Gifted Women

Sylwia Bedyńska, PhD, from the Institute of General Psychology at the SWPS University of Social Sciences and Humanities, explains how negative stereotypes affect gifted women and their education choices.

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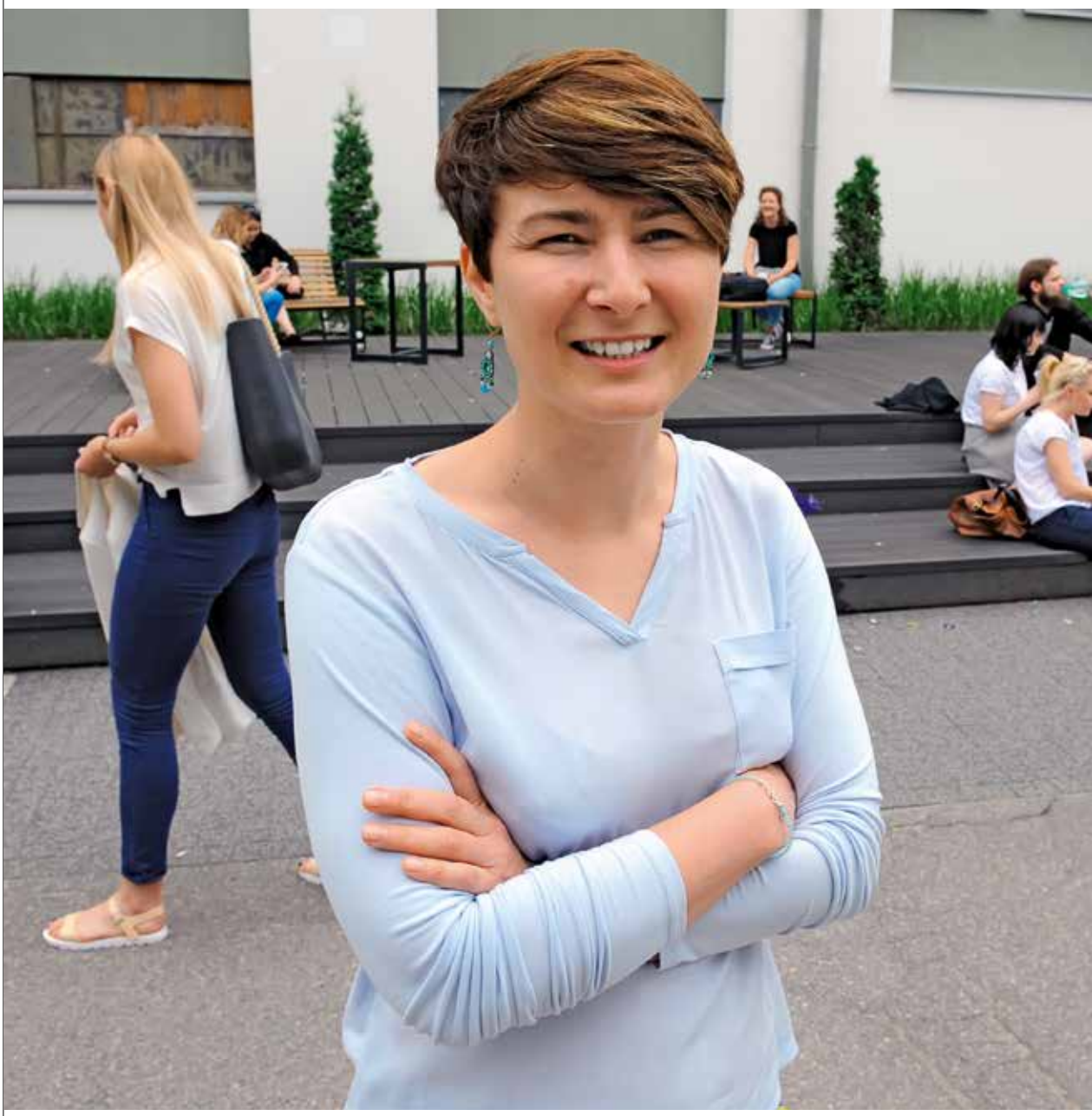

Have It Worse

ACADEMIA: **How do psychologists study stereotypes?**

SYLWIA BEDYŃSKA: In the past, the main focus was on the stereotypical perceptions of outgroupers. That perspective changed radically in 1995, when Claude Steele and Joshua Aronson published a paper that looked at the issue from the perspective of agents, or people who are aware of the stereotypes that are applied to them and their group, thus revealing a new phenomenon called "stereotype threat." It involves activating a negative stereotype about a certain group in the mind of a person that belongs to that very group. For example, women suddenly remember they should be worse at math than men according to stereotypes, whereas men should be worse at learning languages.

Those first studies were interesting also for another reason. The participants included African Americans, very gifted students of Stanford University. They were asked to solve standardized tests, in a seemingly typical situation, perceived as neutral. However, it turned out that the participants who were told they would be solving intellectual ability tests did worse than those who were assured that the tests had nothing to do with measuring intellectual ability. Consequently, the mere mention that the tests were diagnostic to specific abilities activated a negative stereotype of the group to which the participants belonged.

Those findings shook American psychology. It turned out that, first of all, a seemingly innocent piece of information activated a stereotype, thus leading to worse test results, and, secondly, that those tests were not as perfect as everyone had thought. One of the experiments conducted by the same two researchers demonstrated that even the necessity of having to indicate one's race on the test sheets could activate negative stereotypes, for example about the participant's intellectual ability, thus impairing cognitive functions and, by the same token, leading to lower test results.

You study the influence of stereotypes on women's interest in STEM subjects. Can we observe the same mechanism in this field?

Yes. This has been demonstrated by a number of studies, including one done by a team led by Diane M. Quinn and Steven Spencer from the University of Connecticut, published in 1999. Female students that were mathematically very gifted clearly underperformed on tests described as "mathematical." Obviously, however, there are plenty of other subtle cues from the environment that activate such stereotypes. For example, Paul Davis's team (Davies, Spencer, Quinn & Gerhardstein, 2002) ran a study in which they exposed participants to sexist television commercials and then asked them to solve tasks presented as

typically male. Women exposed to the commercials underperformed on subsequent tests.
As part of my doctorate (Bedyńska, 2004), Prof. Grzegorz Sędek and I tested those findings in Warsaw. Female students were asked to read jokes about stupid blondes, while male students from the University of Technology were exposed to jokes about stupid men. In both groups, the results were the same. In a different study (Nosek, 2009), Brian Nosek's team tested a different factor. Women were shown photographs from a science conference whose participants were predominantly men. The experiment revealed that the disproportion activated the negative stereotype. The same holds true for classroom composition in schools, if most of the students are boys.

Do you mean the stereotype that girls are worse at math than boys?
Yes. This generally applies to STEM subjects, which are stereotypically perceived as not typically female fields. This is borne out by statistics: there are simply fewer women in those fields, and the vicious circle is complete. We may remain trapped inside it for a long time.

> Girls are stereotypically perceived as worse in fields regarded as typically male. Also, there are fewer women in such fields, and the vicious circle is complete.

What cognitive functions does this negative stereotype affect?
A stereotype is a certain cognitive model that is difficult to control. Once it is activated, people start having various thoughts related to this stereotype. If we assume that we all have a certain pool of cognitive resources and some of these resources are allocated to thinking about stereotypes, then we definitely spend less cognitive resources on solving tasks at hand.

What types of tasks did the participants solve?
Stereotype threat essentially manifests itself only in difficult tasks. When tasks are easy, girls perform as well as boys. Problems start when they are faced with problems that require a non-standard approach – after all, tasks that require thinking outside the box are an inseparable part of a scientist's life.

And one more thing: stereotype threat affects only exceptionally gifted women in the exact sciences.

Does this mean they have it worse?
Both them and generally women who want to succeed in a "non-female" field, be it physics or business. Numerous studies by the Australian researcher Courtney von Hippel at the University of New South Wales/University of Queensland show that stereotype threat also determines if a certain field is considered important. At some point, women simply say, "Ah, maybe that's not really important, maybe I shouldn't invest so much time in that?" This also holds true for professional advancement and promotions to executive posts.

Maybe girls are really less gifted at math?
When it comes to standardized ability tests, especially in math, hundreds of studies have been conducted on this issue. These findings have several times been culled together and summed up (Hyde, Fennema & Lamon, 1990; Lindberg, Hyde, Petersen & Linn, 2010). Such meta-analyses are interesting, in that they also take into account unpublished studies (teams usually publish studies that reveal significant differences between groups; if no differences are found, the reports end up in a drawer). In turned out that these differences were very small and statistically insignificant, for example girls performed slightly worse at geometry, but they did better at algebra. Such meta-analytical studies were started in the 1990s by Janet Hyde, Elizabeth Fennema, and Susan Lamon. Back then, it was discovered that gender differences in the 1990s were smaller compared to the 1970s. This trend continues.

The same holds true for how boys and girls are graded by teachers: the differences are negligible, sometimes even favoring girls. In a meta-analysis of self-esteem and achievements, however, girls did a lot worse than boys. It could be concluded that that women are objectively highly skilled, but when they start assessing their own ability, they tend to describe themselves as craftswomen, not as artists. Such a way of thinking poses a serious barrier.

Why do they believe that?
Again, because of the stereotypical messages that come from their surroundings, suggesting that maybe they should take an interest in psychology or sociology, because these fields are so interesting. They are told that humanities are more consistent with gender roles, more "feminine." Aside from that, women who take up jobs in "non-female" sectors are simply perceived more negatively.

As unattractive and nerdy?
As well as ugly, masculine, and aggressive. Such pejorative words are really still used. This was demonstrated in a study conducted by the psychologist Laurie

A. Rudman from Rutgers University. She studied the backlash against women who were not stereotypically feminine or had job or occupations that were not stereotypically associated with women. Her studies showed that highly-qualified women, for example in the world of business, were perceived as cold, unpleasant, unlikeable, even if they were objectively none of these things. That's the reason why female bosses are viewed unfavorably and avoided.

Susan Fiske and her collaborators have been studying the importance of two dimensions of perception, namely warmth and competence, in various countries. Her studies have revealed the existence of a mechanism that is quite universal: a woman cannot be perceived as both warm and competent. If she's perceived as competent, she can't be warm; if she's warm, she's deprived of competence.

What could parents and teachers do to boost self-esteem in girls and help them develop their abilities in the exact sciences?

It is important to show that women make great mathematicians, coders, and physicists. If we don't, we shouldn't be surprised when girls say such things are simply not their cup of tea.

One effective technique involves focusing on individual characteristics, on who a specific girl is, not on the fact that she is a girl. This means stressing her unique characteristics as a person, not as a mathematically gifted girl.

As for school organization, studies show that girls in single-sex schools perform better at math (Picho & Stephens, 2012). Unfortunately, there's a reason to believe that this is not good for the development of social skills. Single-sex classes are therefore a very risky solution, because we generally have to work together in mixed teams (Halpern et al., 2012). However, we could run activity clubs for girls, or at least make sure that female students are equally represented in such groups. A female friend of mine works with Coder Dojo, a group of coders who teach programming classes for kids in their free time. They say they have a problem with girls.

What problem?

There are no major differences among eight-year-olds: girls like to come to class and engage in classroom activities. Problems start when they enter adolescence. That is when cultural stereotypes about female and male roles come into play. Kids and teenagers want to be like their peers. That is when girls drop coding courses.

Curiously enough, fathers play a very important role here, because they are the ones who bring their kids to such classes. That's extremely important – it's necessary to change the cultural stereotypes in the minds of parents, in particular fathers.

Coder Dojo

Coder Dojo is a foundation that runs free programming classes for children, teenagers, and young adults (aged eight to 20). It runs courses in Warsaw and several other cities in Poland. The instructors are coders who volunteer to teach. Every child comes with a parent and decides what tasks he or she wants to do during a session. Parents help children find solutions on the Internet or in other sources, whereas the coders only help when neither the child nor the parent can solve the problem.

For more information visit https://coderdojo.org.pl/.

Paternity leave, which is a period when a completely different relationship is formed between the father and the child, helps promote gender equality and knowledge free of stereotypes among men. Fathers often encourage kids to take up certain hobbies, they are the ones who bring kids to Coder Dojo's classes.

What else do these programming classes reveal?

The instructors say that the girls often want to focus on different problems than boys. For example, when kids program the behavior of robots, girls want the robots to play together. That's why the instructors must be flexible, they must allow girls to do tasks that are not designed with boys in mind. This shows that the teachers or the instructors need to think outside the box.

What else do we need to do to help overcome their fear to pursue careers in the exact sciences?

What is needed is knowledge on how to navigate the labyrinths of science and business, a smart support network, and wise self-presentation skills. When my female friends meet at conferences, they usually start talking about their kids, instead of professional issues. After such a meeting, I know very well what illnesses their kids had, but I have no idea what they do scientifically or professionally or what additional qualifications they have. When I look for an expert for a project, I don't know which of my female friends specializes in that field. That's where we differ clearly from men, who boast openly about their professional accomplishments.

How did you develop your own math skills?

I owe most to my math teacher in high school. Her conviction that anything is learnable was extremely helpful.

Interview by **Anna Zawadzka**
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