Research Design

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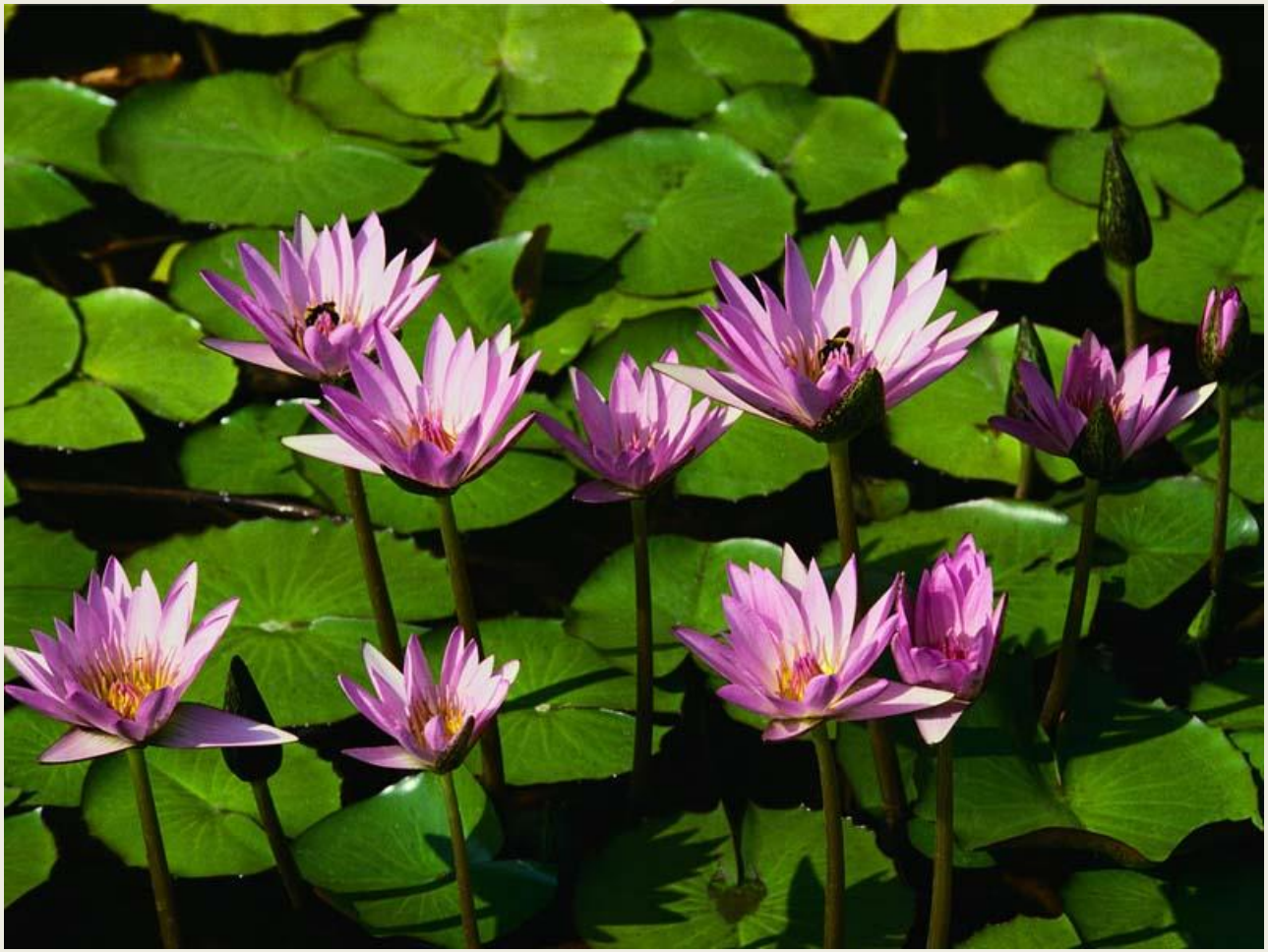


Definition and Characteristics

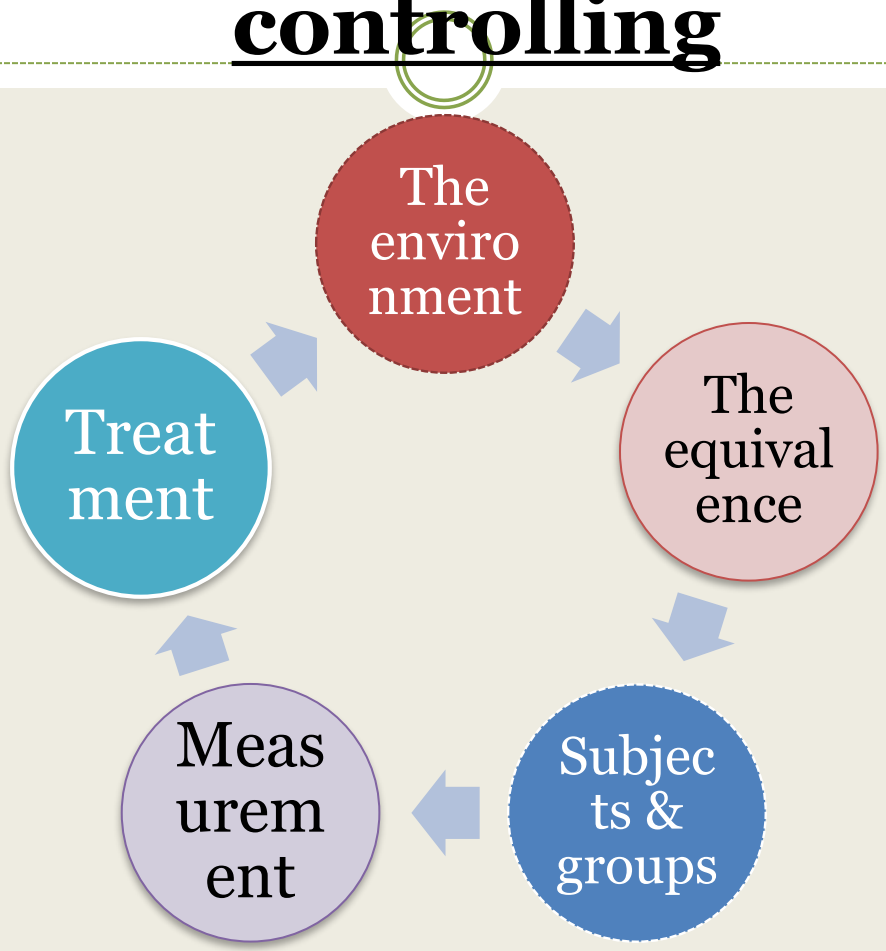
Research design

- **Is a plan or Blue Print for conducting a study**
- **Indicates basic structure of the study**
- **Maximizes control over factors that could interfere with the validity of the findings**

Characteristics continued

- Guides the researcher in planning and Implementing a study
- Not specific to a particular study but must link to the other steps of the research process in the study.

Elements of Good Design is controlling



Elements Continued

- Appropriateness to research question
- Absence of bias, precision, Power
- Maintain integrity of research design
    * Maximize control
    * Minimize bias
    * Control threats to validity

Concepts relevant to Research Design

Causality & multi-causality

Probability or Bias

Manipulation

Control

Validity

Nursing Research Methods

Qualitative

- Phenomenological
- Grounded Theory
- Ethnographic
- Field theory
- Historical

Quantitative

- Descriptive
- Experimental
- Historical

Outcome research

Definitions of Research Methods

- Qualitative Research: A systematic, interactive, subjective approach used to describe life experiences and gives them meaning (Burns and Grove)

Quantitative Research: A formal, objective, systematic process to describe and test relationships, and examine causes and atudy effects of intervention s.

Outcome Research

- Scientific methodology that was developed to examine the end result patient care, The strategies used in outcomes research are departure from traditional scientific style and incorporate evaluation research , epidemiology, and economic theory perspectives.

Types of Desgn

- Is random assignment used?

Yes

Randomized or true experiment

No

Is there a control group or multiple measure?

yes

Quasi experiment

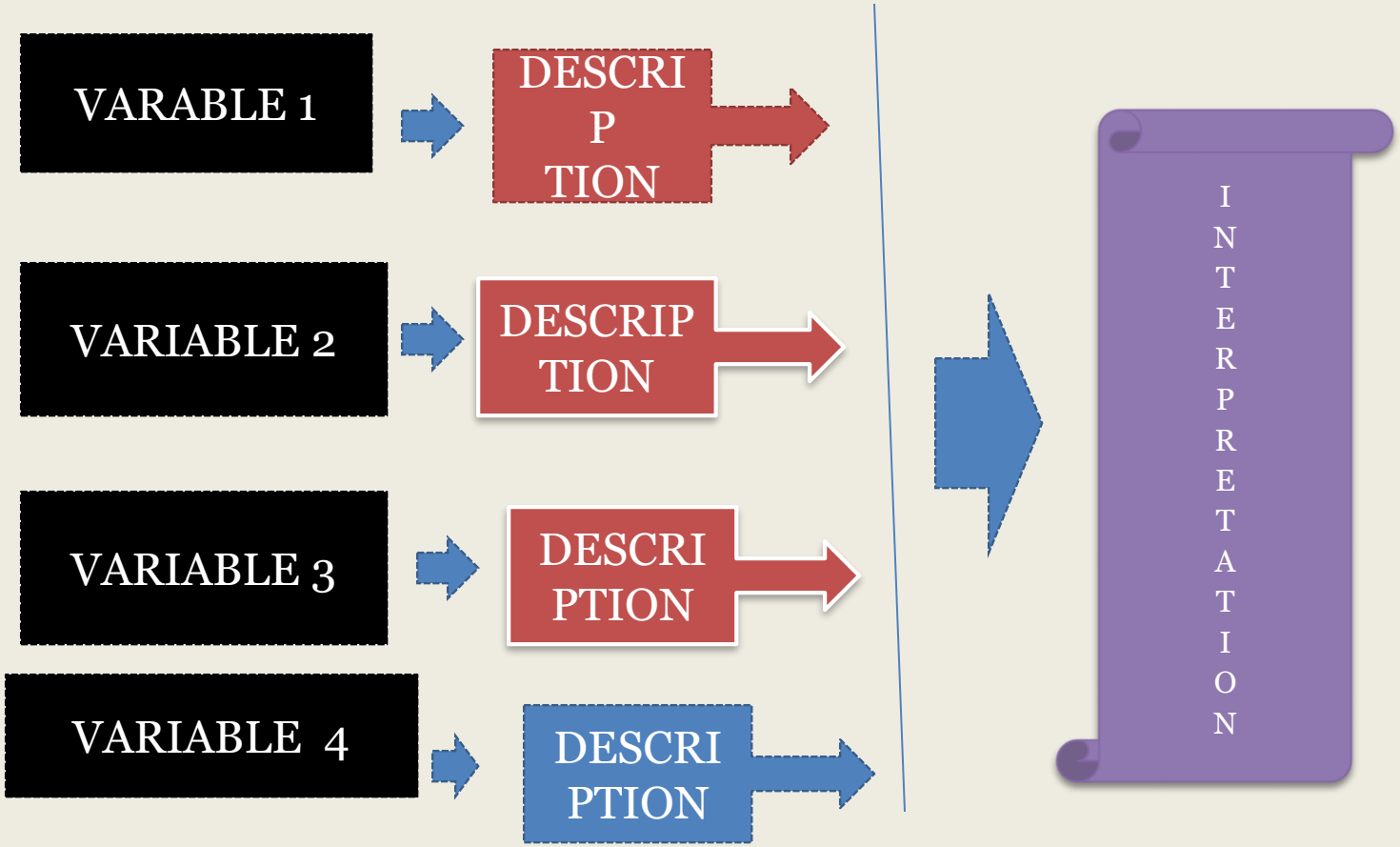
no

pre-experimental or Non-experimental

Types of Survey design

- **Descriptive**
- **Comparative**
- **Correlated**
- **Evaluative**
- **Developmental – Cross sectional, Longitudinal, trend study**

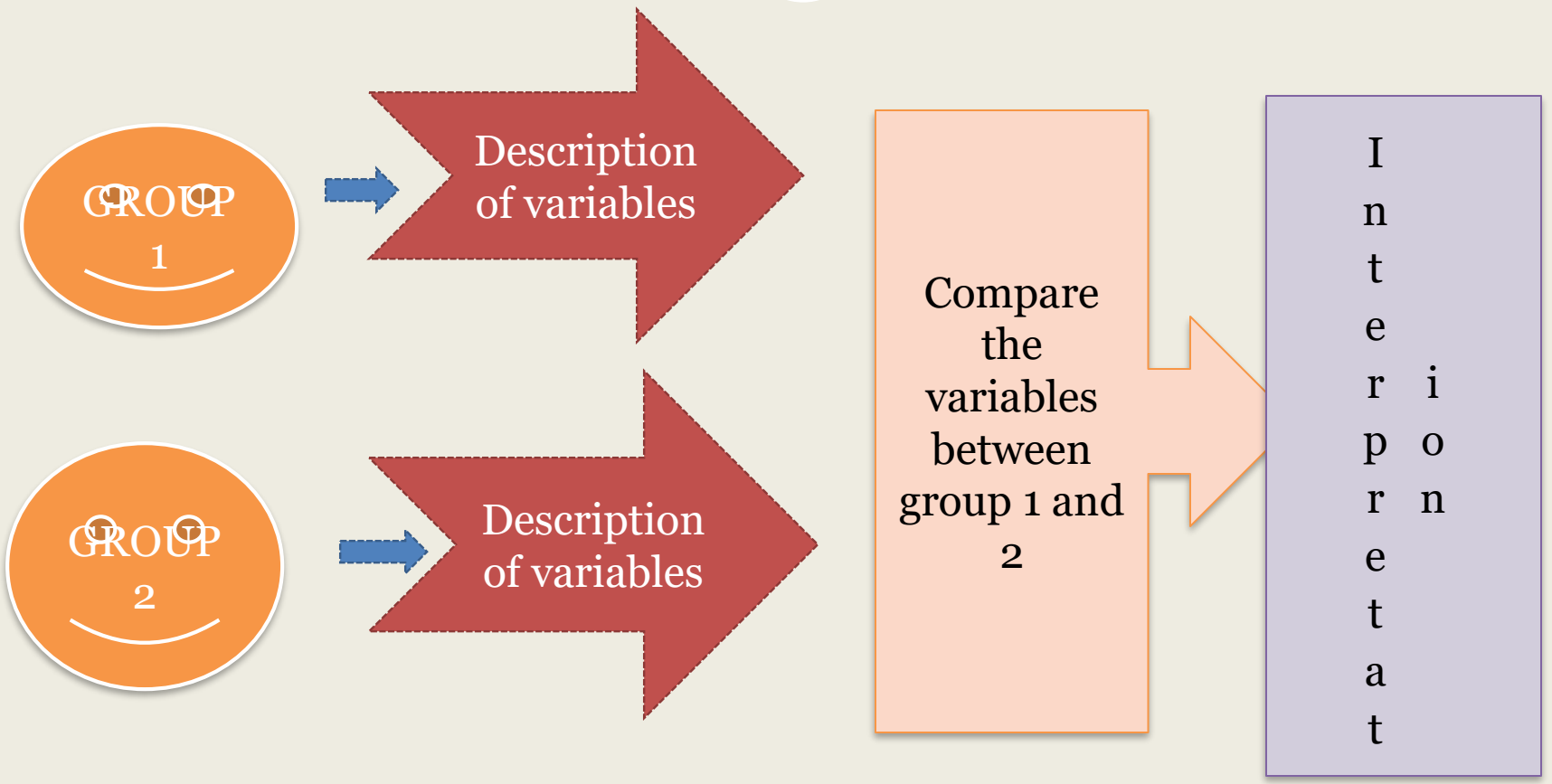
Survey Design : Descriptive Survey



Descriptive design

- To describe systematically a situation or area of interest factually and accurately
  - **PURPOSE IS EXPLORATION AND DESCRIPTION OF PHENOMENA IN REAL LIFE SITUATION**

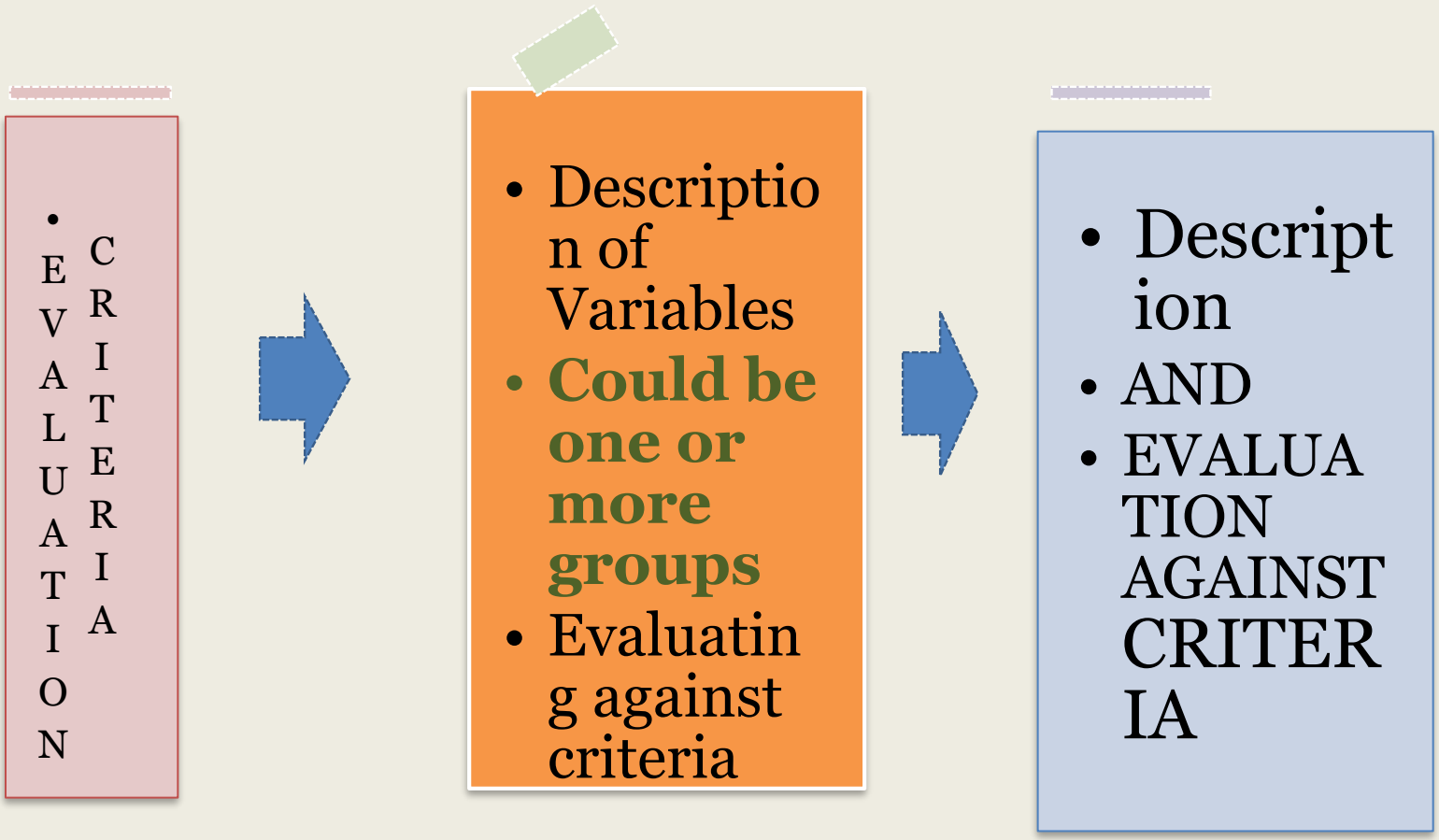
Survey Design – Comparetive Survey



Comparative Descriptive design

- Used to describe differences in variables in two or more groups in natural settings
- A study is comparative survey if the researcher takes at least 2 entities now in existence and compare against known criteria

Survey Design: Evaluative Survey



Correlation Design

- A systematic investigation of relationships between two or more variables to explain the nature of relationships in the world and not to examine causes an effect

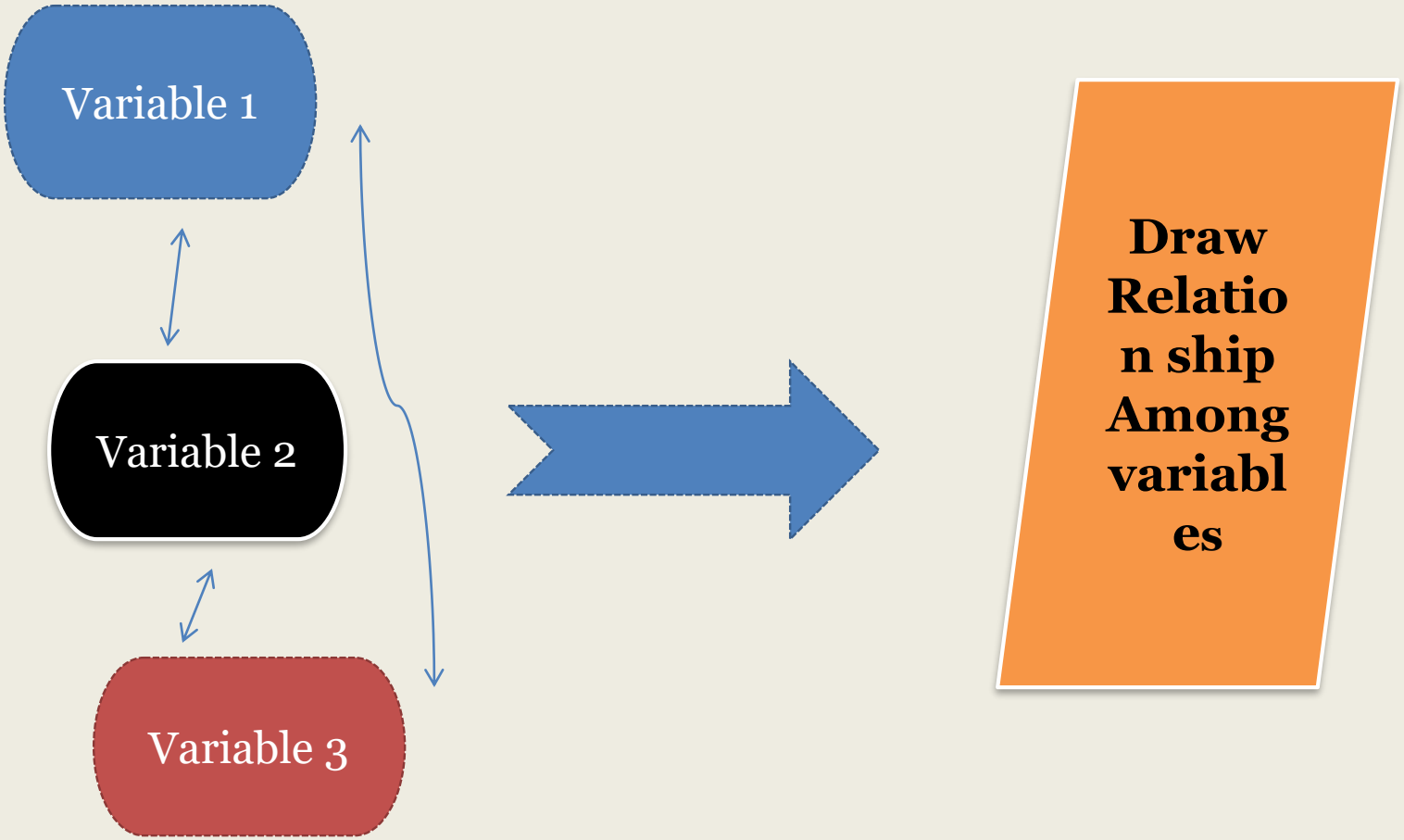
Correlation Design: Types

- Descriptive Correlation design
- Predictive Design
- Model-Testing Design

Types of Correlation Design

• Describe theoretically Relationships Between / among Variables	Predict relationships between or among among variables	Test proposed relationships
Descriptive Correlational Design	Predictive correlation design	Model Testing design

Correlation Design



Application of statistics in correlation design

- **Correlation between two variables is computed by Rank Difference method, and Pearson Product moment method**
- **If the data are in nominal /ordinal level association is computed by chi-square**
- **For computing relationship among more variables compute multiple regression**

TIME DIMENTIONAL DESIGN S

- designed within the discipline of epidemiology in which occurrences and distribution of diseases among population are studied

- designs examine occurrences and sequences and patterns of change, growth or trends across time - **Dimension of time is an important factor**.

Cohorts

- **Within the field of epidemiology the samples in time**

dimensional studies are called COHORTS- means classifying populations that have relevance in relation to time include : age, time of diagnosis, point of entry into treatment protocol, point of entry into new life style, age at which started smoking, etc.

Design is usually used to determine risk factors or causal factors of illness state: called inferred causality

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Strategies used in studying inferred causality

- 1 **Retrospective:** Group of people who have experienced a particular event

- **Prospective:** Group of people who are at risk for experiencing a particular event

Developmental studies-Longitudinal

Time 1	Time 2	Time 3	Time 4	Time ….n
Measure Variables Sample 1	Measure variables Sample 1	Measure Sample 1variables Sample 1	Measure Variables Sample 1	Measure Variables Sample 1
Longitudinal Design				

Cross Sectional design

Time 1 **Measure Variables** **Sample 1**	**Time 1** **Measure Variables** **Sample 2**	**Time 1** **Measure Variables** **Sample 3**	**Time 1** **Measure Variables** **Sample 4**	**Time 1** **Measure Variables** **Sample… n**

Trend Study Design

Time 1 Measure Variables Sample 1	Time 2 Measure Variables Sample 2	Time 3 Measure Variables Sample 3	Time 4 Measure Variables Sample 4	Time ,,,n Measure Variables Sample ... n	*Predictions*		

Experimental Study Designs

- Pre experimental

Examples: One group pretest-post-test designs, One group post test only design, post test only design with non-equivalent groups, static group design

  - True Experimental

Examples : Pretest-post-test control group designs, Post-test only control group designs, Solomon four-group design, Factorial design , nested designs

- Quasi experimental

Examples: The time series experiment, the equivalent time samples design, the non-equivalent control group design

Pre-experimental Designs

- 1. The one-shot Case study

X O

Common knowledge comparison- Single group is studied once

Expose subjects to X, the new teaching method,

Administer test (O),the post test to measure mean reading speed after exposure to X

There is complete absence of control and no internal validity

Pre-experimental Design

- 2. The one-group pretest-postotest design

O1 X O 2

- Advantages: Pre-test provides a comparison between performances by the same group of subjects before and after exposure to X .
- **Provides a control for *selection* and *mortality* variables**

Pre-experimental Design

- 3. **The static group comparison**

Here a group which has experienced X, is compared with one which has not, for the purpose of establishing the effect of X.

History , Testing, instrumentation and regression factors are controlled .

True Experimental Design

- **4. Pretest - Posttest Control group Design**

Experimental group(R)

Control group (R)

O1	X	O2
O3		O4

R Random assignment

In general , internal validity gains strength in this design

True Experimental Design

- 5. **Variation of Design 4 . Pretest- posttest control Group design**

- E1 (R)
- E 2 (R)
- Control

O 1	X 1	O 2
O 3	X 2	O 4
O 5		O 6

- X 1 and X 2 are two methods / interventions

True Experimental Method

- **6.Randomized Solomon Four-group Design**

Pretested (R)	O 1	X 1	O 2
Pretested (R)	O 1	_	O 2
Un-pretested (R)	_	X 1	O 2
Un-pretested R)	_	_	O 2

Greater confidence can be placed on the findings

True experimental Designs

- **7. Randomized control group post- test only design**
- **Usually planned where pretest is not necessary, unavailable, inconvenient, or likely to be reactive**
- **Controls internal validity factors**

- **E (R)**
- **C (R)**

X	O 1
_	O 2

Quasi-Experimental Designs

- These designs are suitable for researches which are taken out of laboratory and into operating situation
- **8. The Time-series Experiments**

The essence of the time-series design is the presence of a periodic measurement process on some group or individual and the introduction of an experimental change into this series of measurements. Chief potential sources of internal validity are History and instrumentation

O1 O2 O3 O4 X O5 O6 O7 O8

Quasi- Experimental Design

- **9. Equivalent Time Sample Design**

  A recurrent form of one group experimentation employs two equivalent samples of occasions, in one of which experimental variable is present and in another of which it is absent, The effect of the experimental variable is anticipated to be transient or reversible character

X1O X0O X1O X0O

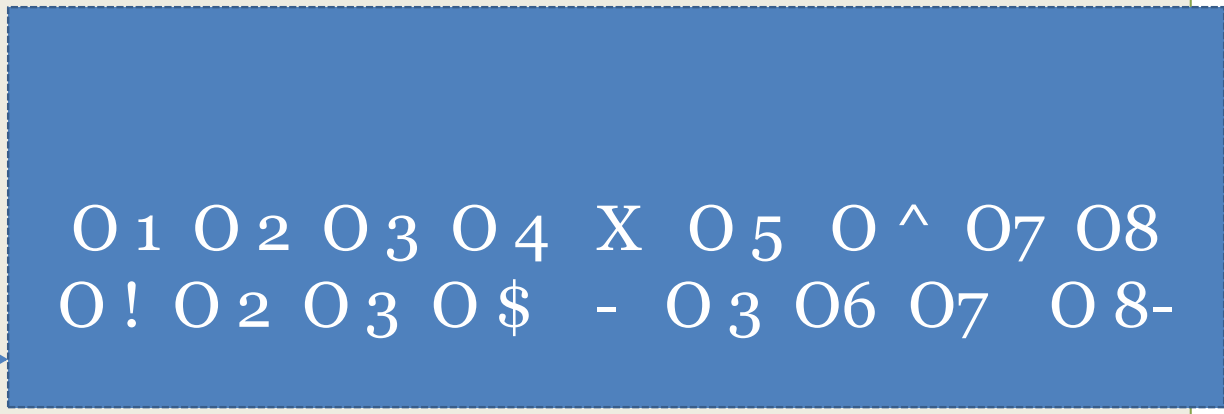
The Quasi Experimental Design

- **10 , The Non Equivalent Control group Design**

O 1	X	O 2
O 1		O 2

Control group Time series design

- Experimental group
- Control group



Factorial Design

- The simplest factorial design permits to study the effects of the two Xs (treatment) each of which is varied in two ways, i.e. , levels or values
-
  - **Teaching methods**
  - Mean difference

	Length of periods		
	50’	30’	Mean dif
Lecture	A 59.0	B 58,0	-1.0
Discussion	C 82.0	D 84.0	+ 2.0
	+ 23.0	+ 26.0	

Counter-balanced Design

	Time 1	Time 2	Time 3	Time4
• Group A	X1 O	X 2 O	X 3 O	X 4 O
• Group B	X 2 O	X 3 O	X 4 O	X 1 O
• Group C	X 3 O	X 4 O	X 1 O	X 2O
• Group D	X 4 O	X1 O	X2 O	X 3 O

- **This is a post test only design where pretests are inappropriate . Note each treatment occurs once in each column**

Summary

- **In essence, the goal of good design is to maximize (1) internal validity , (2) external validity and (3)minimize error**

Key Concepts in Experimental Design

- **Maximize the experimental**

Variance – done by designing

and planning

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Key Concepts - continued

- **Control the Extraneous Variance**

a) Select homogeneous subjects (b) employ randomization technique © Build extraneous variable right into the study (d)Control extraneous variable by matching (e) Use appropriate statistics. (

Key Concepts - Continued

- **Minimize the Error Variance**
  - **CONTROL MEASUREMENT CONDITION**
  - **INCREASE RELIABILITY**

END