FOURTH PART

THE FOUR BRANCHES OF STATISTICS

Units of a set can be either ordered or not.

Unit mass can be either uniform or not.

Units are →	Non-ordered ≡ POPULATIONS	Ordered ≡ SERIES
Unit mass is ↓		
UNIFORM	CLASSICAL STATISTICS	Gy 1967
NON-UNIFORM	Gy 1951 generalized 1975	Gy 1979

SERIES OF ORDERED UNITS

- **SPATIAL ORDER** along geometrical axes. « Geostatistics » created by Matheron for the sampling of three-dimensional mineral deposits in 1962-65.
- **CHRONOLOGICAL ORDER** along time axis. « Chronostatistics » simultaneously devised by Gy for the sampling of one-dimensional flowing materials.

NON-ORDERED UNITS WITH AN EQUAL STATISTICAL WEIGHT

MODEL : 1. all manufactured objects or …
2. equally reliable analytical data.

PROPERTIES : absence of order and equal statistical weight (comparable masses)

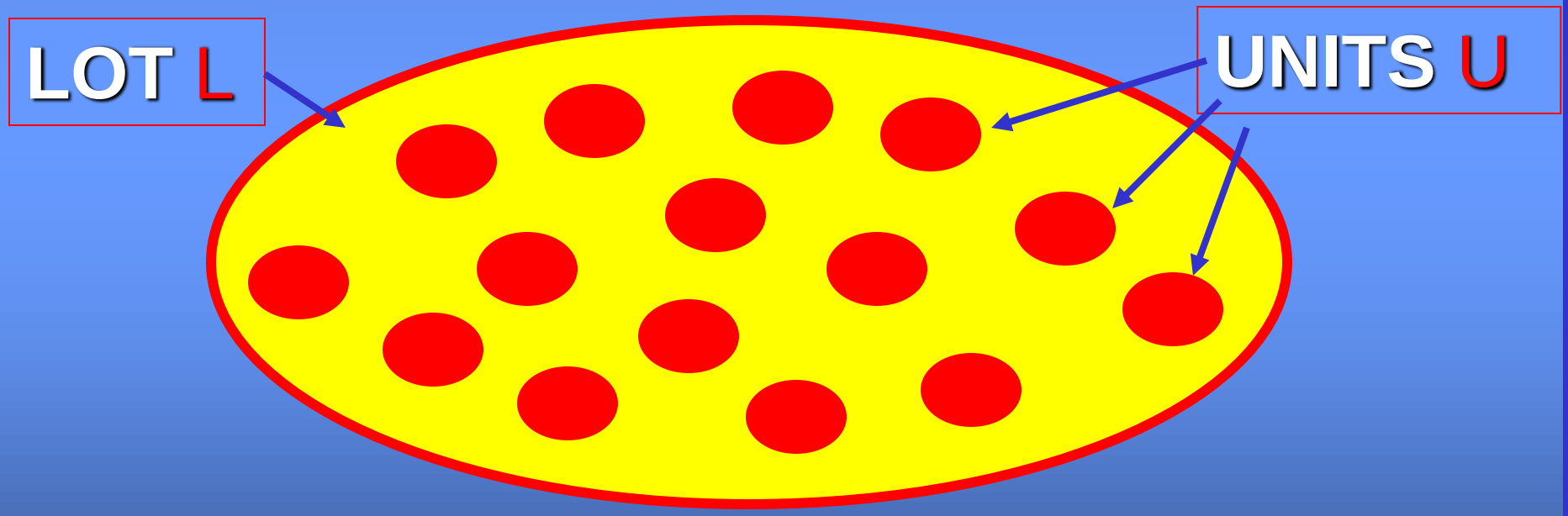
Treated in handbooks of « classical » stats.

THIS MODEL IS NOT APPLICABLE TO OTHER UNITS SUCH AS …

- **« Units with different statistical weights »**
- **« Ordered Units ».**

NON-ORDERED MATERIAL UNITS WITH A UNIFORM MASS

Mass uniformity may be approximate.
Units are given an equal statistical weight.



Units with a uniform mass are represented by ellipses of equal size.

NON-ORDERED MATERIAL UNITS WITH A NON-UNIFORM MASS

MODEL : mineral fragments on which the 1950-51 model has been developed.

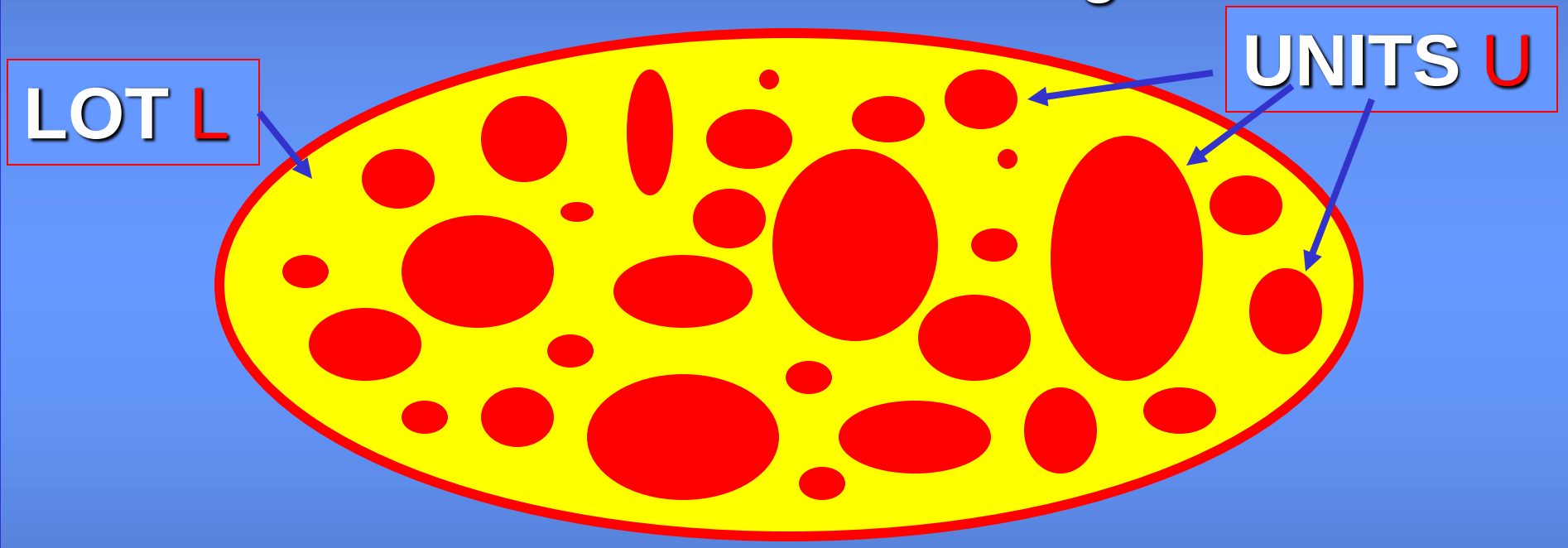
PROPERTIES : masses can be very different (e.g. range of 1 to 10^{20} and even more).

SUBJECT NOT TREATED in handbooks of classical statistics. Models Gy 1951 / 1975

DANGEROUS MATHEMATICAL MISTAKE
TRY TO SOLVE THE PROBLEM BY MEANS OF CLASSICAL STATISTICS

NON-ORDERED MATERIAL UNITS WITH A NON-UNIFORM MASS

Non-uniform mass is the most general case.



Units with different masses are repre-sented by ellipses of unequal size.

ORDERED UNITS WITH A MASS THAT CAN BE UNIFORM OR NOT

ORDER : generates **series**, not **populations**

MODEL : elongated objects, flowing batches

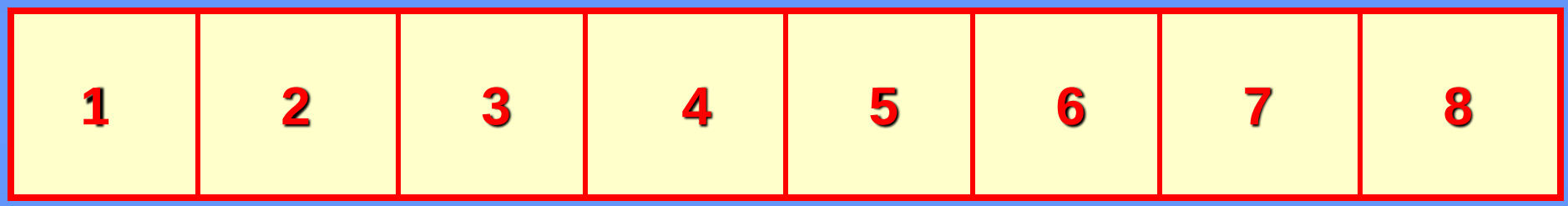
PROPERTY : units are **CORRELATED**.

SUBJECT : treated by Gy. Mass M_n assumed to be uniform in 1967. Model generalized to the weighted grade h_n of U_n in 1979.

DANGEROUS MATHEMATICAL MISTAKE : TO PROCESS SERIES BY MEANS OF FORMULAS MEANT FOR POPULATIONS

ORDERED UNITS WITH A MASS THAT CAN BE UNIFORM OR NOT

The order can be spatial or temporal (time series). It generates correlation.



EXAMPLE : load of a conveyor belt or elongated object (wire, bar, etc.)

THEORY of time series of weighted grades h_n is developed in the 1979 / 92 textbooks.