Gender differences in mental rotation at young Romanian students at psychology—a pilot study

Mihaela Chraif*

Postdoctoral fellow, University of Bucharest, Kogălniceanu 36-46 street, Bucharest, 050107, Romania

Abstract

The objective is focused on highlighting gender differences in mental rotation on spatial ability visual tasks in Romanian undergraduate psychology students. Method: Participants were 57 undergraduate students aged between 20 and 24 years old (m=21.56; S.D.=1.42). Instruments: 3D Spatial Orientation test, Vienna Tests System (Schuhfried, 2007). Results confirmed the hypotheses (p<0.05) regarding gender differences in mental rotation tasks as measured by Spatial Orientation test. Findings show that undergraduate male students have better statistically significant spatial orientation than undergraduate female students (p<0.05).

Keynotes: mental rotation; spatial ability; spatial orientation; gender differences in mental rotation

1. Theoretical framework

Thurstone, (1938) in his Primary Factor Theory, defined spatial ability for the first time. Furthermore, Guilford (1956) confirmed the spatial ability factor as belonging to factor theories while Spearman (1927), Burt (1949) and Vernon (1950) support hierarchical models of intelligence having the spatial ability factor in composition. Nevertheless, Gardner (1983) highlighted the spatial ability factor as a component of the multiple intelligences. Previous research on gender differences in mental rotation made by Roberts (1999) evidenced that adult males had faster reaction times, and activation patterns that were more indicative of a simple rotation task while females had slower reaction times and exhibited brain patterns indicating a difficult type of rotation task. Terlecki & Newcombe (2005) and Voyer, Voyer, & Bryden (1995) highlighted gender differences in spatial cognition. Green & Bavelier (2006, 2007) showed that boys have higher performance in mental rotation and spatial cognition than...
girls as young and later adults because they play videogames. Previous research made in the laboratory of Experimental Psychology, Faculty of Psychology and Educational Sciences, were focused on highlighting the influence of college specialization on deductive reasoning in young Romanian students (Miulescu, Chraif, Aniţei, Iliescu & Bârcă, 2012) and the influence of sleep deprivation on short term memory and attention to details in young students (Chraif, 2012).

2. Objective and hypotheses

2.1. The Objective

• To highlight gender differences in mental rotation on spatial ability visual task in Romanian undergraduate psychology students.

2.2. Hypotheses

There are statistically significant differences in spatial ability with computer tasks regarding the mental rotation of 3D geometrical objects in young males psychology students compared with young females psychology students.

2.2.1. Specific hypotheses

• There are statistically significant gender differences in the number of correct answers as measured by the mental rotation Spatial Ability test.
• There are statistically significant gender differences in the number of incorrect answers as measured by the mental rotation Spatial Ability test.

3. Method

3.1. Participants

The participants were 57 undergraduate students, aged between 20 and 24 years old (m=21.56; S.D.=1.42), 33 young females and 24 young males, undergraduate students at the Faculty of Psychology and Educational Sciences, University of Bucharest, Romania.

3.2. Instruments

The Instrument was the 3D Spatial Orientation test, Vienna Tests System (Schuhfried, 2007). The primary factor measured by the 3D Spatial Orientation test is represented by spatial ability. The test measures the mental rotation capacity of geometrical objects and the combination between faces by mental rotation of the geometrical blocks.
3.3. Procedure

The two groups of students were separated by gender differences into male and female experimental groups. One by one, the participants took the computer task version of the spatial ability test. The interface presented the standardized instructions and an exercise phase.

3.4. Experimental design


4. Results

Applying the Kolmogorov-Smirnov test, the distribution for the correct and incorrect answers by gender, the data are normally distributed (p>0.05).
Figure 3 illustrates data distribution by gender for each variable: correct and incorrect answers.

Table 1 illustrates descriptive statistics for the variables: correct and incorrect answers in the Spatial Ability test from the Vienna Tests System. The mean of correct answers for male undergraduate students is statistically significant higher than the mean of correct answers for female undergraduate students (42.28>31.10; p=0.043<0.05). This confirms the first specific hypothesis “There are gender differences in the number of correct answers as measured by the mental rotation Spatial Ability test”. The second specific hypothesis has also been confirmed “There are gender differences in the number of incorrect answers as measured by the mental rotation Spatial Ability test” and the mean of male undergraduate students incorrect answers is lower than the mean of female undergraduate students (17.57<27.65; p=0.044<0.05).

5. Conclusions

According to previous behavioral-social psychology specialization studies, both groups of students obtained means lower than groups from other specializations focused on technical skills and mathematics (Miulescu, Chraif, Aniței, Iliescu, & Bârcă, 2012). In concordance to different studies, the human cognition is adapting to new ways of information processing (Vasile, 2012).

Talking about gender differences in mental rotation at psychology, young undergraduate students males obtained a higher number of correct answers at the Spatial Ability task measuring the mental rotation of 3D geometrical objects by a statistically significant margin than young undergraduate student females. Young
undergraduate students should know that their spatial abilities can be exercised and trained according to their practical needs.

Acknowledgements

This work was supported by the POSDRU/89/1.5/S/62259 strategic grant, Project “Applied social, human and political sciences. Postdoctoral training and postdoctoral fellowships in social, human and political sciences” co-financed by the European Social Fund within the Sectorial Operational Program for Human Resources Development 2007-2013.

References