

Is it Math?

Is it Science?

Statistics



Includes

Science
Science
Math
Math

- Collection
- Organization
- Summarizing
- Graphical Displays



Includes

- Making Inferences Science
- Hypothesis Testing Math & Science?
- Confidence Intervals Math
- Making Predictions Science

The debate goes on

Population (Census)

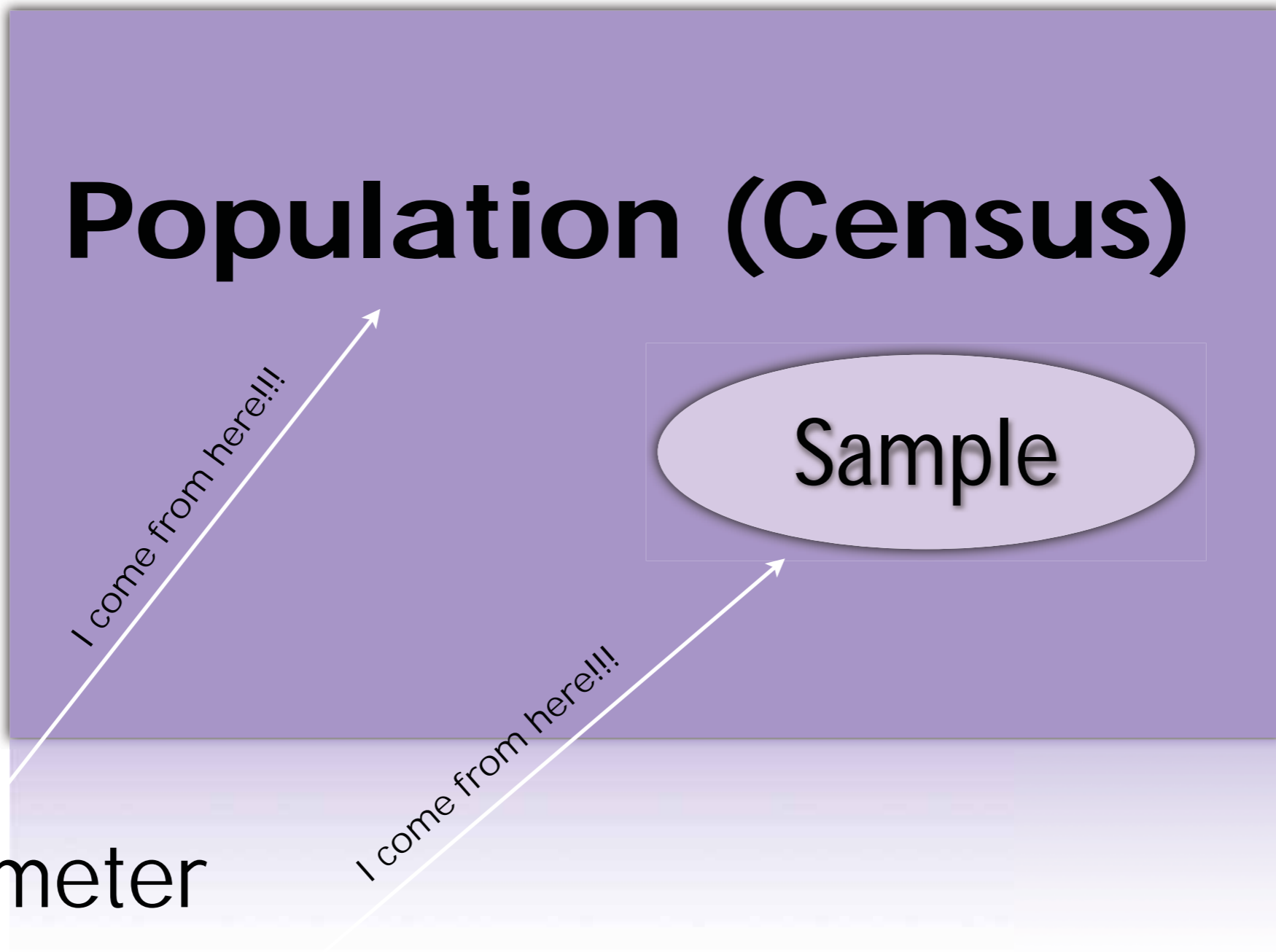
Sample

I come from here!!!

I come from here!!!

Parameter

Statistic



2010 RESIDENT POPULATION

308,745,538



Kansas	6.1%	2,853,118	42	34.9
Wisconsin	6.0%	5,686,986	25	105
District of Columbia	5.2%	601,723	1	9,856.50
Connecticut	4.9%	3,574,097	6	738.1

Parameter - Greek alphabet

μ, σ, ρ

You'll find us using these when referring to whole populations

Statistic - Our alphabet

\bar{x}, s, \hat{p}

And these when referring to samples

We will use statistics to approximate parameters.

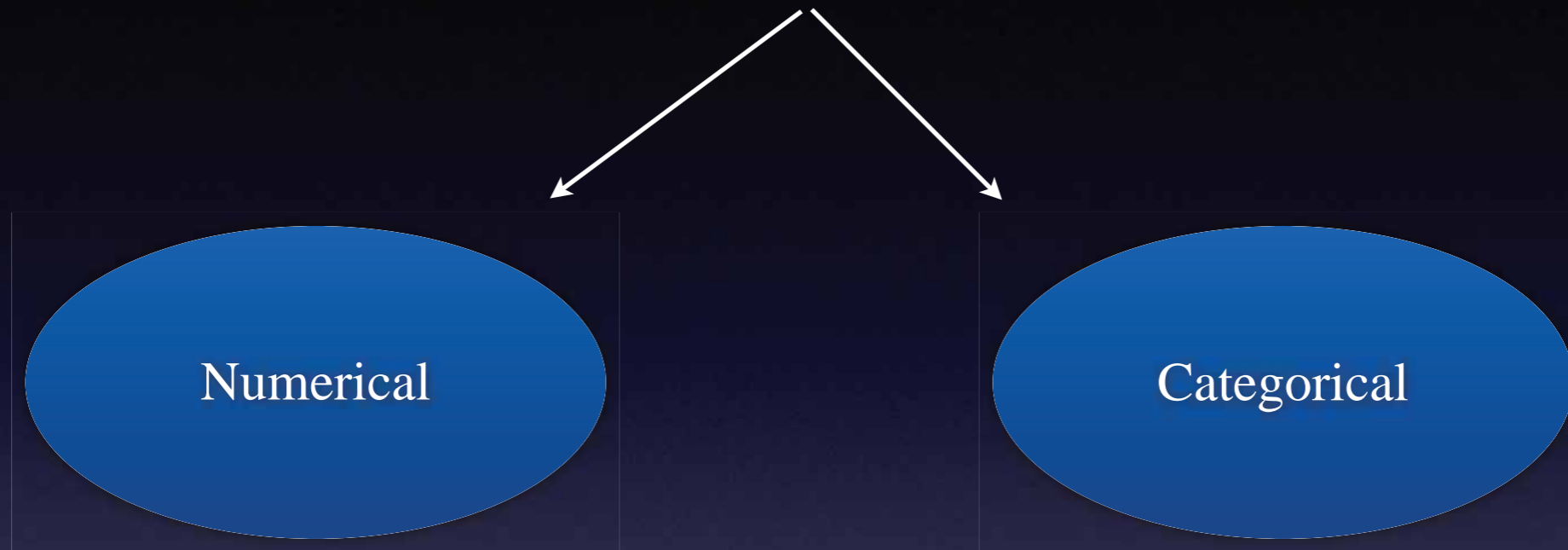
- **Statistics** is the science of collecting, analyzing, and drawing conclusions from data.
- There are two main branches of statistics
 - ▶ **descriptive statistics**
 - ▶ **inferential statistics**
- **Data** are the values or measurements of **variables** of an “event.”
- The entire collection of individuals or objects about which information is desired is called the **population** of interest.
- A **sample** is a subset of the population, selected for study in some prescribed manner.
- A **parameter** is a characteristic or fact of a *population*. A **statistic** is a characteristic or fact of a *sample*.
- A **census** is a sample of an entire population (all members of the population of interest).

Ex1 The student senate at a university with 16,000 students is interested in the proportion of students who favor a change in the grading system to allow for plus and minus grades (e.g. C+, C, C-, rather than just C). Four hundred students are interviewed to determine their attitude toward this proposed change.

- What is the population of interest? **The 16,000 students**
- What group of students constitutes the sample in this problem? **The 400 students interviewed**

Let's look at the difference

Variables



Discrete (integer) $\begin{cases} \# \text{ of People} \\ \# \text{ of Cars} \end{cases}$

something you count

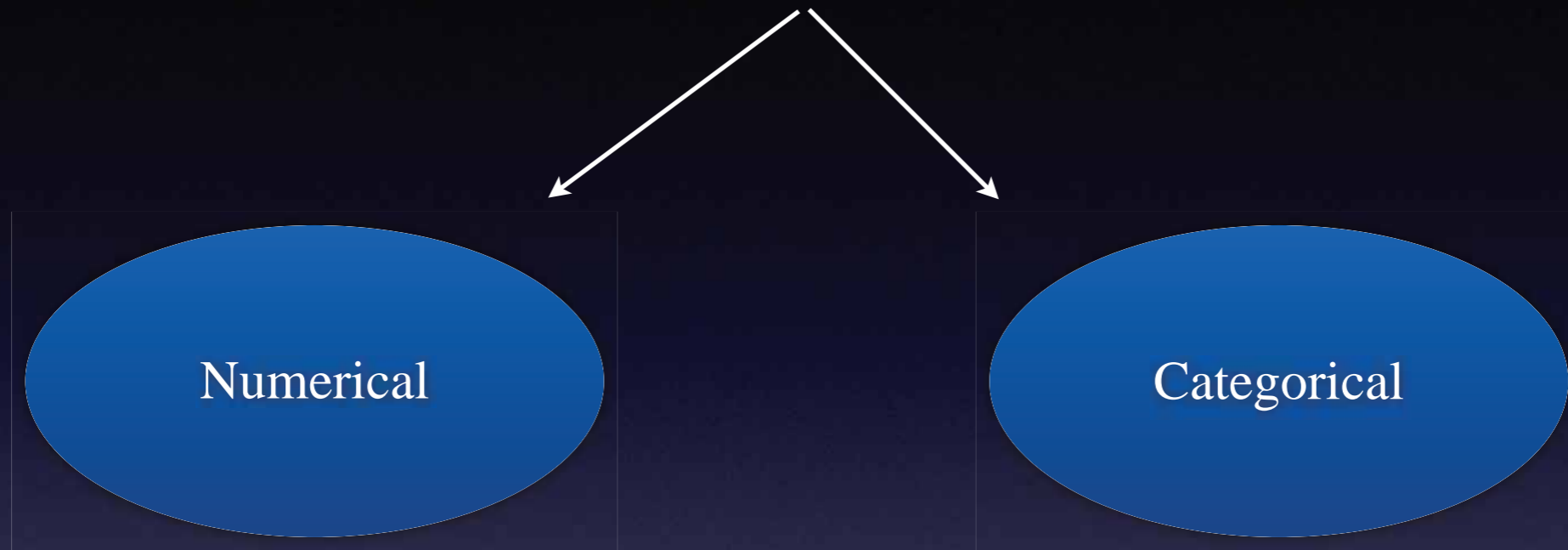
Continuous (real number)

Height Weight Temperature

something you measure

Let's look at the difference

Variables



Nonnumeric

Eye color

Product Brand

Grade Level

Gender

The difference between Discrete and Continuous Random Variables?

Discrete is countable, like the number of students in a group

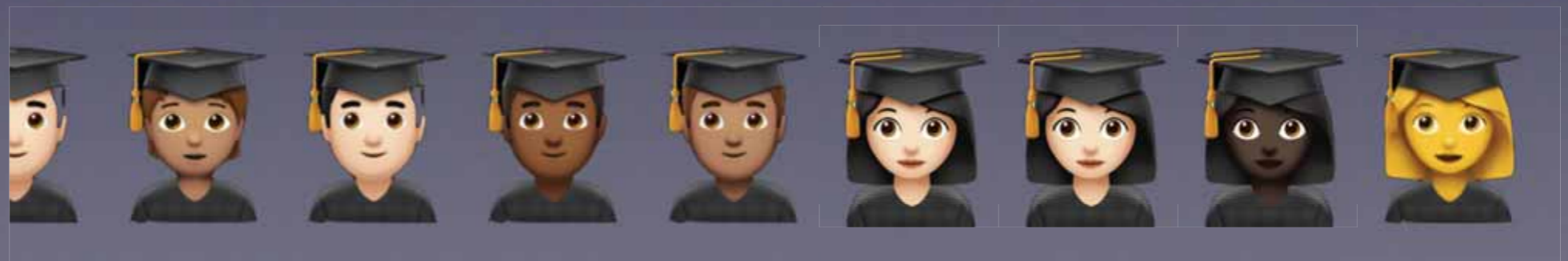
Continuous defines measurements like temperature or length

The number of students can't be continuous

10 students



19.5 students?



The difference between Discrete and Continuous Random Variables?

Discrete is countable, like the number of students in a group

Continuous defines measurements like temperature or length



Be careful with money though

It's common to think that because we used decimals with money it is continuous but...

Because we round to two decimal places, this is discrete
Besides, we count money. Only economists measure it