

Lecture 2 Psychological Testing and Measurement
Sunthud Pornprasertmanit

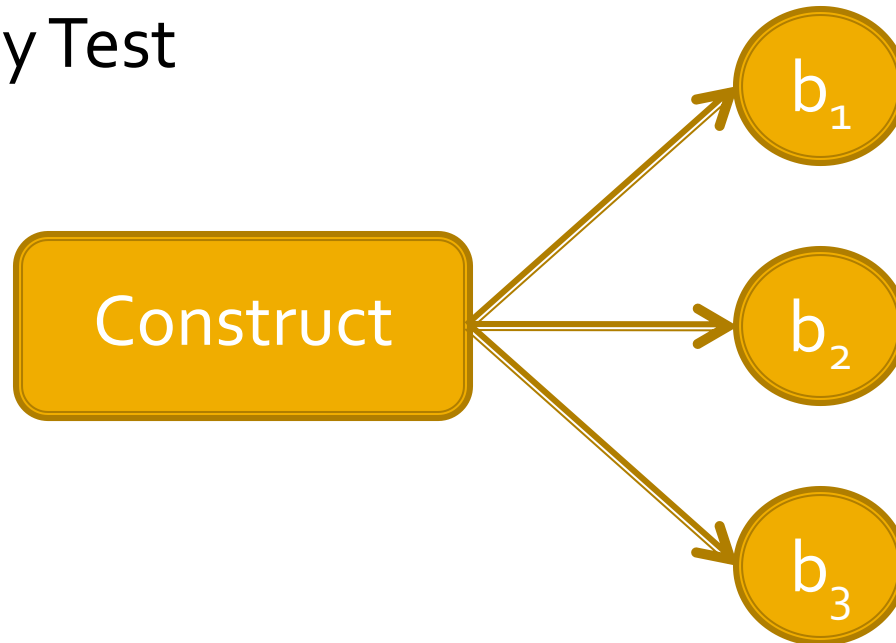
Statistics in PT

Functions of PT

- What is function of psychological testing?
 - Measuring psychological construct
 - Predicting criterion in the real world

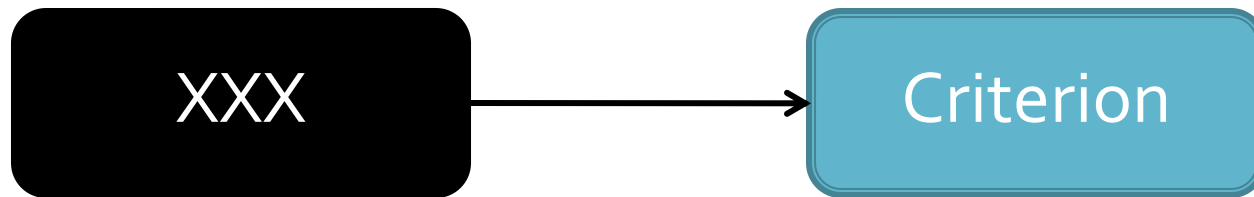
Functions of PT

- Construct Measurement
 - Achievement Test
 - Intelligence Test
 - Personality Test



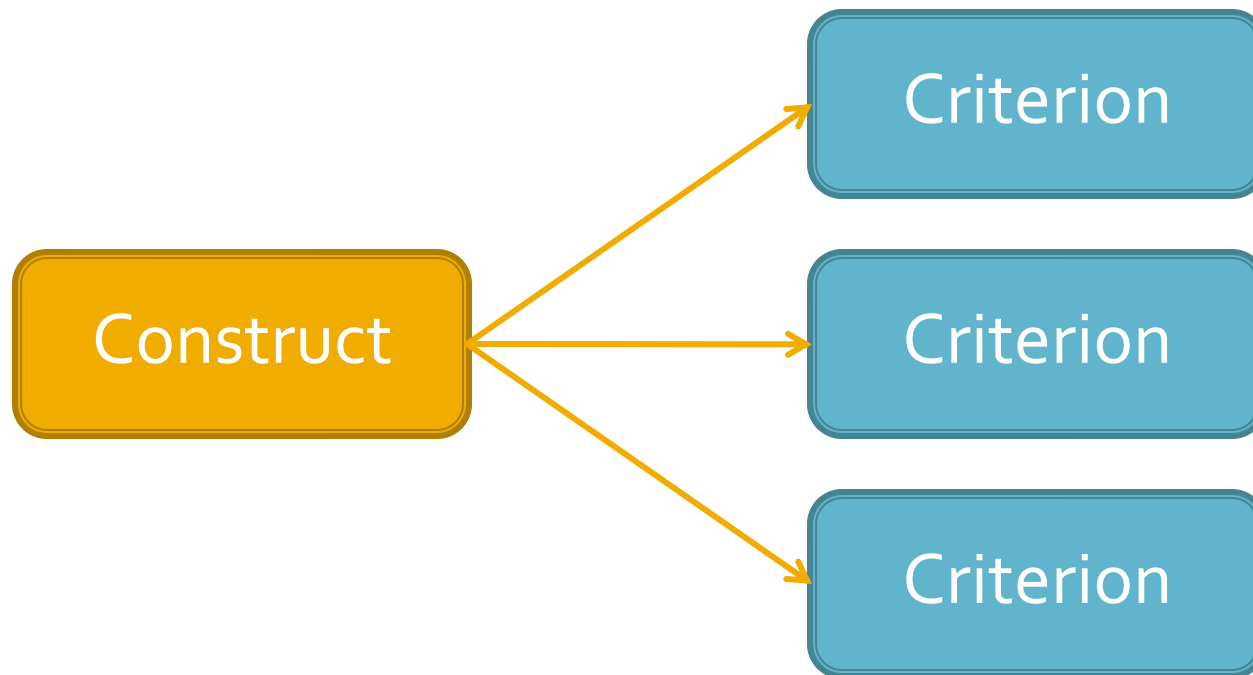
Functions of PT

- Criterion Prediction
 - Biodata (Empirical Keying)



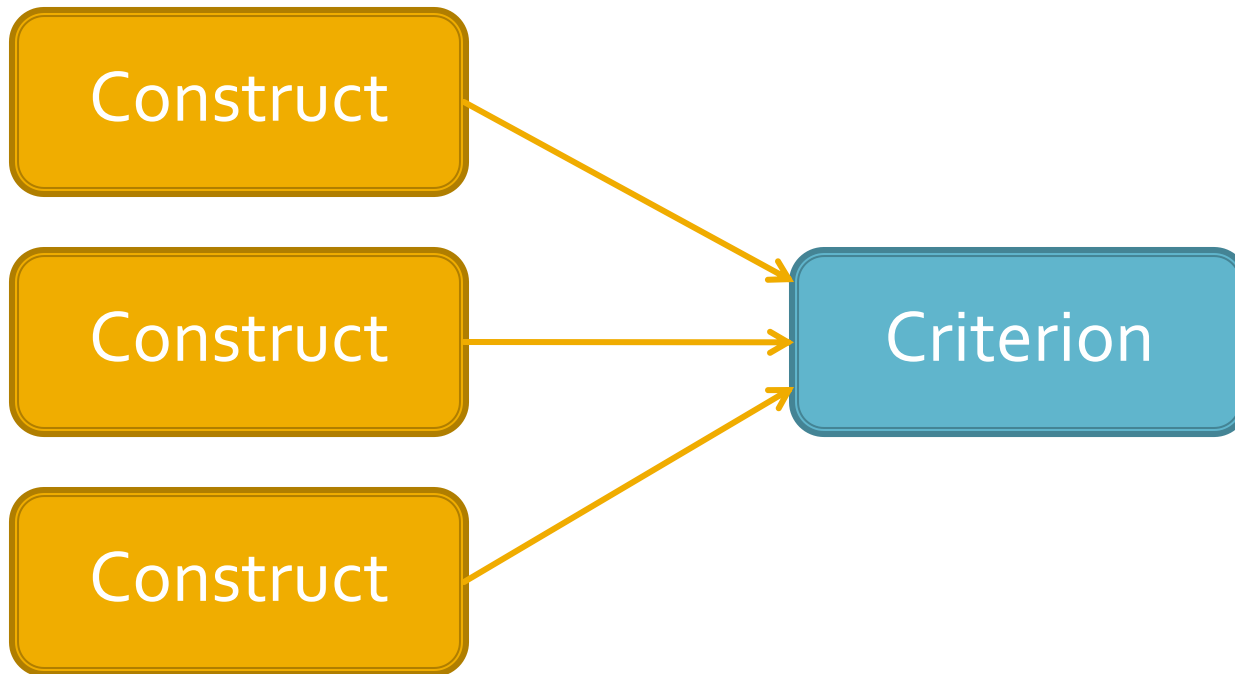
Functions of PT

- Construct can predict multiple criteria in the real world



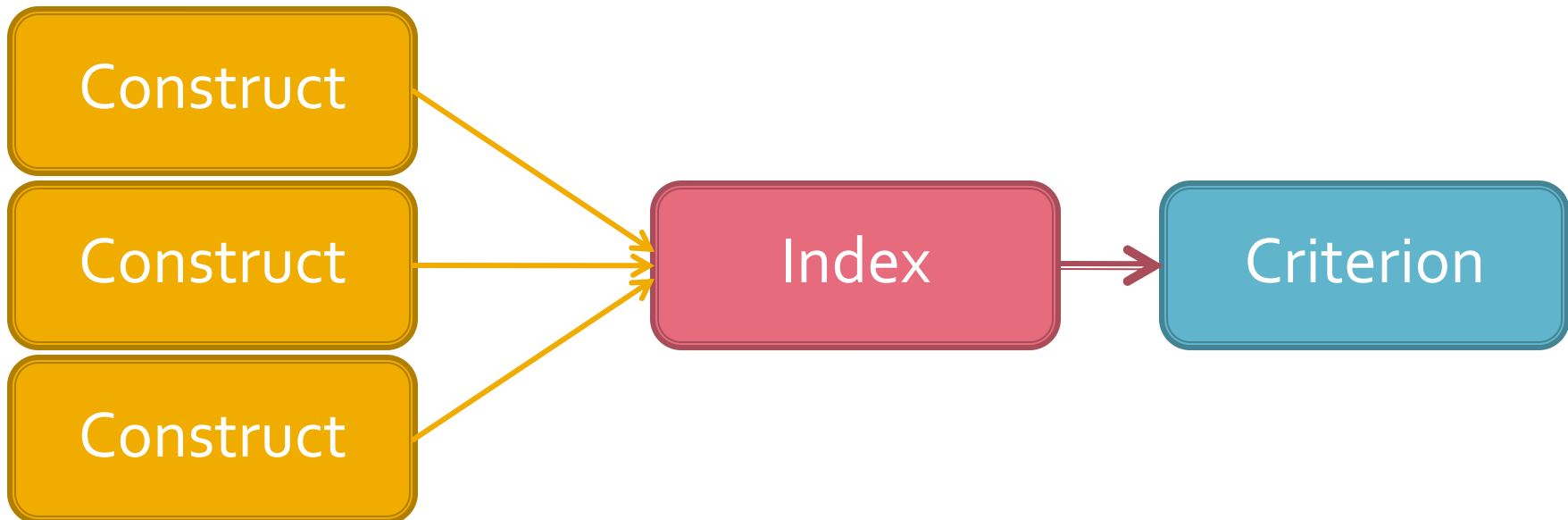
Functions of PT

- Multiple constructs can predict the same criterion simultaneously.



Advance Topic: Functions of PT

- Index is the score that represent the likelihood of presenting criterion.
 - Socioeconomic status
 - Bankrupt index



Graphical Illustration

- Why score of psychological testing should be drawn in graphical illustration?

Graphical Illustration

- Shape of distribution
 - Modality
 - Skewness, Kurtosis
- Outlier
- Truncated Distribution

Before Computing M and SD

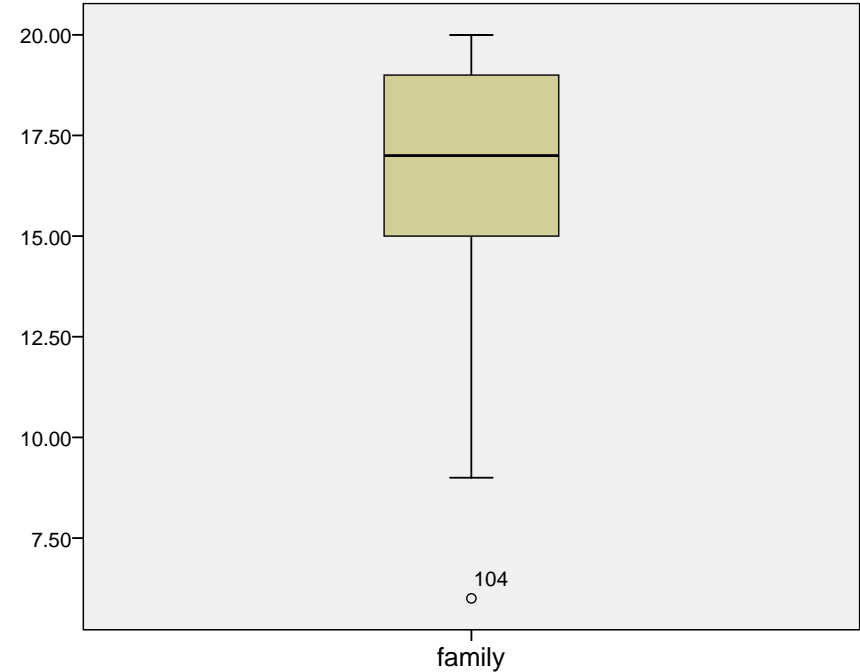
- Which extremely affect the M and SD ?

Before Computing M and SD

- Outlier
 - Difference between outlier and extreme score in SPSS
 - Outlier: the point outside $[Q_1 - 1.5IQR, Q_3 + 1.5IQR]$
 - Extreme Score: the point outside $[Q_1 - 3IQR, Q_3 + 3IQR]$

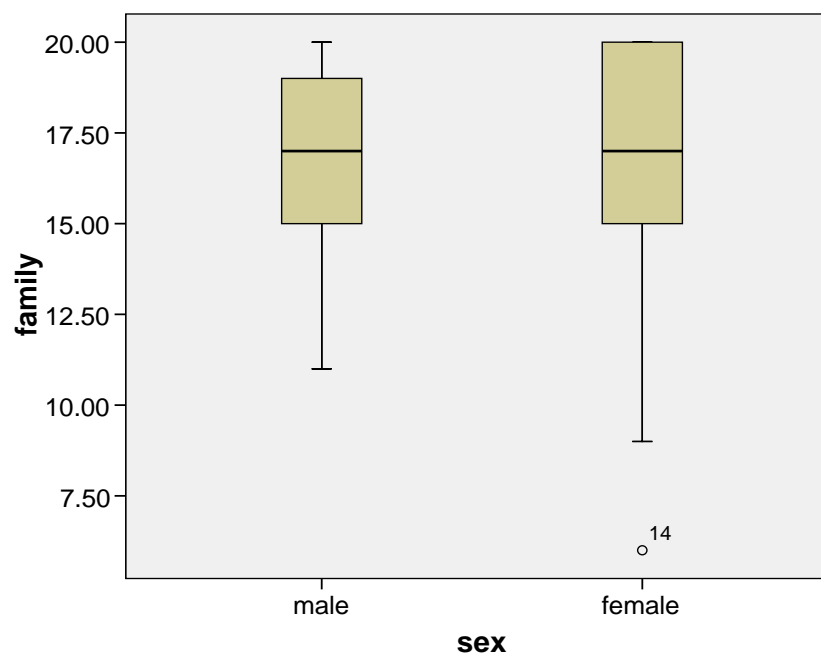
Before Computing M and SD

- How to identify outlier?
- Univariate Outlier
 - Boxplot



Before Computing M and SD

- How to identify outlier?
- Bivariate Outlier
 - Boxplot
 - Scatterplot
 - Numerical Index (Mahalanobis D^2 , Leverage)



Before Computing M and SD

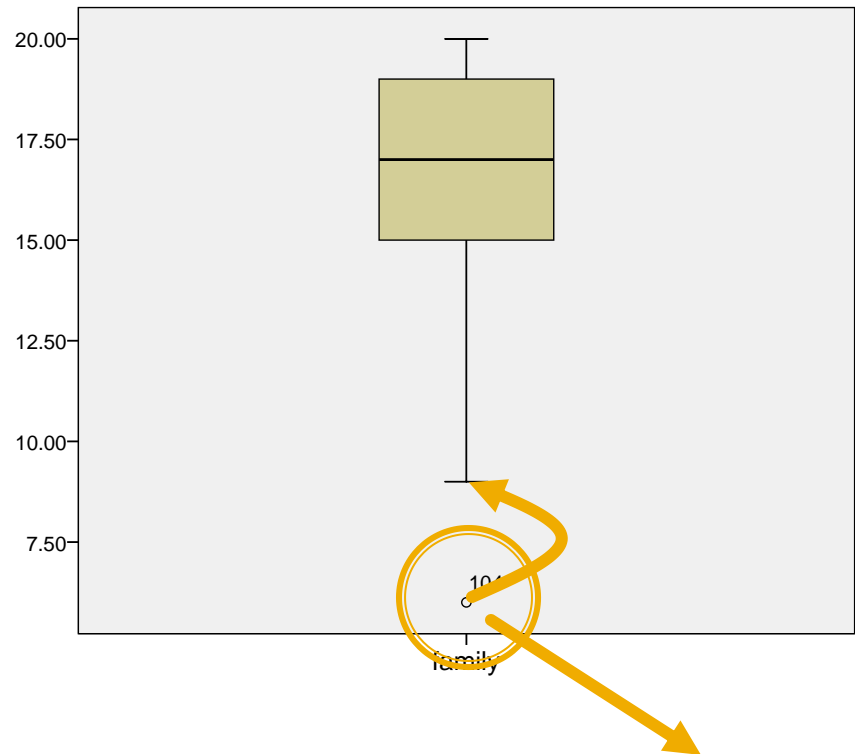
- How to identify outlier?
- Multivariate Outlier
 - Numerical Index (Mahalanobis D^2 , Leverage)

Before Computing M and SD

- Why do outliers occur?
 - Technical failure (computing, experiment)
 - Abnormality of the case
 - Unknown

Before Computing M and SD

- How to remedy
 - Leave it
 - Draw it out
 - Reduce its effect



Effect of Nonnormality

- Using Standard Normal Distribution
 - 50th Percentile = Mean?
- Statistical Assumption
 - T-test
 - Regression Analysis

Normalized Standard Score

Standard Score

- Convert raw score to z-score

Normalized Standard Score

- Convert raw score to percentile
- Convert percentile to z-score

SPSS

Analyze → Descriptive →
Descriptive Statistics...

SPSS

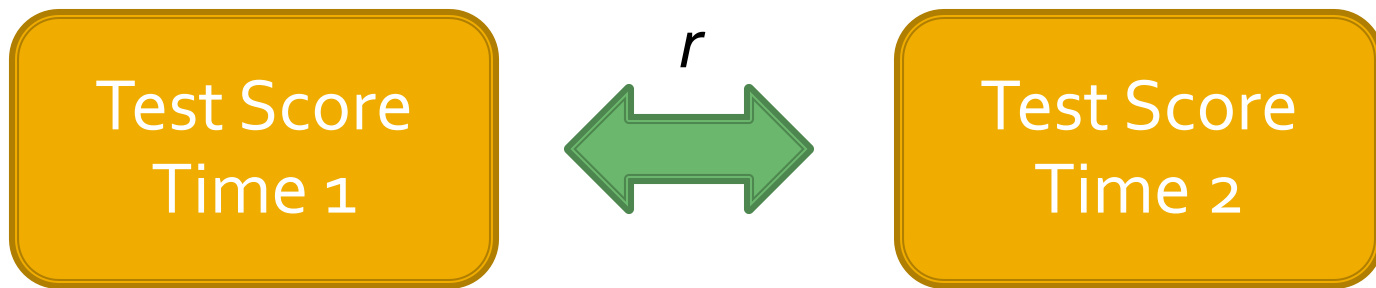
Transform → Rank Case...

Caution in Comparing Test within A Test Taker

- Normality?
- Same Reference Group?

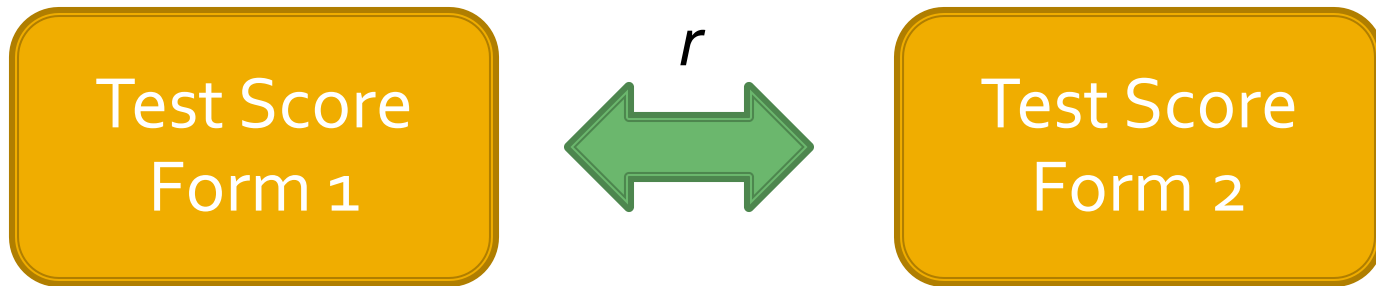
Correlation and PT

- Test-retest reliability



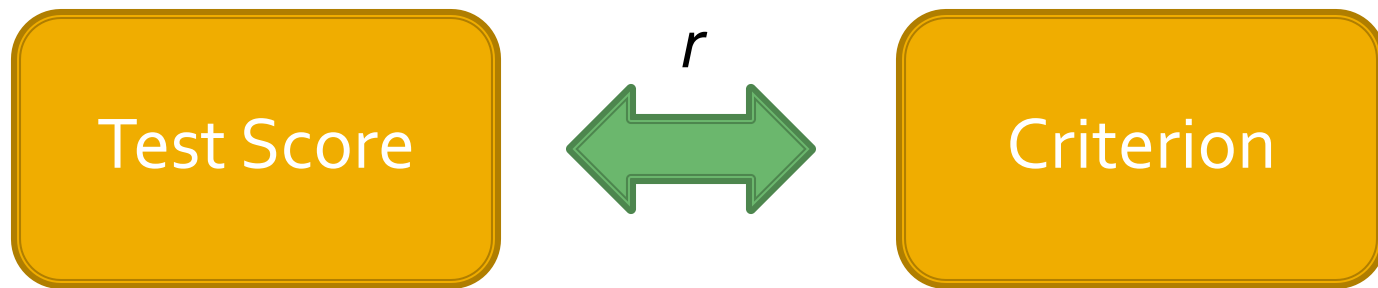
Correlation and PT

- Alternate form reliability



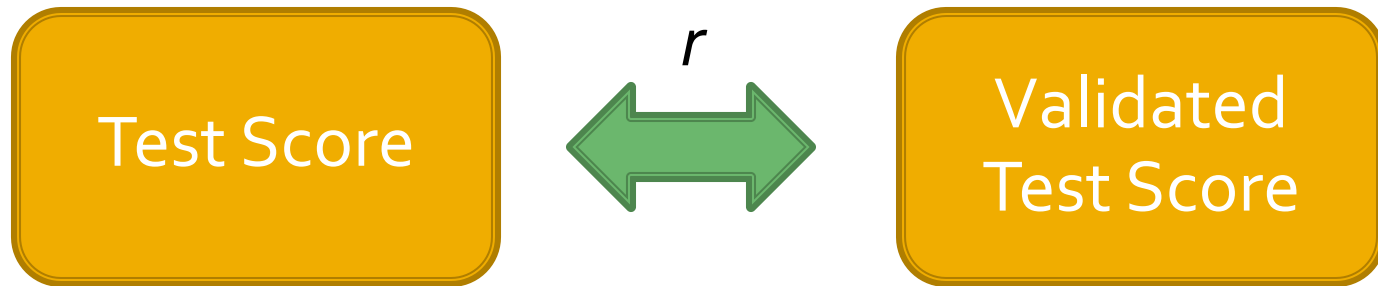
Correlation and PT

- Predictive validity



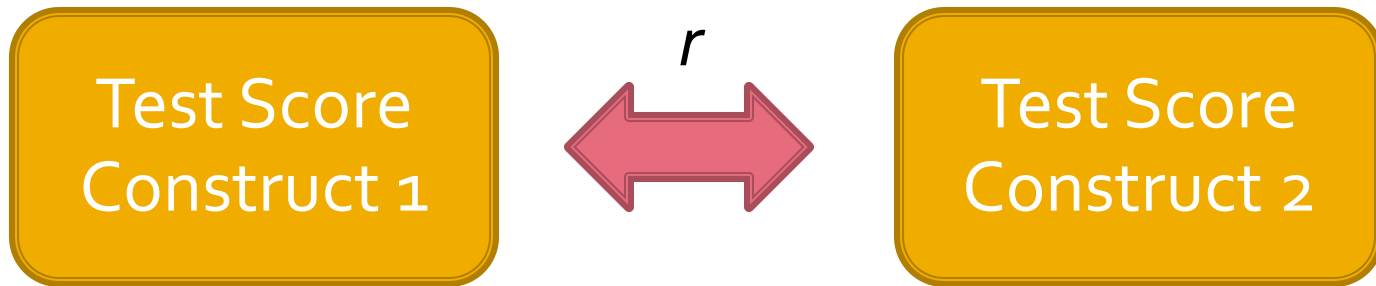
Correlation and PT

- Convergent validity



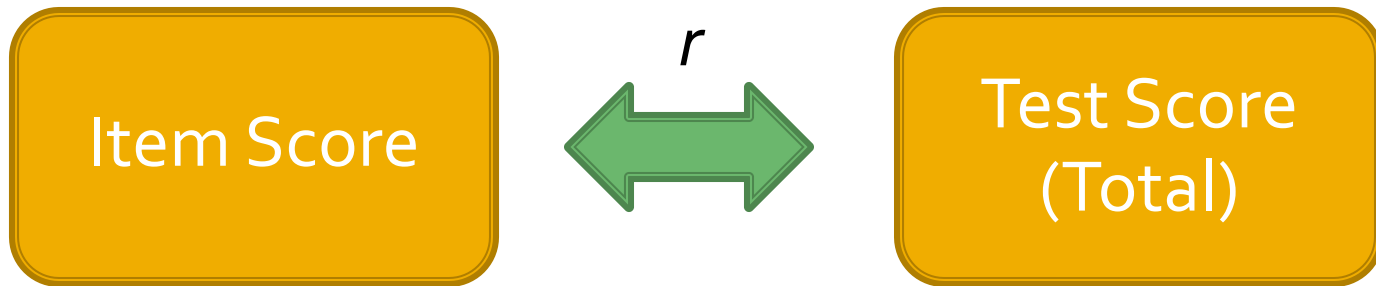
Correlation and PT

- Discriminant validity



Correlation and PT

- Item-total correlation

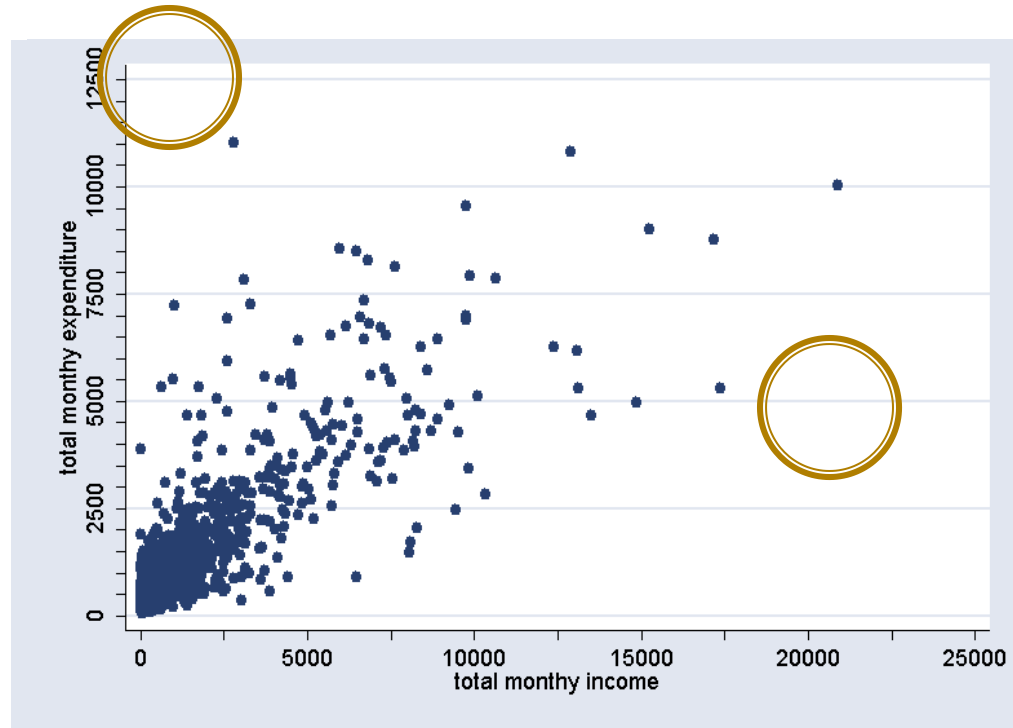


Factors Affect r

- Outlier

- $r = .79$

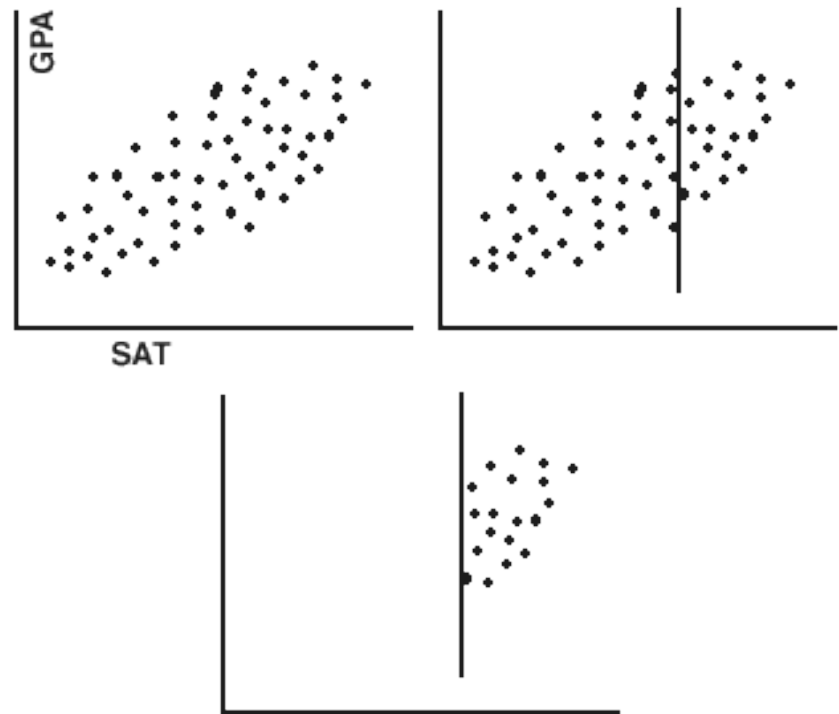
- r reduces to
.52



Factors Affect r

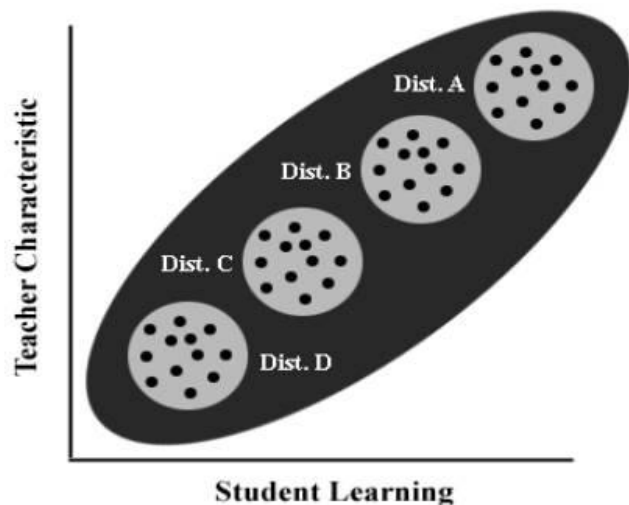
- Range Restriction

- $r = .50$
- r reduces to
.20

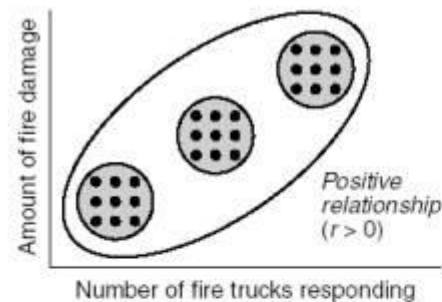


Factors Affect r

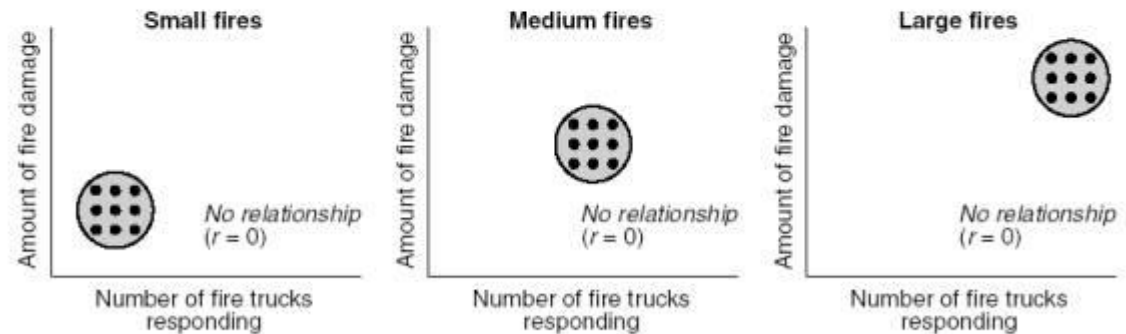
- Unreliability
- Heterogeneous Subgroups



(a) Before controlling for size of fire



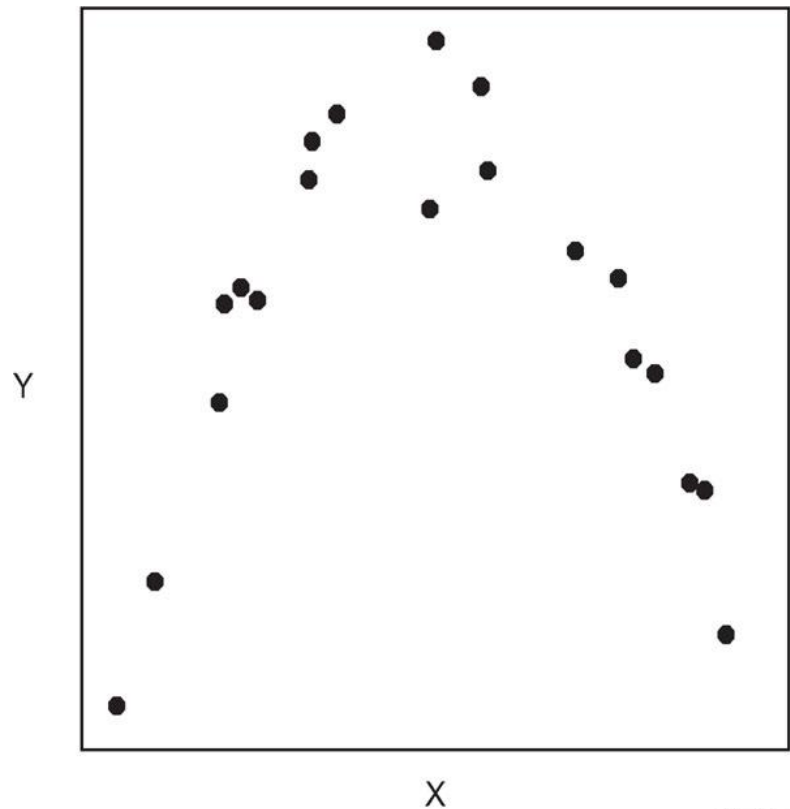
(b) After controlling for size of fire



■ **FIGURE 11.2** Relationship between amount of fire damage and number of trucks responding before and after controlling for size of fire. We controlled for size of fire by examining the original relationship at different levels of size of fire. The original relationship disappears.

Factors Affect r

- Nonlinear Relationship

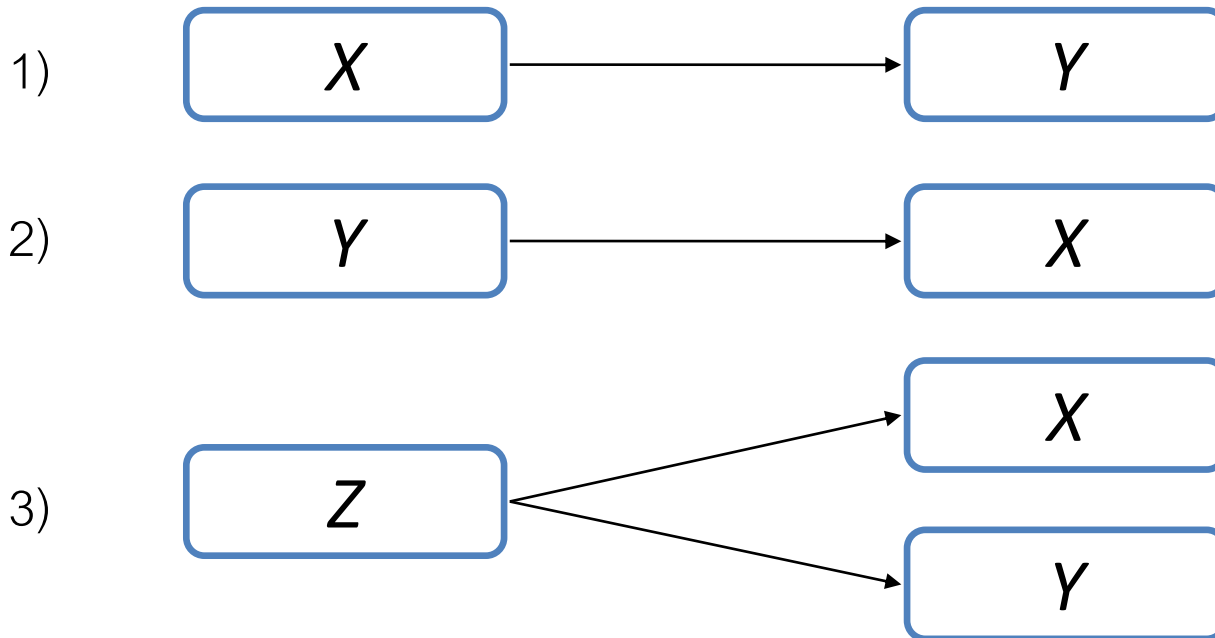


Correlation and Causation

- The conditions make causal relation
 1. X precedes Y in time
 2. Some mechanisms explain
 3. Change in X is accompanied by change in Y (Correlation)
 4. Effect X on Y cannot be explained by other variables

Correlation and Causation

- Interpretation of Correlation
 - Such as correlation between stress and feedback of performance



Case

2.1 Bimodal Distribution in Test Score

2.2 Cutoff in Diagnostic Test

Exercise 2.1 – 2.4

- Mechanical Comprehension.sav
- Outline Lecture 2 from educational year 50

Next Lecture

Psychological Scaling

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Measurement

- Measurement is the assigning of numbers to individuals in a systematic way as a means of representing properties of the individuals
 - Scaling
 - Classification

Ways to Measure

- Guttman Scaling
- Thurstone Scaling
- Likert Scaling
- Q-sort
- Multidimensional Scaling

Before Building PT

- Specific the type of measure
- Define the domain of the test
 - Context of the test
 - Difference from related constructs
 - Dimension
 - Emphasis of each dimension
- Determine item format
- Individual Test of Group Test

Before Building PT

- Test Length
- Item Difficulty

Types of Meaning

- Norm-Referenced Test
- Criterion-Referenced Test