

# Welcome to Stats 250 W26

## Let's Build a Collaborative Statistics Community

Create groups of 2 or 4 students, with a student sitting next to you and two sitting directly behind or in front of you.

Start a conversation with those students around you.

This will be your group for today.

- Where are you from?
- What was the highlight of your winter break?
- Why are you taking Stats 250?
- How might you use statistics in the future?

**Welcome to Stats 250**  
**stats250W26@umich.edu**

**Today:**

Syllabus Highlights

Overview of Lecture Format

Lecture 01

**Enrollment or registration questions - email [statsugradprogram@umich.edu](mailto:statsugradprogram@umich.edu)**

# Meet Your Instructors

## Dr. Alicia Romero

(she/her/hers)

- From Los Angeles, CA
- Meet Coco!
- Ask me about cooking, and pickleball



# Meet Your Instructors

## Dr. John Keane

(he/him/his)

- From Milwaukee, Wisconsin
- Plays a lot of volleyball
- Aspiring piano player
- Ask me about metalsmithing



# Meet Your Instructors

## Mark Rulkowski

(he/him/his)

- From Beverly Hills, MI
- Lecturer since 2018
- Lecturer for Stats 401
- Meet Peanut & Butterscotch!
- Ask me about Ann Arbor parks and Michigan sports



# Meet Your Instructors

## Tianyi Wang

(she/her/hers)

- From Shanghai, China
- Enjoys travelling, finishing, and reading novels



# Check Canvas Often-Same Site for Labs and Lecture

<https://umich.instructure.com/courses/805558>

Winter 2026

- [Home](#)
- [Gradescope Sites](#)
- [Piazza 1.3](#)
- [Mon/Wed Lecture Recordings](#)
- [Tues/Thurs Lecture Recordings](#)
- [Lab Recordings](#)
- [Files](#)
- [Pages](#)
- [Syllabus](#)
- [Quizzes](#)
- [Assignments](#)
- [Grades](#)
- [People](#)
- [BigBlueButton](#)
- [Teaching Evaluations](#)
- [Media Gallery](#)
- [NameCoach Roster](#)

STATS 250

Introduction to Statistics and Data Analysis

Course Email: [STATS250W26@umich.edu](mailto:STATS250W26@umich.edu)



STATISTICS  
UNIVERSITY OF MICHIGAN

Lecture Notes & Slides

M/W Lecture Recordings

Gradescope

T/TH Lecture Recordings

Office Hour Schedule

Lab Recordings

Syllabus

Meet Your Stats 250 Instructional Team

Labs start the week of January 25th.

DUE DATES

EPs, Labs, & Case Studies are due by 8 PM

Sections 100 & 200 Due Dates

Sections 300 & 400 Due Dates

Practice Exam Prep (via Gradescope) due January 16

Practice Exam Prep (via Gradescope) due January 17

Extra Credit - [Module 0 Stats Review](#) (via [Canvas Quizzes](#)) due January 29

Extra Credit - [Module 0 Stats Review](#) (via [Canvas Quizzes](#)) due January 29

Prework due before lecture 2 (via Gradescope)

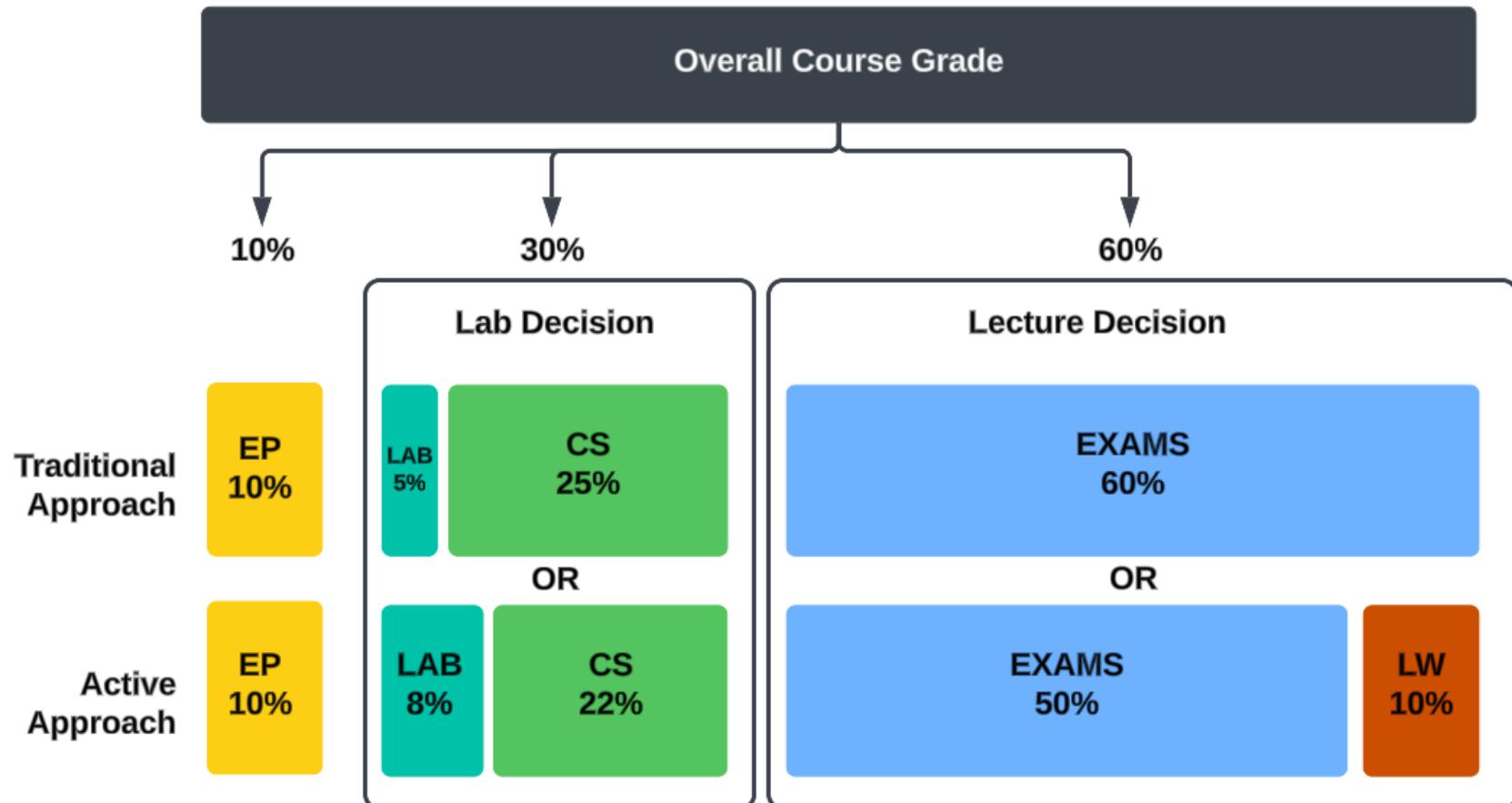
Prework due before lecture 2 (via Gradescope)

# Required Resources

- **Interactive Lecture Notes**
  - Posted as PDFs on Canvas (full notes & associated slides)
- **Gradescope (free)**
  - Used to *submit* all course-related assignments
  - Accessible through the *Gradescope Sites* tab on Canvas
- **Posit.Cloud (free)**
  - Used to complete all labs and case studies
  - Instructions for creating an account are provided in Lab 01
  - Lab 01 opens Monday, August 25th

# Overall Course Grade

How will your letter grade be determined?



97 and up $\Rightarrow$ A+	$[86, 88) \Rightarrow$ B+	$[75, 78) \Rightarrow$ C+	$[60, 65) \Rightarrow$ D+	Below 50 $\Rightarrow$ E
$[90, 97) \Rightarrow$ A	$[80, 86) \Rightarrow$ B	$[70, 75) \Rightarrow$ C	$[55, 60) \Rightarrow$ D	
$[88, 90) \Rightarrow$ A-	$[78, 80) \Rightarrow$ B-	$[65, 70) \Rightarrow$ C-	$[50, 55) \Rightarrow$ D-	

## Course Structure—Lecture Overview

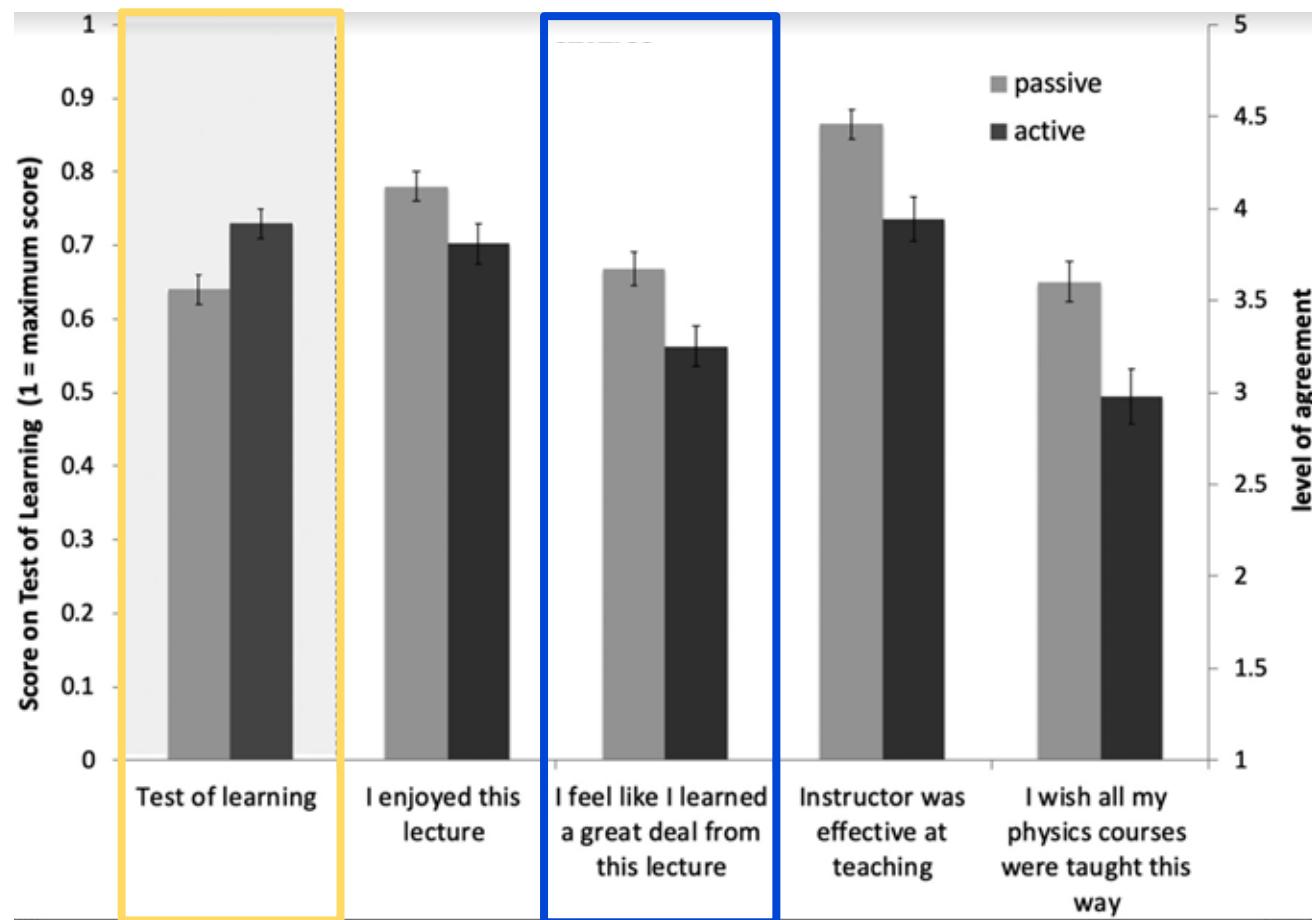
- Lectures are your first opportunity to engage with key concepts.
- Lecture participation (in-person or via the recordings) is essential for success in Stats 250 and will make it easier for you to do well in the course.
- We will work through the interactive lecture notes together during class.
- Please be respectful in your use of technology during class.
- It is important that you attend the lecture section you are registered for.
- Lecture sections 200 and 400 will be recorded and posted to Canvas.

# Course Structure—Lecture Options

- **Option 1: Traditional Approach**
  - Attend lectures in person or review recordings to stay up to date with the material.
  - Lecture pre-work and group work are *not required* and do not affect your overall course grade.
- **Option 2: Active Learning Approach**
  - In-person attendance is required.
  - Lecture pre-work and group work are *required*. Students will work in groups to complete and submit a set of exercises by the end of each lecture.
  - These exercises offer immediate practice with concepts covered in lecture and contribute to your overall course grade.

# Actively Engaged In The Classroom

Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom (Deslauriers et al, 2019)



## Exams-Mark Your Calendar

You will have **80 minutes** to complete exams, which are proctored in-person, on paper, in a closed notes format.

- **Exam 1:** Wednesday, February 11, starting at 6pm
- **Exam 2:** Thursday, March 19, starting at 6pm
- **Exam 3:** Thursday, April 23, starting at 7:30pm

More details (including practice exams, review packet, etc.) will be provided as the semester progresses.

If you are enrolled in a course that meets during a scheduled exam, you can request an alternate proctoring session via a Google Form distributed later in the semester.

If you are entitled to extended time or other testing accommodations, ensure you submit them to us before Monday, January 19.

# Labs and Case Studies - 30% of Overall Grade

In-person labs start the week of January 26th

## Labs

- Complement and reinforce the concepts covered in lecture.
- Provide hands-on experience with real data.
- Build proficiency in R, a powerful tool for statistical computing and data visualization.
- **Note: First lab is asynchronous!**

Sections 100/200 - Lab 01 is due Friday, January 23, at 8 PM

Sections 300/400 - Lab 01 is due Saturday, January 24, at 8 PM

## Case Studies

- There will be three case studies throughout the course.
- For each case study, you will:
  - Analyze real data based on a specific research question.
  - Apply the relevant statistical methods learned in class.
  - Write a report detailing your analysis, findings, and conclusions.

# **Weekly Exam Prep - 10% of Overall Grade**

- Assigned weekly via Gradescope.
- Each assignment is open for an entire week, allowing you to work at your own pace and resubmit as needed until the deadline.
- There are a total of 10 EP assignments throughout the semester.
- Late submissions are not allowed, but your EP average is only calculated using your 8 highest scores.

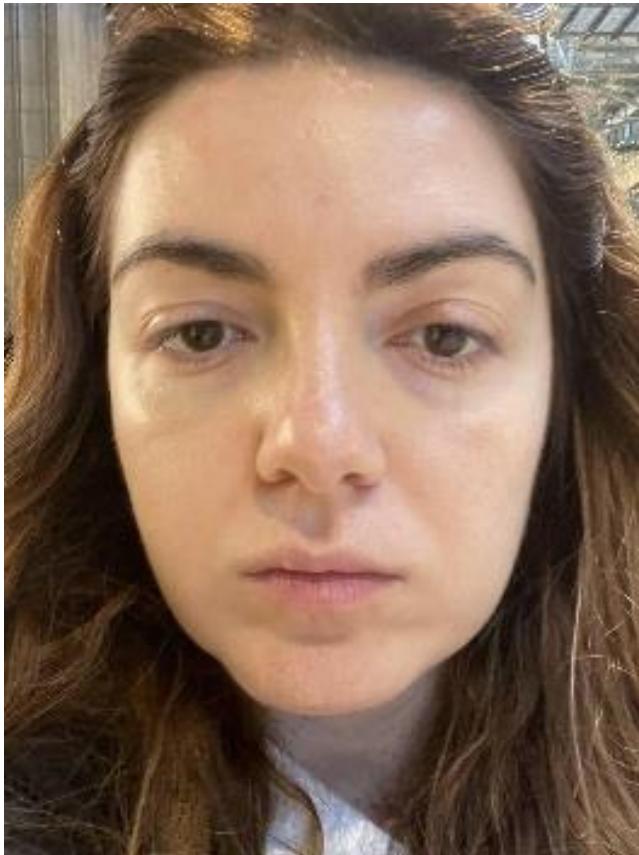
**What questions do you have?**

# **LECTURE 01: Variable Types, Parameters, & Statistics.**

## **Learning objectives:**

- Given a data set, identify observational units and variables.  
Classify variables by their type (categorical or quantitative).
- Distinguish between parameters and statistics, using appropriate notation.

# Age-Guessing Game

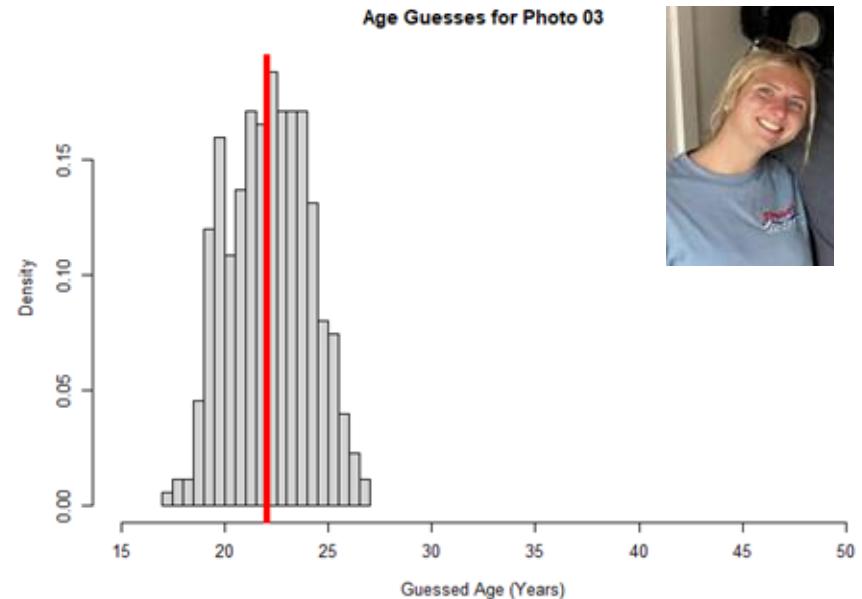
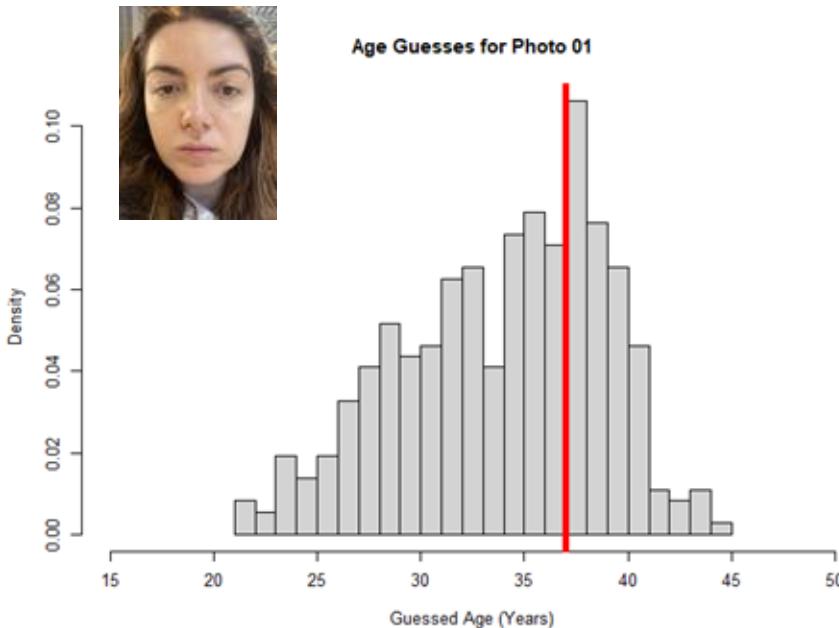


How old is the person  
in this photo?



How old is the person  
in this photo?

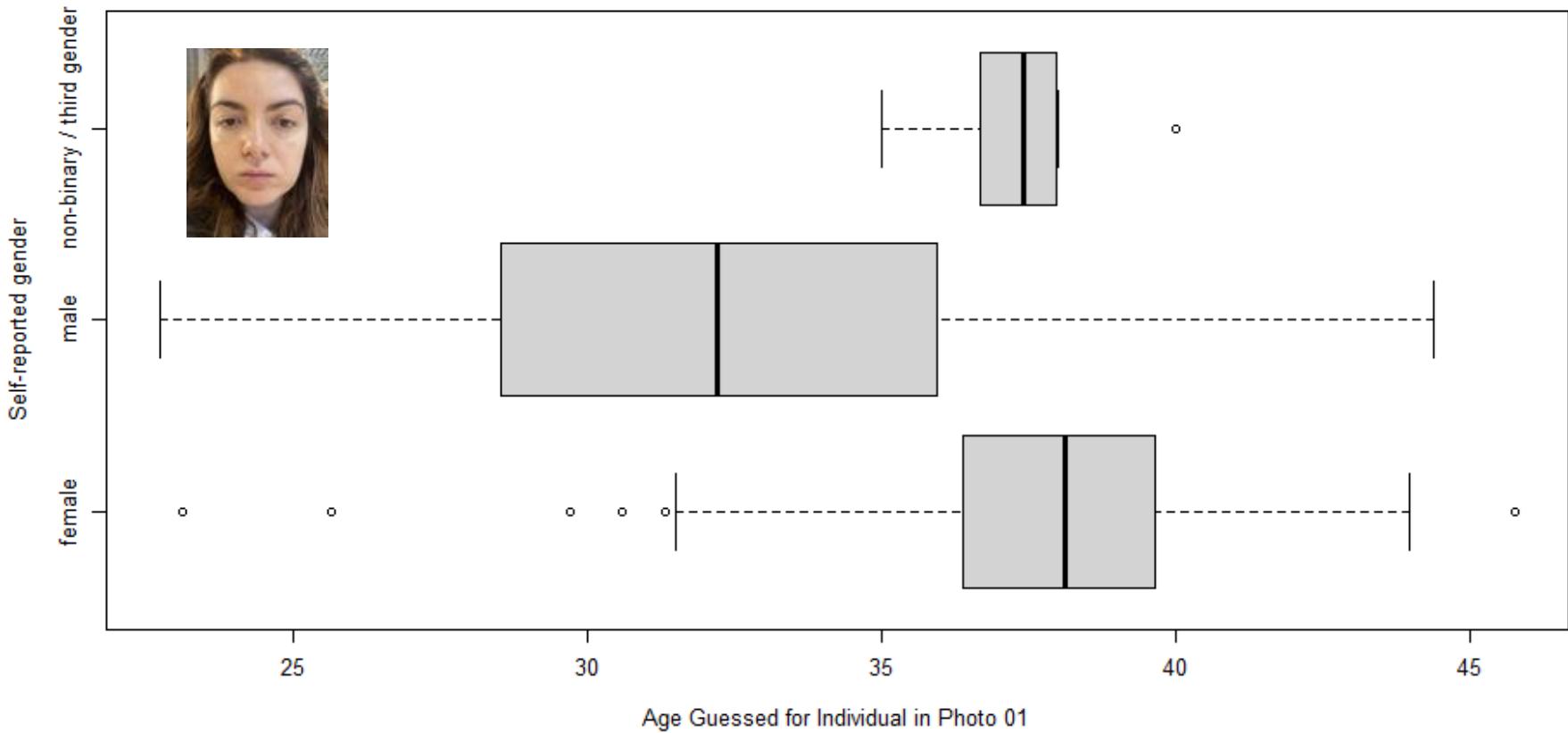
# Try It! Exploring observed data



The plots above show the distribution of age guesses for each photo. The vertical red line represents each person's *true* age in the photo.

- a. What are your main takeaways from inspecting and comparing these two graphs? You might consider....
  - Were the guesses biased or unbiased?
  - For which photo were the observed guesses more “accurate?”

# Try It! Exploring observed data



b. What are your main takeaways from inspecting these data?

# Results of the Age-Guessing Game

Page 4

Age	Gender	Ethnicity	Photo01.Guess	Photo01.outcome	Photo01.ageDif	.	Photo10.outcome
20	Male	Middle Eastern	30	Under	17	.	under
22	Male	White	40	Over	15	.	Over
18	Female	White	41	Under	19	.	over
20	Non-binary	Asian	37	Correct	17	.	correct
21	Female	Black or African American	29	Under	16	.	under
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**Observational units (or cases)** are the specific entities about which information is recorded. Often, they form the **rows** of an observed sample of data.

The number of independent observational units observed in a dataset typically determines your **sample size**.

# Results of the Age-Guessing Game

Page 4

Age	Gender	Ethnicity	Photo01.Guess	Photo01.outcome	Photo01.ageDif	Photo10.outcome
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A **variable** describes any characteristic of an observational unit you might record. Often, they form the *columns* of an observed sample of data.

# Think about it!

Page 4

Age	Gender	Ethnicity	Photo01.Guess	Photo01.outcome	Photo01.ageDif	.	Photo10.outcome
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.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.

f. Could you compute the average value of “Photo01.guess” for all students who responded to the survey?

g. Could you compute the “Photo01.outcome” for all students who responded to the survey?

# To Review: Types of Variables

## **Quantitative Variable:**

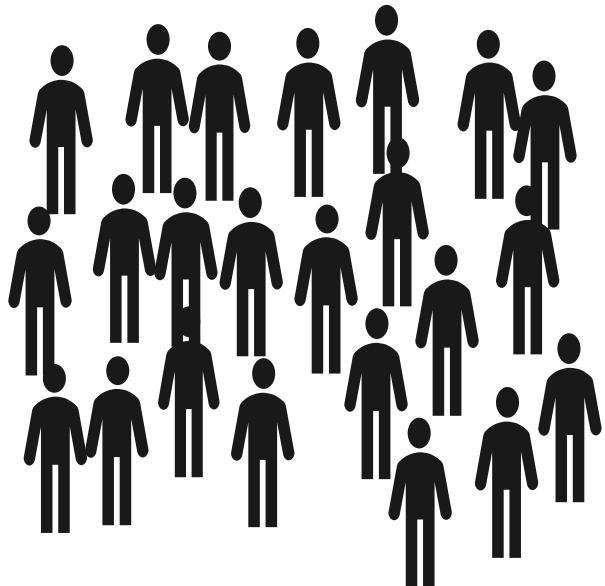
A variable that takes numerical values for which arithmetic operations such as adding and averaging make sense.

## **Categorical Variable:**

Places an observational unit (case) into one of several groups or categories.

# Populations and Samples

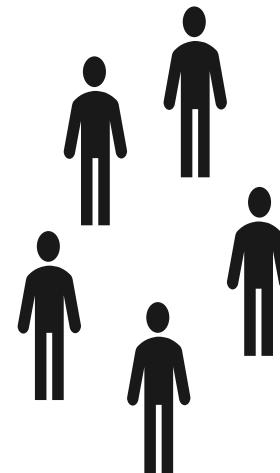
Population of interest



*Random  
Selection*

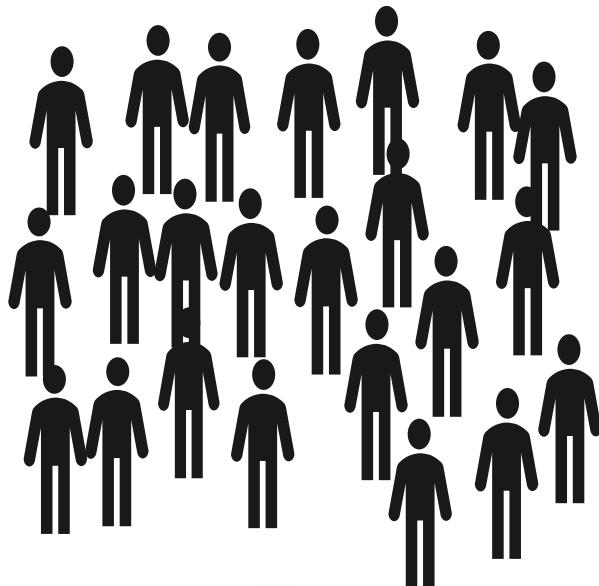


Sample



# Parameters and Statistics

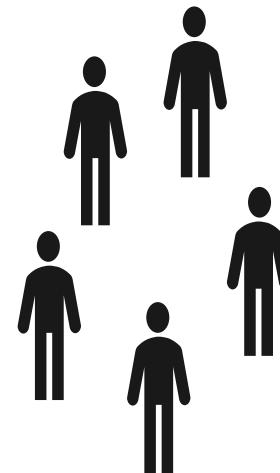
Population of interest



**Parameter:** a numerical characteristic of a population.

*Random Selection*  
→

Sample

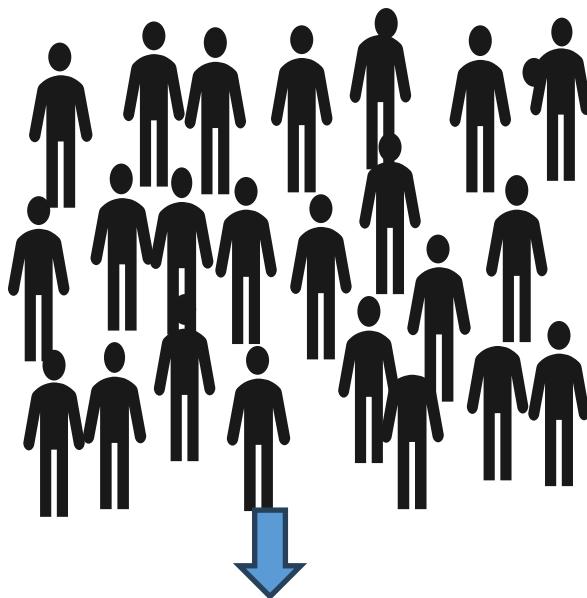


**Statistic:** a numerical characteristic of an observed sample.

# An Example

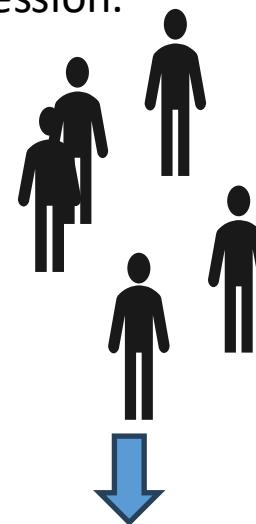
## Population of interest:

All students enrolled in STATS 250 this semester.



## Sample:

The subset of students that were sitting in the first row of the lecture hall during the first class session.



## Parameter:

The average number of texts members of this population have sent in the last 2 hours.

## Statistic:

The average number of texts students sitting in the first row have sent in the last 2 hours.

# Parameters and Statistics

	Parameter	Statistic
<p><b>A quantitative mean</b></p> <p>RQ: On average, how old do STATS 250 students think the person in Photo 01 is?</p>	Notation: _____	Notation: _____
<p><b>A quantitative standard deviation</b></p> <p>RQ: How much variability do Photo 01 age guesses display?</p>	Notation: _____	Notation: _____
<p><b>A categorical proportion</b></p> <p>RQ: What proportion of Photo 01 guesses are underestimates?</p>	Notation: _____	Notation: _____

*Try It! Classifying variables by their type*

**h. Suppose that the students in today's class session are the observational units of a survey study. Classify the answer a student would give to each of the questionnaire items below as quantitative or categorical.**

- i. How long did you sleep last night?
- ii. In what zip code were you born?
- iii. How many credits are you taking this semester?
- iv. Are you left- or right-hand dominant?

**i. Explain why the following are *not* variables (still considering the students in today's class session as the observational units).**

- v. What proportion of students in this class are left-handed?
- vi. What is the average amount of sleep in the past 24 hours among all students in today's class session?

A medical researcher is interested to know how different cardiovascular diseases affect patients' blood pressure variability. Across the US adult population, the standard deviation of systolic blood pressure is 20 mmHg. The researcher is interested to know whether this value is higher among US adults diagnosed with hypertension. She takes a random sample of 45 patients being treated for hypertension and finds that they have a systolic blood pressure standard deviation of 32 mmHg.

Observational Units:	
<b>Population:</b>	<b>Parameter:</b>
<b>Sample:</b>	<b>Statistic:</b>

# Learning objectives:

- Describe statistical inference in terms of detecting a signal amid noise.
- Given a data set, identify observational units and variables. Classify variables by their type (categorical or quantitative).
- Distinguish between parameters and statistics, using appropriate notation.

# Group Work 01

- Activity should take about 15 minutes to complete
- **Work in groups of 2-4 students**
  - To create a group of 2 to 4 students, turn to the student sitting next to you and the two students sitting directly behind or in front of you.
  - If you are on the waitlist, be sure to work, with other students who are registered
- Once you formed a group, follow these steps:
  1. Open our Stats 250 Canvas site
  2. Access Gradescope
  3. Open Lecture 01 Group Work assignment

# Group Work 01

## Gradescope Instructions:

Access Gradescope directly from our Stats 250 Canvas site

Only one student per group should complete the Gradescope assignment

Before working through the assignment, **add group members by following these steps:**

1. Click “Submit and View Submission” (located at the bottom of the page)
2. Click “Group Members”
3. Search for your group members and click “Add”

Once you’ve added all group member, click “Resubmit” to reenter the assignment and work through the questions. Once finished, click “Submit and View Submission” again.

**Note:** all group members will have access to the assignment in Gradescope

# **Learning objectives for today:**

- Describe statistical inference in terms of detecting a signal amid noise.
- Given a data set, identify observational units and variables.  
Classify variables by their type (categorical or quantitative).
- Distinguish between parameters and statistics, using appropriate notation.

## **Coming up next class:**

Sampling Distributions!

# Reminders

## TO DO:

Due before Lecture 02

1. [*Lecture Activities Gradescope*] ~ Prework

Due at the end of the week

1. [*EP, Labs & CS Gradescope*] ~ Try the Practice EP!

Get a head start on upcoming assignments:

1. [*EP, Labs & CS Gradescope*] ~ Lab 01 after setting up posit.cloud
2. [*Canvas*] ~ Module 0 Extra Credit Assignment