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Gender – Related Perceptions and Causal Attributions Regarding School Achievement

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Abstract

Gender roles have a powerful impact on educational system, influencing children's and adolescents' beliefs about their academic potential. Our study focuses on gender differences and similarities in students' perceptions of two school subjects, mathematics and language arts, and in students' explanations of the performances obtained in these areas within the frame of Weiner's causal attribution theory (1985). A total of 54 girls and 56 boys, 17-19 years old, undertook a questionnaire design for the assessment of mathematics and Romanian language on six bipolar scales, another questionnaire for the attributional style used in explaining the performance in mathematics and Romanian language, based on ability, effort, task difficulty and luck. Also the subjects were asked to estimate their performance, after the completion of two tasks, based on verbal and spatial abilities. The evaluations made by our participants sustain the presence of gender stereotyped perceptions of these academic subjects: mathematics is seen as masculine, and Romanian language as feminine. In explaining the school achievement, girls, comparing to boys, granted a higher importance to personal efforts and luck. Also girls had a higher tendency to underestimate their results obtained in task designed to assess verbal abilities. The results indicate that girls emphasized the importance of an external, unstable and unpredictable explanatory factor for success, and had lower performance expectations regarding the level of verbal abilities. Our findings emphasize the cultural diversity issue, and draw attention to the consequences of "modesty training" and gender stereotypes threat on the girls learning opportunities and career development.

Theoretical Background

A large number of specialists foreground the importance of the way in which students assess subject matter; offer explanations for results obtained; construct beliefs related to their efficacy in relation to preferences for subject matter; and, the level of students' performance and their aspirations (Popa, 2002; Woolfolk, 1998; Bandura et al., 1996). At the same time the educational system inevitably reflects a part of the cultural beliefs related to gender, which results in encouraging behaviours acknowledged as appropriate for both genders.

Gender stereotypes consist of the social shared specific beliefs about the characteristics that women and men are likely to posses. The studies of gender stereotypes focused on identifying different beliefs about personality characteristics, and found two basic clusters of sex-differentiated traits, which are frequently given labels as communal and agentic (Bakan, 1966, apud Moskowitz, Suh & Desaulniers, 1994). Nurturance/ expressiveness is associated with females (affectionate, concerned with others, sensitive), and dominance/ instrumentality is associated with males (independent, assertive, enterprising). Williams, Satterwhite & Best (1999) conducted a cross-cultural research on the content of gender stereotypes, which produces considerable communality in beliefs about the characteristics of men and women, following the dimension mentioned above.

In case of the educational system, subject matters are perceived as "masculine" and "feminine" in accordance to the level at which higher performances are related to certain traits included in the gender stereotypes. When it is about "masculine" subject matters, especially mathematics, the teachers' explanations regarding the girls' high performances reveal their effort, whereas the boys' performances are generated by their abilities and talent. When examining poorer results, with girls the explanation lies in their lack of talent, while with boys, it consists of lack of interest or focus. In case of "feminine" subject matters, these attributions are not common (Swinn & Sanna, 1996, apud Colley, 1998). Stereotyping of subject matter is associated with the students' preference for them, girls being more interested and favouring "feminine" discipline, respectively, boys showing the same attitude towards the "masculine" subject matters (Stetsenko et al., 2000; Jacobs et al., 2002; Secui & Tirla, 2003). The polarization of preferences is not identifiable in primary teaching but it appears and becomes relevant during middle school and high school, demonstrating the pressure of gender roles on the students' attitudes (Colley, 1998; Evans, Schweingruber & Stevenson, 2002). Stereotyping of subject and teachers' and parents' attributional style in case of their children's success/failure influence the latter's interest and

involvement. Investigating the reasons for which a small percentage of specialists in engineering and mathematics are women, a number of authors concluded that girls' whose academic achievements would entitle them to opt for mathematics and sciences in high school refuse to do it. Thus they do not develop abilities specific for these fields and mandatory for competing for these colleges and faculties (Raty et al., 2002; Ayalon, 2003).

Schools also provide examples of gender role behaviour. Several studies show that the presence of male teachers in primary schools is associated with students' less traditional beliefs and preferences and with a less stereotypical perception of the teaching staff (Ruble and Martin, 1998). Similarly, the female role models, assessed as being competent in "masculine" fields are associated, in the case of girls, with a higher degree of self-evaluated competence in that field and with a higher school performance (Marx & Roman, 2002). Emphasis is also laid on the identification in the textbooks and avoidance of excessively stereotypical presentation of persons of both genders, and the under representation to a gender category. The research pointed at the fact that the alternative Romanian language textbooks accepted for the primary school display a rather stereotypical presentation of both genders, and the ration between the number of characters in terms of gender favours males (1:2, respectively, 1:3 in case of the two analyzed textbooks (Grünberg, 1997, apud Ciupercă, 2003).
The specialists insist on the fact that the representations related to traits and roles believed to be typical and adequate to either gender are echoed in the teachers' activities as well, but they emphasize the impartiality of the field of education, unlike other social institutions. The influences of the gender roles are extremely subtle, acting at the level of all socialization agents and mutually supporting themselves in most cases.

Aim and hypotheses
The present paper emphasizes the implications emerging against the school system of gender stereotypes and social prescriptions regarding what is considered appropriate for the members of gender categories.
The first objective consists of identifying ways in which high school students perceive two essential academic subjects areas - Romanian language and literature, respectively, mathematics - as well as the existing differences of these perceptions according to the subjects' gender. As other studies abroad have pointed to the fact that these subjects are traditionally considered typically feminine (language and literature), or typically masculine (mathematics), we expect to identify significant differences between the ways of perceiving each of them: the Romanian language and literature, as compared to mathematics, will be assessed by more adolescents to be feminine, humanistic, involving emotions, whereas mathematics will be perceived by most subjects as being masculine, object-focused, involving thinking.
Furthermore, we postulate that the way in which these two subjects are assessed will vary according to the respondents' gender: more girls than boys will consider that Romanian language is easy, simple, interesting; similarly, more boys than girls will assess mathematics as being easy, simple, interesting.
Our research also aims at identifying gender differences between assessments of factors involved in the academic performance related to these two subjects: we assume that girls will attribute in higher degree than boys do their success in Romanian language and literature to internal factors (talent and effort) and in lower degree to luck or task difficulty (external attributions), while in case of mathematics, boys will consider in higher degree than girls that personal success owes to internal factors and will consider external factors (luck, task difficulty) less important.
Another purpose refers to students' estimation on performances obtained in carrying out tasks that imply typically feminine abilities (verbal abilities), respectively, typically masculine ones (non-verbal abilities). We consider that the girls will display a more conspicuous tendency to overestimate their performances in case of verbal-ability-prone tasks than boys will do, and the boys will display the same tendency when estimating their tasks of non-verbal-activity-prone tasks.

Method
Participants
Our survey was carried out on a sample of 110 teenagers, aged 17-19 **(**54 girls and 56 boys), randomly selected from one high-school from Oradea.

Measures
The present study made use of the following instruments:
1. A questionnaire employed in order to find out the way in which students evaluate the selected subject matters – Romanian language and literature and mathematics-, starting from a six bipolar scales: easy - difficult, boring - interesting, feminine - masculine, about people - about things, simple - complicated,

involves thought - involves feelings. The subjects were asked to indicate a characteristic from each pair to describe their view regarding the assessed academic fields (Weinreich-Haste, 1981, apud Colley, 1998).
2. The second instrument was suggested by the authors in order to evaluate the adolescents' attributions for their performances in Romanian language and literature and mathematics. According to Weiner's causal attribution theory (1985, apud Hewstone & Antaki, 1993), the four factors that might explain the subjects' performances are: ability (talent), effort, task difficulty, luck. The participants had the task to evaluate on a four-point Likert scale (very little, little, much, very much) the degree at which their performance is caused by each of the four factors mentioned above. The assessment was made for each subject matter separately.
3. The third measure recorded the students' tendency of overestimate/underestimate their performances in completing tasks that imply ability typically seen as feminine – verbal abilities, respectively, typically seen as masculine – spatial, non-verbal abilities. In these cases first are administrated instruments that can measure the real subjects' performance in carrying out such tasks. As this real performance gets relevant only when it is compared to the student's self-assessed performance, we decided to use only several items of two psychometric instruments meant to evaluate verbal, respectively, non-verbal intelligence. For verbal intelligence we used the first 20 items of Verbal Intelligence Scale designed by I. Holban, and for non-verbal intelligence we opted for the last series of Progressive Matrices Raven test (the series E – 12 items). After the administration of the items within each scale, the subjects were asked to estimate the number of the correct answers they considered they had given during that specific task, this number later being compared to the subject's real performance.

Procedure

The questionnaires were administrated collectively, with the subjects' consent. Each questionnaire started with instructions read by the operator. The survey was carried out during educational classes; the operator suggested that the subjects should use a kind of identification name in order to get further details, personally relevant.

Results and discussion

The first objective referred to the ways in which the two subject matters are perceived and the possible variations emerging from the respondents' gender.

According to the formulated hypothesis, the Romanian language and literature, as compared to mathematics, is assessed by a larger number of students as being feminine, about people, involving feelings, whereas mathematics was perceived by mostly subjects as being masculine, about objects, implying thinking. Both subject matters are seen as being difficult and complicated, yet mathematics is assessed by a large number of adolescents as being more difficult and complicated than Romanian.

Table 1 Comparison of the participants' assessments for Romanian language and literature and for Mathematics

Scales	Romanian language and literature	Mathematics	Chi-square
Difficult Easy	63	95	22.997**
	47	15	
Boring Interesting	54	51	.164
	56	59	
Feminine Masculine	100	16	128.674**
	10	94	
About people About things	91	6	133.224**
	19	104	
Simple Complicated	34	12	13.303**
	76	98	
Involves thought Involves feelings	29	108	120.748**
	81	2	

** p< 0.01

For the second hypothesis, aiming at recording the variations associated with the participants' gender in assessing their perception of Romanian language and literature, the data point to a single significant

difference, namely, it is seen as interesting by a larger percentage of girls (Table 2; chi-square = 8.207, $p<0.01$).
In case of mathematics, the results synopsized in Table 3 reveal the fact that there are no statistically significant differences related to the subjects' gender, but a tendency of the boys to consider mathematics as being more masculine than girls do.

Table 2 Comparisons between boys' and girls' assessments for Romanian language and literature

Girls		**Boys**		**Chi-square**	**Sig.**
Boring	**Interesting**	**Boring**	**Interesting**	8.207**	.004
19	35	35	21		
Easy	**Difficult**	**Easy**	**Difficult**	1.270	.259
26	28	21	35		
Feminine	**Masculine**	**Feminine**	**Masculine**	1.604	.205
51	3	49	7		
About people	**About things**	**About people**	**About things**	.441	.503
46	8	45	11		
Simple	**Complicated**	**Simple**	**Complicated**	1.865	.172
20	34	14	42		
Involves thought	**Involves feelings**	**Involves thought**	**Involves feelings**	.109	.741
39	15	42	14		

**p<0.01

Table 3 Comparisons between boys' and girls' assessments for Mathematics

Girls		**Boys**		**Chi-square**	**Sig.**
Boring	**Interesting**	**Boring**	**Interesting**	2.298	.130
29	25	22	34		
Easy	**Difficult**	**Easy**	**Difficult**	.574	.449
6	48	9	47		
Feminine	**Masculine**	**Feminine**	**Masculine**	2.895	.089
11	43	5	51		
About people	**About things**	**About people**	**About things**	.631	.427
2	52	4	52		
Simple	**Complicated**	**Simple**	**Complicated**	1.338	.247
4	50	8	48		
Involves thought	**Involves feelings**	**Involves thought**	**Involves feelings**	.741	.161
15	39	14	42		

The findings of the study point to the existence, even in the case of adolescents, of a different perception of the two subjects, in accordance with the gender role contents. The Romanian language, unlike mathematics, is assessed as being more feminine, about humans, and involving feelings, that is, the very traits considered to be the "tough core' of femininity, whereas mathematics is seen as being masculine, relying more on rationality. These images are similar for both girls and boys, foregrounding the homogeneity of the representation of subject matters. The impact of these evaluations can be extremely powerful: the moment a field is perceived as corresponding or not corresponding to the prescribed gender roles, there will be differences at the level of interest for the specific tasks of the field, of the beliefs related to success/failure and commitment to carrying out the respective tasks. Bandura *et al*. (1996) suggested and tested an explanatory model of the influence through which parental and children's efficacy beliefs and academic aspirations affect academic achievement. The results of the study show that the students' beliefs related to their efficiency of adjusting their own learning contribute to the academic achievements both directly and by promoting a high level of academic aspirations and the diminution of feelings of inferiority and uselessness.
Consequently, the perception of these two important subject matters as more or less corresponding to gender role prescriptions can contribute to the explanation of the gender gap in the field of school and professional orientation, Ayalon (2003) showing that women rely on high qualifications more than men when applying to selective and male-dominated fields of study, as mathematics, which is symptomatic for

the higher need for validating one's competences and knowledge in case of girls, formerly employed in these fields. The author also notices that the fields in which mathematics is a pre-requisite are better paid and have a higher prestige on the labour market, but the girls' scarce interest and implication in the field of mathematics and sciences in general, limit their employment opportunities in these fields.
Another hypothesis originated in the existence of significant differences based on the subjects' gender in case of attributions related to their successfulness in mathematics and Romanian, but the results only partially confirm it. The results obtained regarding students' attributions related to their academic performance in the Romanian language and literature point to gender significant differences for the factors of effort ($z = 2.58$, $p<0.05$) and luck ($z = 2.467$, $p<0.01$). Girls more often use internal and unstable attribution type than boys do, but at the same time they underline the greater importance of the external factor of luck, unstable and uncontrollable (Table 4).

Table 4 Participants' self-evaluation regarding the factors involved in school results' causal attribution in case of Romanian language and literature

Explanatory factors	Gender	Mean Ranks	Mann - Whitney Test	Z Value	Sig.
Ability/talent	**masculine**	56.23	1471.000	.267	.789
	feminine	54.74			
Effort	**masculine**	48.35	1111.500	2.58*	.010
	feminine	62.92			
Luck	**masculine**	48.60	1125.500	2.467*	.014
	feminine	62.66			
Task difficulty	**masculine**	52.53	1345.500	1.061	.289
	feminine	58.58			

* $p<0.05$

Regarding the students' attributions related to their performance in mathematics, the only significant differences between girls and boys are for the factor of effort (Table 5): the girls attribute in larger number their performance in mathematics to personal effort, as compared to boys, that is, to an internal factor, unstable but controllable, the results showing a tendency opposed to that initially presumed.
When investigating gender differences in terms of the importance associated to different factors in explaining the performances in the two subjects matters, we have seen that the pattern of attribution is similar but in some points to that presumed in our hypothesis. No matter what field, girls lay more emphasis on effort and luck, even in Romanian language, than boys do in this subject matter seen as feminine.

Table 5 Participants' self-evaluation regarding the factors involved in school results' causal attribution in case of Mathematics

Explanatory factors	Gender	Mean Ranks	Mann - Whitney Test	Z Value	Sig.
Ability/talent	**masculine**	55.04	1486.500	0.163	0.870
	feminine	55.97			
Effort	**masculine**	49.70	1187.000	2.075*	0.038
	feminine	61.52			
Luck	**masculine**	52.73	1357.000	0.975	0.330
	feminine	58.37			
Task difficulty	**masculine**	55.15	1492.500	0.122	0.903
	feminine	55.86			

*$p<0.05$

The results are in agreement with other studies. Stetsenko *et al* (2000) carried out a cross-cultural research through which they paralleled the academic performance of girls and boys aged between 8-13 related to their perception of their own performances and to the causal factors of their success. The findings show that in all cultures girls and boys have close beliefs regarding factors inducing academic success. Yet when girls' real performance surpasses the boys', the former's beliefs regarding their talent are not different from the boys', but they have stronger beliefs than boys regarding the other factors that contribute to success (effort, chance, teacher's support).
In terms of Weiner *et al* (1985, apud Hewstone & Antaki, 1993), the attributions of internal stable type are not more frequent in case of girls not even for situations in which their performances are higher than the boys', but there appear attributions of external unstable (chance) and internal (effort) type. The

internal unstable-type attributions do not act as strongly motivational vectors as stable-type attributions (capacity, talent, competence) and do not offer the greatest benefit in terms of self-esteem.
Another issue of this research refers to the potential differences between girls and boys regarding correct estimation, underestimation or overestimation of performances obtained at completing a task that implies either typically masculine abilities (non-verbal, spatial) or feminine ones (verbal).

Table 6 Gender comparison in performance estimation in tasks involving non-verbal and verbal abilities

Task	Estimation	Girls	Boys	Chi-square/ Sig.
Non-verbal abilities task	Underestimation	12	8	3.908/ .142
	Overestimation	33	30	
	Correct estimation	9	18	
Verbal abilities task	Underestimation	29	18	5.964/ .051
	Overestimation	13	24	
	Correct estimation	12	14	

The data in Table 6 point to the fact that in case of the former type of task, based on non-verbal abilities, there are no significant differences between girls and boys, all participants displaying a tendency to overestimate their performance for the 12 items selected from the Raven test. In case of the 20 items of the Verbal Intelligence Scale, the tendency observed is close to the statistically significant level: contrary to the formulated hypothesis, a higher percentage of girls, as compared to boys, underestimate their performance, whereas the boys overestimate it, even if it is a field traditionally seen as feminine
This tendency was foregrounded by other researchers, too. Reilly and Mulhern (1995, in Furnham and Gasson, 1998) determined the intellectual level of the subjects by using the Wechsler test and then asked the subjects to assess their IQ. The men's estimations were superior to the women's and significantly higher than the measured quotient, whereas women's self-assessment were slightly lower, but not significantly, in comparison to the measured quotients. The results are partially explained by women's larger "modesty training" and by the subtle positive encouragement to be found at social level for women to accept men's intellectual superiority.

Conclusions

The results of this study contribute to the awareness of the issue of gender similarities and differences at the level of perception of subject matters and evaluation of explanatory factors related to academic performances. The perception of the two subject matters - Romanian language and Mathematics – in accordance with gender stereotypes arises the problem of equal opportunities and chances for both boys' and girls' academic and professional accomplishments, for orienting their preferences and the female and male students' commitment towards domains regarded as appropriate through the perspectives of gender roles.
The emphasis girls lay on the internal, but unstable attributions type, as well as on the external type one, even in fields typically considered to be feminine, together with the girls' tendency to underestimate their performances, foreground the importance that achievement-related competence beliefs and achievement values represent for behaviours, choices, and success in the school and workplace contexts.
Future research on this topic is needed, in order to examine, based on a longitudinal design, the relations among students' competence beliefs, causal attributions, task values, mathematics and Romanian grades, courses enrolment and career decisions, both for girls and boys.
It is of great interest to observe both parents' and teachers' beliefs related to factors that explain the students' performances, parents being well known for their „classic gender-related attribution pattern" (Raty *et al* 2002), which consists in explaining their son's mathematical performance in terms of talent and their daughter's in terms of effort.

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