

**The Relationship Between Gender Perception of  
Profession and Mental Rotation**

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Ph.D. Thesis

Submitted to the Senate of Bar Ilan universty

Ranat-Gan, Isreal

October 2015

## Abstract

Researchers are in disagreement about the reasons why there are differences between men and women in specific professions such as mathematics, science and engineering. Some think that males have cognitive advantages with which they are born and that this is the reason they choose this profession. Others believe that even if there is a difference, it is small and the reason for the professional gap is mostly social and cultural.

**The aims of this research are to:** (1) Examine the connection between a person's professional gender perceptions and the professional choices that individual men and women make; (2) Examine the connection between the professional gender perceptions and the cognitive spatial ability of mental rotation; (3) Examine the contribution of the spatial ability intervention program in reducing gender difference in mental rotation; (4) Develop tools for the examination of professional gender perceptions; (5) Develop and expand the scope of the Windows test developed by Tzuriel & Egozi (2010) in evaluating cognitive spatial ability of mental rotation in adults.

This research includes three studies: Study 1, Study 2 and Study 3.

**Study 1:** The purpose of this study was to examine to what extent professional gender perceptions represent a young person's spatial ability of mental rotations. The sample (n=184) included three groups from three different Israeli public schools. In each school three classes were randomly selected from three different age groups ( 2nd, 4th and 6th Grades).

**Study 2:** The purpose of this study was to examine how the spatial ability intervention program has influenced mental rotation. A random sample (n=101) was divided into a research group (n=53) and a control group (n=48). Each group was tested in three age groups: 2nd, 4th and 6th Grades. The experimental group received an intervention plan on using the spatial type of mental rotation while the control group received an alternative plan.

**Study 3:** The purpose of this study was to examine whether the choice of profession is related to professional gender perceptions or cognitive ability or a combination of both. The study sample (n = 199) comprised of two groups. Group 1 consisted of

students studying for undergraduate science degrees (mathematics, physics, chemistry and engineering) ( $n = 113$ ), and Group 2 consisted of students studying for undergraduate humanities degrees (history, early childhood education, literature and the Bible) ( $n = 86$ ). The students were freshmen from Bar Ilan University, Tel Aviv University and Ben Gurion University. The subjects were randomly selected from each field of study.

**The findings point to several trends:** (a) there were no differences between the genders in mental rotation ability among primary school students in all grade levels. This finding is in contrast to previous findings indicating that boys have higher achievements in mental rotation test than girls. (b) There were no differences between the genders in mental rotation ability among primary school students in all grade levels even after the implementation of the program. However, it was found that the experimental group (boys and girls), who participated in this program received significantly higher marks for mental rotation ability more than the control group. (c) Differences in mental rotation ability of the students sample were only related to the field of academic study, regardless of gender or how the individuals perceived their perception of the social role of gender in determining their professions. (d) It was found that in both the primary school students and university student groups, the boys showed a higher stereotyped choice in choosing their profession choices than girls. This finding supports the hypothesis of the study that there is culture-bound gender segregation in the field of career practice. However, the connection between gender and perception of professional mental rotation ability is only a sample of all elementary school students. In accordance with the hypothesis of the study, girls who showed perceptions of gender profession choice (less stereotyped) showed the higher achievements of mental rotation ability higher. Such a connection was not found in the student sample.

**This study has two important implications.** (A) Gender differences in mental rotation found in previous studies were primarily due to socio-cultural influences rather than innate or biological differences as had been speculated. (B) The findings support that the potential for cognitive learning type spatial ability of mental rotation is equal between the sexes. Therefore, it is crucial for parents and educators to ensure the proper environmental exposure from the earliest years in formal learning frameworks and non-formal settings. The working assumption of this study is that

exposure to equal opportunities will allow women to integrate into professions that are currently male dominated.