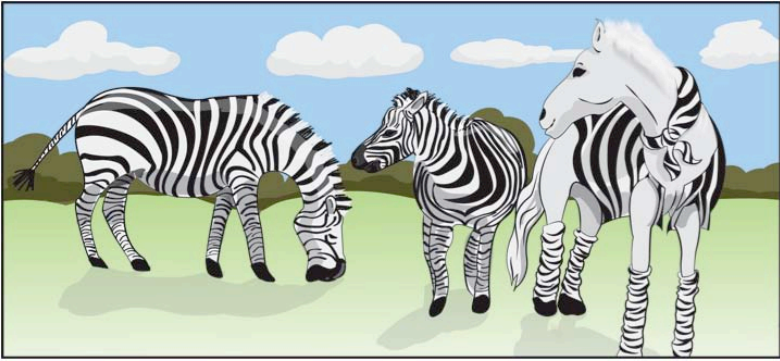


What Every Teacher and Mentor Should Know

*A Guide to Identifying and Reducing
Stereotype Threat to Maximize Student
Performance*

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Illustrated by Dr. Mary O'Reilly

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About this publication

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Understanding stereotype threat and wise criticism is essential for being a good mentor or teacher.

1. Introduction

Discussions of stereotypes and diversity often focus narrowly on race and gender and have the potential to seem accusatory. Although gender-based and race-based prejudices are cause for deep concern and often represent the most overt forms of personal prejudices, there is a broad spectrum of stereotypes embedded in everyday social interactions. By definition, a stereotype is a prevalent belief about specific types of individuals or certain ways of doing things that may or may not reflect reality. Stereotypes can be both positive (scientists are smart people) and negative (scientists are socially inept). They can be both true (most scientists *are* smart) and false. Stereotypes result from the way we have been socialized by our families, friends, and the media to think about groups of people, including those groups to which we belong.¹⁻³ The bottom line is that we all hold stereotypes and we can all be the victims of stereotypes.

The good news is that the damage due to stereotypes can be minimized, but getting the requisite conversations started can be challenging. The mere mention of the words “stereotype” and “diversity” can induce anxiety in even the most open-minded person.⁴ This reaction is natural. In fact, multiple independent studies suggest that the people who care most deeply about minimizing stereotypes and enhancing diversity are more uneasy discussing these issues than people who care little about changing the status quo.^{4,5} This discomfort can result from lacking the proper tools with which to identify and address personal prejudices and institutional or systemic biases. This training will provide some of those tools.

By the end of this training, you should be:

- 1) able to define and recognize “stereotype threat” and provide examples of how it can undermine student performance in the classroom and/or laboratory,
- 2) aware of what studies show about who has stereotypes and who can be the victims of stereotype threat,
- 3) familiar with strategies to minimize stereotype threat and thereby maximize student performance, and
- 4) able to conduct this training at your home institution.

This training can be conducted in two ways:

- 1) Individuals can read this booklet and use exercises 1-7 as the starting points for discussion.
- 2) A Powerpoint presentation¹⁵ can be used to convey material in an interactive training session that also employs exercises 1-7, and this booklet as further reading.

Exercise 1*: *Can you recall a time when you or someone you know felt judged by a superficial characteristic? Example: Someone made the assumption that an individual was not a good student just because this individual played college sports.*

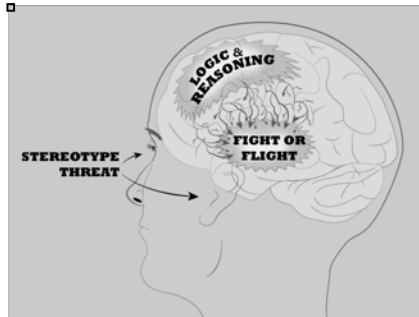
*If the training group has more than 10 people, we recommend that groups of 2-3 people discuss the exercise for 3-5 minutes before sharing their stories with the larger group.

2. What is stereotype threat?

Stereotype threat is the perceived risk of confirming a negative stereotype.^{4,6-8} For example, a woman in a math class is under stereotype threat if she is afraid that a poor performance on her part will prove to her male classmates that “women are not good at math” (the negative stereotype). Fear distracts and discourages us, often resulting in that dreaded poor performance, which feeds both the false stereotype and the student’s insecurities.⁴

3. Stereotype threat can lead to under-performance.

In his book, *Whistling Vivaldi and Other Clues to How Stereotypes Affect Us* (2010), the renowned Columbia University social psychologist Dr. Claude Steele provides us with data that address both the biological basis of



stereotype threat and its importance. Notably, he reports on the research of Anne Krendl, Jennifer Richeson, William Kelley and Todd Heatherton that showed that the brain activity of women performing math problems is altered when those women are placed under stereotype threat. (pp. 124-125)⁴ In particular, blood flow in the brain (an indicator of brain activity) shifts from the area of the brain responsible for logic and reasoning, to the region of the brain that becomes activated when we are under attack or distress. In other words, the idea that people in fearful situations do not think clearly has experimental support.

Dr. Steele offers a number of examples of studies that show a connection between stereotype threat and underperformance. In one such study, conducted by Steele and Steve Spencer, strong math students were divided into groups. He assured one group of students that the test contained no gender bias, while telling the other group that it did. Women in the group that was assured that the exam was bias free “performed at the same high level as equally skilled men,” whereas the other group of women underperformed. When stereotype threat is eliminated, performance improvements can be dramatic. (pp. 39-40)⁴

Whereas negative stereotypes lead to stereotype threat, positive stereotypes can *benefit* the group being stereotyped.^{3,4,9,10} For example, the presumption that Asian students are good at math often dissuades instructors from doubting an Asian student’s quantitative ability unless the student proves otherwise. Additionally, since students are not threatened with confirming a negative stereotype, their minds can remain focused on the task at hand, which can *augment* the performance of modest students.



Exercise 2: *Identify that stereotype: the image above shows two undergraduate students on their first day at work in a research lab as part of a summer research program. Imagine the following scene: a postdoc walks into the lab to talk with two new summer interns, one from a small school and one from a big one. The postdoc says to the student from the small college, "Here let me do that for you; you probably don't have labs at your school." The postdoc then turns to the summer intern from the large school and says, "I bet you don't have any questions, do you?"*

Identify the stereotypes at play here. Is the stereotype harmful to the student from the small college? Why or why not? Could the stereotype be harmful to the student from large college? Why or why not?

4. Stereotype threat can lead to feelings of being judged unfairly.

Fear of being stereotyped, whether real or otherwise, can change how an individual believes he or she is perceived and treated by others.⁶ Data supporting this idea comes from a classic experiment by Kleck and Strenta (1980) in which subjects had a disfiguring facial scar applied cosmetically, which the participants viewed in a mirror.¹¹ The participants were then asked to interact with a fellow student.



Subjects overwhelmingly reported that other students were uncomfortable and condescending in their interactions with them, and the subjects attributed this behavior to their facial scars. However, unbeknownst to the subjects, a makeup artist had wiped off the scar prior to the student interaction. The perceived prejudice *was not* a result of the scar.¹¹

Think about what this study suggests in terms of your own students. Some of your students will be primed to interpret your tone, silence, or body language as negative.

Individuals under stereotype threat will be looking for signs of prejudice, and this study suggests that when one looks, one finds (even if it is not really there).

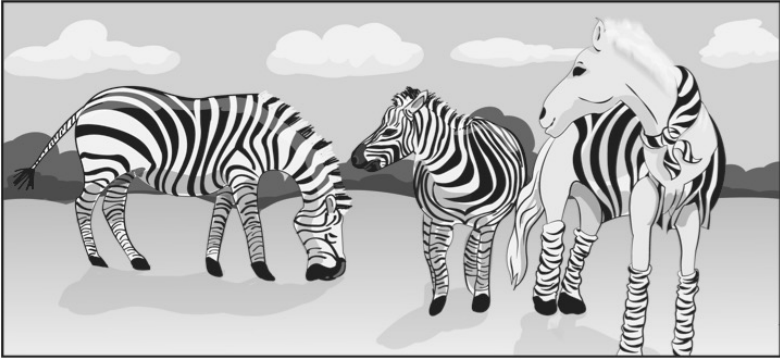
To the right is an illustration of how a student can *feel* in a professor's office even when that professor is just there to help.



Exercise 3: *Can you think of a time when you felt you were being judged or treated unfairly only to later discover that this was not the case? For example, a professor shared that as a new faculty member she met with a prominent older male scientist who seemed to have no interest in her research and only asked her questions about her personal experiences in the department. She perceived his questions as condescending and concluded that he didn't respect her as a scientist because she was young and female. However, she later found out that he was asking about personal issues because he had a son about to start a faculty position, and he was concerned about the current challenges facing young faculty, since it had been so long ago that he himself was starting out.*

5. Who can be the victim of stereotype threat?

Everyone! Although one might assume that stereotype threat affects only weaker students, the opposite is actually true. Stereotype threat affects the students who care *most* about disproving negative stereotypes; these students are generally the strongest academically.⁴ Thus, academically rigorous programs are the perfect incubator for stereotype threat, as well as a condition known as *impostor syndrome*. When a person suffers from impostor syndrome, he/she feels like a fraud despite having achieved a high level of success. For example, MIT students often report that although they can dress like a geek, they are afraid that someone will discover that they aren't really that smart; they fear that he or she was the single mistake that MIT admissions made that year.



When surrounded by brilliant and talented people, it is easy to question whether you really belong with that cohort.

The following comments include stereotypes or stereotype threat observed or experienced by undergraduates, graduate students and professors:

- (1) "(Students at my school) are supposed to be really smart, so asking a question will only make me sound stupid."
- (2) "White people are less intelligent than Asians; Black people and Latinos are less intelligent than White people—all of the Black people are here because of affirmative action."
- (3) "Women are not as gifted as men in quantitative analysis; men are not as good at communicating as women."
- (4) "Women are more emotional than men; men are more analytical than women."
- (5) "(Everyone at my school) is fluent in English, so if I ask a question in class and reveal that English is not my first language or I am not fluent, everyone will think I'm stupid."
- (6) "Scientists care more about their work than about their appearance, so if I'm too particular about my personal hygiene or dress too nicely, then people will think I don't care about my work."
- (7) "Asians study the most out of any racial group and do the best in classes here, so if I participate in any student clubs or take a break from my studying, I will do poorly in my classes, and everyone will think that I'm lazy and don't deserve to be here."
- (8) "TAs are too young and do not know that much about real science so they can't help me. I would rather talk to the professors."

Exercise 4: *Can you add to this list? Can you think of any other stereotypes that may arise while teaching in the classroom or while training students in a research lab? What types of unintended damage might these stereotypes cause? For example, consider stereotype (1).*

Exercise 5: *The title of Claude Steele's book "Whistling Vivaldi and Other Clues to How Stereotypes Affect Us" comes from a story he heard of a young African-American man who started whistling classical music by Vivaldi to reassure an elderly white couple walking nearby that he was no threat to them. Steele asserts that we all "whistle Vivaldi" from time to time in order to make those around us feel more comfortable and to "fit in." Can you think of a time that you "whistled Vivaldi"?*

6. Who has stereotypes?

Everyone! Even scientists who are trained to be rational and make decisions based on data have stereotypes! Evidence demonstrating that modern scientists allow stereotypes to influence how they evaluate others comes from a study by Jo Handelsman and co-workers.¹² In this study published in the *Proc. Natl. Acad. Sci. USA* in 2012, faculty at research-intensive universities were asked to evaluate a candidate for a lab manager, who was randomly assigned a male (John) or female (Jennifer) name. Although the application material was identical (except for the candidate gender), faculty rated the male applicant to be significantly more competent and hireable. They also selected a higher salary for the male applicant by a significant margin. Notably, female faculty displayed equal bias against female candidates as the male faculty did.¹²



7. Ways to mitigate stereotype threat and maximize student performance.

(A) Give wise criticism.

Wise criticism can be used to create an environment of trust, mitigating stereotype threat. By definition, wise criticism is criticism in which you explicitly tell a student that you think they are capable of attaining a high level of success and achievement. Criticism delivered in a “wise” way helps students feel less defensive and less threatened.^{4,7}

Consider this classroom scenario: Which response would you rather hear after receiving a low grade on an exam?



Unwarranted praise can be as damaging as bad criticism. It “can cause further harm to the extent that it communicates low expectations for future achievement. Praise for substandard performance, or for easy work, can send the message that little more is expected from the student.” (p. 316)⁶

Bad criticism is particularly harmful for students who already worry that they do not belong. Providing no feedback allows the student’s imagination to fill in the blanks. Again, if a student feels that he/she does not belong, his/her imagination will create the worse case scenario.

A “wise” response, on the other hand, tells the student that you are invested in his/her success and believe in his/her ability. With you as their ally, success seems within reach.

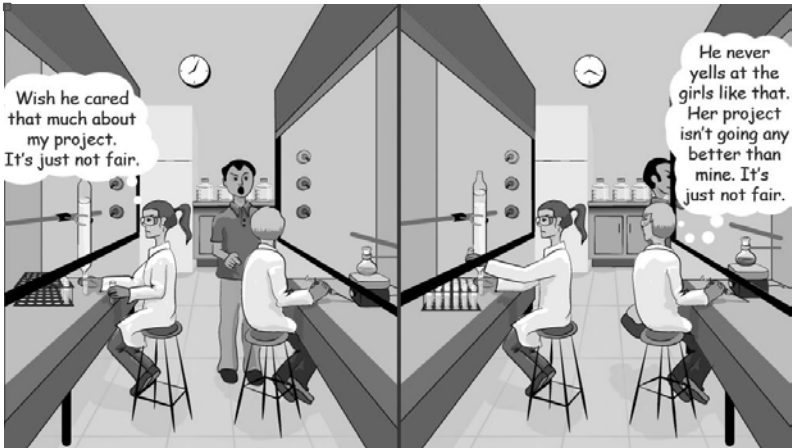
Consider this research group scenario: Instead of handing back an exam, now imagine handing back edits on a first draft of a manuscript. A student under stereotype threat may see numerous edits as a sign that he/she doesn’t belong in graduate school. However, if a student is informed that faculty only spend time making detailed editing notes for students who show promise, then instead of the red marks indicating failure, they reflect promise. We learn through criticism. Criticism is a good thing, and criticism delivered within an environment of trust maximizes student potential.

Exercise 6: *Share an example of when someone gave you “unwise” criticism; think of a way to give that same criticism in a “wise” way.*

If you cannot say something nice, still say something.

Fear of giving criticism in an “unwise” way can cause well-intentioned faculty to choose to say nothing, which as mentioned above can be just as harmful, if not more so.

Consider this scenario: A professor walks into his laboratory and yells at a male graduate student, telling him that he needed his results yesterday for a meeting presentation. Although the female student’s project isn’t going any faster, the professor never yells at her or demands results.



The professor is proud of himself for not yelling at his female student so as not to discourage her, but the female student is discouraged. She assumes that his silence is an indication that he doesn’t care about her or her project or that he doesn’t believe that she is even capable of getting results worth presenting (not saying anything when research is not going well communicates low expectation). Meanwhile, the male student feels unfairly singled out for criticism, which he is. This scenario is a lose-lose.

Providing no feedback may send unintended messages.

An example of unintended messages comes from the recollections of a faculty member who was asked to investigate why so few female graduate students seemed to be considering academic careers. This professor asked both male and female graduate students, "*How do you know you are good enough to apply for academic jobs?*" and the answers tended to divide along gender lines.



Although both male and female graduate students viewed the PhD advisor's recommendation as invaluable, female students tended to assume that their advisor would tell them if they were good enough, while male students tended to assume that they *were* good enough unless told otherwise. Thus, when a busy advisor says nothing about careers to either his/her female or male students, he/she may be unintentionally sending the message to female students that they should not pursue academic careers while sending the message to male students that they should.

(B) Change the narrative to include stories of failure.

As scientists, we publish our successful experiments, omitting mention of failed ones. With failures hidden, it is easy for young scientists to assume that success *should* come easily and that struggling is a sign of a doomed career. To correct this misconception, we need to change the narrative to include both stories of success and of failure. Professor Drennan has been asked multiple times by students, *“was there ever a time that you felt insecure?”* Her response is always, *“You mean other than every minute of every day?”* Hearing that everyone struggles provides a powerful *counter-narrative* to those who think that they alone are finding their studies to be challenging.^{4,13}

Vehicles for such counter-narratives include freshmen seminar programs, student-faculty lunches, and videotaped conversations with successful scientists of all ages. In terms of the latter, watching a 3-minute video¹⁴ of a current graduate student led to the following statement by a freshman, *“I could really relate to how his first college math course went, being surprised by not doing so well. I definitely enjoyed his advice on going into a scientific field, and the video gives me that much more confidence.”*

Exercise 7: *Think of a story that you can share about a difficult time in your career or a challenge that you faced.*

(C) Showcase a diverse set of scientists.

The visual cues students see in their textbooks and in their classes are often regarded as metrics that indicate who can be successful in the field and, tangentially, who is valued and belongs.⁴ When you teach, you can cite examples of significant contributions that women, and members of underrepresented groups have made to science. Showcase the entire team, mentioning undergraduate students that contributed to the work. As a meeting organizer, you can make sure that the speakers represent the diversity of scientists in a field. As a seminar coordinator, you can do the same.

8. Conclusion

Teachers and mentors have an awesome and challenging responsibility to convey material effectively to an increasingly diverse classroom and to train an increasingly diverse group of individuals in the laboratory. Although we all have stereotypes, creating an environment of trust can mitigate the negative effects, promote diversity and maximize student performance.

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10. Additional Resources

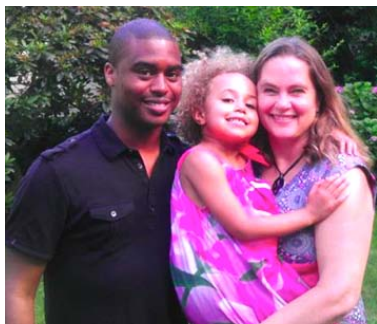
14. Behind the Scenes at MIT video series: <http://chemvideos.mit.edu>
Twenty-four free, short videos featuring:
12 inspiring, real-world applications of chemistry textbook topics,
and 12 personal journeys on becoming a scientist
15. Free power point presentation for use in running a training session on stereotype threat: <http://drennan.mit.edu/diversity>

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Wes Glenn and Cathy Drennan shown with Cathy's daughter at Wes's Ph.D. thesis defense party, June 28, 2013.