statistica 2.0
vivere l'innovazione
al servizio del Paese

X Conferenza
Nazionale di Statistica
Roma   15-16 dicembre, 2010

STUDIORUM UNIVERSITAS FLORENTINA
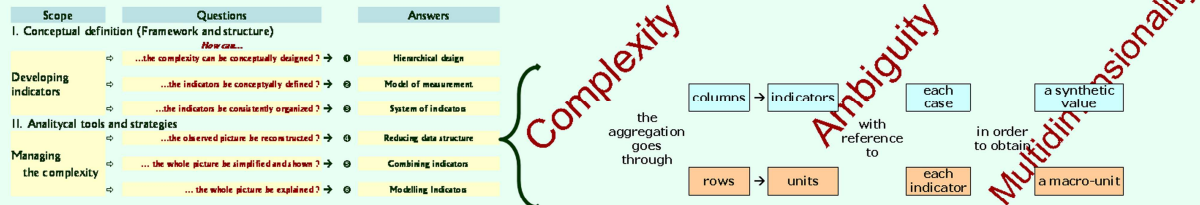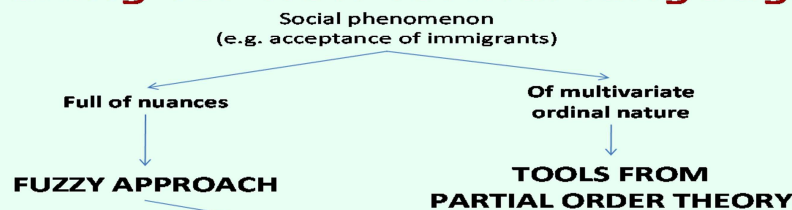
UNIVERSITÀ DEGLI STUDI DI MILANO BICOCCA

New tools for the construction, analysis and interpretation of social indicators based on ordinal variables

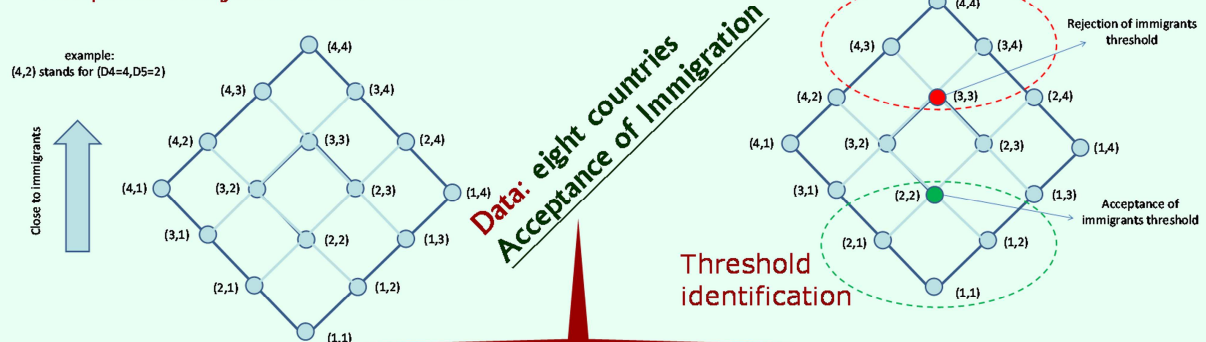## indicators construction ➔ consolidated tradition

Scope	Questions	Answers
I. Conceptual definition (Framework and structure)	*How can...*	
Developing indicators	...the complexity can be conceptually designed ? ➔ ❶	Hierarchical design
	...the indicators be conceptually defined ? ➔ ❷	Model of measurement
	...the indicators be consistently organized ? ➔ ❸	System of indicators
II. Analitycal tools and strategies	...the observed picture be reconstructed ? ➔ ❹	Reducing data structure
Managing the complexity	... the whole picture be simplified and shown ? ➔ ❺	Combining indicators
	... the whole picture be explained ? ➔ ❻	Modelling Indicators

Complexity

Ambiguity

Multidimensionality

the aggregation goes through

| columns | → | indicators | | each case | | a synthetic value |
with reference to
| rows | → | units | | each indicator | in order to obtain | a macro-unit |

Searching for new formal languages...

Social phenomenon
(e.g. acceptance of immigrants)

Full of nuances

Of multivariate
ordinal nature
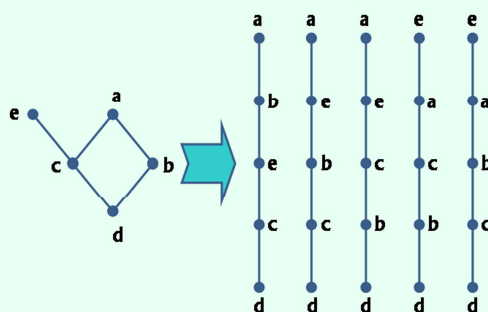
FUZZY APPROACH

**TOOLS FROM
PARTIAL ORDER THEORY**

A new language for treating complex multidimensional ordinal phenomena (and datasets)

The application shows how POSET theory can be used to compute indicators out of ordinal data, without turning them into numerical scores.
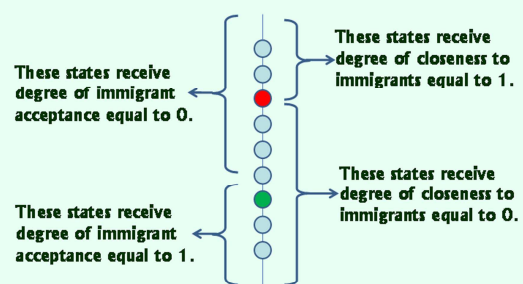
Acceptance configurations on D4 and D5

example:
(4,2) stands for {D4=4,D5=2}

Close to immigrants

Data: eight countries
Acceptance of Immigration

Rejection of immigrants threshold

Acceptance of immigrants threshold

Threshold identification

Linear extensions of a poset

The basic idea: pick up a linear extension...

These states receive degree of immigrant acceptance equal to 0.

These states receive degree of closeness to immigrants equal to 1.

These states receive degree of immigrant acceptance equal to 1.

These states receive degree of closeness to immigrants equal to 0.

State of the art

- Approach applied also to other social phenomena (deprivation)
- Computations performed without relying on heavy and complex numerical algorithms
- Possibility to define thresholds composed of more than a single node (→ more flexibility to actual situations)

Future perspectives

- Integration of POSET and Structural Equation Modeling
- Definition of
  - algorithms to help identifying thresholds
  - "weighting" schemes without introducing numerical weights
  - clustering algorithms, for reducing the dimension of posets, when the number of variables and/or the number of possible scores for each variable is high

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