Learning Objectives

- **Remember** key terms from *research methods:*
  - **Variable**: Independent vs. dependent
  - **Data type**: Samples vs. populations
  - **Statistics**: Descriptive vs. inferential
- **Describe** the different types of variables:
  - Four measurement scales
  - Continuous vs. discrete
- **Explain** (very broadly) why we care about variable types

Remember these terms?..

- **Variable:** Property that can have different values

- **Independent Variable (IV):**
  Variable that is manipulated by the researcher

- **Dependent Variable (DV):**
  Variable that is measured by the researcher

Remember these terms?..

Sample

- Subset of all cases
- Described by ***sample statistics***
- Example: Sample mean

Population

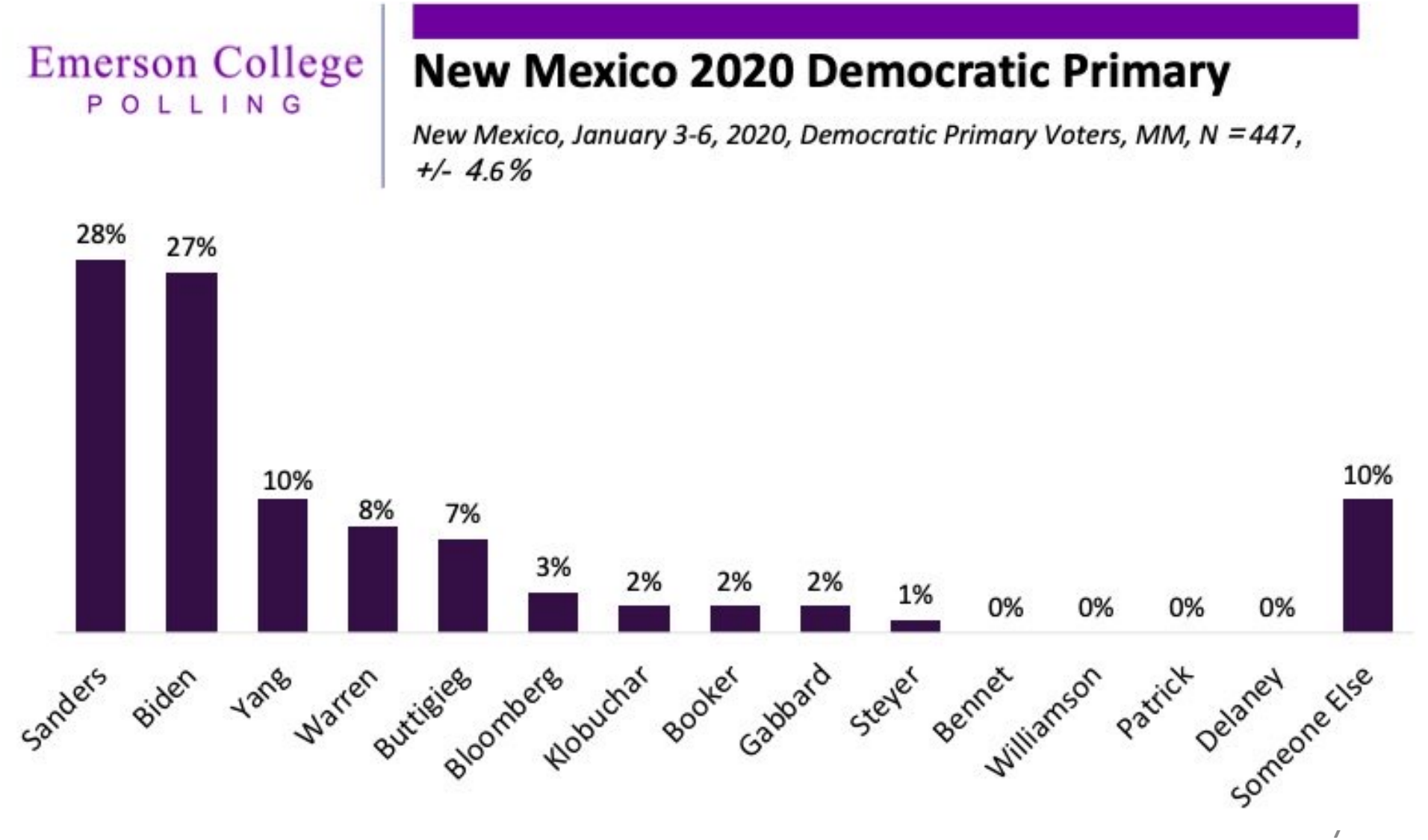
- Complete set of cases
- Described by ***parameters***
- Example: Population mean

Two Types of Statistics

- ***Descriptive statistics*** seek to understand patterns in the sample

- ***Inferential statistics*** seek to infer whether patterns generalize to the population
  - Often inferential statistics quantify our confidence
  - Will sample pattern show up in the population?

Describing *political preferences:*
"If the election were today, who would you vote for?"



"If the election were today, who would you vote for?"

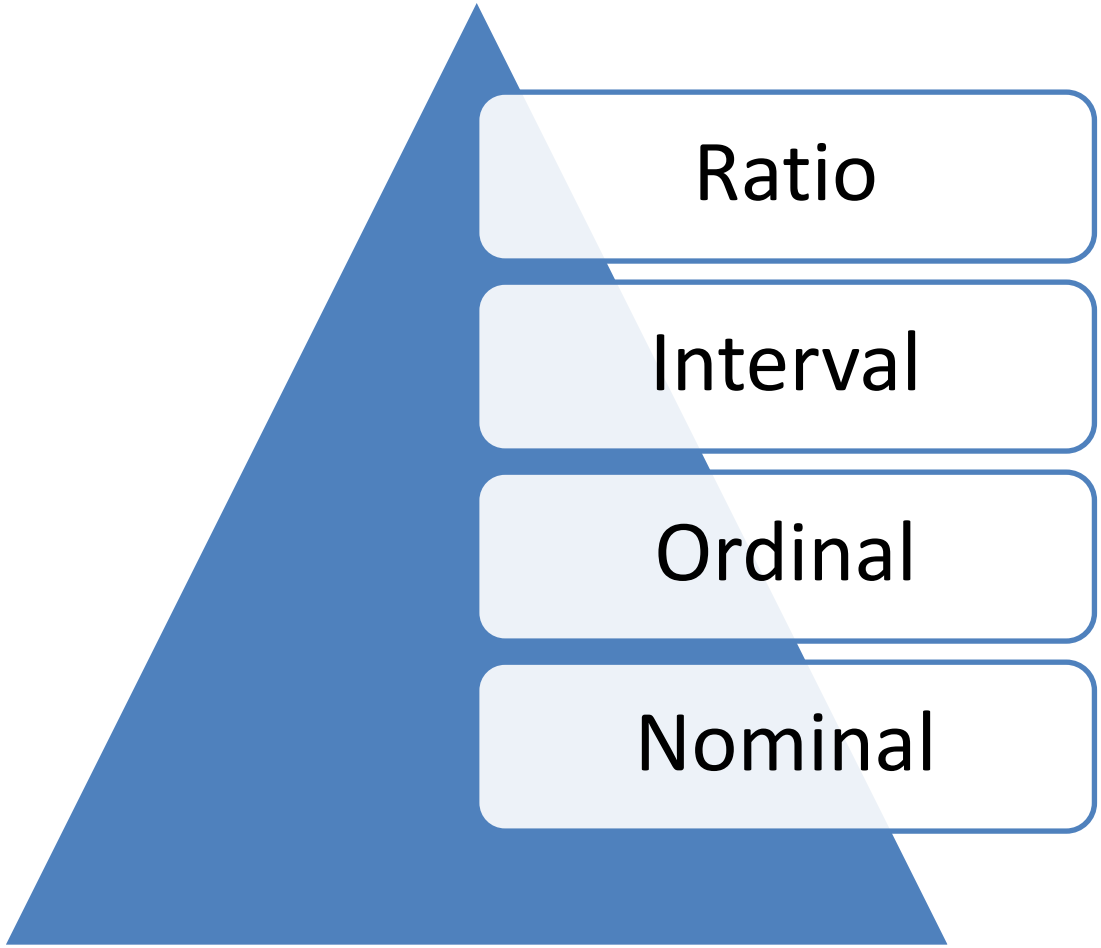
- **Sample:** 447 residents of New Mexico who self-report they will vote in the Democratic primary as of early January, 2020
  - *"N* = 447"
- **Population:** All residents of New Mexico who self-report they will vote in the Democratic primary
- **Descriptive statistic:** Sanders is top with 28%, Biden 2nd with 27%
- **Inferential statistic:** Maybe Sanders, maybe Biden… (+/- 4.6%)
  - Population might reasonably be:
    - Sanders 33%
    - Sanders 23%
- **Interpretation:** "*It's a statistical tie*"
  - Sanders at the top **in this sample**, but we're not confident this is true **in the population**

Who’s going to win the election tomorrow?

Poll	Number of voters polled	Bernie Sanders	Joseph Biden

SorsnA
Mac Book Pro Charger,Replacement AC 85W 2T-Tip Connector Power Adapter,Compatible with Ma...

Measurement Scales



Measurement scales

- Variables are *quantified* for statistical analyses
  - Different measurement scales permit different statistical techniques

1. **Nominal scale**: Values are *arbitrary*
   - Also known as a "categorical variable"
   - Example: undergraduate major
     - Psychology = 1
     - Engineering = 2
     - Kinesiology = 3
   - Nominal variables tell us only *equivalence*

Measurement scales

- Variables are *quantified* for statistical analyses
  - Different measurement scales permit different statistical techniques

2. **Ordinal scale**: Values are *ranked*
   - But, interval between values may not be equal
   - Polling example:
     - 1st Sanders, 2nd Biden, 3rd Yang
     - We know that Sanders had more support than Biden, but we do not know how much more support
   - Ordinal variables convey *rank* but not *magnitude*

Measurement scales

- Variables are *quantified* for statistical analyses
  - Different measurement scales permit different statistical techniques

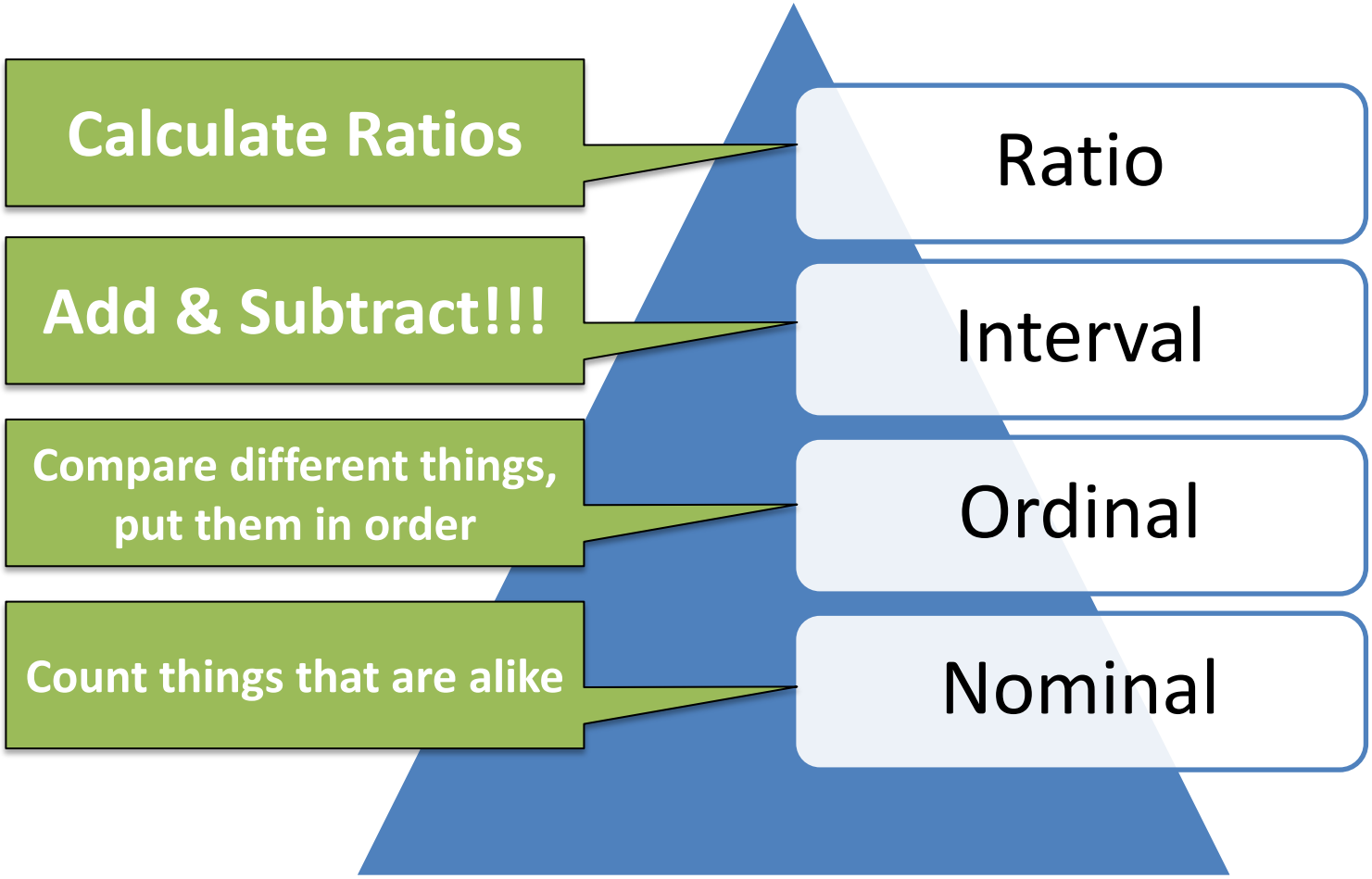
3. **Interval scale**: Ranked *w/equal intervals*
   - Example: Day of the month
     - Today is the 7th, 14th will be exactly 168 hours from now, 21st will be 336 hours from now…
     - But there is no absolute zero point (no day 'zero')

Measurement scales

- Variables are *quantified* for statistical analyses
  - Different measurement scales permit different statistical techniques

4. **Ratio scale**: Ranked, equal intervals, & ***zero***
   - The value of 0 is possible and meaningful
   - Example: Reaction time
     - Zero means you responded *simultaneously* with the presentation of the stimulus
     - It took (literally) no time!

Measurement Scales



What measurement scales?

You want to know if dog weight
is related to the speed of their eating.

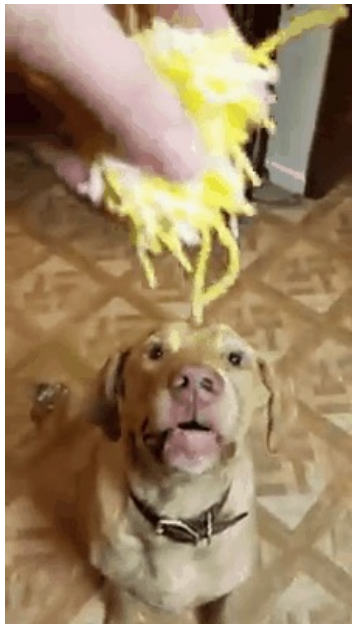
Weight is measured by putting dogs on a scale:

Speed of eating is rated by observers as:

Slow = 1

Medium = 2

Fast = 3



Discrete vs. Continuous

- ***Discrete variables*** have no possible values between adjacent units on the scale
  - Example: Number of dogs (1 or 2, but NOT 1.5!!)

- ***Continuous variables*** can have infinite possible values between adjacent units
  - Example: Weight of dog (1 gram, 2 g, or 1.5g)
    - Or 1.5000000000000001 grams

Real Limits of Continuous Variables

- Continuous variables are *always* approximate
  - Estimates depend on our instrument's resolution
- ***Real limits*** are the values above and below the recorded value (by ½ the smallest measuring unit)
  - Measurement = 34.46lbs
  - Smallest measuring unit = .01lbs (half = .005lbs)
  - Real limits **for this scale**:
    - **Real lower limit** = 34.455
    - **Real upper limit** = 34.465

Significant Figures

"How many decimal places should I report?"

- Means, standard deviation
  - Report 2 or 3 decimal places

- Correlation/regression coefficients, test-statistics (like *t*, *F*, etc.)
  - Always report 3 decimal places

- *p*-values (or 'probability values')
  - Always report 3 decimal places

Rounding

Don’t worry about the text’s discussion of rounding (pp. 38)

- Last digit equal to or greater than 5, round **UP**
- Last digit less than 5, round **DOWN**