



# The Effects of Feedback During Problem Solving in the Context of Stereotype Threat



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## Purpose

**Our purpose was to examine stereotype threat in the context of mathematics problem-solving when students receive feedback or do not receive feedback.**

## Background

**Stereotype threat** occurs when an individual feels they are at risk for confirming a stereotype (Steele & Aronson, 1995). For example, when solving mathematics problems, females may fear confirming the stereotype that “girls are bad at math.” To date, few studies have examined how authentic feedback influences learning in the context of stereotype threat (Rydell et al., 2017). Feedback literature has found the effects of receiving feedback vary widely. In this study, we investigated if stereotype threat was stronger if feedback was provided or not provided.

## Method

### PARTICIPANTS

342 undergraduate students enrolled in an introductory psychology course at Indiana University-Bloomington ( $M$  age = 19.05 years; 68.4% female)

### PROCEDURE

Students participated in a single online learning session where they completed a series of 8 probability problems. Prior to solving those, participants solved 2 baseline items designed to assess prior knowledge of the task. Participants were randomly assigned to one of four conditions using a 2 (Stereotype Threat: Threat or Gender-Fair) x 2 (Feedback: Yes or No) between-subjects design.

## Design

### Threat Manipulation

#### THREAT:

“Today, you have been randomly assigned to learn and work on math tasks that **DO** show gender differences. This means that men outperform women on the math tasks you are completing today.”

#### GENDER FAIR:

“Today, you have been randomly assigned to learn and work on math tasks that **DO NOT** show gender differences. This means that men and women perform equally well on the math tasks you are completing today.”

### Feedback Manipulation

**Correct! The correct answer is ##.**

**Incorrect! Select one option below to proceed.**

- Try this problem again
- See the correct answer to this problem
- Skip to the next problem

**No Feedback:** Your response has been recorded. Click the arrow button to proceed.

Figure 1. Target problem.

### Problem Scenario: Breathalyzers

Imagine you work in a police department. Your department often uses Breathalyzers to test whether drivers are driving under the influence of alcohol. Based on previous cases in which a person’s sobriety was later verified, you know the following:

	Positive Breathalyzer Test (indicates drunkenness)	Negative Breathalyzer Test (Does not indicate drunkenness)
Sober Driver	A 25	B 450
Drunk Driver	C 225	D 50

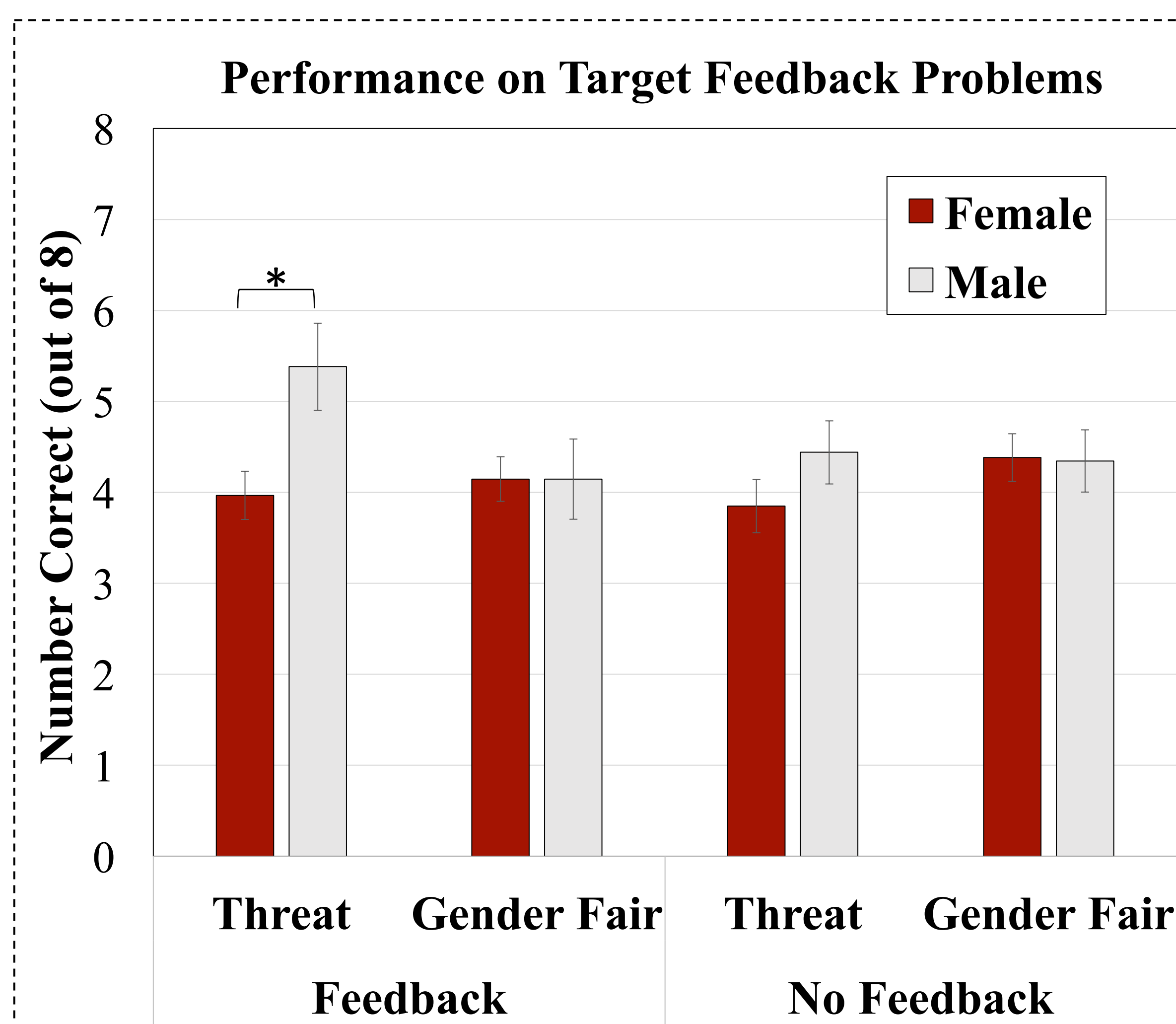
1. Based on this table, how likely is it that a driver with a negative Breathalyzer test is actually sober?

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

Slide the bar along the scale to select an answer.

## Results

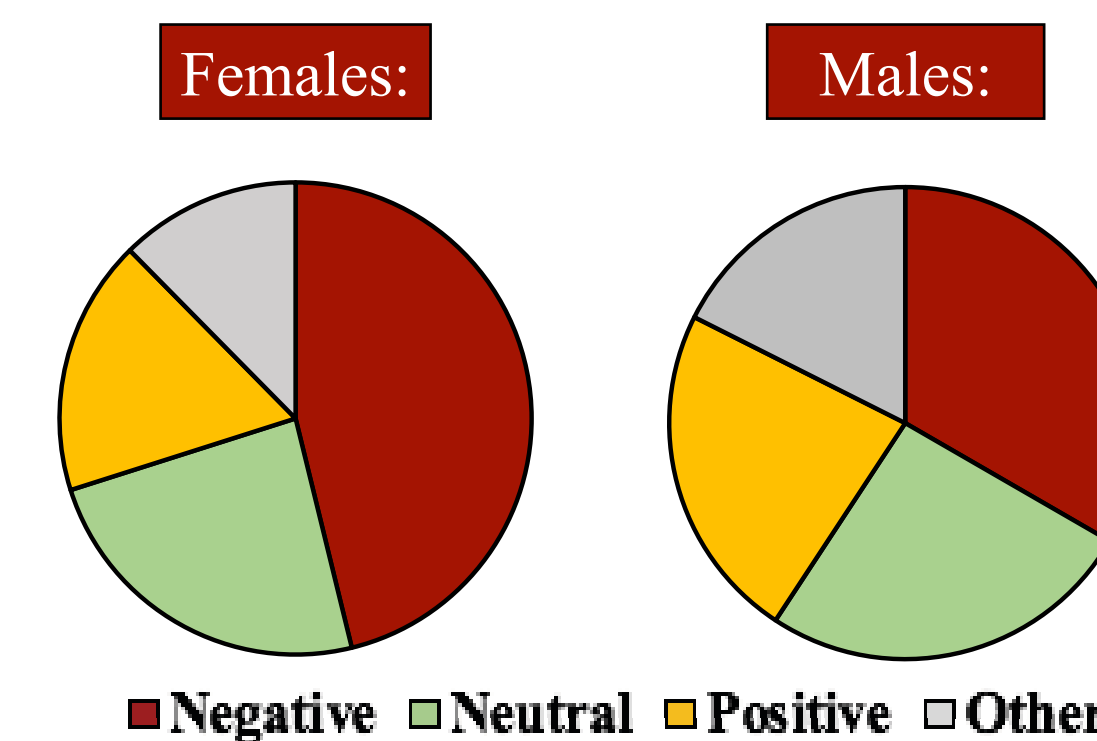
➤ Problem-solving performance was moderate ( $M = 4.23$  out of 8,  $SD = 2.41$ ).



Within each feedback condition, ran ANCOVA with threat, gender, threat-by-gender interaction, controlling for pretest score

### Open-ended Responses

Prompt: How did you feel while solving these problems?



### Feedback Selections

	Try Again	See Answer	Skip
<b>Gender Fair</b>			
<b>Females</b>	41%	37%	22%
<b>Males</b>	38%	30%	32%
<b>Threat</b>			
<b>Females</b>	47%	30%	23%
<b>Males</b>	42%	45%	13%

## Conclusions

When solving problems *without* feedback, there was no effect of gender or threat. When solving problems *with* feedback, there was a threat by gender interaction.

The men in this study only outperformed women in the threat condition when feedback was provided.

## Implications

The current results suggest that feedback may exacerbate the effects of stereotype threat by enhancing the evaluative nature of the learning environment.

They further suggest that the effects of feedback vary and are not always beneficial for problem solving.

Future research is needed to further examine the factors that influence the effectiveness of feedback and have the potential to diminish the effects of stereotype threat on learning.

## References

- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69(5), 797-811.
- Rydell, R. J., & Boucher, K. L. (2017). Stereotype threat and learning. In J. M. Olson (Ed.), *Advances in Experimental Social Psychology*, Vol. 56, 81-129.