

MISSOURIAN

Widely accepted gender gap theory faces skepticism from MU professor

Wednesday, March 7, 2012 | 6:00 a.m. CST

MU MENTION PAGE 2

BY MADELINE O'LEARY

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At least that's been the widely held belief for decades.

Stereotype threat and women's math performance

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In the first, men and women of equal math ability were selected from a pool of college-age students to take a hard math test and an easier one. The hard test contained calculus and abstract algebra questions; the easier one contained advanced algebra but no calculus. Men and women performed equally on the easier test, but the men outperformed the women on the difficult one.

The second study sought to prove that stereotype threat causes women to struggle with difficult math tests. All participants were given the more advanced exam, but in two sections. Half the participants were told that gender differences had been shown on the first part of the exam in the past, but not on the second part. The other half were told the opposite — that gender differences had been shown on the second part of the test but not the first. The mean score on the second part of the test was zero, so only the results from the first test were examined: Women greatly underperformed in relation to men when told that gender differences had occurred in the past. But they performed at the same level when told there were no gender differences.

The third study replicated the effect of the second. Researchers used a control group in which there was no vocal mention of a gender difference. Those results were compared to the results of the group that was told there was no history of gender difference in performance. The men in the control group far

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outperformed the women, whereas the women and men in the no-gender-difference-group performed equally well.

Barbie uttered the phrase "Math class is tough" in 1992, and Mattel had to reprogram its doll in response to an outcry from women's groups. Less than 10 years later, a social media backfire forced J.C. Penney Co. to pull from its shelves a T-shirt that read, "I'm too pretty to do homework, so my brother has to do it for me."

David Geary, curators' professor of psychological sciences in the MU College of Arts and Science, published a paper on Jan. 16 criticizing the evidence for the stereotype's negative effects on women's mathematical performance.

"I do think that the stereotype exists," Geary said, "but the evidence supporting the claim that the stereotype is undermining the performance of women in hard math is not solid."

That claim once again has raised the question of what causes the gender gap in fields such as engineering and science. Methods used to both support stereotype threat and to dismiss it have been placed under the microscope. Is the pervasive stereotype being perpetuated or addressed?

Surrounded by men

"You're brave."

That's the typical response MU engineering major Dana Willsey gets when she tells people what she's studying.

Willsey, a junior, regularly finds herself among a handful of women in large lecture halls packed with hundreds of people.

"I counted 14 girls in my physics class in a room of 300," Willsey said. "You walk into a classroom, and you realize that 75 to 80 percent of the students are male. In that instant, you realize that you will be surrounded by males. When that happens to me, I know that I'm going to have to prove myself."

Throughout her high school career in Kansas City, Willsey excelled in math and science. Because she knew she didn't want to teach either subject, she said majoring in engineering seemed natural.

Because of her transfer credits, Willsey was admitted immediately to the engineering program as a freshman. She completed her calculus classes and other prerequisite courses successfully, yet as she advances through her major, she said the pressure to do well as a woman has grown more intense.

"Every group that I've studied with for a class has been all guys. I feel pressure, and I ask myself: 'If I don't understand this, are they judging me because I'm a girl?'" Willsey said. "I feel like I put in extra work outside the classroom just so when we do get together and study, I don't mess up and I don't fail because if I do fail, I don't want them to look at me and think that I failed because I'm a girl."

The pressure Willsey feels to perform stays with her during difficult tests, she said.

"I feel like I will be looked down upon if I don't do well as a woman," Willsey said. "If I don't do well, I fear the reaction of, 'OK, well she's a woman and didn't do well, so she shouldn't be in (engineering) anyway.'"

Willsey said she knows this high-pressure environment will continue after she graduates and will follow her into the job market.

"It doesn't matter if my GPA is higher than a male's. I feel like I'm going to have to bring more to the table, even in an interview, just to prove that I will do well in this job and that I will succeed as a female," Willsey said. "I am not male, and this is a male-dominated field."

The birth of stereotype threat

The added pressure Willsey feels — and its potential effects on her academic performance — is an intensely studied subject in psychology.

Psychologists and policymakers used to attribute the gender gap in performances on difficult math tests and in mathematically intensive professions to "stereotype threat." The theory states that women score lower than men on difficult math exams because of poor self-image resulting from the stereotype that women aren't good at math.

Steve Spencer of the University of Waterloo developed a serious interest in stereotype threat after his sister failed one of two preliminary exams while working toward a doctoral degree in statistics.

"Ninety percent of the people in the program failed at least one of the two exams, and she did," he said. "She was devastated, but really it was normal. So I started questioning why it was so devastating to her. Stereotypes operate at a level people are not consciously aware of."

Spencer and two of his colleagues — Claude Steele of Stanford University and Diane Quinn of the University of Michigan — were the first to embark on a study that critically examined the possible effects of stereotype threat on women.

"Stereotype Threat and Women's Math Performance" was published in 1999 with results that would shake the world of psychology.

"In situations where math skills are exposed to judgment — be it a formal test, classroom participation or simply computing the waiter's tip — women bear the extra burden of having a stereotype that alleges a sex-based inability," the study states. "This is a predicament that others, not stereotyped in this way, do not bear."

Once stereotype threat is removed from an environment, the gender gap disappears, the study concluded.

After its publication, "Stereotype Threat and Women's Math Performance" became the foundation for hundreds of subsequent studies regarding the gender gap in math proficiency.

Geary said his problem with the study is that its findings haven't been replicated.

Skepticism about stereotype threat

Geary constructed his own indictment of stereotype threat. On Jan. 16, he published a paper titled, "Can Stereotype Threat Explain the Gender Gap in Mathematics Performance and Achievement?"

Geary's paper tackled the conclusions drawn in the 1999 experiment, arguing its methods were unsound. To support this, Geary searched for later studies that replicated the results of the original.

He found 452 articles that cited the original of those 121 related to gender differences in mathematics. Of those, 20 used adults as subjects, and 11 of those used methods similar to the original.

The criteria Geary used to narrow down the tests shrunk the pool further: One of those 11 studies used scores that had been adjusted to control for pre-existing differences in math skills. Geary said using unadjusted scores is key in accurate result replication.

"Imagine that conducting an experiment (pertaining to gender differences in math) is like having a pie with eight pieces. Adjusting the scores is like removing six pieces of the pie," Geary said. "Controlling the experiment for pre-existing math skills is like removing the main parts of the experiment that you're trying to explain. It doesn't make sense. That group difference is exactly what stereotype threat is trying to explain."

Of the 10 studies that didn't use adjusted scores, only three replicated the results of the original study. With only 30 percent of similar studies producing the same results, Geary said, Steele's study doesn't prove negative effects of a stereotype on a woman's math performance.

What Steele's study does not account for, Geary said, is the hypothesis that men might have a real advantage on more difficult mathematical problems.

From threat to gap

Geary said men possess an advantage in solving word problems and items that require "complex spatial competencies," such as geometry.

"Men perform better on multistep word problems where the problem has to be translated into mathematic and algebraic notation and where the translation is aided by spatial diagrams," Geary said.

He said that when advanced math tests don't include spatial math and more abstract concepts, the gender gap ceases to exist. That being said, the gender gap only emerges under specific conditions.

"If stereotype threat really were a significant influence, you'd think the women would get worse grades than men in advanced math classes. But they don't," Geary said. "The difference occurs on standardized tests and in the fields."

The gender gap in math-heavy occupations such as engineering might just be a result of a mere difference in interests. Where women statistically tend to be more interested in interacting with people, Geary said, men statistically prefer solitary activities.

"In order to get good at math, you need to practice a lot. Most of the time, you have to give up social activities to do so," Geary said. "You're more likely to find guys giving up social aspects of their lives."

For example, Geary said women are more likely to "go to the mall," whereas men are more likely to "stay at home and work on a car."

This difference in interests explains why men tend to be more enthusiastic about careers, such as engineering and physics, that involve objects and abstract ideas that exist independent of people, he said. Even if they are equally skilled in math, women are less likely to choose these occupations because of underlying sex differences.

"Where men are more interested in objects, women are more interested in people and living things," Geary said. "Therefore, mathematically inclined women are more likely to pursue careers in medicine and biology."

But aside from differences in interests, the disparity in high performance remains, Geary said.

"We can come up with strategies to solve these problems; we can close the gender gap in spatial math by coming up with teaching strategies," Geary said. "But we're not doing that because we're too concentrated on the theory of stereotype threat."

Flaws in the critique

"The truth is, he botched it," Steve Spencer said about Geary's paper.

Spencer, one of the founding psychologists of the original study on stereotype threat, found Geary's methodology "substandard" and his conclusions "arbitrary."

"While critiquing my study, he didn't bother to contact me," Spencer said.

Spencer said that when Geary dismissed certain studies that published adjusted scores, he lost useful data.

"He could have gotten the unadjusted scores by contacting the scholars that performed the study. He didn't do his homework," Spencer said. "It's ridiculous, arbitrary and completely unjustified to just throw those studies out."

Spencer said Geary made an additional mistake by limiting his analyses to published studies alone.

"The vast majority of people who analyze studies examine ones that haven't been published, but (Geary) didn't include the unpublished studies. That's just boneheaded," Spencer said. "He's using this criteria to narrow studies down, but he didn't even include all of them. Is that an intentional bias? I don't know."

If Geary had examined the unpublished studies, Spencer said, "he wouldn't have been able to denounce stereotype threat."

He also challenged Geary's theory that men and women possess innate sexual differences that could explain the gender gap in professions. There's no supporting evidence, he said.

"If he really believed the notion that gender differences are genetic, then he should go out and find evidence for his explanation," Spencer said. "Claiming is not evidence."

Spencer also said that explaining the gender gap by saying that women are "naturally more drawn to social activities" than men is "a stereotype in and of itself."

"Rather than criticizing social explanations, (Geary) should demonstrate the existence of innate differences because innate differences and social differences can exist together," he said. "The more people talk about innate differences as the only explanation, the greater stereotype threat becomes."

Defending stereotype threat

Jeni Hart, associate professor of higher education at MU's College of Education, said she believes the psychological effects of stereotypes appear early and carry over into professional life.

Women face situations every day where they're told what they can and cannot do. Those experiences can discourage a woman from pursuing interests, such as advanced mathematics or engineering careers, Hart said.

"Women make choices based on what they're told not only in the classroom but from others — you know, 'Girls don't do that,' or, 'Math is hard.' That message sticks with people," she said.

While an undergraduate at Georgetown University, Hart worked as an assistant manager at a student-run pub.

"I was picking up a shift, and I was going to be sitting at the door checking IDs," Hart said. "One of my male colleagues came up and said, 'You can't do that. That's men's work.'"

The comment stayed with her.

"Somebody told me I couldn't do something because I was a woman," she said. "That has affected me to the point that I'm going to be like: 'To hell with you. I can do it, and I'm going to show you that I can do it.'"

Yet many women haven't had the opportunity to develop that sort of strength.

"I think a lot of (women) have been beaten down so many times that they just feel like it's not worth the fight," she said.

Hart agreed that women today face a near constant barrage of negative messages, some subtler than others. She called these "micro-aggressions."

"If each one of those is a grain of sand, eventually it becomes a mound," she said.

Through her studies, Hart has observed that fewer women are pursuing advanced degrees in mathematically intensive areas. This disparity relates to the tenure process that, she said, was developed when men dominated academia.

The tenure clock and a woman's biological clock match, which can be challenging for women who want children, she said. If a woman decides to "stop out" of the tenure process to start a family, Hart said a stereotype is reinforced.

"She's seen as not serious about her career," Hart said.

Society identifies women as caretakers with labels such as "women are quiet" and "women won't start trouble," Hart said. She said such ideas are "socially constructed."

"If you keep telling me that I'm more likely 'to go to the mall' because I'm a woman, then I'm going to start thinking that that's what I need to be doing," Hart said. "Those messages are out there in so many ways that I don't even think we can pin them down exactly."

Closing the gender gap, Hart said, is "much more complicated than just throwing stereotype threat out." It should involve mentoring and the development of a support system for women.

"For women who are successful in math, what is it about them that has helped them be successful? We should learn from those things and use them to help others succeed," she said. "If people have more support and encouragement, they'll be more successful — someone who knows that girls and women can be successful at math, someone who won't say, 'You can't do that because you're a girl.'"

MISSOURIAN

Inactivity directly linked to higher disease risk, MU researchers say

Tuesday, March 6, 2012 | 7:06 p.m. CST; updated 7:41 p.m. CST, Tuesday, March 6, 2012

BY XIAONAN WANG

COLUMBIA — Regardless of their weight or diet, couch potatoes have a higher risk of chronic disease, a recent MU study found.

The study tested blood sugar change on 12 physically active and healthy volunteers with an average age of 30, said John Thyfault, an associate professor in MU's Department of Nutrition and Exercise Physiology who conducted the research with his graduate students.

The results show the volunteers' transition from high activity to low activity directly affects their ability to control blood glucose levels, Thyfault said.

"Bigger swings in glucose after meals is linked to greater risk for heart disease and Type 2 diabetes," he said.

Thyfault said that most people of normal weight will end up becoming overweight if they stay inactive.

"My hypothesis is that you always need to be active no matter what your body weight is," he said.

The study was published February in the *Medicine & Science in Sports & Exercise*, a peer reviewed journal.

It's much harder to keep an active lifestyle today because sedentary jobs are about three times more common than physically active jobs, while 50 years ago, the rate was reversed, according to the American Heart Association.

In 2011, almost 66 percent of Missourians were either obese or overweight — an 8.5 percent rise over a decade ago, according to an obesity report issued by Trust for America's Health and the Robert Wood Johnson Foundation.

"Exercising keeps me in shape. It also helps me better focus on my school work," said Josef Stark, a chemical engineering student who spends about 2 1/2 hours a day, six days a week, at the MU Student Recreation Complex. "Working out releases my stress a lot."

Mary Wilkerson, who has a sedentary job as a senior vice president for marketing at the Boone County National Bank, walks for 30 minutes every morning.

"It calms me and gives me more self-control and a better mood," Wilkerson said. "Walking is so important to me because otherwise I don't have much opportunity to do activities."

The American Diabetes Association's guideline for adults is to have a minimum of 30 minutes of exercise each day. The goal for children and teens is one hour.

Another general recommendation for physical activities is to take 10,000 steps per day, Thyfault said.

A 2010 study done by American College of Sports Medicine found that on average Americans adults take 5,117 steps per day.

"The easiest way to measure your activities is to use a pedometer," he said.

MISSOURIAN

Missouri House committee shoots down bill adding voting student to Board of Curators

Tuesday, March 6, 2012 | 7:20 p.m. CST

BY ZACH MURDOCK

JEFFERSON CITY — The future of adding a voting student representative to the UM System Board of Curators is now in the hands of the Missouri Senate.

Three House bills regarding a voting student curator failed to pass the House Higher Education Committee meeting Tuesday morning.

Now, the focus turns to Senate Bill 747, sponsored by Sen. Kurt Schaefer, R-Columbia. It would replace the current nonvoting student representative with a voting student curator. That representative would have to be a graduate student or professional student but could represent any of the board's congressional districts and would serve a two-year term.

Representatives from the Associated Students of the University of Missouri have been testifying in favor of voting student curator bills since the legislative session began in January. The group represents students from the University of Missouri System in state legislative issues.

At Tuesday's hearing, ASUM legislative intern Abigail Thomas briefly testified in support of the voting student curator bills. According to its website, the group has supported legislation to put a voting student curator on the board every year since 1975.

"The university has nothing to lose and everything to gain by giving students a vote," Thomas said.

ASUM representatives also testified Monday at a public hearing of the Senate's Financial and Governmental Organizations and Elections Committee in favor of Schaefer's bill.

The group's Assistant Legislative Director Nicole Phillips said Tuesday that she is optimistic about an upcoming vote on Schaefer's bill and that ASUM's focus is now turned to the Senate.

The hearing Tuesday was for a third student curator bill sponsored by Rep. Jill Schupp, D-Creve Coeur, designed to clarify that the governor can appoint a student to one of the nine established curator positions. Schupp argued that there's currently no statute stopping the governor from appointing a student that way and that her bill would make the option clear.

A pair of voting student curator bills sponsored by Rep. Chris Kelly, D-Columbia, and Rep. Zach Wyatt, R-Kirkville, were discussed at the committee's public hearing last week. Those two bills mirrored

Schaefer's bill in the Senate. One of the bills would allow any student — not just a graduate or professional student — to be appointed to the Board of Curators.

In the committee's executive session, members voted on each bill to decide whether or not to send it to the House floor. All three failed to pass with seven votes against and four votes in favor.

Student curator Amy Johnson, a junior at the University of Missouri-Kansas City and non-voting representative to the board, said she's focused on her role as a student representative, not a lobbyist for a new student curator position.

"I'm focused on the job I have now," Johnson said. "And my job is to represent the students however I can."



MU research: People would buy sustainable cotton

The Associated Press

COLUMBIA, Mo. —

Researchers at the University of Missouri-Columbia say they've found that people would be willing to pay extra for clothing made from sustainably grown U.S. cotton.

The researchers surveyed 500 people nationwide. They found consumers preferred the sustainably produced U.S.-grown cotton over apparel made in unknown locations using conventional practices. Additionally, consumers were willing to pay up to \$5 more for a \$30 cotton shirt produced sustainably in the U.S.

Researcher Pamela Norum says many U.S. cotton farmers are using sustainable practices but aren't communicating that fact well enough to the public. She says the research shows how important it is to promote those sustainable practices.

The research has been published in the Journal of Consumer Marketing and in the Clothing and Textiles Research Journal.

MISSOURIAN

Conservative columnist Ann Coulter to visit MU

Tuesday, March 6, 2012 | 11:44 a.m. CST

BY CHRIS ROLL

COLUMBIA — Syndicated columnist and political commentator Ann Coulter is scheduled to visit Columbia next month.

She will speak at 6 p.m. April 11 at the Missouri Theatre. Admission will be free, but tickets will be issued to simplify the seating process.

Craig Arnzen, president of the MU College Republicans — the organization helping arrange Coulter's visit — said the group contacted Coulter through connections with the Clare Boothe Luce Policy Institute, an organization concerned with preparing and promoting conservative women leaders.

Coulter is the author of seven New York Times bestselling books and writes a column for Universal Press Syndicate.

Catherine Rodriguez, lecture director for the institute, said Coulter's standard student fee for lecture appearances is \$20,000. However, since Missouri State University in Springfield and Truman State University in Kirksville agreed to bring Coulter to their campuses as well, the MU Campus Republicans will be able to bring Coulter to campus at the reduced price of \$10,000.

Coulter will be in Springfield on April 10 and Kirksville on April 12.

"Being able to give her back-to-back-to-back opportunities helped to reduce cost," Arnzen said in an email.

Despite the reduced costs, the College Republicans were unable to receive funding from the Missouri Students Association due to application deadlines. As a result, the group is raising the money itself.

"There are a lot of people in the community who are excited about bringing a strong conservative voice to campus," Arnzen said.

Fundraising will be held during the event, as well, with a reception after Coulter speaks and a private dinner later that night.

Coulter's caustic, polemicist debate style and outspoken conservative views make her a controversial speaker, but Arnzen said he feels she is well worth hearing.

"Some people think we shouldn't be bringing someone so outspoken to campus," Arnzen said. "We challenge them to come listen, to hear what she has to say, and to do it with an open mind."