Teaching Current Directions in Psychological Science

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Aimed at integrating cutting-edge psychological science into the classroom, Teaching Current Directions in Psychological Science offers advice and how-to guidance about teaching a particular area of research or topic in psychological science that has been the focus of an article in the APS journal Current Directions in Psychological Science. Current Directions *is a peer-reviewed bimonthly journal featuring reviews by leading experts covering all of scientific psychology and its applications and allowing readers to stay apprised of important developments across subfields beyond their areas of expertise. Its articles are written to be accessible to nonexperts, making them ideally suited for use in the classroom.*

Visit the column for supplementary components, including classroom activities and demonstrations.

Visit David G. Myers at his blog "Talk Psych". Similar to the APS *Observer* column, the mission of his blog is to provide weekly updates on psychological science. Myers and DeWall also coauthor a suite of introductory psychology textbooks, including *Psychology* (*11th Ed.*), *Exploring Psychology* (*10th Ed.*), and *Psychology in Everyday Life* (*4th Ed.*).

When Anxiety Doesn't Add Up: Understanding and Preventing Math Anxiety

By C. Nathan DeWall

Foley, A., Herts, J., Borgonovi, F., Guerriero, S., Levine, S., & Beilock, S. (2017). The math anxiety-performance link: A global phenomenon. *Current Directions in Psychological Science, 26,* 52–58.

Snakes, spiders, and mathematics may seem worlds apart, yet they all can invoke apprehension and fear. The world does not need more snake handlers or spider trappers. But we do need more people who can perform basic and advanced math. What stands between the supply of math-competent people and the global demand for their services?

The answer, according to Alana Foley, Julianne Herts, Francesca Borgonovi, Sonia Guerriero, and APS Fellows Susan C. Levine and Sian Beilock (2016), is *math anxiety*. Math anxiety refers to people's apprehension and fear when they anticipate or perform math tasks (Richardson & Suinn, 1972). It's no surprise that math anxiety predicts poor math performance, greater activation in brain regions related to

fear, and avoidance of math-related professions (Beilock & Maloney, 2015). The more startling finding is that math anxiety often gets transmitted from one's parents, teachers, and culture. Students often are taught to question their math ability and whether they can meet their culture's expectations about how well they should perform.
The result is a growing population of students who associate math with anxiety. Approximately 1 in 4 university students report math anxiety (Beilock & Willingham, 2014). That rate jumps to 80% among community college students. But there is good news: Just as people can learn to fear math, people also can extinguish their math anxiety. They can perceive their physiological arousal as something that can benefit their performance (Jamieson, Mendes, Blackstock, & Schmader, 2010). They can write about their thoughts and feelings before doing a math test (Park, Ramirez, & Beilock, 2014). And, especially when they're young, they can prioritize having positive interactions with their parents that relate to math (Berkowitz et al., 2015). All of these options are effective ways to reduce math anxiety and improve math performance.

To bring this cutting-edge science to the classroom, instructors can have students complete two activities. The first activity teaches students about the causes and consequences of math anxiety; the second activity shows students how to reduce math anxiety. The activities should take approximately 5 and 7 minutes respectively.

Activity No. 1: Where does math anxiety come from, and why does it matter?

It helps to understand from where math anxiety might originate. Ask students to think of a time in their lives when they experienced fear and apprehension related to math. The situation could involve something as trivial as making sure they had the correct change for a gas-station purchase or as crucial as completing the quantitative portion of the SAT. If students haven't experienced math anxiety, ask them to write about a time when a close friend or relative did.

Next, have students form pairs and discuss their responses to the following questions:

- To what extent do your parents experience math anxiety? How much time did your parents spend with you as you learned math?
- When you learned basic and advanced math, did your teachers show signs of math anxiety? If so, how much?
- Have you felt social pressure to perform well or poorly on math tests? How have these pressures to succeed or to avoid embarrassment by performing well made you feel?
- Do you feel that stereotypes about members of your group (e.g., gender, race, ethnicity, country of origin) have affected your math anxiety?

Instructors then can discuss how students' responses to these questions may help explain their math anxiety. Having math-anxious parents or teachers increases one's likelihood of experiencing math anxiety. Ditto for members of cultural, ethnic, or racial groups who feel that others expect them to excel or fail at mathematics. Thus, students can see how they may have learned to experience math anxiety — and how they can learn to combat that anxiety.

Activity No. 2: Math is your friend

Knowing the causes and consequences of math anxiety is not enough. How can you reduce math anxiety? Make it a friendly challenge rather than a menacing threat. Framing tasks as challenges versus threats improves healthy physiological responses and performance (Blascovich & Mendes, 2010).

Instructors first need to divide their class randomly into two groups. Next, ask one group of students to read the following prompt on a PowerPoint slide:

Rethinking Arousal Condition

In this activity, you're going to complete a math exercise. Math can cause people to feel anxiety. Your heart might race, your palms might sweat, and your breathing might speed up. *This sort of arousal can help you*. Much research shows a relationship between physiological arousal and better performance.

Spend the next 2 minutes writing about any thoughts and feelings you have as you prepare for the math activity.

Ask the other group of students to read the following prompt on a PowerPoint slide:

Sit Quietly Condition

In this activity, you're going to complete a math exercise. Please sit quietly for a couple of minutes as you prepare for the math activity.

Finally, show all students the following PowerPoint slide:

Math Activity

This math activity will test your ability to perform mental calculations quickly. Your job is to start at the number 913 and subtract the number 6 repeatedly. You have 3 minutes to complete as many calculations as possible.

Ready? Go!

Once students complete the exercise, ask them how much the activity caused them to experience fear and apprehension about math (1 = *not at all* to 7 = *extremely*). How much did the preactivity prompt influence their math anxiety? How many math calculations did they complete during the 3-minute math activity? Instructors can discuss how the instructions included in the Rethinking Arousal Condition have improved performance on tests that normally induce anxiety (Jamieson et al., 2010; Park et al., 2014).

Math anxiety hinders otherwise competent people from pursuing careers that involve both basic and advanced math. Although math anxiety resides within an individual, it often is transmitted through one's parents, teachers, and culture. We can stem the tide of math anxiety by encouraging people to express their thoughts and emotions about math, to perceive math as a challenge to master rather than a threat to overcome, and to believe that they have what it takes to master most mathematical activities they will encounter in their everyday lives.

The article "The Math Anxiety-Performance Link: A Global Phenomenon" will be available in the February 2017 issue of Current Directions in Psychological Science.

Should You Trust Your Unconscious When Judging Lying? Probably Not!

By Gil Einstein and Cindi May

[Street, C. N. H., & Vadillo, M. A. (2016). Can the unconscious boost lie-detection accuracy? *Current Directions in Psychological Science, 25*, 246–250.]

How good are we at detecting a lie? The department store salesperson tells you that your outfit looks stunning. An applicant presents a background that fits perfectly with the advertised criteria. A friend tells you that she would love to go on a date if she did not have a prior engagement. A defendant swears that he wasn't anywhere near the scene of the crime.

Are these people lying? Research suggests that we are not particularly good lie detectors: After watching video tapes of people who are lying or telling the truth, participants are barely above chance (less than 55%) at identifying the liars (Bond & DePaulo, 2008) — at least when making this decision consciously.

There has been great interest in recent years in the power of unconscious processing. Although this topic is highly controversial (see Newell, 2015; Nieuwenstein et al., 2015), many have suggested that the unconscious can perform complex cognitive processing — handling large amounts of information without effort — and can make better decisions than the more limited conscious mind. For example, a number of studies suggest that whether you are selecting art to hang on a wall or making a sports bet, people who go with their gut rather than executing careful analysis are more satisfied with their choices. Indeed, a theme in Malcolm Gladwell's (2007) popular book titled *Blink: The Power of Thinking Without Thinking* is that quick, snap judgments are often more accurate than slow, deliberate, and methodical reasoning.

Consistent with this thinking, many researchers argue that our unconscious, gut feelings are more adept than our conscious processes at lie detection. One explanation is that our conscious decision processes are subject to biases (such as a truth bias and a desire to trust others) and that our unconscious processes, unencumbered by these predispositions, are better equipped to detect lying (ten Brinke, Stimson, & Carney, 2014). If so, as Volker H. Franz and Ulrike von Luxburg (2015) note, perhaps we should start instructing jurors to forego conscious and careful discussions and instead rely on sheer intuition.

In their well-balanced *Current Directions in Psychological Science* article, Chris N. H. Street and Miguel A. Vadillo conclude that the current evidence for potent unconscious lie-detection processes is not convincing. They argue that existing research (1) fails to eliminate the influences of conscious processes, (2) includes mixed findings and failures to replicate key results (Moi & Shanks, 2015), and (3) sometimes uses questionable comparison conditions (see the arguments of Franz & von Luxburg, 2015).

Much of the support for the power of the unconscious comes from comparing lie-detection accuracy using direct and indirect methods. In the direct method, participants are shown videos and told that the speakers may be lying and then asked to make a conscious judgment. In the indirect method, participants are not told that the speaker may be lying but instead are asked to judge a characteristic of the speaker, such as whether he/she is "tense" or "thinking hard." The researcher then codes the "thinking hard" or "tense" responses as "lying" judgments (and "not thinking hard" and "not tense" responses as "truth" judgments). Early research found that indirect judgments were more accurate than conscious direct judgments (DePaulo & Morris, 2004). The assumption is that when we are distracted by an orienting activity, a more skilled unconscious system takes over.

To sensitize students to the indirect method and some of its limitations, you could present them with several videos from the Bloomsbury Deception Set (you can request these videos from Street's laboratory website at https://conflictlab.org/stimuli). This set of videos contains 18 speakers who were each taped describing two stories about a holiday vacation — telling the truth in one and lying in another. You could first test the indirect method by presenting several videos and asking students to judge whether the speaker is "thinking hard" or "not thinking hard." You could then try the direct method by presenting several other videos and asking students to assess whether the speaker is telling the truth or lying. After converting the indirect judgments to lie/truth scores, you can assess whether students were more accurate with the indirect method.

Regardless of the outcome, this demonstration can serve as a basis for discussing whether the indirect method necessarily assesses unconscious lie-detection processes. Street and Vadillo (2016) reasonably propose that it does not. First, they argue that indirect method studies often rely on judgments — such as whether or not the speaker is "thinking hard" — that are diagnostic of lying and that those studies tend to find high lie-detection scores. Interestingly, a recent meta-analysis found that the indirect method often leads to lower lie-detection scores than the direct method (about 80% of the time; Bond, Levine, & Hartwig, 2014), and this likely happens when the to-be-judged characteristics are not reliably diagnostic of lying. Thus, the impressive results from the indirect method, when they occur, appear to be the product of focusing conscious attention on diagnostic characteristics of speakers (Street & Richardson, 2015) rather than relying on unconscious processes. Second, the researchers point out that the judgment that is used in a particular study is selected by the experimenter and not by an all-knowing unconscious.

As a general point, Street and Vadillo (2016) remind us of the law of parsimony, and that it is probably unwise to invoke mysterious unconscious processes when a simpler explanation (conscious processing) exists. œ

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