Patel (2013) distinguished among achievement, aptitude and intelligence as different types of ability. Achievement refers to previous learning. Aptitude refers to potential for learning or acquiring a specific skill. Traditionally, distinguished from achievement and aptitude, intelligence refers to a person’s general potential to solve problems, adapt to changing circumstances, think abstractly and profit from experience. All these are highly interrelated (Patel, 2013). Intelligence and Aptitude as mental

abilities are not much differentiable and are often very subtle and difficult to disentangle. Examples of intelligence and aptitude tests are presented in many major psychological measurement and testing texts such as those of 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. Aptitude tests tend to be more for gauging occupational success and they tend to be group administered. 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. Dissatisfied with the previous aptitude tests, predominantly based on grammar-translation methodology, Carroll and Sapon devised the MLAT test, which puts forward the four-component view of language aptitude (Skehan 1989). The components measured by this paper-and-pencil test battery are:

1. Phonemic Coding Ability-the ability to link sounds and symbols so that they could be recalled later, i.e. the capacity of handling phono-orthographic material;
2. Grammatical Sensitivity-the ability to identify the grammatical functions that words have in sentences;
3. Inductive Language Learning Ability-the ability similar to grammatical sensitivity involving capacities to analyze language learning material and find patterns (Godina, 2010.)
4. Memory and Learning-the ability to bond stimuli (native language words) and responses (target language words) which affects learner's

speed in acquiring new vocabulary. (Carroll, 1965)

Skehan's contribution to the development of aptitude tests is a review of Carroll's concept of aptitude in 1989. He argued that the number of aptitude components should be reduced to the three basic ones: auditory ability, memory ability and linguistic ability, which unites Carroll's grammatical sensitivity and inductive language learning ability, the two features he claimed to be of the same nature (Dornyei 2005). Further attempts at devising linguistic aptitude tests were mainly for military purposes, the most important of which was carried out by the American Armed Forces-the Defense Language Aptitude Battery. The main aim of this test was to modify the MLAT so that prediction was maximized. However, it is a general agreement that none of the subsequent tests managed to outperform the MLAT in terms of reliability and prediction (Dornyei, 2005).

The most prominent feature of previously mentioned tests is a strong emphasis on auditory and structural aspects of aptitude, probably the result of the predominant methodology (audio-lingual) of that period. What seems to be evident is a lack of interest in communicative features of aptitude. It is also important to mention that previously mentioned batteries were devised before the development of the SLA (Second Language Acquisition) theory, which might account for the failure to include communicative competence measuring in the tests. Nonetheless, the MLAT is still one of the most influential tests in this field, precisely because of its reliability and high degree of successful prediction. 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). However, the last few years brought a significant revival of interest in language aptitude and a number of studies and research papers have been published

with the new ideas and concepts of aptitude. One of the explanations for this shift lies in the development of cognitive psychology, reflected in new theories of intelligence with more accurate fragmentation and explanation of various mental abilities which are the constituents of the overall language learning ability. In addition, further attempts were made to relate the research on aptitude to the key points of the SLA theory (Dornyei, 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 (2002). Dornyei and Skehan (2003) suggested the possible link between aptitude and the concept of 'processes' of second language acquisition (Brown, 2005). Furthermore, same authors conducted research which relates aptitude to implicit learning, i.e. learning out of the teaching context. Another important advancement in aptitude research was made by Robinson. His continuous efforts to extend the notion of aptitude and its constituents far beyond original Carroll's concepts seem very promising. Robinson's idea (which will be discussed in more detail in the next section) that various aptitude factors and their combinations significantly contribute to learning processes appears to be supported by the research evidence. At this point, it is evident that research on aptitude, combined with exploring other psychological variables, may significantly contribute to clarifying some of the SLA issues concerning language learning and learning in general.

2.2 Cognitive ability for novelty in the 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 et al., 2002).

The first empirical results seem promising and concordant with the

authors' views that aptitude is not to be measured only in terms of one general language aptitude score. Grigorenko et al. argued that a valid aptitude test should also give sub-scores which would point towards most appropriate forms of instruction (Sternberg et al., 2002). Such tests would not only be applicable in practice, but would also give more reliable results since they would not only measure one's analytical language abilities, but also creative and practical language acquisition abilities. Skehan (cited in Robinson, 2002) tackled the question of the nature of modularity in language learning. He suggested that, towards the end of the critical period, the nature of modularity changes in the sense that the number of modules increases. Namely, there was evidence that L1 aptitude may be consistent with the syntax and semantics modules, whereas in the L2 case, our brain resorts to three more general learning mechanisms. Each of these mechanisms corresponds to one of aptitude components: auditory processing- receiving input, language processing-analyzing data and memory-recalling of the processed data. Based on the research evidence, Skehan argued that there is a possibility that there are specific linguistic abilities. In terms of input processing and memory, whereas in the case of language analysis and creating patterns more general, cognitive abilities seem to be operating. This may be an interesting line for further research, but remains very speculative for the time being. The only person who has so far managed to link the individual differences research with SLA aspects and provided some viable evidence is Peter Robinson. His main achievement (2002) is profiling individual differences in cognitive abilities and further connecting such profiles with adequate pedagogic tasks. He made the distinction among implicit, incidental and explicit learning and points out some cognitive (e.g. working memory capacity) and primary abilities (e.g. pattern recognition and processing speed) which were further combined into higher-order abilities directly responsible for learning. His idea was that these sets of higher-order abilities constitute aptitude complexes which affected learning under specific conditions.

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.

3. Research Question

1. Is there any difference between male and female students in Cognitive Ability for Novelty in Acquisition of Language-Foreign Test (CANAL-FT)?

4. Methodology

4.1 participants

126 undergraduate students majoring in English translation and English teaching at Shiraz Azad University were randomly selected to participate in this study. The teacher of the class selected some numbers from the name list and asked those students to do the test. The randomization procedure was employed to guarantee maximum group homogeneity. To shed more light on the role of gender, the participants comprised ninety five females (%75) and thirty one males (%24).

4.2. Instrument

1. Cognitive Ability for Novelty in Acquisition of Language Foreign Test (CANAL-FT) (Grigorenko et al., 2002).

Among the limited number of empirical studies, Grigorenko (2002) developed a learning theory called CANAL-F (Cognitive Ability for Novelty in Acquisition of Language Foreign test). According to this theory, learning including foreign language learning is understood as the ability to cope with novelty and ambiguity. Based on this theory, the researchers developed a formal test that measured the ability of learners to deal with novel problems. They name this test as CANAL-FT. Such tests would not only be applicable in practice, but would also give more reliable results since they would not only measure one's analytical language abilities, but also creative and practical language acquisition abilities.

4.3 Procedure

The data were collected during the fall term of 2014-2015. The CANAL-FT was administered within 30 minutes; the researcher was present in the session and administered both tests under standard conditions. The test had different subtests including morphology, semantic and syntax as well. Although any kind of mediation or guidance was 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 was the examinee offered mediation, either in the form of hints, suggestions, prompts, leading questions or through interaction with another person.

5. Results and Discussion

5.1 Results

As Table 5.1 shows, females with the mean score of 7 had a better performance than males with the mean score of 4 in the test. One reason for unsatisfactory results for males may be due to the number of the subjects.

In order to answer the 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 5.2.

As Table 5.2 shows, there is a statistically significance differences between the two groups, so the null hypothesis is rejected, since $p = .0$ and it is less than 0.05 ($P < \%05$).

Table 5.1. Descriptive statistics of both genders in CANAL-FT

test1	Gender			Statistic	Std. Error
	female	Mean		7.1263	.23292
		95% Confidence Interval for Mean	Lower Bound	6.6638	
			Upper Bound	7.5888	
		5% Trimmed Mean		7.1199	
		Median		8.0000	
		Variance		5.154	
		Std. Deviation		2.27026	
		Minimum		2.00	
		Maximum		12.00	
		Range		10.00	
		Interquartile Range		4.00	.247
		Skewness		-.037	.490
		Kurtosis		-.679	
test1	Male	Mean		4.2258	.33347
		95% Confidence Interval for Mean	Lower Bound	3.5448	
			Upper Bound	4.9068	
		5% Trimmed Mean		4.1398	
		Median		4.0000	
		Variance		3.447	
		Std. Deviation		1.85669	
		Minimum		1.00	
		Maximum		9.00	
		Range		8.00	
		Interquartile Range		2.00	
		Skewness		.549	.421
		Kurtosis		.363	.821

Table 5.2. Independent sample t-test independent samples test

	Equal variances assumed	Levene's Test for Equality of Variances		t-test for Equality of Means			Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)			Lower	Upper
test		3.88	.051	6.44	124	.000	2.9005	.45039	2.009	3.79195
2	Equal variances not assumed	5		0			1		07	
				7.13	61	.000	2.900	.40676	2.0873	3.71369
				1	724		51		3	

5.2 Discussion

This question deals with sex differences and test performances, it was found that females had a significantly better performance than males.

Over the years, experts have proposed a variety of explanations for gender differences in test scores, including differences in innate abilities, sex biases in test questions, differences in interests, attitudes and the kinds of courses students have taken and differences in the social backgrounds of those who took the tests. A number of studies have demonstrated that boys and girls were treated differently in school and that their teachers had different expectations of them.

Females seem to have language functioning in both sides of the brain (Denckla, 2013). Consider 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. (Geary, 2013) believed that as a whole, girls outperform boys in the use of language and fine motor skills until puberty. Boys also fall prey to learning disabilities more frequently than girls. Clinics see a preponderance of boys with dyslexia he suggests that women use language skills to their advantage. Females use language

more when they compete and manipulate information. Geary believes that this behavior, referred to as relational aggression, may have given females a survival advantage long ago. Women pause more, allow the other friend to speak more, offer facilitative gestures. When it comes to performing activities that require spatial skills, like navigating directions, men generally do better. Women use the cerebral cortex for solving problems that require navigational skills. Men use an entirely different area, mainly the left hippocampus—a nucleus deep inside the brain that's not activated in the women's brains during navigational tasks (p. 121).

Cowan (2005) defined women working memory and claimed that "Women are better with memory, analyzing, multi-tasking and creative thinking. They have an easier time expressing their emotions and thoughts. They are smarter, more focused and they have a better graduation rate from college" (p.338). Numerous studies showed subtle differences in male and female behavior and in cognitive functions, too. 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.

The gap between male and female performance on standardized tests has disappeared on verbal tests and is narrowing on mathematics tests, researchers who have analyzed a wide range of examination data assert. The findings contrast with major studies in the 1970's that showed pronounced differences in the scores of males and females, with females on average scoring higher on verbal tests and males higher on mathematics tests. Experts said they can only speculate about why the gender gap has since vanished in verbal areas and steadily decreased in mathematics. They cited a variety of possible explanations, including changes in the educational experiences and expectations of males and females, or changes in the tests or in the kinds of students taking them, But a number of experts said the findings refuted the conviction among some educators and psychologists that females are inherently superior in verbal abilities, like reading and writing, and that males are inherently better at the reasoning and geometrical skills of mathematics.

6. Implications

These skills can be exercised in class of any size. What the teacher may need is the knowledge of what to look for trying to help the learners to reach their objectives and overcome their difficulties. An analytical scheme of the kind developed by recent research on language learning may be found helpful by teachers in assisting them in the process of understanding in many instances, it may simply confirm what good practitioners intuitively know and practice. Furthermore; it is one of the objects of research of this kind to make more explicit and systematic the knowledge implicit in the best practice.

Addressing the multiple intelligences and potential of students can help instructors personalize their instruction and methods of assessment. The main thrust of this research was to demonstrate the value of multiple pedagogical approaches that ensure that children are taught in ways that challenge and develop their analytical, practical, and creative abilities. 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). In one of the largest studies, a triarchic theory-based curriculum was administered to a few thousand children enrolled in the fourth grade in various locations in the United States. The curriculum was developed for language arts, mathematics, and sciences; it was based on the national standards and, prior to implementation, was adapted to requirements of the various states and districts where it was delivered. 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. Yet, in the field of practical applications, the theory has been regarded critically. The major points of criticism focus on the difficulties of reliably measuring "unconventional" (e.g. creative and practical) abilities and differentiating them psychometrically from abilities measured by more conventional tests of intelligence and achievement.

In summary, integrate educational theories, teaching strategies, and other pedagogic tools can be used in meaningful and useful ways to satisfy students' needs. Gardner himself believed 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.

7. Conclusion

The findings of the present study indicate the differences between male and female performance in Cognitive Ability for Novelty in Acquisition of Language Test. CANAL-FT, as is clear from the name, its origin is in 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 (1988). It is also a useful tool for teachers who want to gain a better understanding of their own students and language learners. The model represents the complexities of the interaction between the various factors involved. It can' therefore, be used as an instrument of analysis in teaching-learning situation.

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. It becomes clear that aptitude is a very important factor in the process of language learning. Firstly, linguistic aptitude is a universal human characteristic when L1 acquisition is

in question. Secondly, despite the claims that it is undemocratic, aptitude does play a very significant role in L2 learning. Everyday teaching practice confirms this. However, the big question is what is to be done with the information we have on our students' aptitude. Perhaps a little change of attitude would make a difference; namely, if we consider aptitude from the perspective of the possibilities it offers for the improvement of our teaching and our students' ultimate success, and not as an unalterable factor which only causes unnecessary distinction and confusion, we may realize its value and potential. Since it seems that aptitude has a major significance for the rate of language learning, aptitude test scores can be used for enhancing teaching materials and techniques. Thus, all students will have the opportunity to receive better instruction, adjusted to their needs. On a broader concept, exploration of the notion (or maybe notions) of aptitude will certainly have major implications for a detailed explanation of human cognitive abilities and learning processes.

We encourage teachers to teach and assess achievement in ways that enable students to analyze, create with, and apply their knowledge. When students think to learn, they also learn to think. And there is an added benefit: Students who are taught analytically, creatively, and practically perform better on assessments, apparently without regard to the form the assessments take. That is, they outperform students instructed in conventional ways, even if the assessments are for straight factual memory (Sternberg, Torff, & Grigorenko, 1998a, 1998b). Moreover, this research shows that these techniques succeed, regardless of subject matter area. Teaching for successful intelligence improves performance relative to standard (or critical-thinking) instruction, there are at least four reasons for this statement: First, teaching for successful intelligence encourages deeper and more elaborated encoding of material than does traditional teaching, so students learn the material in a way that enhances probability of retrieval at the test time. Second, teaching for successful intelligence encourages more diverse forms of encoding material, so there are more retrieval paths to the material and greater likelihood of recall at test time. Third, teaching for successful intelligence enables students to capitalize on strengths and to correct or

compensate for weaknesses. Fourth, teaching for successful intelligence is more motivating to both teachers and students, so teachers are likely to teach more effectively and students are likely to learn more. Ideally, of course, exams should not assess only static memory learning.

As this article makes clear, we are all responsible for giving our children equal chances to succeed in school and in life. Not only does it make economic sense, it is simply the right thing to do.

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