MEASURES OF CENTRAL TENDENCY

Did you hear about the statistician who had his/her head in the oven and his feet in a bucket of ice? Someone asked how he/she was feeling. He/she replied, "On the average, I'm feeling fine." ***- Author Unknown***

- Purposes for Measures of Central Tendency:

- There are 3 common methods for measuring central tendency: the mean, median, and mode.

Measures of Central Tendency

Mean	the sum of all the scores in the distribution divided by total number of scores
Median	the middle score
Mode	the most frequent score(s)

MEAN

Definitions:

1.

2.

3.

e.g. A group of n = 6 boys buys a box of baseball cards at a garage sale and discovers that the box contains a total of 180 cards. If the boys divide the cards equally among themselves, how many cards will each boy get?

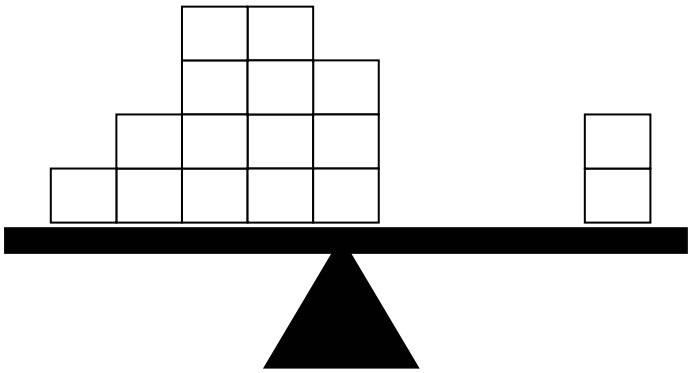
4.

5. The mean is the sum of all the scores divided by the total number of scores:

   For a sample, $\bar{X} = \frac{\Sigma X}{n}$ For a population, $\mu = \frac{\Sigma X}{N}$

Mean

Extreme scores pull the mean in their direction.



$$\bar{X} = \frac{\sum X}{n}$$

A	B	C
1	1	1
2	2	2
3	3	3
4	4	4
5	50	200

Characteristics of the Mean:

1.

2.

e.g. A sample of quiz scores for a psychology lab section consists of 9, 8, 7, 5, & 1. What are n, ∑X, & $\bar{X}$?

If the score X = 1 is changed to X = 8, what are n, ∑X, & $\bar{X}$?

3.

Original Sample	*New Sample Adding X = 12*
n = 4	*n = 5*
∑X = 28	*∑X = 40*
$M = \frac{28}{4} = 7$	$M = \frac{40}{5} = 8$

4.

Compute the mean for the following scores:
6, 1, 8, 0, 5

Add 4 points to each score & then compute the mean:

5.

Multiply each of the original scores in the example above by 5, and then compute the mean:

MEDIAN

Definitions:

1.

2.

If there is an odd number of scores, the median is the middle score:

$$Median_{odd\ number\ of\ scores} = \left[\frac{n+1}{2}\right]^{th} score$$

e.g. 3, 5, 8, 10, 11

If there is an even number of scores, the median is the mean of the two middle scores:

$$Median_{even\ number\ of\ scores} = \frac{\left[\frac{n+2}{2}\right]^{th} score + \left[\frac{n}{2}\right]^{th} score}{2}$$

e.g. 3, 3, 4, 5, 7, 8

Median

Represents the distribution by its position as the center of the scores.

A	B	C
1	2	3
2	3	3
3	**3**	**3**
4	6	9
5	10	12

When To Use The Median:

1.

2.

3.

4.

MODE

Definition:

- *Unimodal* (1 mode)
- *Bimodal* (2 modes)
- *Multimodal*

When to Use:

1.

2.

Mode

Represents the distribution by frequency.

A	B	C
1	1	1
2	3	1
3	3	1
4	5	3
5	10	5
6	11	6
7	12	7
mode =	mode =	mode =

SKEW

Definition:

Zero skew:

Skewed distribution:

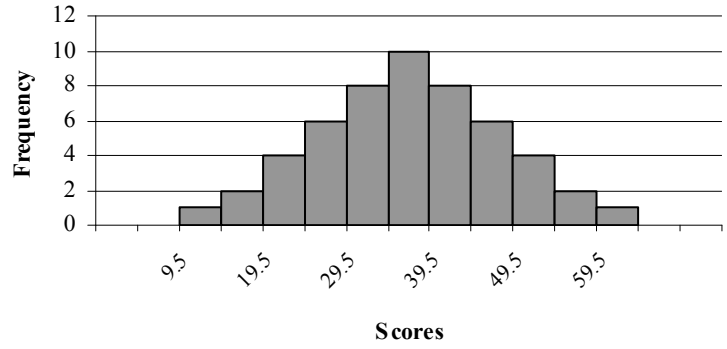
The tails of distribution:

Positive skew:

Negative skew:

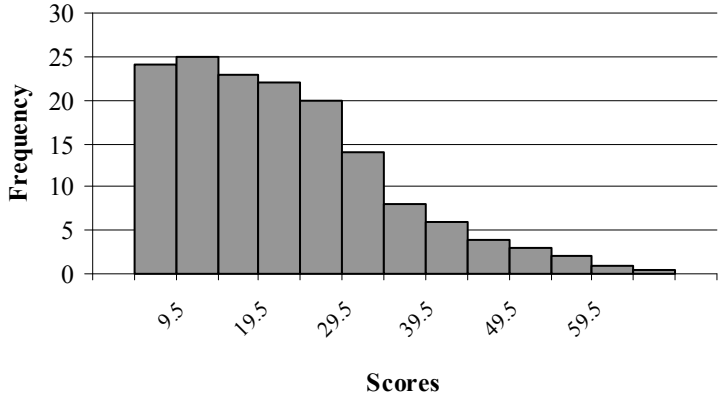
Which measure of central tendency is most affected by extreme scores?

Zero Skew



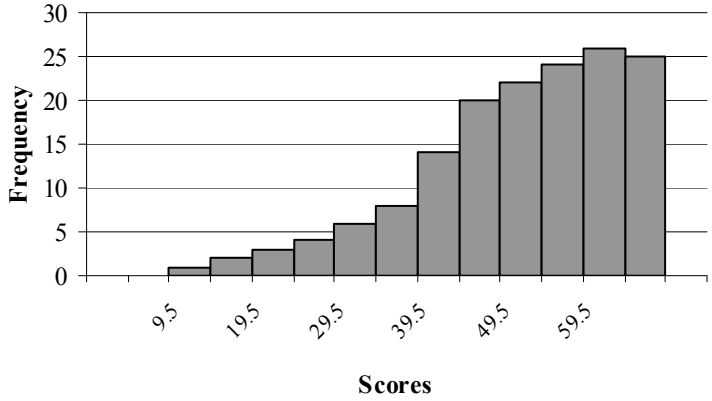
Mean = Median = Mode

Positive Skew



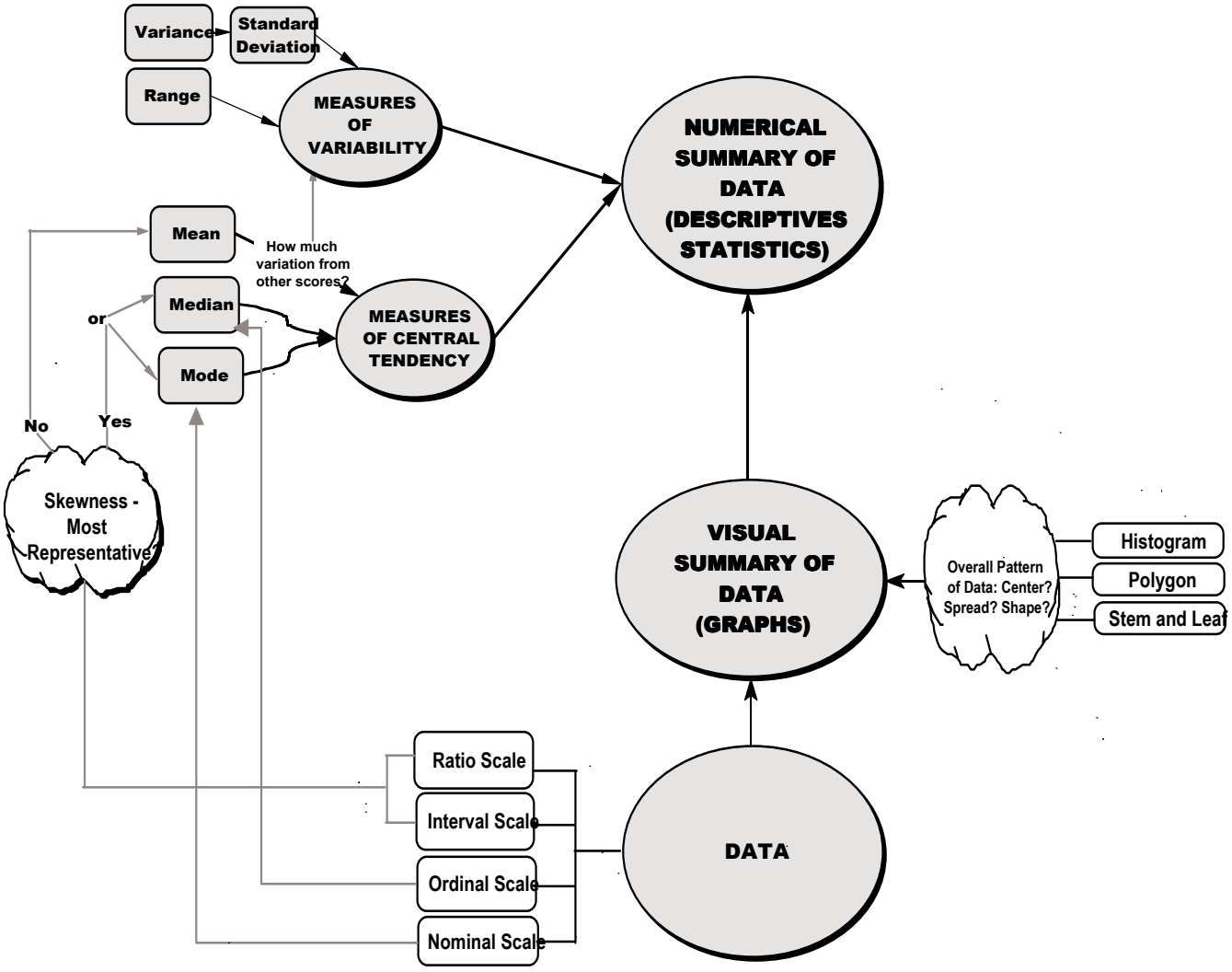
Mode < Median < Mean

Negative Skew



Mean < Median < Mode

Concept Map


Variance
Standard Deviation
Range
MEASURES OF VARIABILITY
NUMERICAL SUMMARY OF DATA (DESCRIPTIVES STATISTICS)
Mean
How much variation from other scores?
Median
or
Mode
MEASURES OF CENTRAL TENDENCY
No
Yes
Skewness - Most Representative?
VISUAL SUMMARY OF DATA (GRAPHS)
Overall Pattern of Data: Center? Spread? Shape?
Histogram
Polygon
Stem and Leaf
Ratio Scale
Interval Scale
Ordinal Scale
Nominal Scale
DATA