

# Mindset

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# POP QUIZ!

- Who here is a math person?
- Who here is a creative person/artist?
- Who here is musical?
- Who here is athletic?

# A Research Example

- In one study, students who identified as being **better with language/writing** outperformed the “math students” on a math test *(see Tomasetto, C., Matteucci, M. C., Carugati, F., & Selleri, P., 2009)*

## MATH TEST

Welcome to Stats Class! You will need **strong math skills** to do well in this class.

vs.

## MATH TEST

Welcome to Stats Class! You will need **strong math and language skills** to do well in this class.

**RESULTS:** Students who said they were better at language/writing **OUTPERFORMED** the “math students” but only when they were told they would need their language/writing skills

# What Does this Mean?

...It's all in your head!

**What you BELIEVE about your ability impacts  
your actual ability.**

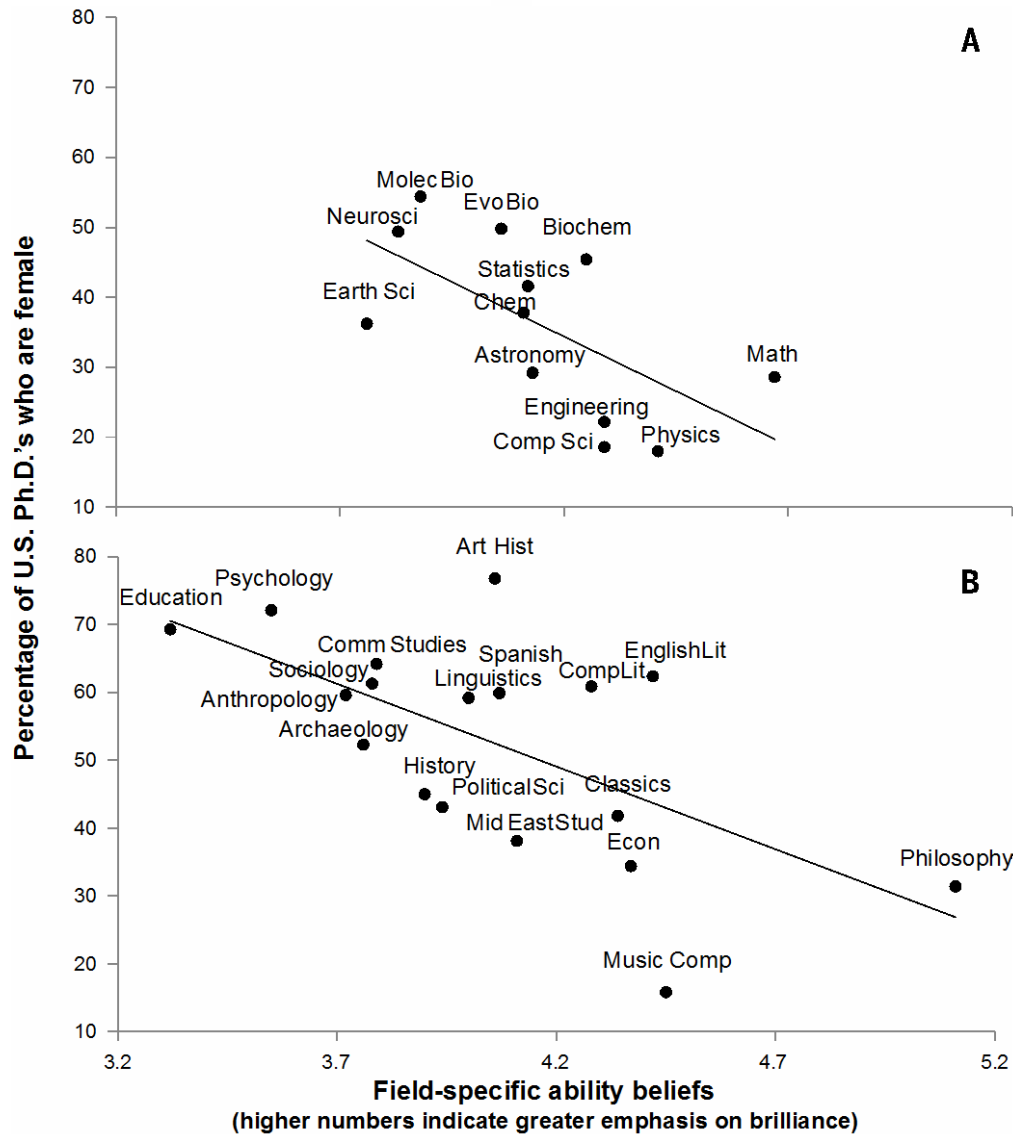
One type of belief is particularly important and  
it is called “MINDSET”

# “Mindset” = Beliefs about Innate Intelligence

- **FIXED** mindset:  
believes in *innate intelligence*
- **GROWTH** mindset:  
believes that *effort and time* more important  
than innate intelligence

Your experiences will have helped you develop a fixed or growth mindset.

- **Society** believes that intelligence is innate and fixed. Some people have it and some people don't.



The more PhD's believe their discipline requires "innate ability" the fewer **females** with PhDs in that field.

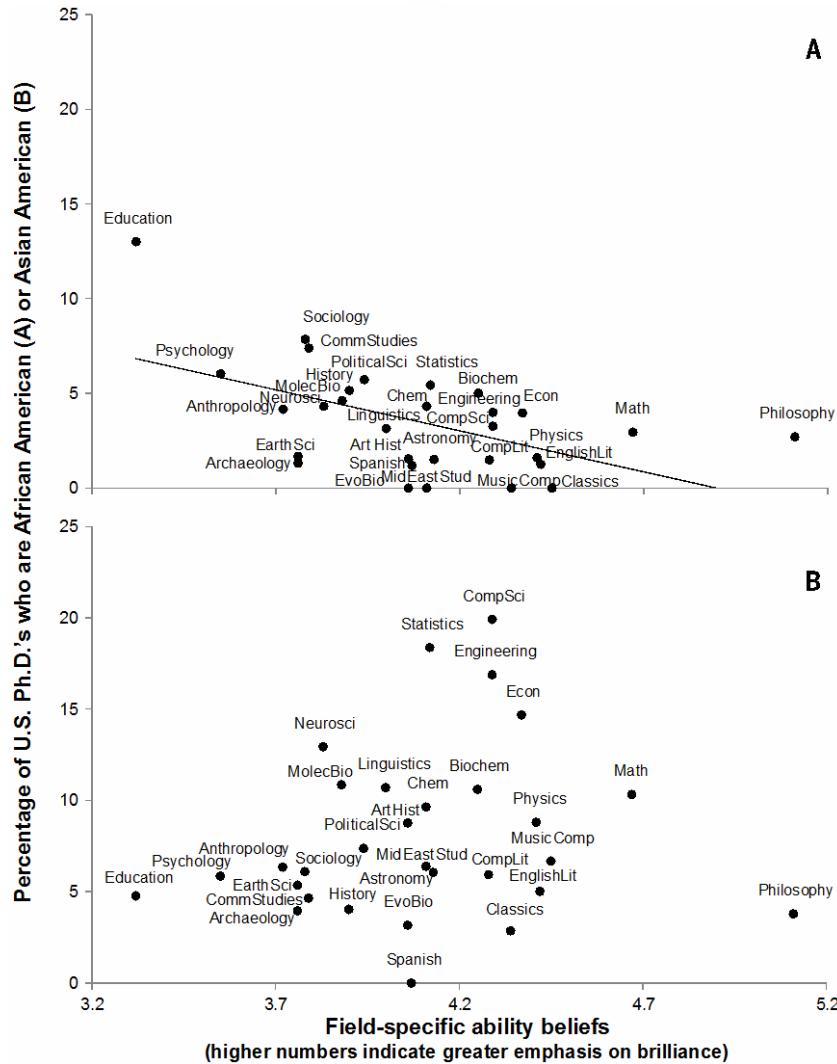


Fig. 2. Field-specific ability beliefs and the percentage of 2011 U.S. Ph.D.'s who are (A) African American and (B) Asian American.

The more PhD's believe their discipline requires "innate ability" the fewer **African Americans** with PhDs in that field.

The pattern is different for **Asian Americans** with PhD



Your experiences will have helped you develop a fixed or growth mindset.

- **Society** believes that intelligence is innate and fixed. Some people have it and some people don't.
- Your **teachers** send messages about your ability.

# What Our Teachers Say Matters

- Yeager, et al. (2013)
  - “I’m giving you these comments because I have very high expectations and I know that you can reach them.” vs.
  - “I’m giving you these comments so you will have feedback on your paper.”
  - Differences in number of revisions and final grade

# What Our Teachers Say Matters

- Smith et al. (2017)
  - “Everyone can do well with statistics if they work at it.” vs.
  - “Some people do better with math than others”
  - Differences in statistics anxiety levels and quiz scores

Your experiences will have helped you develop a fixed or growth mindset.

- **Society** believes that intelligence is innate and fixed. Some people have it and some people don't.
- Your **teachers** send messages about your ability.
- Your **parents** send messages about your ability.

# What Our Parents Say Matters

- Maloney et al. (2015)

“We found that when parents are more math anxious, their children learn significantly less math over the school year and have more math anxiety by the school year’s end—*but only if math-anxious parents report providing frequent help with math homework.*”

# Why Does Mindset Matter?

- Does it really matter whether you have a fixed or growth mindset?

**YES**

Mindset is strongly related to more than 30 social, psychological, and educational factors.

A word cloud of psychological and educational terms. The words are arranged in a dense, overlapping manner. The word 'MINDSET' is prominently displayed in the center, circled in blue. Other words include 'LEARNING', 'GOALS', 'HOPELESSNESS', 'PREPARATION', 'SCHOOL ENJOYMENT', 'PROCRASTINATION', 'PHYSIOLOGICAL AROUSAL', 'SELF-ESTEEM', 'ANGER', 'CLASS PARTICIPATION', 'LIFE', 'SATISFACTION', 'COPING', 'SENSE OF PURPOSE', 'STANDARDIZED TEST SCORES', 'WORRY', 'GOAL ORIENTATION', 'TEST PERFORMANCE', 'PERCEIVED', 'HELPLESSNESS', 'ACHIEVEMENT', 'MASTERY', 'STRATEGIES', 'ADAPTABILITY', 'TASK PERFORMANCE', 'SELF-EFFICACY', 'SELF-REGULATED LEARNING', 'BOREDOM', 'AFFECTIVE AROUSAL', 'HELPLESS SHAME', 'ANXIETY', 'GOAL ACHIEVEMENT', 'MOTIVATION', 'PURPOSE', 'PERFORMANCE', 'STANDARDIZED TEST SCORES'. The words are in various colors and sizes, with 'MINDSET' being the largest and most central.

# Mindset Matters

Research has CONSISTENTLY shown that having a GROWTH mindset can help you embrace positive attributes that help you succeed



## A Social–Cognitive Approach to Motivation and Personality

Carol S. Dweck  
University of Illinois

Ellen L. Leggett  
Harvard University

**aps**  
Journal of Educational Psychology  
2016, Vol. 108, No. 3, 295–299

Research Report

## Mind Your Errors: Evidence for a Neural Mechanism Linking Growth Mind-Set to Adaptive Posterror Adjustments

Jason S. Moser<sup>1</sup>, Hans S. Schroder<sup>1</sup>, Carrie Heeter<sup>2</sup>,  
Tim P. Moran<sup>1</sup>, and Yu-Hao Lee<sup>2</sup>

<sup>1</sup>Department of Psychology  
Michigan State University

British Journal of Educational Psychology (2015), 85, 242–245  
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[www.wileyonlinelibrary.com](http://www.wileyonlinelibrary.com)

### Discussant Growth

Carol S. Dweck\*  
Stanford University, California, USA

## Ability and Mathematics: the mindset revolution that is reshaping education

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0022-0663/16/\$12.00 <http://dx.doi.org/10.1037/edu0000134>

### INTRODUCTION

## Instructional Interventions That Motivate Classroom Learning

Xiaodong Lin-Siegler  
Teachers College, Columbia University



ELSEVIER

Carol S. Dweck and Geoffrey L. Cohen  
Stanford University

Applied Developmental Psychology 24 (2003) 645–662

**Applied  
Developmental  
Psychology**

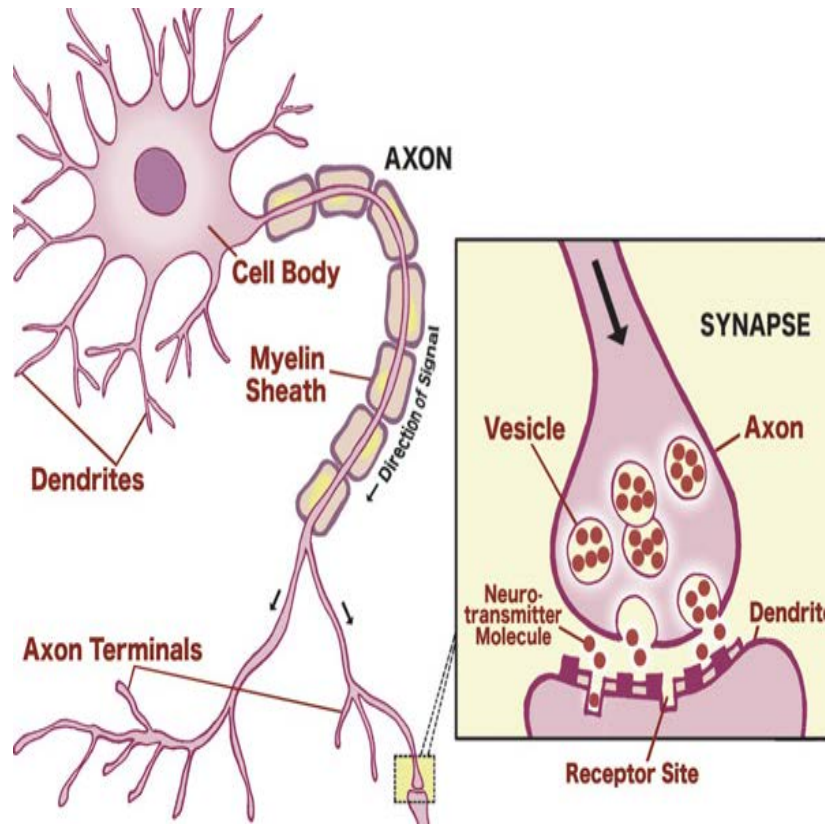
## Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat

Catherine Good<sup>a,\*</sup>, Joshua Aronson<sup>b,1</sup>, Michael Inzlicht<sup>b</sup>

<sup>a</sup>Department of Psychology, Columbia University, 405 Schermerhorn Hall, 1190 Amsterdam Avenue,  
New York, NY 10027, USA

<sup>b</sup>New York University, East Building, 239 Greene Street, 537F, New York, NY 10003, USA

# How Does A Growth Mindset Do This?



## Two Important Brain Responses:

**ERN** - When there is a “mistake” there is an electrical “spark” in the synapse signally the potential to fire

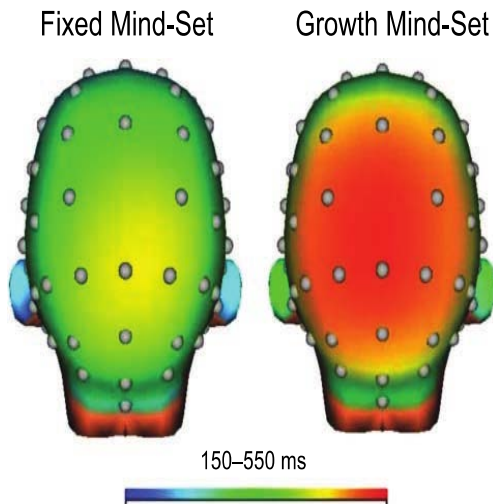
**Pe** – When a mistake is recognized, Pe activity peaks...

# Mind Your Errors: Evidence for a Neural Mechanism Linking Growth Mind-Set to Adaptive Posterror Adjustments

Jason S. Moser<sup>1</sup>, Hans S. Schroder<sup>1</sup>, Carrie Heeter<sup>2</sup>,  
Tim P. Moran<sup>1</sup>, and Yu-Hao Lee<sup>2</sup>

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SAGE



- *When prompted with feedback about an error they made, participants with a **growth** mindset had more active brains than **fixed** mindsets.*

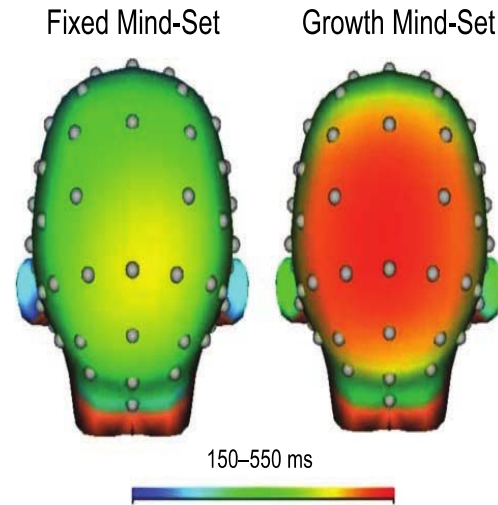
# WHY?

- FIXED mindset:

Error = innate ability = I can't =  
no need to reflect

- GROWTH mindset:

Error = part of the learning process =  
need to figure out where I went wrong!



# FIXED Mindset

Intelligence is *static* – leads to a desire to look smart and the tendency to:

- Avoid challenges
- Give up early
- See effort as *fruitless* or unnecessary
- Ignore useful feedback
- Feel threatened by the success of others
- Possibly plateau early and achieve less than their potential

# GROWTH Mindset

Intelligence can be *developed* – leads to the desire to:

- Embrace challenges
- Persist in the face of obstacles
- See effort as a *pathway* to mastery
- Learn from criticism
- Find lessons/inspiration in the success of others
- Reach higher levels of achievement

# ACTIVITY!

## **Create a One Page Mindset Reminder**

Design your own one page sheet to keep around that reminds you about growth mindset

- What do you want the title to be?
- What three key messages do you want to have on the page?
- What images would help get the message across visually?

# Mindset Also Helps Reduce Anxiety

- If you believe that you cannot do something,
- BUT, you are forced to do it anyway,
- You will be anxious.

Anxiety KILLS working memory...



- Working memory is the tool that holds information pertinent to our tasks in mind

46

- 17

- When you are anxious, an internal voice of worry takes up your working memory

46

- 17

Instead of remembering to put a “1” in front of the “6”, you use your WM to think “I always make mistakes on these problems!”

THE RESULT: You make a mistake because your memory is holding information NOT related to the task instead of the information you need it to hold!

# How Do We Know This?

- Researchers have shown that being distracted leads to just as many errors as when you are **anxious** (*Beilock, 2008; 2014*)

GROUP ONE:

**MATH TEST**

Welcome to the lab.  
Please complete the  
following math  
questions.

GROUP TWO:

**MATH TEST**

Welcome to the lab.  
Please complete the  
following math  
questions. **Your score  
will be posted** on the  
wall with other  
scores.

GROUP THREE:

**MATH TEST**

Welcome to the lab.  
Please complete the  
following math  
questions.  
**[This group was  
constantly distracted  
while taking the test]**

# The Take Home:

- Know that intelligence is not FIXED
- Know that EFFORT and FEEDBACK help you “get smarter”
- EMBRACE MISTAKES—don’t fear them!
- REGULATE YOUR ANXIETY when it does show up.
- Use EFFECTIVE STUDY STRATEGIES and ways of learning.

# Regulating Anxiety

**Self-regulation has three phases:**

**1. Before** you start your work

*How do I feel about having to do this task?*

**2. During** your working

*I am capable of this! Anxiety can be a good thing.*

**3. Reflect** after you work

*What worked? Congratulations on your accomplishments so far!*

# ACTIVITY!

**Think about an academic task you don't like to do. It may or may not cause you anxiety.**

- How do you feel when you do the task?
- How do you believe you will do at completing the task?

Take a look at your answers. Do you see any of the following in your answers? If yes, write down where you identify each message.

- Can you hear anxiety messages?
- Do you hear messages about fear of failure?
- Do you hear apathetic messages?

# ACTIVITY!

- What can you do in that situation to help yourself **feel less anxiety** and **have a growth mindset**?
  - What messages can you send to yourself?
  - What things can you do?

# Effective Study Strategies

- **Don't re-read. Retrieve!**
  - Quiz yourself (during and after reading/class)
    - With text AND notes
  - Make mistakes!!! This aids in the development of long-term memory and neuropathways.
  - Keep a set of flashcards (don't drop any of them)
  - Work with peers to quiz each other. If you can explain it to someone else, you are FORCED to pull information out of the abyss of your brain...



# Effective Study Strategies

- **Try without Directions**

- Go to the end of the book chapters that you have not covered yet, and try to problem solve the answers.
- Try to figure out WHY a lab works before being told the answer.
- Look at key terms at the back of chapters you have not covered yet and try to decipher what they mean.

# Effective Study Strategies

- **Vary Your Practice**

- Don't keep the same study schedule—mix up the subjects!
- Don't do the same material in the same order for each subject—mix it up!
- Don't study in the same place—mix it up!
- Get it: Mix it Up!

# ACTIVITY!

## **Let's Help this Student!**

Let's say you see a friend on campus who looks really upset. You ask them what is wrong, and they say:

"I need to figure out what to do about this class I'm in. I don't know if I should withdraw. I took the midterm, and the professor like, just tore me apart. I studied and all, but they just, I don't know, I guess they just didn't like what I had to say. I asked her about it, and she said I should see a tutor. So, I just don't know what to do, I guess. I might just withdraw because, I don't know, I mean if she doesn't like me, then it's probably not worth staying in the class."

## **Assessing Mindset:**

- What do you believe is this student's mindset?
- What statements make you think that?

## **Assessing Anxiety:**

- Are there signs of anxiety? What leads you to this conclusion? What could you ask to find out more about their level of anxiety?

## **Self-Regulation:**

- What can we suggest/do to help relieve this anxiety right away?
- What can we suggest/do to help relieve anxiety while they work on their next exam for the class?
- What can we suggest/do after they are done the next exam?

## **Perception & Intention:**

- How does perception and intention come into play in this student's situation? What can you say to help the student reflect on that?

## **Mindset:**

- What can we say to address the situation and start moving the session forward that is GROWTH related?
- What can we say to address the situation and start moving the session forward that is FIXED related?