# Insights across disciplines: What do Duke students believe about intelligence?

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BRITE Ideas

December 4, 2019

# Roadmap

1. Our research questions
2. Lessons  from classroom research
3. A few results
4. Questions & discussion

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1. **Our research questions**
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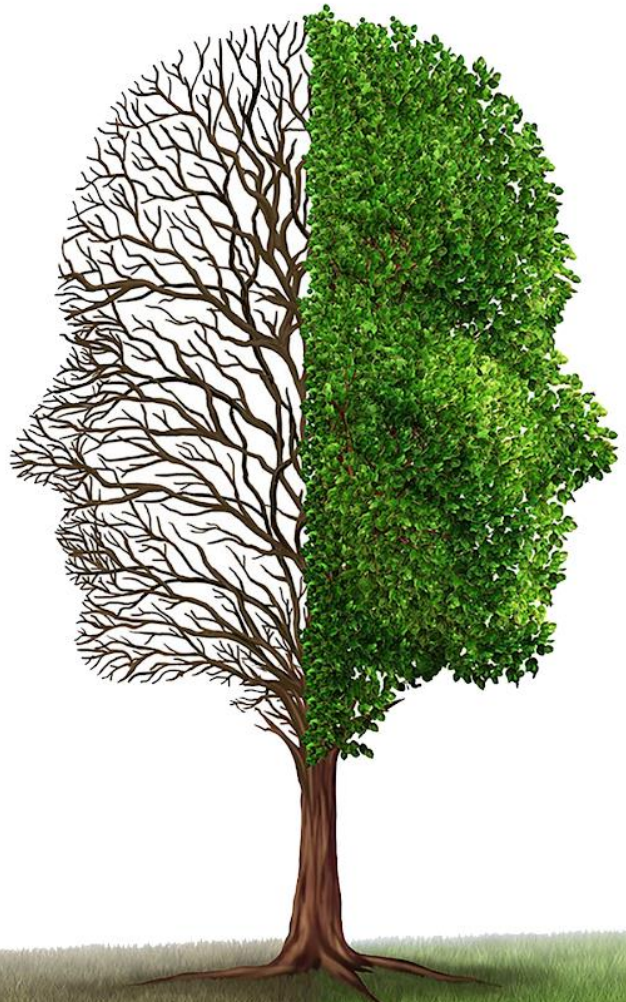
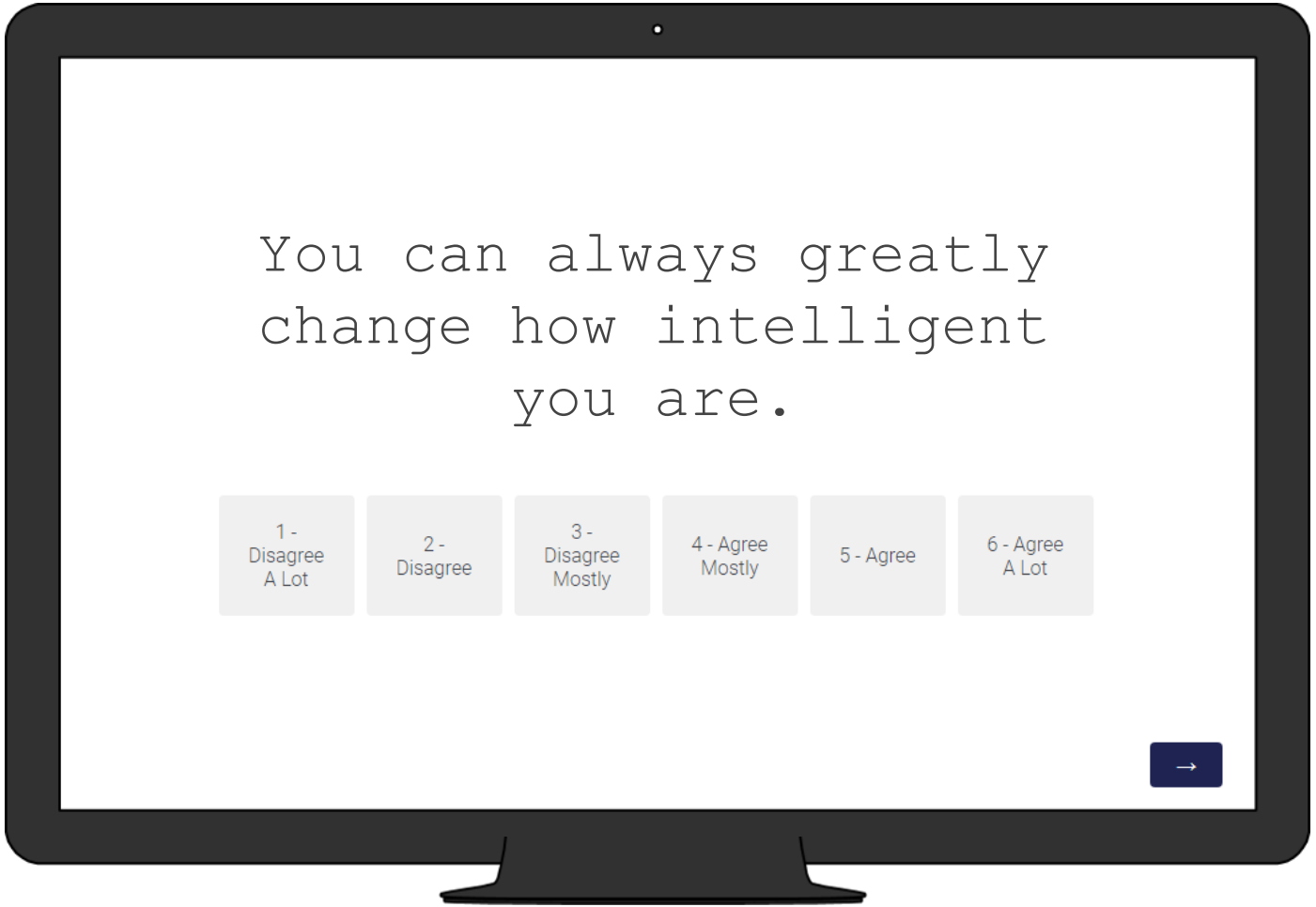
## Intelligence is fixed.

- Avoid challenges
- Give up easily
- Effort signifies a lack of talent



## Intelligence can be grown.

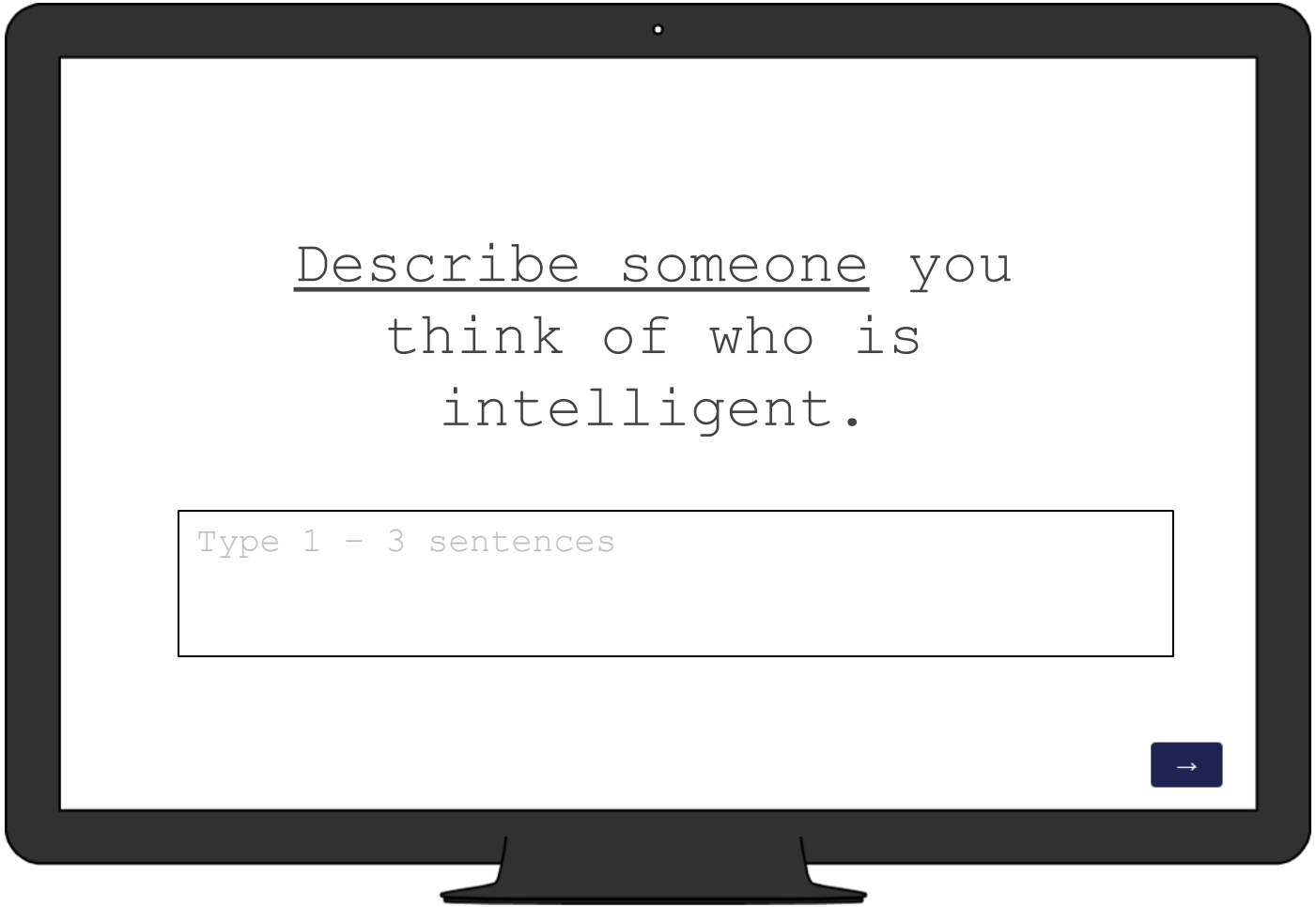
- Embrace challenges
- Likely to persist in the face of setbacks
- Effort is the path to mastery

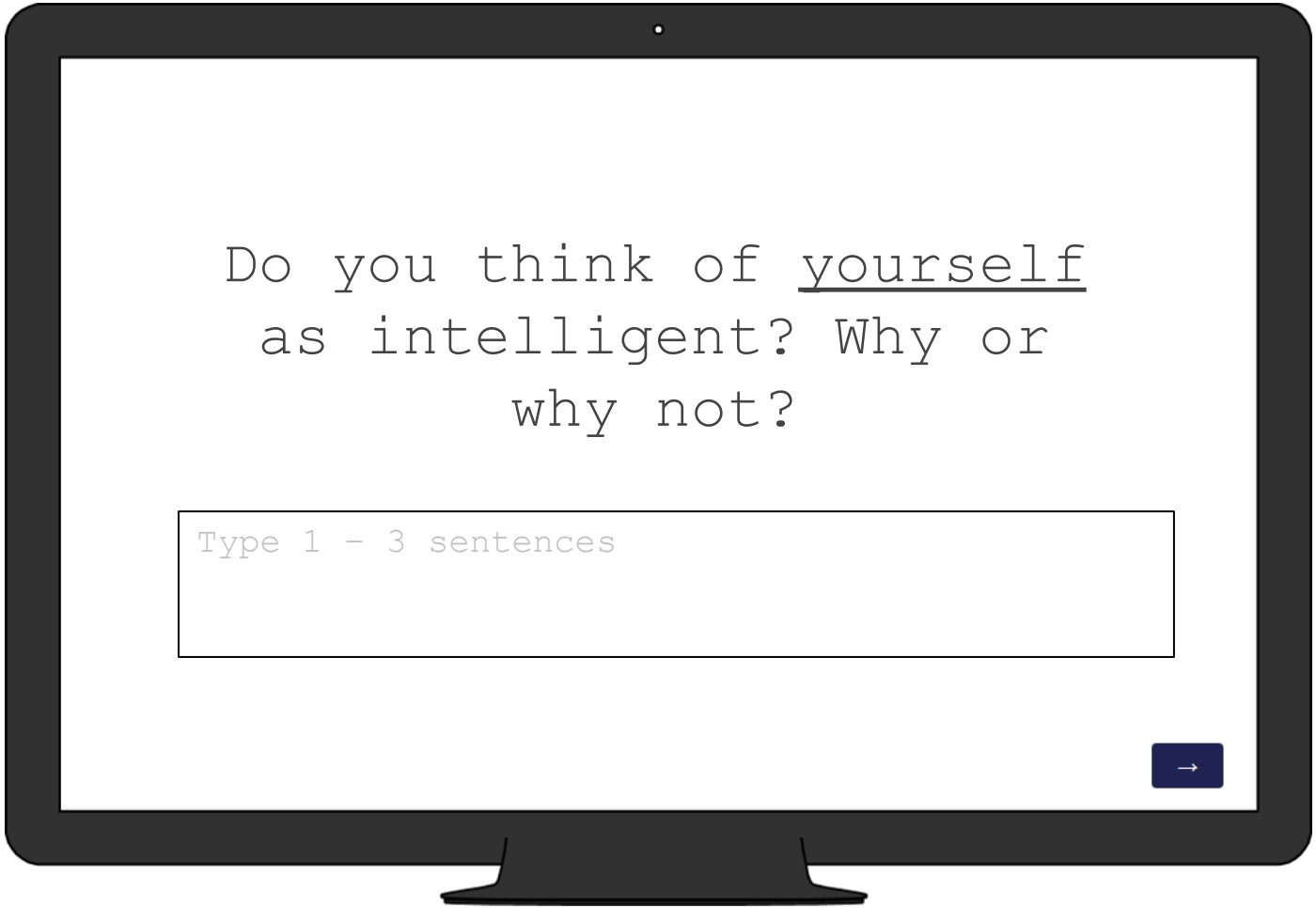

You can always greatly change how intelligent you are.
1 - Disagree A Lot
2 - Disagree
3 - Disagree Mostly
4 - Agree Mostly
5 - Agree
6 - Agree A Lot
→

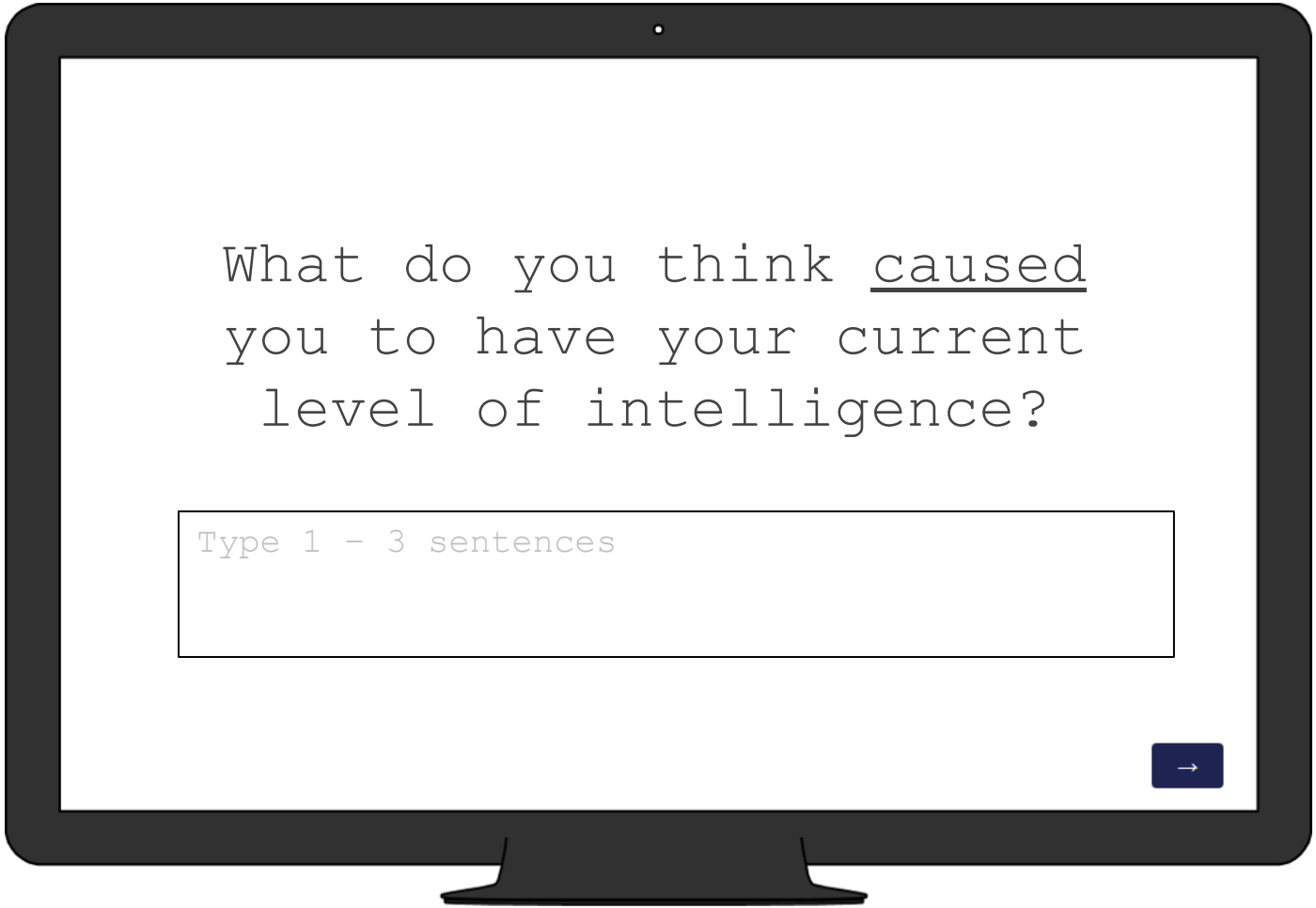
**TOI**

*scale*

[1-6]


Describe someone you think of who is intelligent.
Type 1 - 3 sentences
→


Do you think of yourself as intelligent? Why or why not?
Type 1 - 3 sentences
→


What do you think caused you to have your current level of intelligence?
Type 1 - 3 sentences
→

fixed

**Do you think you are intelligent? Why or why not?**

Yes, because I can learn things really quickly, catch on to things pretty quickly

**What caused to you have your current level of intelligence?**

I think it's genetics. Both of my parents went to a top university, and my grandparents are intelligent

growth

## Do you think you are intelligent? Why or why not?

I think that I am a hard worker and that that has made me successful as opposed to innate intelligence. I try my best to use problem-solving skills.

## What caused to you have your current level of intelligence?

I think my upbringing caused me to have the level of intelligence and awareness I have. I was very fortunate be surrounded by people that supported me from a young age.

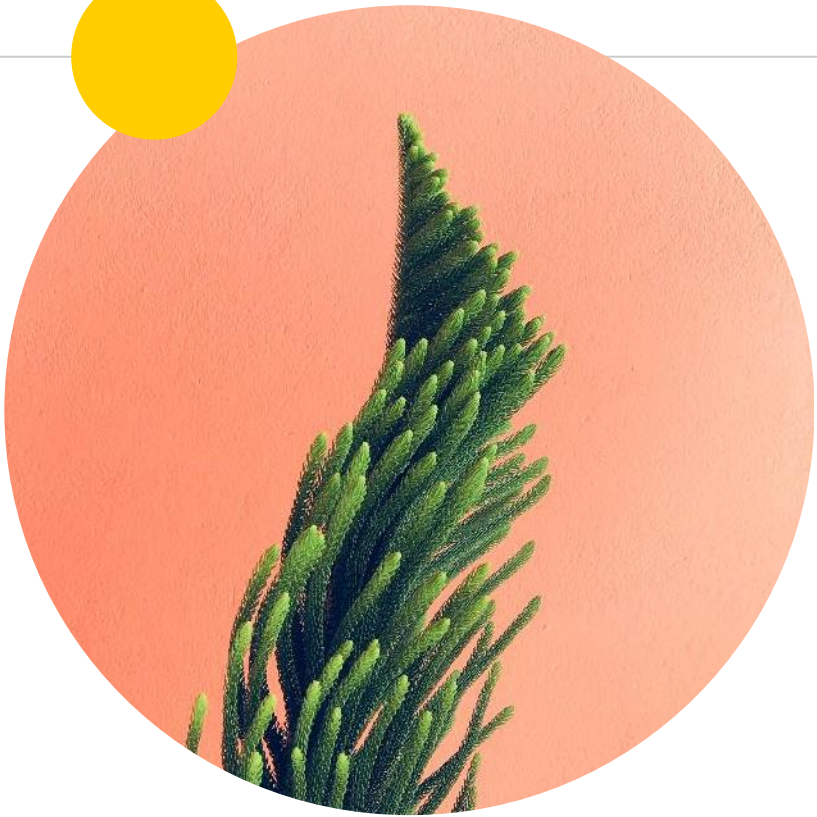
mixed

**Do you think you are intelligent? Why or why not?**

In some cases yes, in other no.

**What caused to you have your current level of intelligence?**

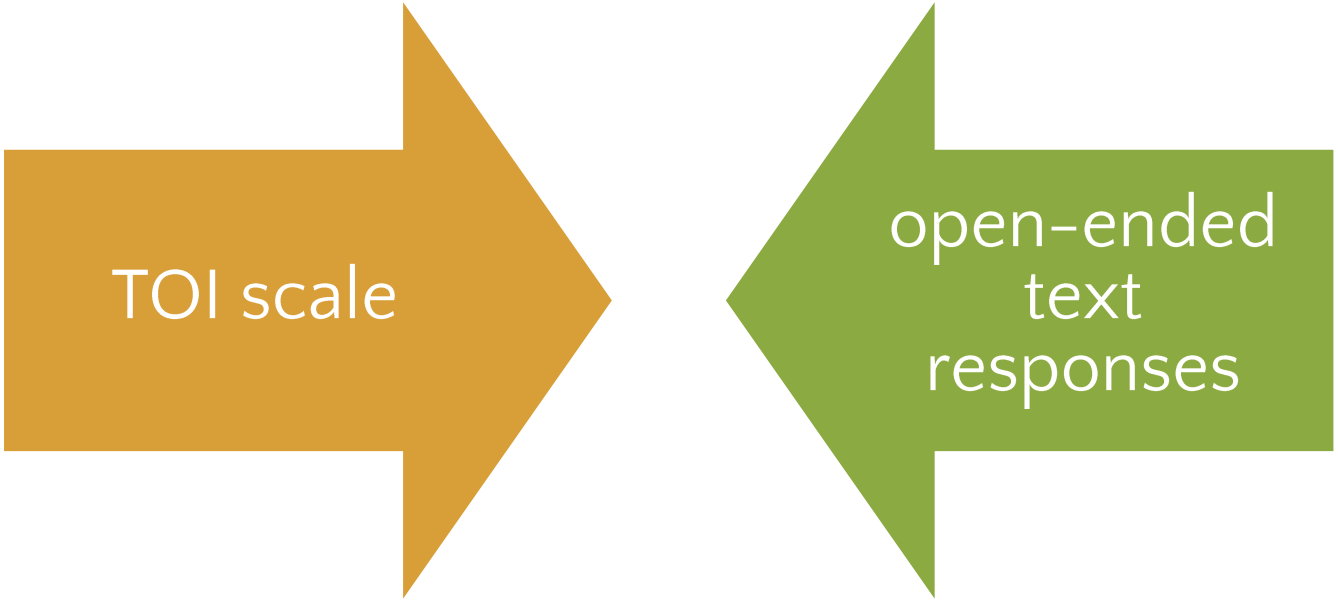
I think intelligence in general is a combination of personal effort, natural affinity for a specific topic and genetics.



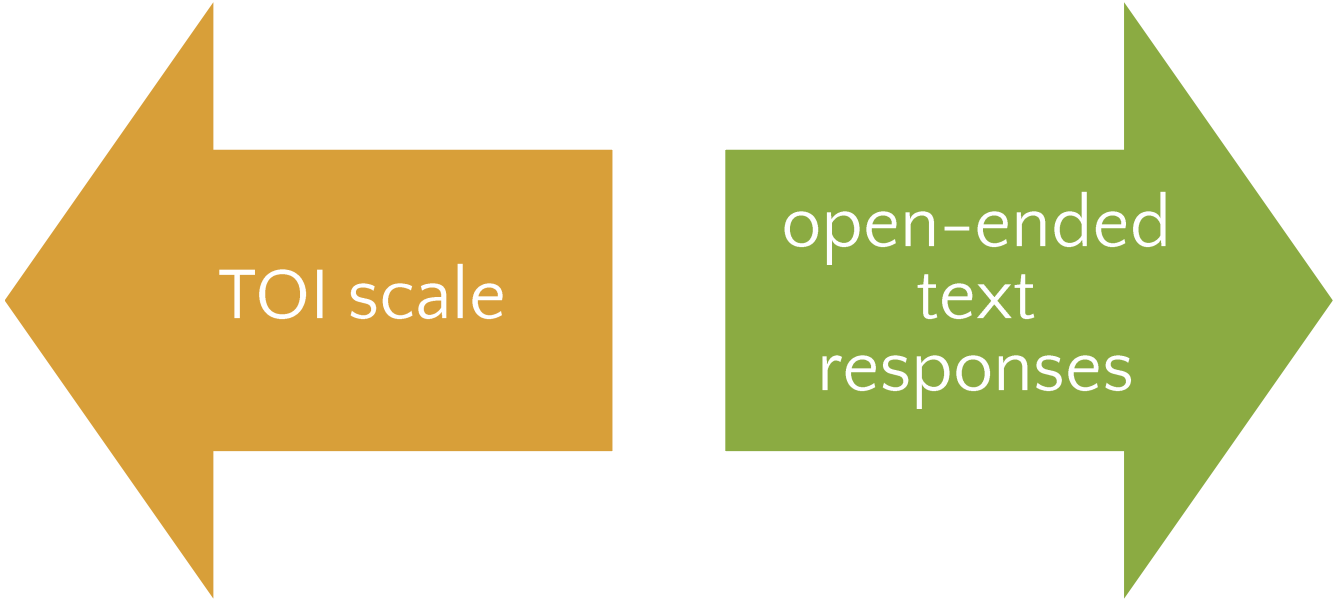
**Can we detect beliefs about intelligence through language?**

- naturalistic measurement
- identify “false mindsets”

# Measurements: mindsets



# Measurements: mindsets

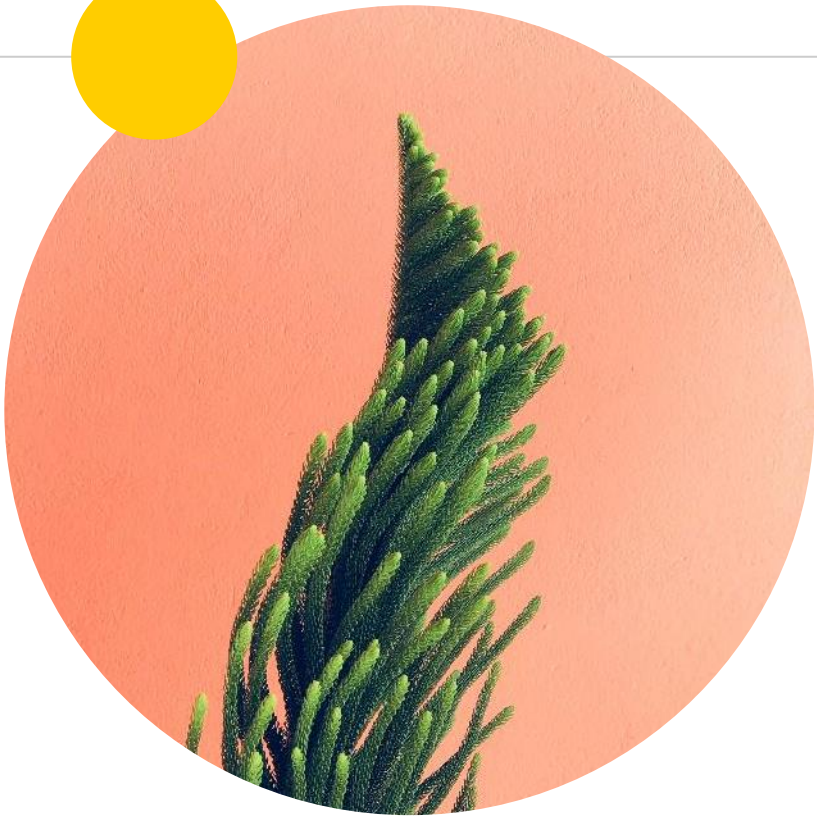


“This person isn't very intelligent because … they lack the **innate mental ability** and have to work hard to get good grades”

TOI: 5.5

“I think that this person is very intelligent because **you can always make yourself smarter**. If you put in more effort, you'll do better.”

TOI: 5.0



**Can we detect beliefs about intelligence through language?**

- naturalistic measurement
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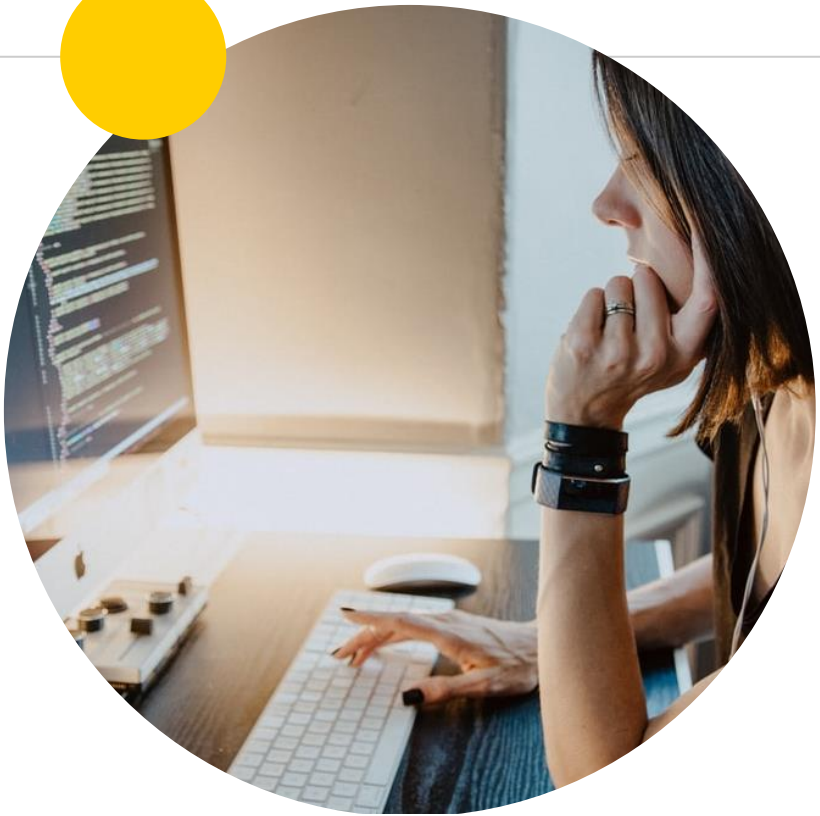
**Is there pedagogical value to teaching about mindsets?**



## Does domain matter?

- psychology, computer science, statistics, math, chemistry, physics

## Do student perceptions of faculty mindsets matter?

## Are non-performance measures predicted by mindset?

- well-being
- grade satisfaction
- help-seeking behaviors

response coding team

teaching teams

Psy 101

CS101

Stats 101

Psy 201

Chem1 01

Phys 141

Math 216

developers

researcher

logistical help

Duke Learning Innovation

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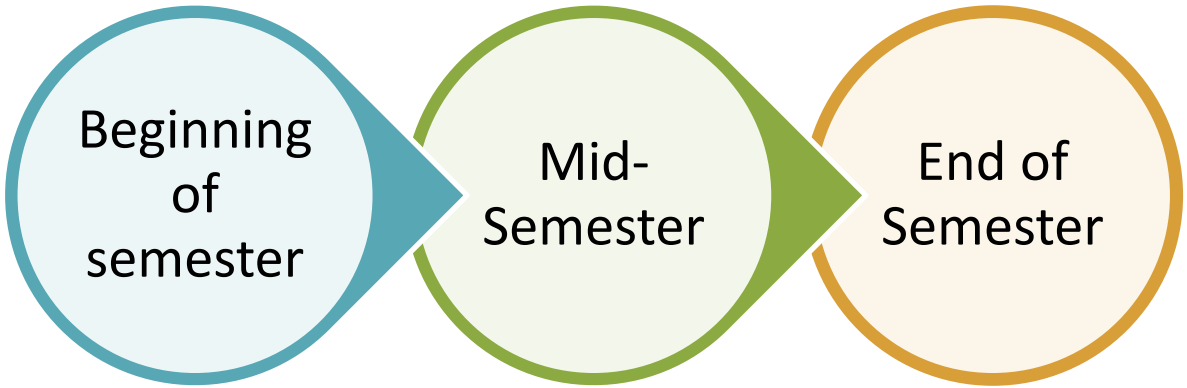
# Recruiting classroom collaborators

- Screen STEM classes with large enrollments
- Email faculty: collaborate with research, low effort for them, $500 honorarium
- Meet in person to introduce project and set expectations

# Survey schedule in classrooms



# Lessons from classroom research

- Use Qualtrics panels
- Data wrangling is the primary challenge! Be organized.
- Make it easy for yourself
- Provide structure for your collaborators
- Motivate students
- If you want to use event logs/naturalistic data (e.g., Sakai, Piazza), specify hypotheses as much as possible
- Proofread carefully

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# Sample sizes of classes

| | Psy101 | CS101 | Sta101 | Chem101 | Math216 | Phys141 |
|---|---|---|---|---|---|---|
| Fa19 | 300 | 254 | 278 | 440 | 110 | 162 |
| Sp19 | 215 | 224 | 225 | -- | -- | -- |
| Fa18 | 251 | -- | -- | -- | -- | -- |

# N-gram library

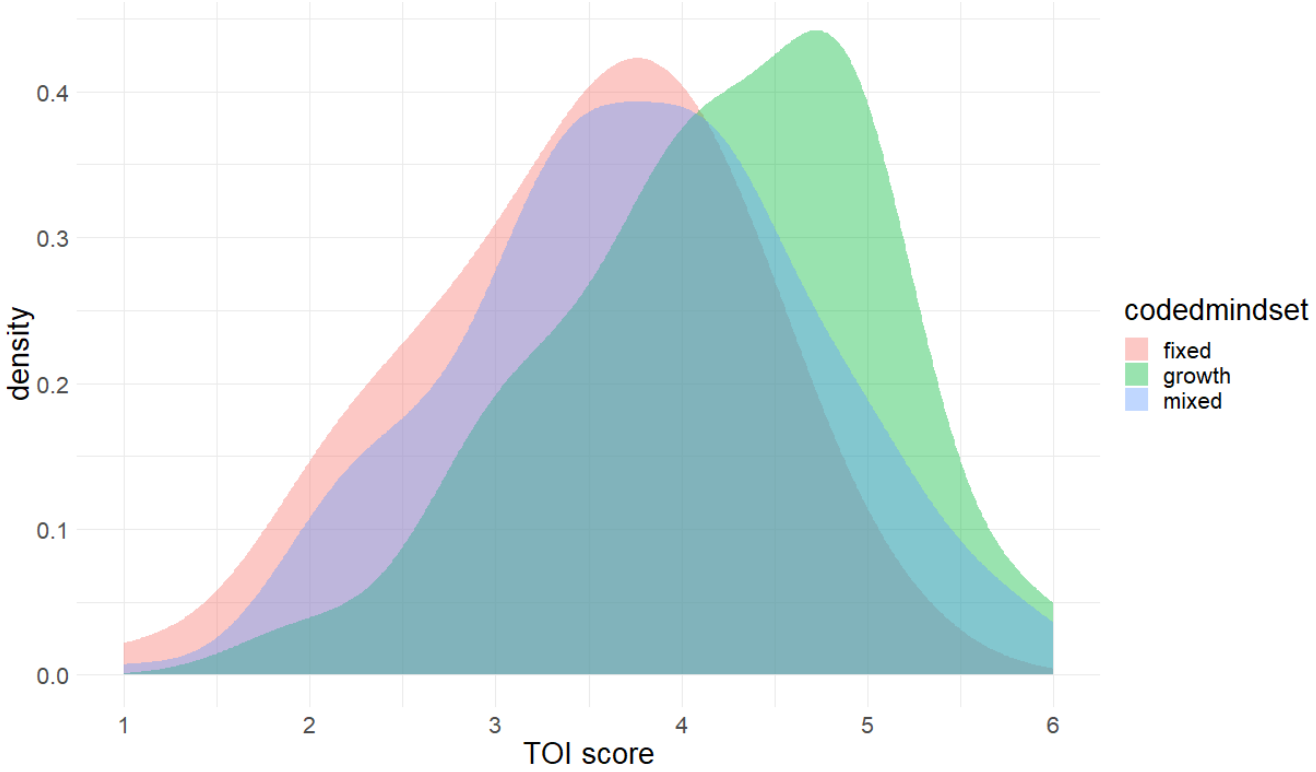
| Fixed | Growth |
| --- | --- |
| easily, naturally, talent, talented, IQ, memory, fast, quickly, easy, born, gifted, ease, innate… | dedicated, passion, studious, practice, motivated, driven, diligent, thorough, eager, curious, interest, open-minded, adapt, flexible, malleable, explore challenge, improve, … |
| no effort, rarely studies, doesn't need, never studies, book smart, good grades | push through, work hard, lifetime learner, open minded, love of, try again, tries again, give up, desire to… |
| too much time, always does better | willing to learn, strive to understand, excited about learning, learn from mistakes… |

## How does the n-gram library do?

- 233 are *correct* (out of 241)
- 8 are *incorrect* (out of 241)

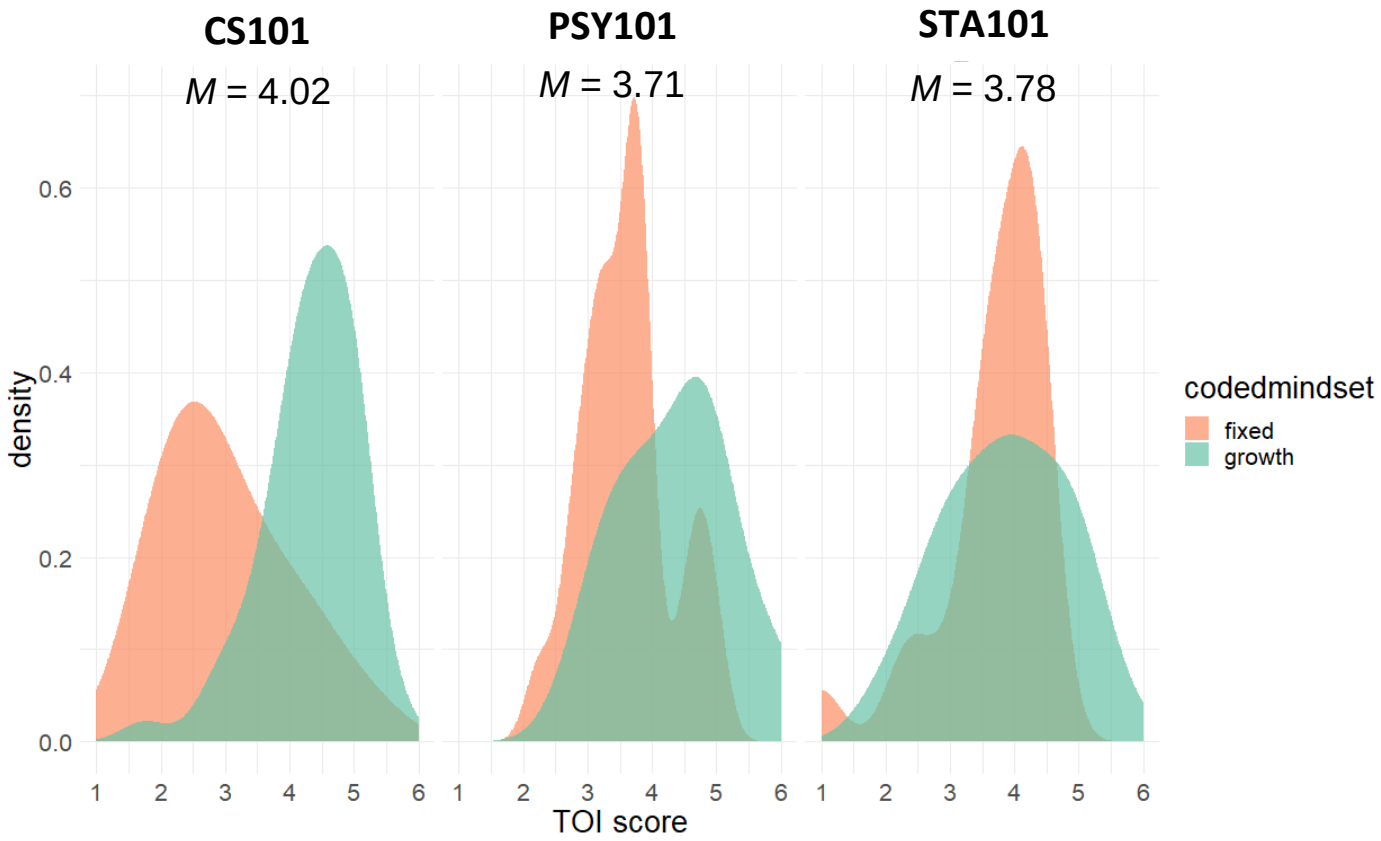
# bit.ly/mindsetmapper

# Coded mindset and TOI score (Spring 2019)



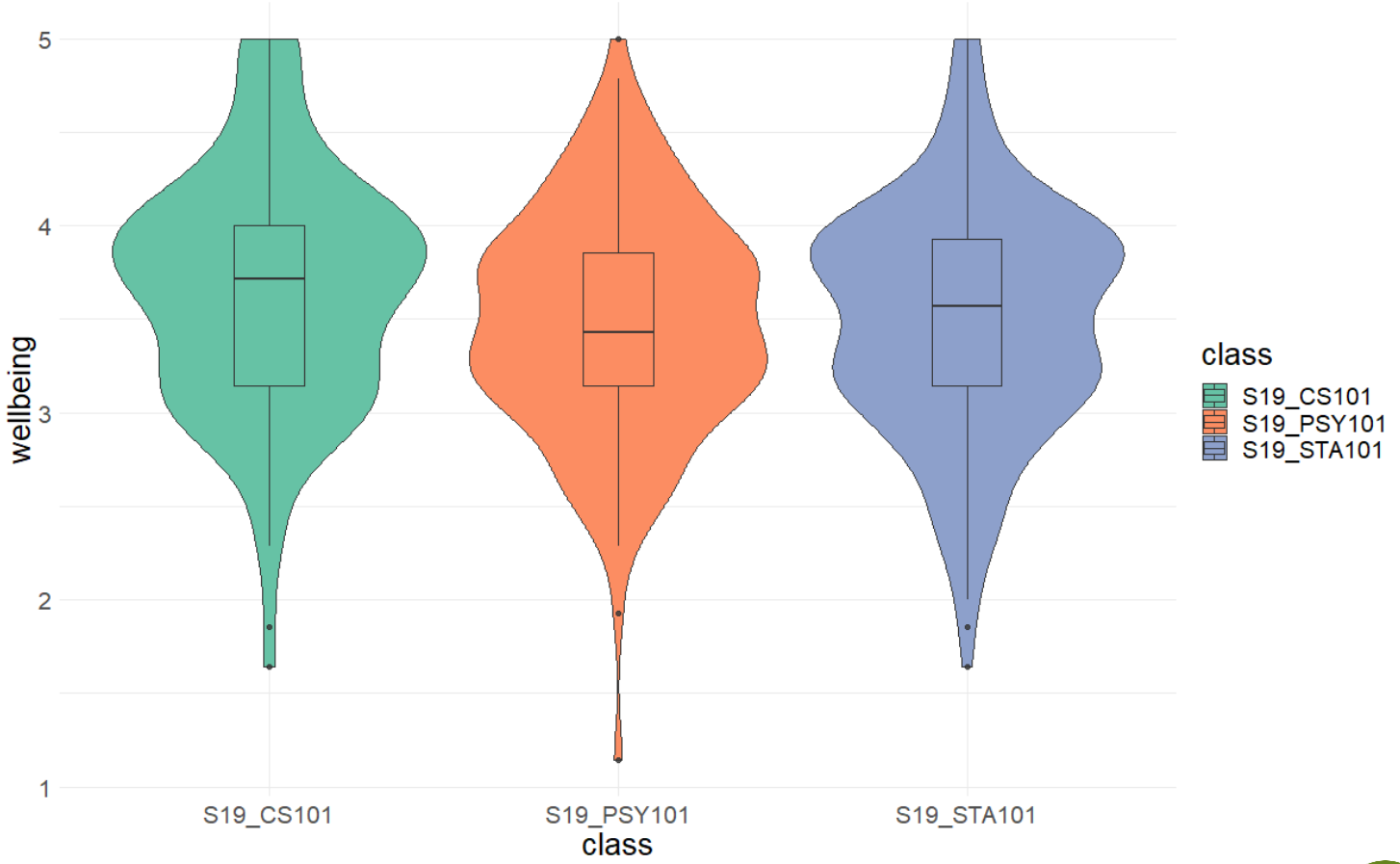

N = 500

# Coded mindset & TOI across CS, PSY, and STA




N = 245

# Well-being across classes



# Perceptions of faculty mindset

instructor(s)

**Great!**

This last section (4 of 4) will ask you to rate how much you agree or disagree with several statements. For this section, we would like you to think of the **instructor** or **instructors** you most closely associate with evaluating whether or not you are successful in this course.

Choose the instructor(s) you are thinking of:

- [ ] Dr. Richard MacPhail
- [ ] Dr. Christopher Roy
- [ ] Dr. Daniel Fowler
- [ ] Your TA:
- [ ] Other:

# Perceptions of faculty mindset

FTOI1

**${lm://Field/1}** believes that my intelligence is something very basic about me that I can't change very much.

| 1 - Disagree A Lot | 2 - Disagree | 3 - Disagree Mostly | 4 - Agree Mostly | 5 - Agree | 6 - Agree A Lot |
|---|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ | ○ |

# Perception of faculty intelligence mindsets

| | Student ratings of faculty | | Faculty's TOI |
|---|---|---|---|
| Class1 (n = 302) | 4.28 | < | 4.75 |
| Class1 (n = 51) | 4.26 | > | 3.50 |
| Class2 (n = 114) | 3.89 | < | 4.50 |
| Class2 (n = 50) | 4.70 | < | 5.50 |
| Class3 (n = 98) | 4.07 | > | 2.75 |
| Class4 (n = 203) | 4.56 | | NA |
| Class5 (n = 104) | 4.68 | | NA |

2. Increasing intelligence

Percentage of Psych 101

"I think of myself as averagely intelligent…. I believe that **intelligence is a trait of people who don't have to work very hard**, and yet hold a natural talent in academics."

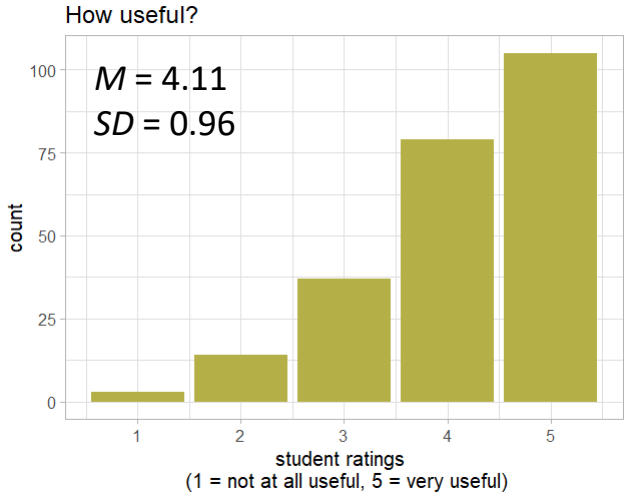
"I don't think of myself as intelligent. It takes me longer to process and learn information and I think that **truly intelligent people just have an innate skill** of learning about new information …without having to study it. "

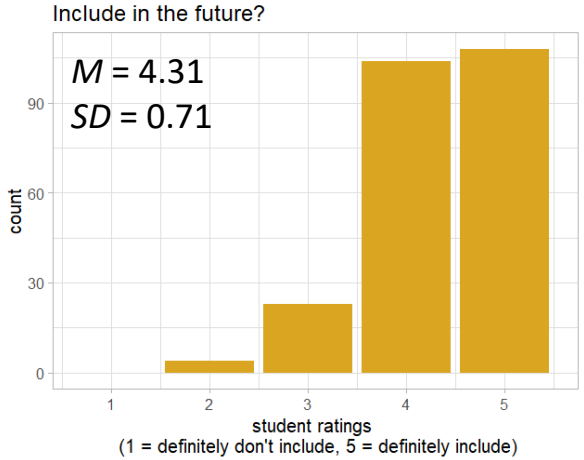
"I do, **because I work hard and study hard** to perform well."

Yes -- I'm strong at picking up new ideas and connecting them with my prior knowledge. While I have weaknesses (math for example), I believe I'm **good at overcoming them when I dedicate my effort** to them.

# **Survey of students**: ratings

- 232 students (92.4% of the introduction to psychology course)
- “How useful was it to see student responses from the class?” (1 – 5)
- “Would you advise the instructor to include this activity in future lessons on intelligence?” (1 – 5)



## Survey of students

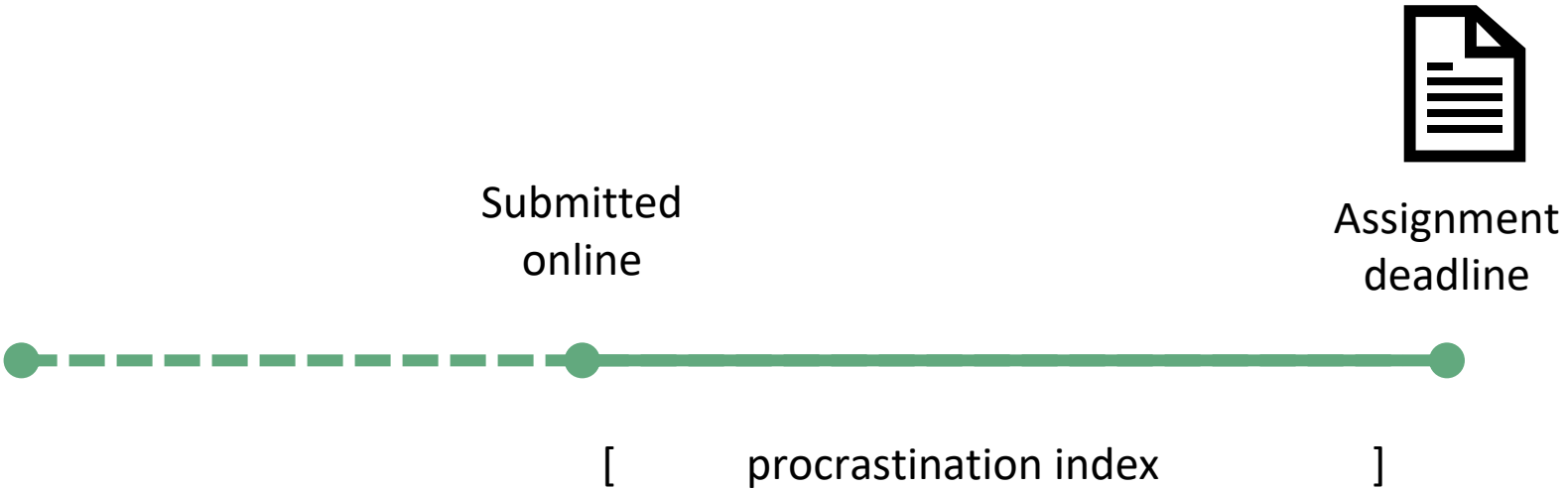
- Seeing class distribution helps contextualize their own responses

"It ... showed that both mindsets really did exist, even right in our classroom."

# Planned analysis

| Dependent measures of interest | Predictor variables of interest | Predictor variables |
|---|---|---|
| Course grade | Mindset: TOI, coded, algorithm | Previous GPA |
| Grade satisfaction | Perception of faculty mindset | SAT score |
| Well-being | Procrastination (logs analysis) | |
| Naturalistic behaviors e.g. help-seeking | | |
| Future course grades | | |

# Procrastination index



# Outreach: February 2020 Libraries Exhibit

# Talk

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