DESIGN OF EXPERIMENT

PG –STAT-511

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THE PRINCIPAL OF EXPERIMENMTAL DESGIN

Some Terms Use in Design

- STATISTCAL EXPERIMENT –

  An Experiment is a plan for the collection and analysis of Data.

- EXPERIMENTAL UNIT –

  The smallest division of the experimental to which we apply the treatment and can make the observation on it is called **EXPERIMENTAL UNIT**. It is also called **EXPERIMENTAL PLOT**.

- TREATMENT –

  The treatment are the object of comparisons in an experiment.

❑ EXAMPLE: (i) Effects of different Fertilizers

(ii) The yield of different varieties of a crop

- EXPERIMENTAL ERRORS –

  The variation in responses (result) caused by the extraneous factor is termed as **EXPERIMENTAL ERRORS .**

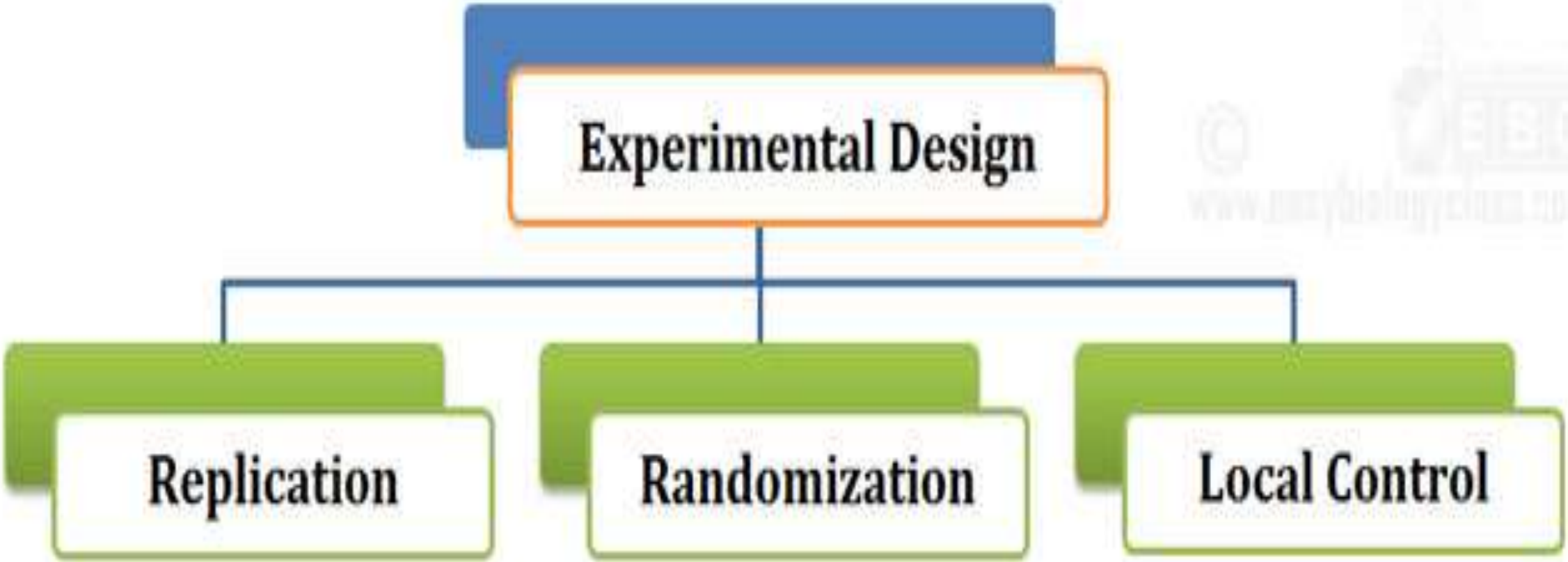
- Professor Ronald A. Fisher pioneered the design of experiment inn statistics.

- According to Fisher, a good experimental design should be :
  - ➢ Increase the efficiency of design
  - ➢Reduce the experimental errors.

- The increased efficiency and reduced experimental errors in experimental design are achieved by three basic principal .they are classically called the "PRINCIPLES OF EXPERIMENTAL DESIGN" , they are :
  - ❖ REPLICATION
  - ❖RANDOMIZATION
  - ❖LOCAL-CONTROL

Principles of Experimental Design

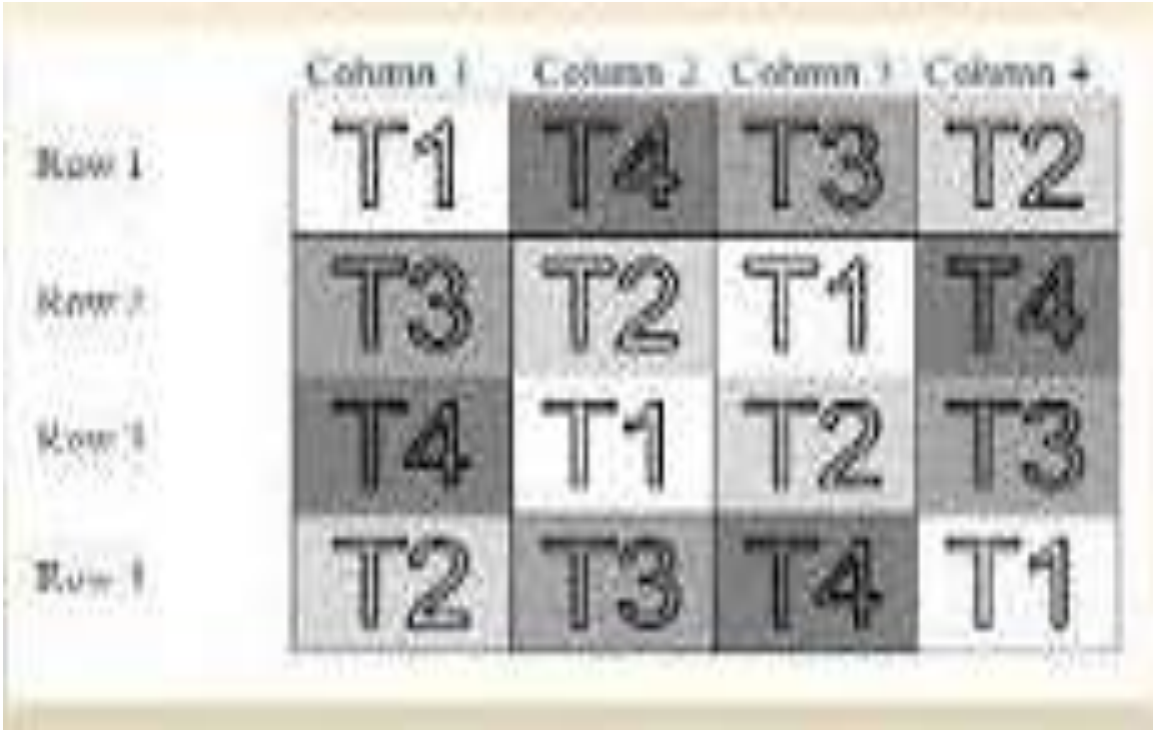
(Ronald A. Fisher)



REPLICATION

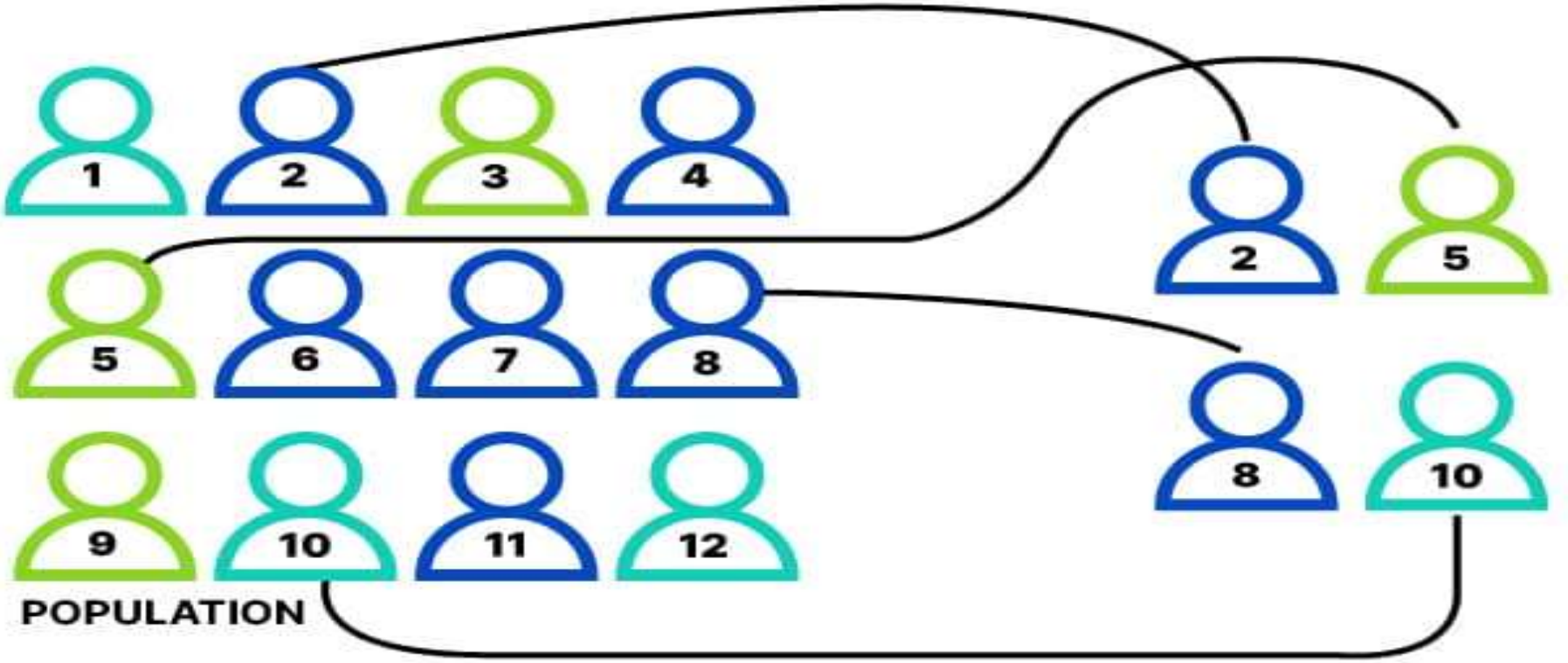
- The repetition of the treatments under the investigation is called replication.
- It helps to reduce the experimental errors.

Rep 1	Plot 1	Treatment 1
	Plot 2	Treatment 2
	Plot 3	Treatment 3
Rep 2	Plot 4	Treatment 2
	Plot 5	Treatment 3
	Plot 6	Treatment 1
Rep 3	Plot 7	Treatment 3
	Plot 8	Treatment 1
	Plot 9	Treatment 2



RANDOMIZATION

- When all the treatments have an equal chance of being allocated to different experimental units is called randomization. In the absence of ‘replication’, the randomization will NOT be effective.
- Replication and Randomization together form the foundation stone in the success of an experimental design.



LOCAL CONTROL

- The process of reducing the experimental errors by providing the relatively heterogeneous experimental areas into homogenous units is called Local-control.
- The local-control will increase the efficiency of the experimental designs.
- Local-control can be used to reduce the extraneous errors.
- Reduction of extraneous errors reduced ‘experimental errors’.

Different types of Experimental Designs

Experimental designs are broadly classified into TWO categories:

(i) Single-Factor Experiments

(ii) Multi-factor Experiments

Single-Factor Experiments:

- Single factor experiments are those experiments in which only a single factor varies while all others are kept constant.
- Here the treatments consist exclusively of the different levels of the single variable factor.
- All other factors are applied uniformly to all plots.
- Examples of Single-Factor Experimental Designs:

(1) Completely Randomized Design (CRD)

(2) Randomized Block Design (RBD)

(3) Latin-Square Design (LSD)

Multi-Factor Experiments

- Multi-factor experiments are also called as factorial experiments.
- They are used in the experiments where the effects of more than one factor are to be determined.
- A multi-factor experimental design is used to study a problem that is affected by a large number of factors.

Thank you