Personality and Individual Differences 50 (2011) 434–436

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Short Communication

Sex differences in second language comprehension

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ARTICLE INFO

Article history:
Received 22 July 2010
Received in revised form 19 October 2010
Accepted 26 October 2010
Available online 20 November 2010

Keywords:
Sex differences
Second language ability

ABSTRACT

Several studies have reported that females have higher average ability than males in second language learning in studies using children. We further investigated this issue by examining potential sex differences in second language ability in college students matched for the age of acquisition of the second language, the number of classes taken, working memory capacity, and English Reading Comprehension. The results showed that females performed significantly better than males in second language reading comprehension when they are matched on all these variables, suggesting that females have a stronger module for second language processing than do males.

1. Introduction

Numerous studies have shown that there are sex differences in a variety of abilities, in some of which males have higher average ability than females and in others females have higher average ability than males (Feingold, 1992). Kimura (2007) has listed the abilities in which males have higher average ability than females as mathematics, spatial ability, throwing accuracy, and mechanical reasoning, and the abilities in which females have higher average ability than males as verbal fluency, perceptual speed, fine motor skills, memory object location, and arithmetical calculation.

It has frequently been asserted that females have an advantage in first language ability. For instance, "boys, from various cultures, are superior to girls on spatial problems; girls are superior to boys on verbal tasks" (Kagan, 1971, p. 182); "female superiority on verbal tasks has been one of the more solidly established generalizations in the field of gender differences" (Maccoby & Jacklin, 1974, p. 75); "females are consistently superior to males in a wide range of verbal tasks" (Galsworthy, Dionne, Dale, & Plomin, 2000, p. 206); "the existence of gender differences in verbal ability, claiming superiority of girls throughout the life cycle, has been one of the true facts of psychology for decades" (El Hassan, 2001, p. 118); "the well attested fact that women are stronger on verbal items" (Bartholomew, 2004, p. 106); "it is well known that females have about a one-third of a standard deviation (i.e., 5 IQ points) advantage over males" (Anderson, 2004, p. 828).

These assertions are overgeneralizations, since verbal ability in the first language can be defined more specifically. In a meta-analysis of sex differences in first language verbal abilities in the United States, Hyde and Linn (1988) found that there is no sex difference found for vocabulary ($d = -.02$) or in verbal comprehension ($d = -.03$). The female advantage was confined to verbal fluency ($d = 0.33$–0.53), defined by Kimura (2007, p. 40) as "generating as many words as possible with a specific constraint (e.g., beginning letter)." In comparison to females, males have been found to show more variability in performance scores on a number of intellectual abilities, such as spelling in the first language (Feingold, 1992). Lynn, Raine, Venables, Mednick, and Irwing (2005) report sex differences in Mauritius, in comparison to 8 other countries, all with similar findings in which males score higher on verbal intelligence. When participant groups were equivalent in Gf, males still show an advantage on tests of semantic memory (Lynn & Irwing, 2002). Ellis et al. (2008) summarize the results for research on sex differences and report more studies with findings of female superiority in rate of language development, spelling, and reasoning, whereas the majority of research indicates males with better performance on verbal analogies, vocabulary, and adult literacy. Although the majority of studies indicated a female advantage on both reading ability and comprehension, there were reported findings favouring males, and findings of no differences across age groups (i.e., childhood to adulthood).

This list of sex differences in abilities does not include second language ability. Nevertheless, several studies have reported that females have higher average ability than males in second language ability and these have found that the female advantage in second language ability is not simply a function of an advantage in first language ability.

A female advantage in second language ability has been reported among 13 year olds in England (.17d: Burstall, Jamieson, Cohen, & Hargreaves, 1974), among 12 year olds in Ireland (.64d:

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0191-8869/$ - see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.paid.2010.10.026

Lynn & Wilson, 1993), among 13 year olds in Ireland), among 12 year olds in Israel (.20d: Lewy & Chen, 1974), among 12 year olds in Sweden (.27d: Ljung, 1965), among 14 year olds in Lebanon (.19d: El Hassan, 2001), and among 11 year olds in Mauritius (.13d: Lynn, in press). In all these studies, all school students learned the second language at school, females did not perform better than males in first language ability, and the female advantage in second language ability was statistically significant. These results suggest that females have a specific advantage in second language ability that is not attributable to any advantage that they may have in first language ability.

The objectives of the present study were to ascertain whether the better performance of females in second language ability could be confirmed in college students matched with males on a number of experiences and abilities, and to ascertain what the female abilities are that contribute to their better performance of females in second language ability. To examine these hypotheses, data from a sample of college students who were all in the process of learning Spanish as a second language were assessed to explore potential sex differences. Reported experience with Spanish, as well as working memory capacity and L1 reading comprehension in English, and L2 Reading comprehension in Spanish were assessed. Further analysis of sex differences is necessary in the current paper in order to compare this more mature sample with that of the younger populations already reported in the literature that differ only in L2 ability, and not in other experiential or ability factors.

2. Method

2.1. Participants

Participants consisted of 73 native English speaking college students (32 males, and 41 females) who were all in the process of actively learning Spanish as a second language. All participants were between the ages of 18–22 years old and had some experience with Spanish (i.e., had taken classes in Spanish as a second language and/or had gained experience with Spanish through abroad experiences).

2.2. Measures

2.2.1. Reported L2 experience

To assess domain experience with Spanish as the second language, the participants in this study responded to survey questions regarding their age of acquisition for Spanish, the years spent actively learning Spanish, and the total number of Spanish classes taken from high school to college.

2.2.2. Working memory capacity

The working memory capacity assessment used in this study is the Counting Span Task, in which participants engage in controlled visual search for target shapes, while continuously attempting to remember the quantity of targets counted on a series of screens (Kane et al., 2004). This is the only measure administered using a computer (Dell, with 17 in. monitor). This task is reliable in terms of internal consistency, with Cronbach's $\alpha = .71$, (Payne, Kalibatseva, & Jungers, 2009). This computerized working memory capacity assessment requires participants to count the number of blue squares, amongst distractors that share either the feature of color (dark blue squares) or shape (light blue circles). Targets were counted aloud on a series of screens. After 2–6 screens, participants record the numbers counted, in successive order. There are 60 points possible, and total score was calculated by adding the number of correctly recalled memory sets.

2.2.3. L1 reading comprehension for English

Participants were administered the Air Force Officer Qualifying Test (AFQT) for L1 reading comprehension in English (Berger, Gupta, Berger, & Skinner, 1990). This specific version of the AFQT was used by Kane et al. (2004). This assessment requires the reading of 14 text passages on general topics. Participants were allotted 9 min to read each passage and respond to multiple choice comprehension questions. Internal consistency is good for this task, with Cronbach's $\alpha = .82$ (Payne et al., 2009).

2.2.4. L2 reading comprehension for Spanish

This measure was compiled by Payne et al. (2009), and also demonstrates good internal consistency, with Cronbach's alpha at .86. This assessment requires reading of 6 short text passages in Spanish, each followed by 4–5 multiple choice comprehension questions. Participants were allotted 15 min.

2.3. Procedure

Participants were administered the tasks in the order listed above. Each participant was tested individually in a sound attenuated laboratory.

3. Results

The results regarding sex differences in experience and ability variables are given in Table 1. They show that males and females did not differ on any of the variables with the exception of second language comprehension. The effect size for the difference between males and females on this is .49 (Cohen's d), equivalent to7.5 conventional IQ points, ($t(71) = -2.147$, $p < .05$), and is rather substantial in relation to other performance comparisons.

Correlations between the experience and ability variables with L2 comprehension are listed in Table 2. Even with a small sample of college participants both sexes' data revealed a significant correlation between years of experience learning L2 and L2 com-

Table 1
Mean sex differences for experience and cognitive variables.

	Males (N = 32) M (SD)	Females (N = 41) M (SD)	d	p
Experience variables				
Age of acquisition	**13.25** (3.32)	**13.25** (3.18)	.000	.466
Years L2 experience	**4.02** (2.36)	**4.41** (2.55)	.159	.495
Number of classes	**4.65** (2.94)	**5.05** (3.03)	.134	.573
Cognitive variables				
Working memory	**26.56** (12.72)	**26.49** (10.80)	.006	.978
L1 comprehension	**9.50** (3.41)	**9.68** (3.60)	.051	.826
L2 comprehension	**14.13** (4.04)	**16.66** (6.02)	**.494**	**.044***

* Significant difference ($p < .05$).

Table 2
Correlations with L2 reading comprehension in Spanish: for males and females.

	Males r	Females r
Experience variables		
Age of acquisition	**−.162**	**−.347***
Years L2 experience	**.422***	**.567*****
Number of classes	**.482****	**.647*****
Cognitive variables		
Working memory	**.101**	**.361***
L1 comprehension	**.424***	**.612*****

* $p < .05$.
** $p < .01$.
*** $p < .001$.

prehension, as well as significant relationships between L1 ability and L2.

4. Discussion

The results show two significant features. First, they confirm the results of studies of 11–14 year olds, summarized in the introduction, showing that females perform better than males in second language ability, although they do not perform better than males in first language ability. Second, the present study shows that the female advantage in second language ability cannot be attributed to any advantage in the age of acquisition of the second language, in the number of classes taken, in working memory capacity, or in L1 comprehension. The results showing that females perform better than males in second language ability when they are matched on all these variables suggests that second language ability should be added to the abilities listed by Kimura (2007) in which females excel, and that females have a stronger module for second language ability than do males.

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