

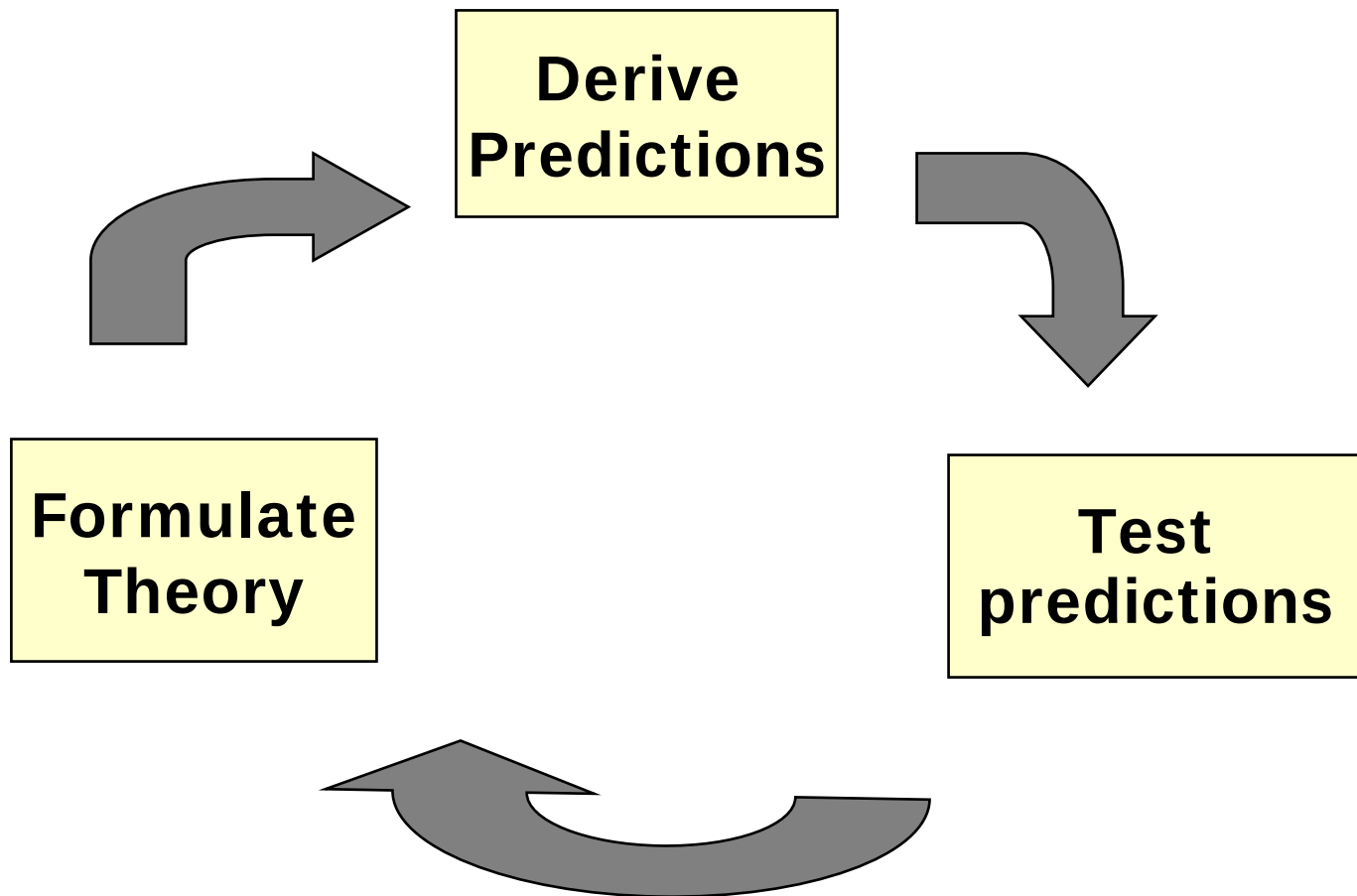
# **Psychology 020**

## **CHAPTER 2**

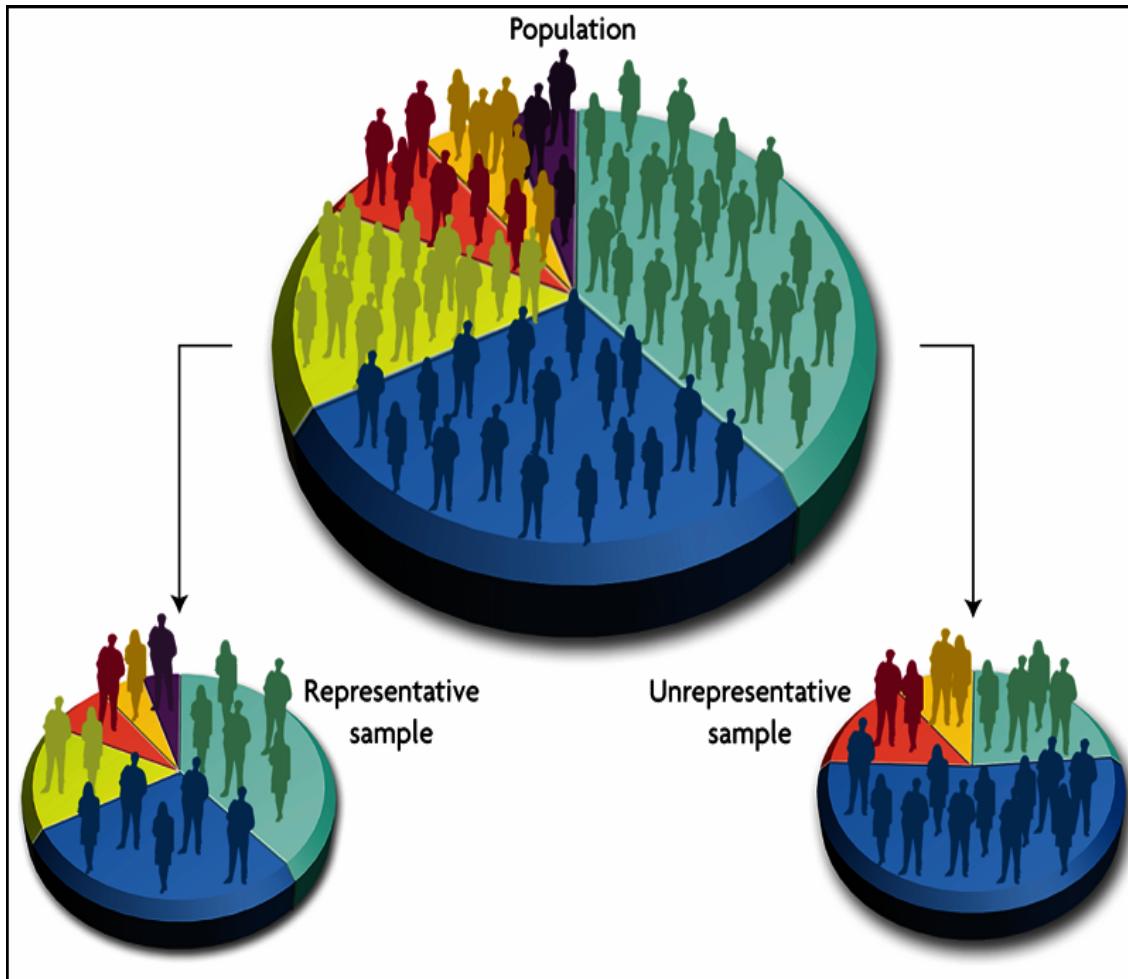
**Professor Fazakas-DeHoog**

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# Scientific Research in Action...



# The SAMPLE



## REPRESENTATIVE SAMPLE

- Same characteristics as population

- Age
- Gender
- Education

Important for drawing conclusions

Prof. Laura Fazakas

<http://www.laurafazakas.com>

*Please tell us a little about your current relationship feelings*

**For each of the following pairs of opposite adjectives, select the circle that best describes HOW YOU FEEL ABOUT YOUR relationship. Base your responses on your first impressions and immediate feelings about the item.**

|              |                       |                       |                       |                       |                       |                       |                       |               |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------|
| Interesting  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Boring        |
| Bad          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Good          |
| Unpleasant   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Pleasant      |
| Full         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Empty         |
| Weak         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Strong        |
| Satisfied    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Dissatisfied  |
| Lonely       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Friendly      |
| Sturdy       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Fragile       |
| Rewarding    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Disappointing |
| Discouraging | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Hopeful       |
| Enjoyable    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Miserable     |
| Tense        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Relaxed       |
| Stable       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Unstable      |
| Happy        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Sad           |
| Stressful    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Peaceful      |

## TYPES OF SURVEYS

### Likert Scale

- range of choices  
on a continuum

**versus**

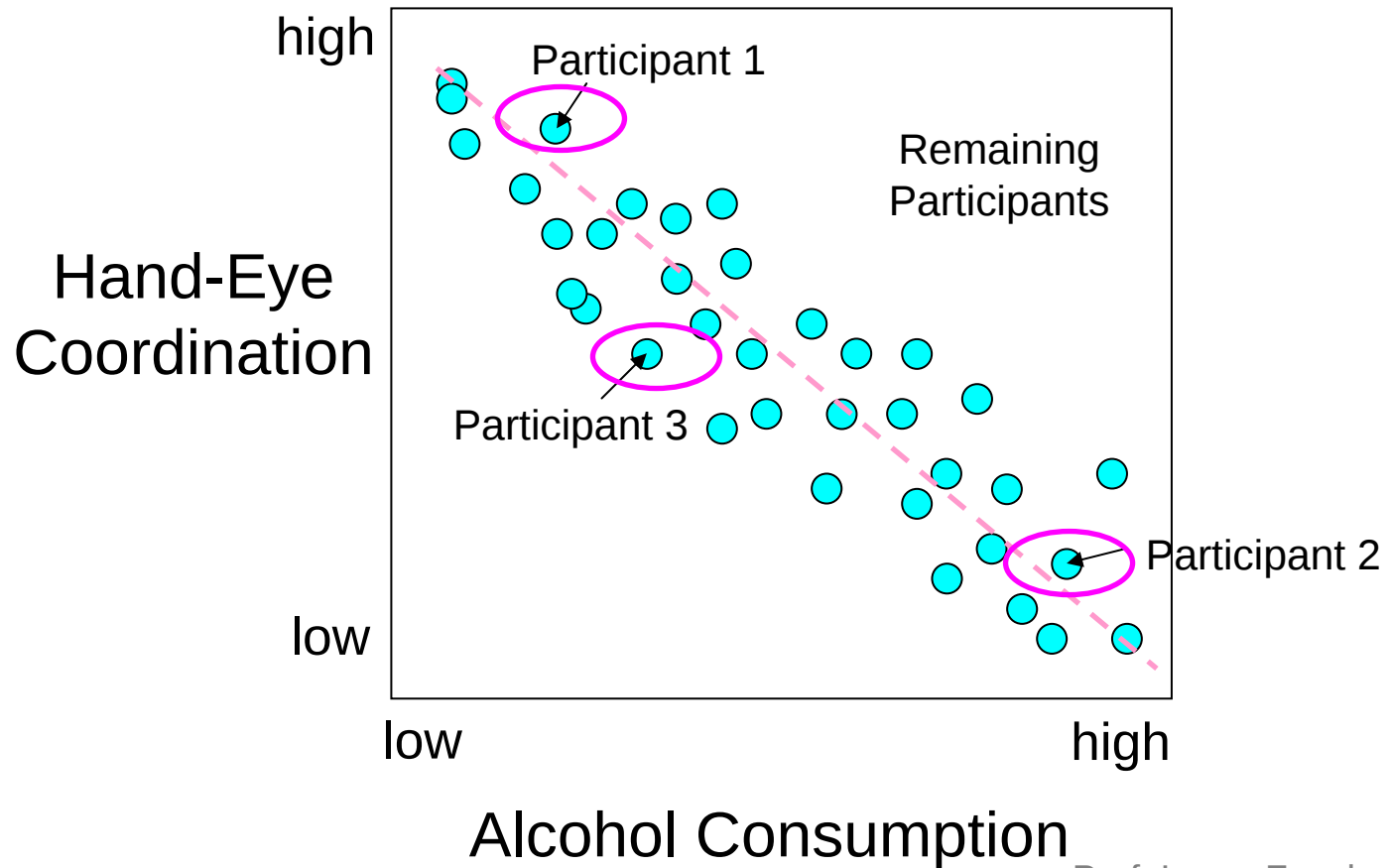
### Forced-Choice

- 1 of 2 options  
e.g. True / false

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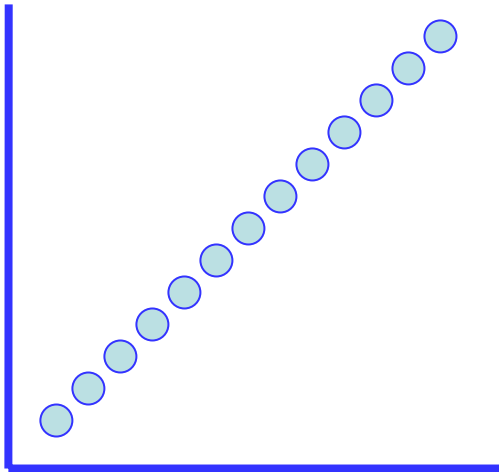
# An Example



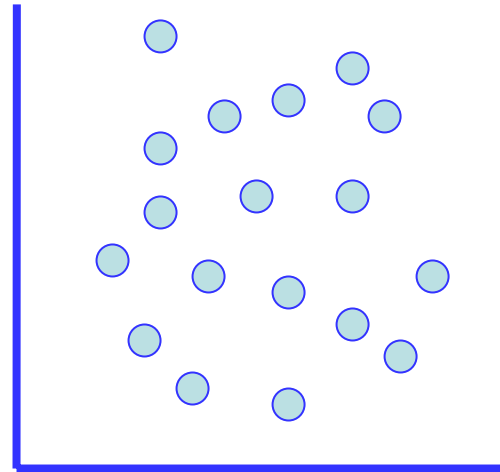
# Correlation Coefficients

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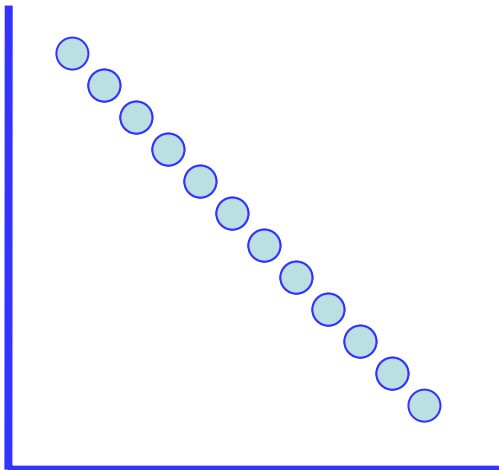
<http://www.laurafazakas.com>



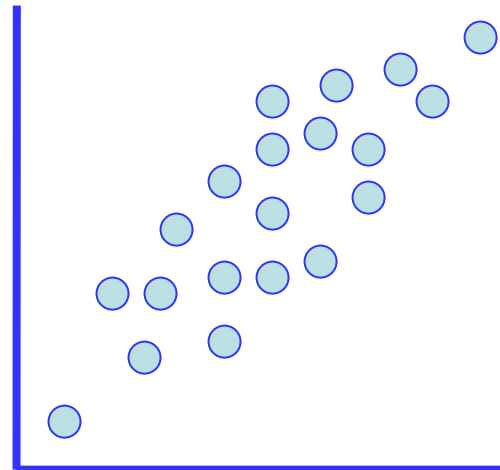
+1



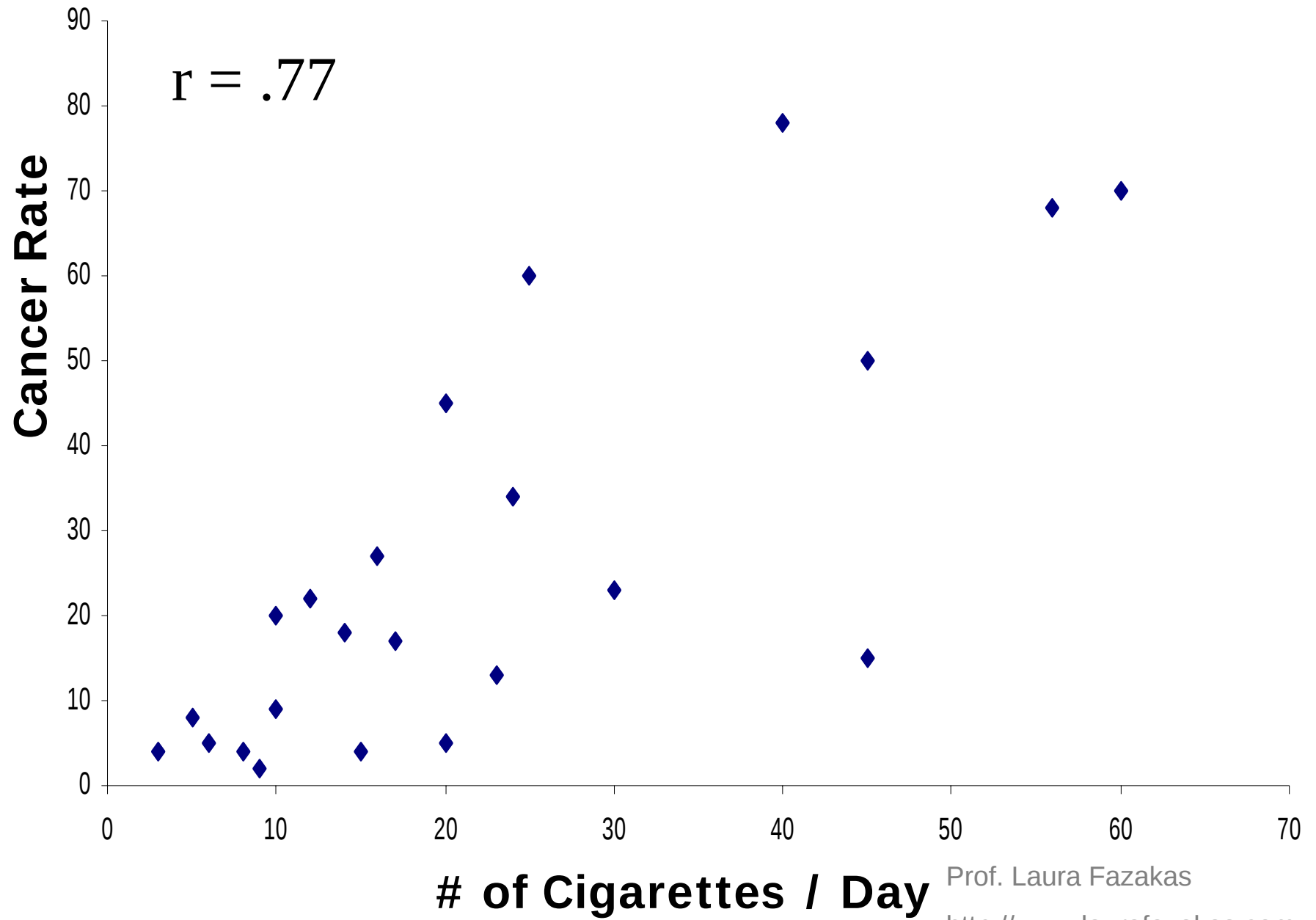
0

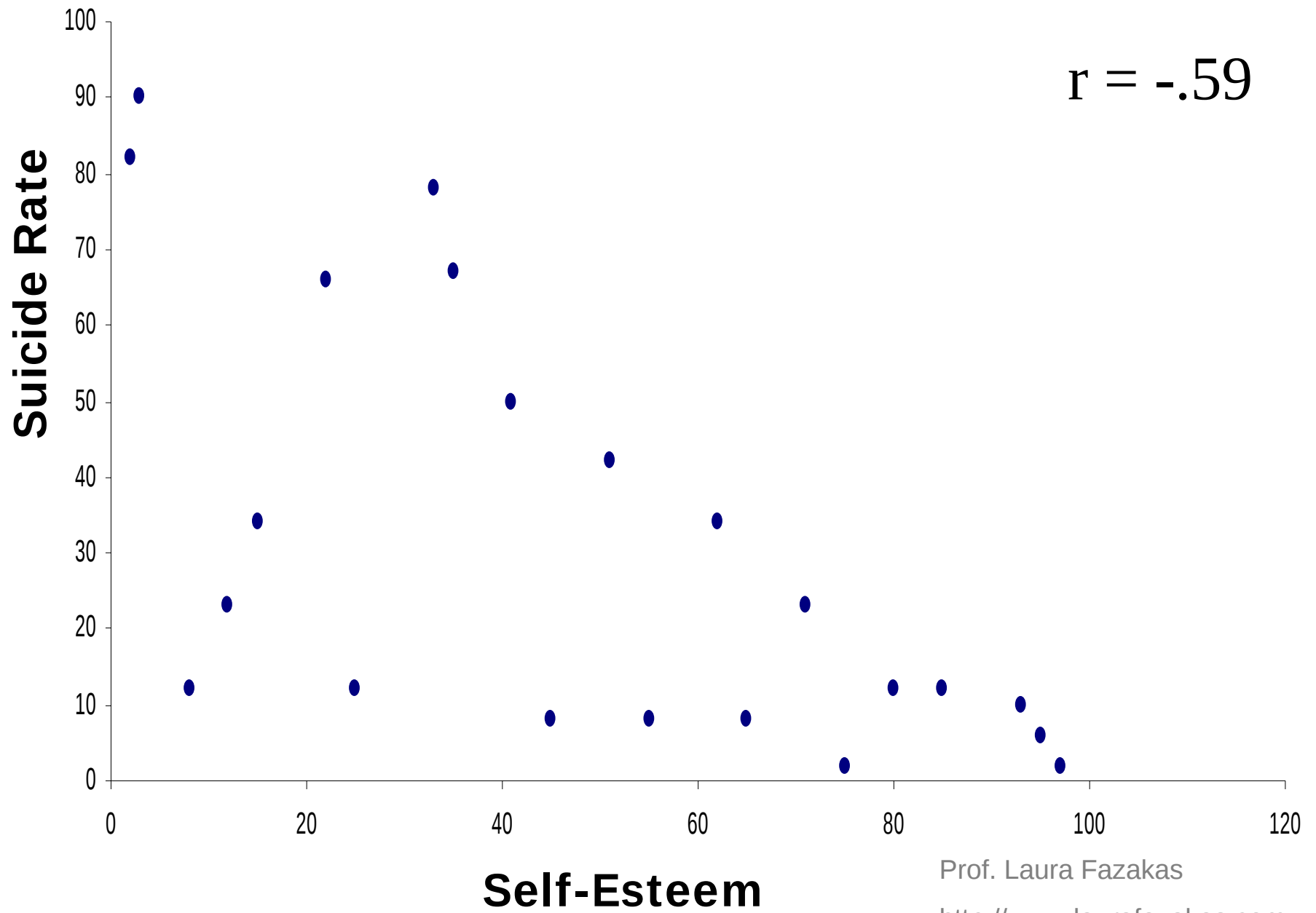


-1



+.8



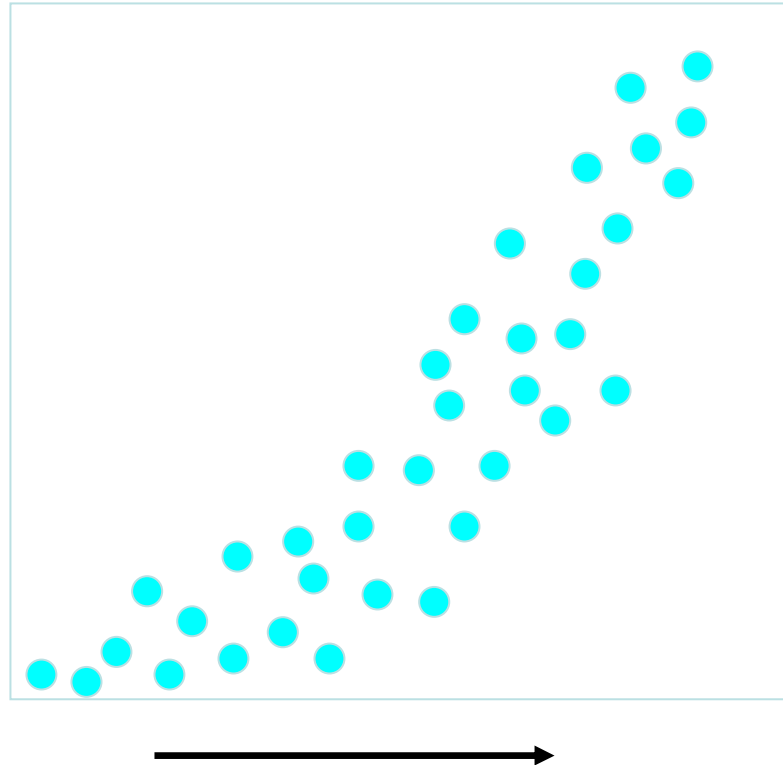


# Correlation is NOT Causation

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Weekly  
Number of  
Drownings  
in Canada



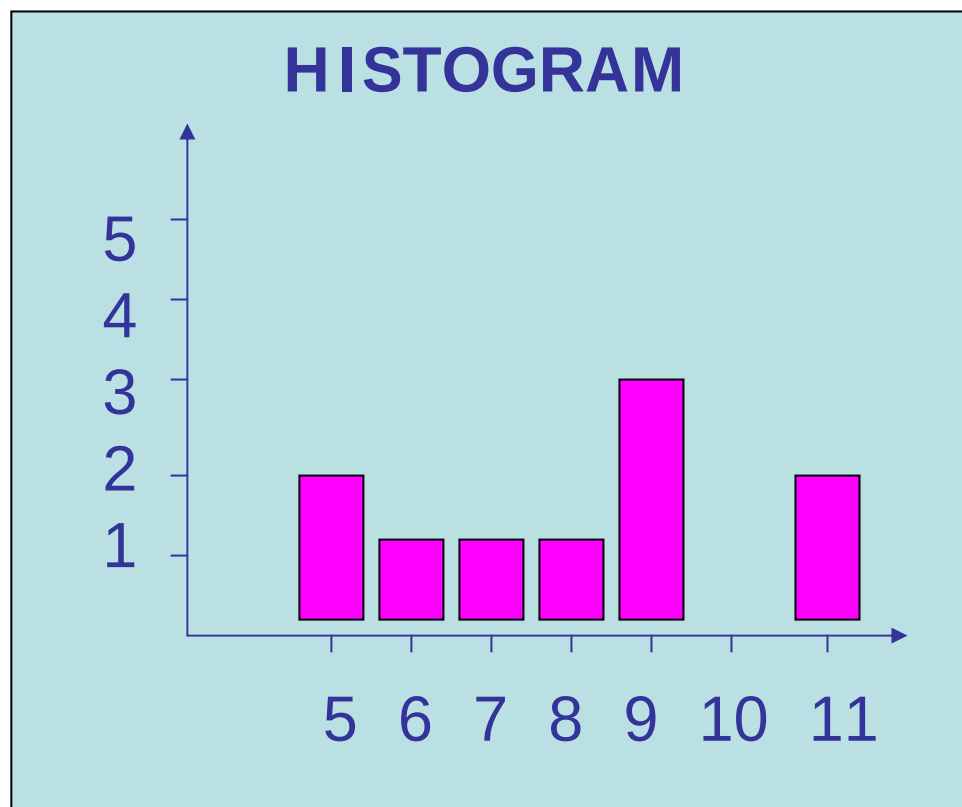
Weekly Ice Cream Consumption (cones per capita)

# Looking at Data

**N = number of  
responses**

**N = 10**

8    11    6    7    5    9    5    9    9    11



**Score**      **Frequency**

11                  2

10                0

9                   3

8                   1

7                   1

6                   1

5                   2

# MEASURES OF CENTRAL TENDANCY

8    11    6    7    5    9    5    9    9    11

| <u>Score</u> | <u>Frequency</u> |
|--------------|------------------|
|--------------|------------------|

**1. MODE - most frequently occurring response**

***MODE = 9***

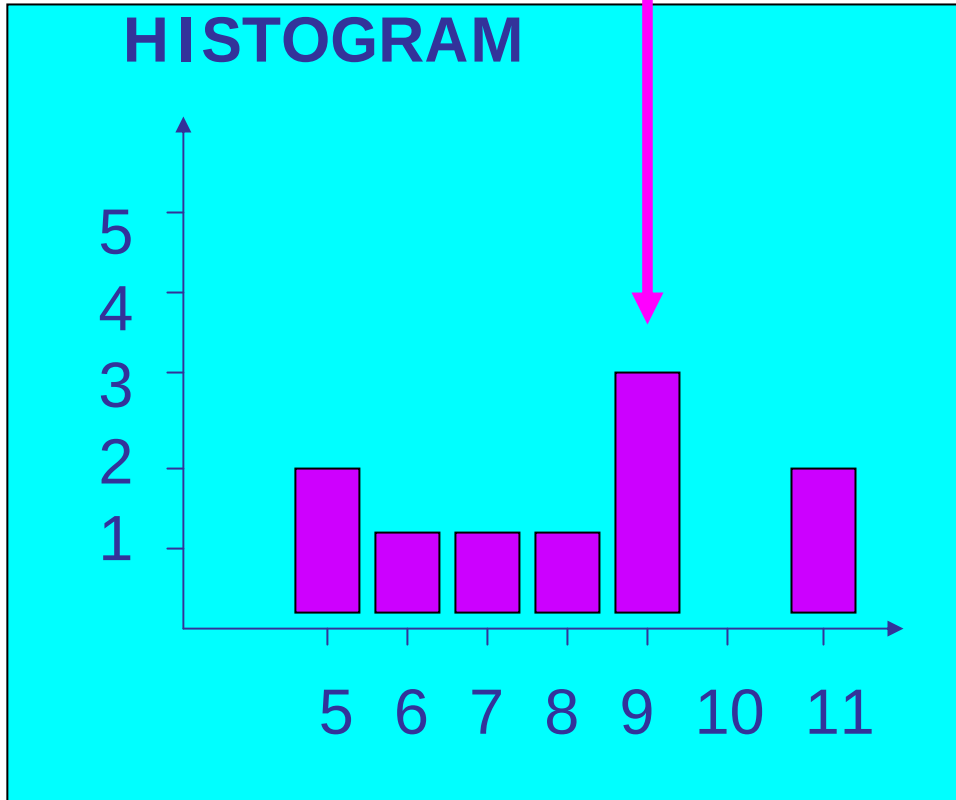
|    |   |
|----|---|
| 11 | 2 |
| 10 | 0 |
| 9  | 3 |
| 8  | 1 |
| 7  | 1 |
| 6  | 1 |
| 5  | 2 |

# Looking at Data

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MODE = 9



| <u>Score</u> | <u>Frequency</u> |
|--------------|------------------|
|--------------|------------------|

|    |   |
|----|---|
| 11 | 2 |
|----|---|

|    |   |
|----|---|
| 10 | 0 |
|----|---|

|   |   |
|---|---|
| 9 | 3 |
|---|---|

|   |   |
|---|---|
| 8 | 1 |
|---|---|

|   |   |
|---|---|
| 7 | 1 |
|---|---|

|   |   |
|---|---|
| 6 | 1 |
|---|---|

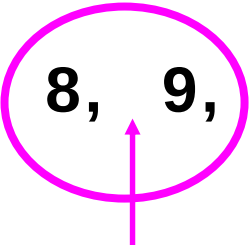
|   |   |
|---|---|
| 5 | 2 |
|---|---|

# MEASURES OF CENTRAL TENDANCY

**2. MEDIAN** - The middle response after after arranging from lowest score to highest score.

Responses - 8   11   6   7   5   9   5   9   9   11

Arrange Scores   5,   5,   6,   7,   8,   9,   9,   9,   11,   11



If N is an even number  
average the 2 middle  
scores

8.5

# MEASURES OF CENTRAL TENDANCY

## 3. MEAN - the average of all scores

$$\text{MEAN} = \frac{\text{sum of all scores}}{N}$$

$$\frac{(8 + 11 + 6 + 7 + 5 + 9 + 5 + 9 + 9 + 11)}{10}$$

$$\text{Mean} = 8$$

# Variability in the Data ....

**MEASURES OF VARIABILITY** - provide information about the spread in the scores

**1. RANGE = highest score - lowest score**

**Our Example:      $11 - 5 = 6$**

***RANGE = 6***

# Variability in the Data ....

## MEASURES OF VARIABILITY

**2. VARIANCE** - How much on average each score varies (or deviates) from the mean

$$\text{VARIANCE} = \frac{\text{sum of } [( \text{each score} - \text{the mean} )^2 ]}{N}$$

# Variability in the Data ....

$$\text{VARIANCE} = \frac{[\text{sum of (each score - the mean)}^2]}{N}$$

$$[(8-8)^2 + (11-8)^2 + (6-8)^2 + (7-8)^2 + (5-8)^2 + (9-8)^2 + (5-8)^2 + (9-8)^2 + (9-8)^2 + (11-8)^2]$$

10

$$= (0 + 9 + 4 + 1 + 9 + 1 + 9 + 1 + 1 + 9) / 10$$

$$= 44 / 10$$

$$\text{VARIANCE} = 4.4$$

# Variability in the Data ....

**3. STANDARD DEVIATION = the square root of the variance.**

$$\text{S.D.} = \sqrt{\text{VARIANCE}}$$

**OUR EXAMPLE:**

$$\text{S. D.} = \sqrt{4.4}$$

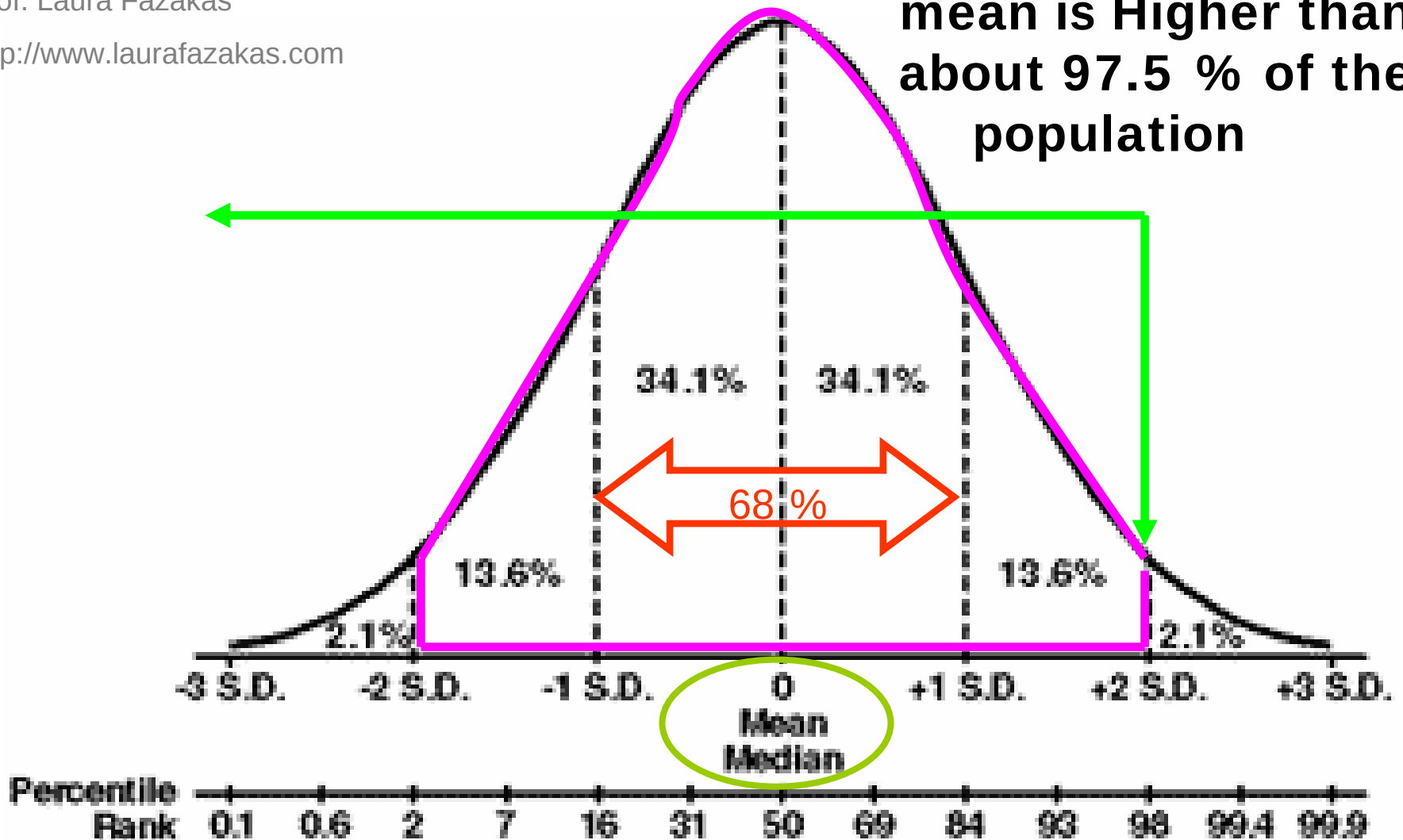
$$\text{S. D.} = 2.098$$

# The Normal Curve ....

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**+ 2 S.D. above the mean is Higher than about 97.5 % of the population**

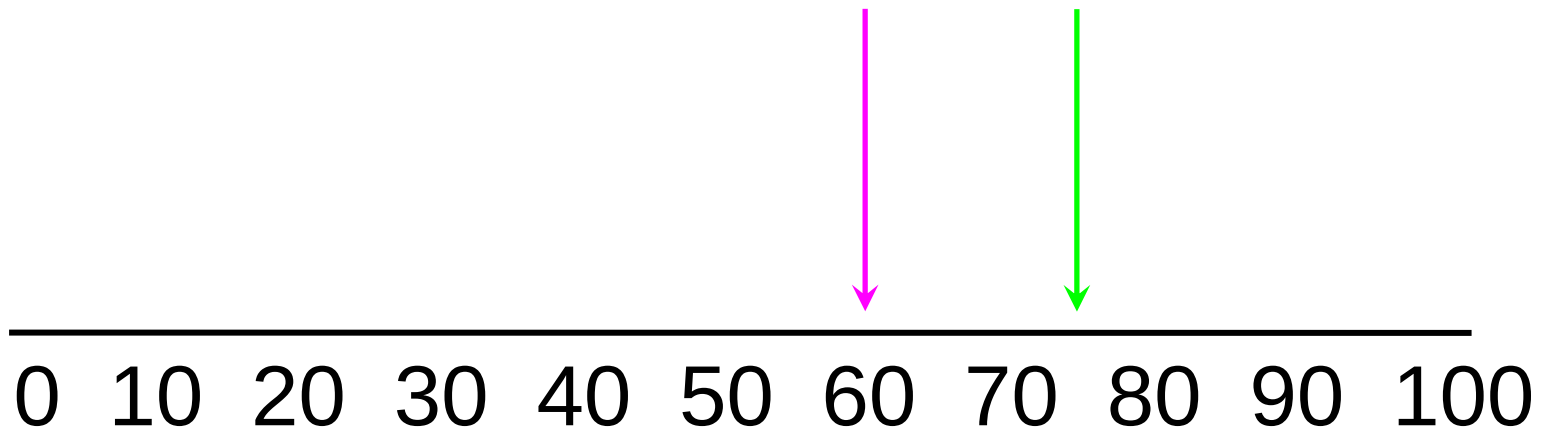


# Application

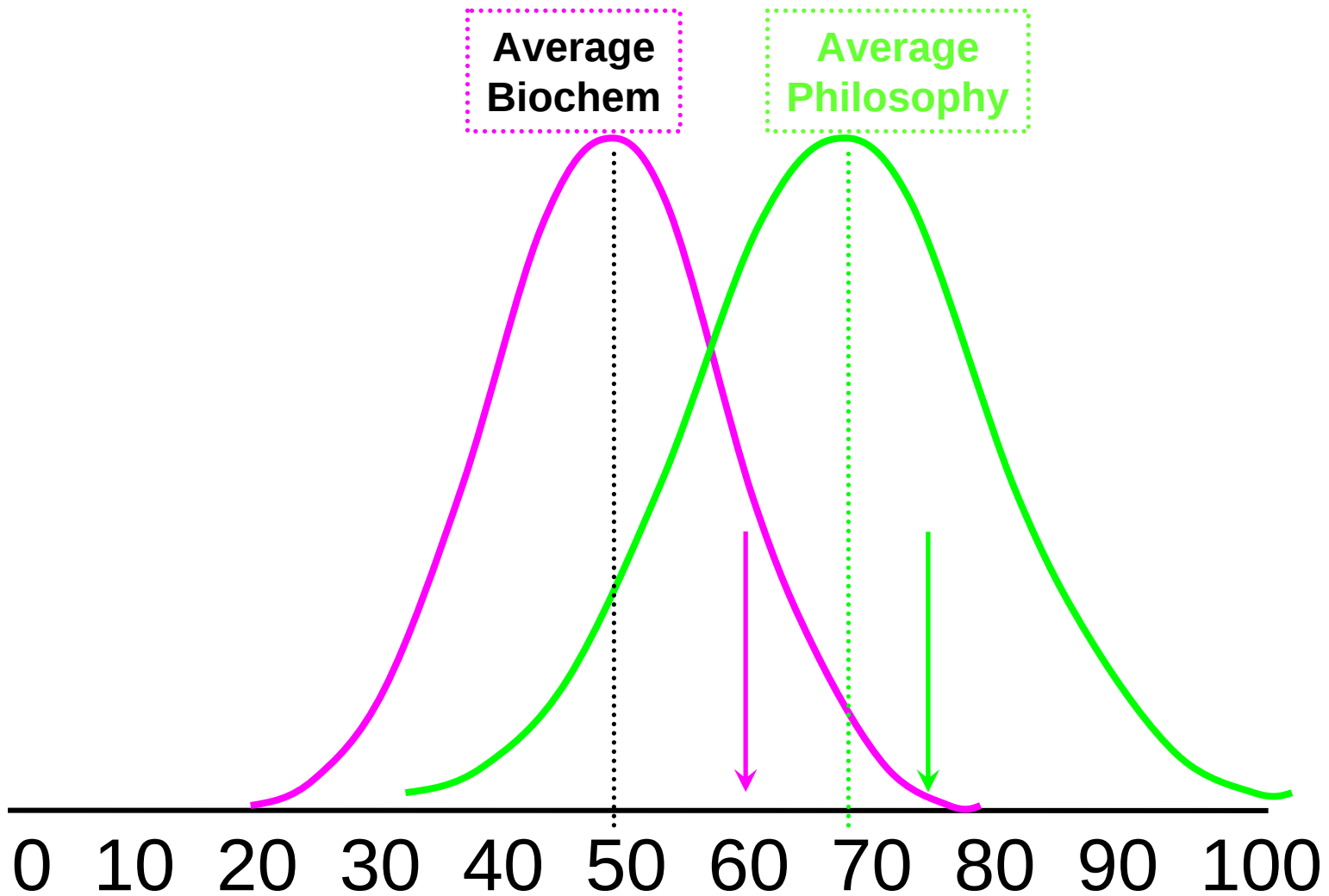
Did you do better in Biochemistry or Philosophy?

Biochem mark: 60

Philosophy mark: 75



Marks



Marks

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# Standard Scores

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$$Z = \frac{(\text{Score} - \text{Mean})}{\text{Standard Deviation}}$$

Allows one to compare different distributions

**Did you do better in Biochemistry or Philosophy?**

**Biochem mark: 60**

**Philosophy mark: 75**

**(Mean = 50, SD = 10)**

**(Mean = 69, SD = 12)**

$$Z = \frac{60 - 50}{10}$$

$$Z = \frac{75 - 69}{12}$$

$$Z = +1$$

$$Z = +0.5$$