

# **Indicators and complexity**

## **New challenges for indicator construction, use and communication**

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Filomena Maggino *Editor*

# Complexity in Society: From Indicators Construction to their Synthesis

 Springer

Academic (but not only)  
community





SEMPLIFICARE È PIÙ DIFFICILE  
(Bruno Munari)

making things complicated is easy, simplifying things is  
difficult





SEMPLIFICARE È PIÙ DIFFICILE  
(Bruno Munari)

making things complicated is easy, simplifying things is  
difficult

what cannot be said in few words cannot be said in  
many





*There are no good or bad things ...  
there are things done in a good way and  
things done in a bad way*



# Premise

## TOPIC

- considered a “niche field” from a scientific point of view
- never missed in any conference, workshop, seminar on measuring socio-economic dimensions during the last decades

PROCEEDINGS OF THE 1974 QUALITY-OF-LIFE MEASUREMENT  
CONFERENCE

# SOCIAL INDICATORS RESEARCH

AN INTERNATIONAL AND  
INTERDISCIPLINARY JOURNAL  
FOR QUALITY-OF-LIFE MEASUREMENT

*Editor: Filomena Maggini*

 Springer

# Premise

PIC

# 1974



# Outline

1. Construction
2. Use
3. Communication



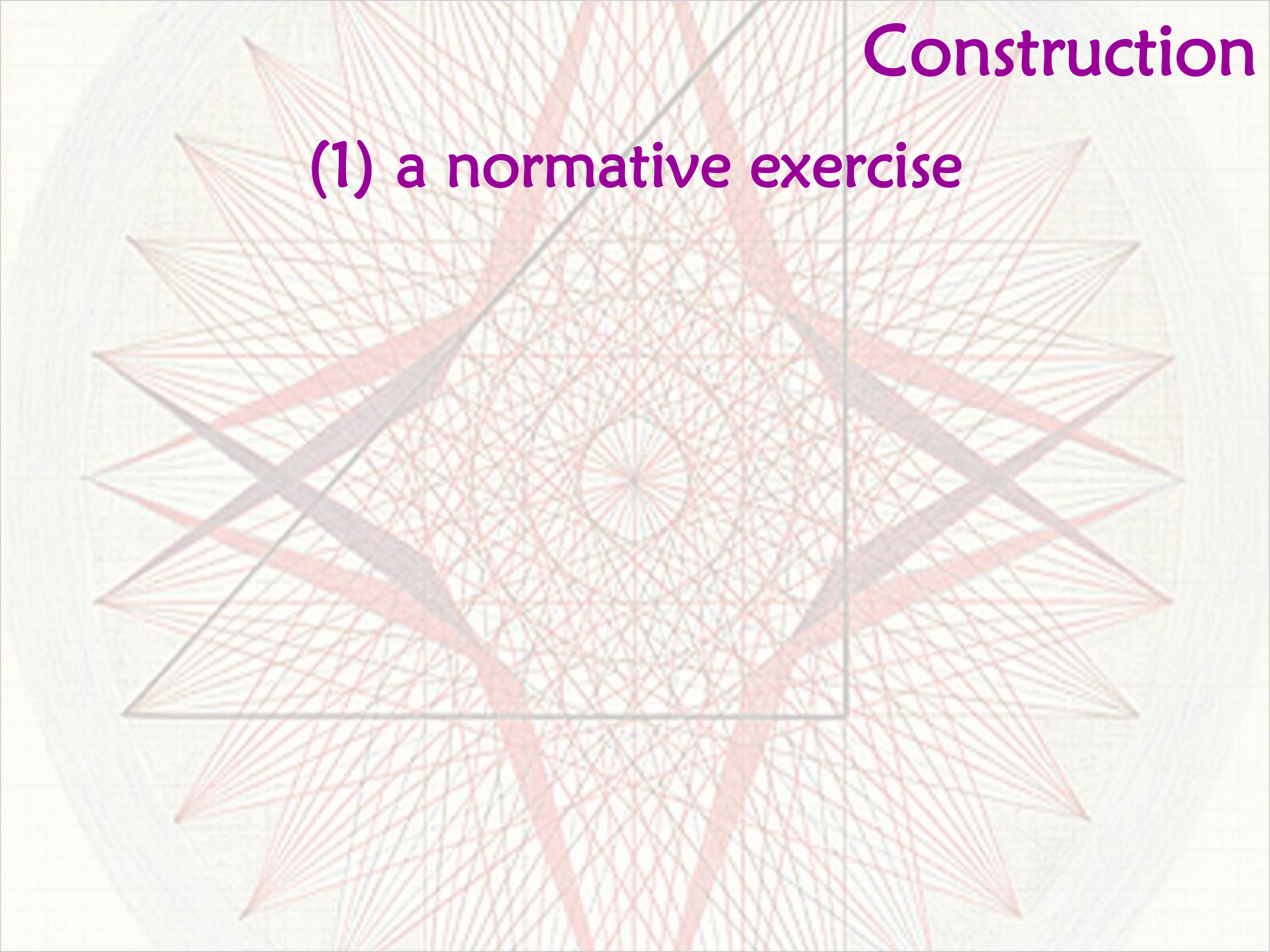
# Outline

1. Construction
2. Use
3. Communication



# Construction

(1) a normative exercise





# Construction

(1) a normative exercise

**Indicators construction**

between

**data-driven**

**concept-driven**

approach



# Construction

(1) a normative exercise

**Indicators construction**

**data-driven → more objectivity**



# Construction

(1) a normative exercise

**Indicators construction**

**data-driven → more objectivity**

*Does respect for data imply intellectual passivity?  
Is that **objectivity**?*



# Construction

(1) a normative exercise

## Indicators construction

measuring through definition ← **concept-driven**

*In order to start any measurement process, a crucial guiding principle should be identified ...*



# Construction

## (1) a normative exercise

In social sciences, where the concept of “indicator” was born, the measuring process requires:

- a robust *conceptual definition*
- a consistent *collection of observations*
- a consequent *analysis of the relationship* between observations and defined concepts.



# Construction

(1) a normative exercise

**Indicator**



what relates  
concepts to reality  
through observation



# Construction

(1) a normative exercise

Indicator



**not**

a simply crude statistical information

**but**

a measure organically connected to a conceptual  
model



# Construction

(1) a normative exercise

**Indicators should be developed and managed so that they ...**

- ... represent different aspects of the reality,
- ... picture the reality in an interpretable way, and
- ... allow meaningful stories to be told



# Developing indicators

## (1) a normative exercise

### **RISK**

lack of any logical cohesion and consistency

deforming reality through distorted results

(hidden – sometime - by using and applying  
sophisticated procedures and methods)



# Developing indicators

## (1) a normative exercise

normative nature of the selection of indicators  
cannot be denied

the process contains a “subjective” component



# Developing indicators

## (1) a normative exercise

normative nature of the selection of indicators  
cannot be denied

the process contains a “subjective” component

GDP is the most important example of failing in using a  
statistics as an indicator



# Construction

## (2) Dealing with complexity





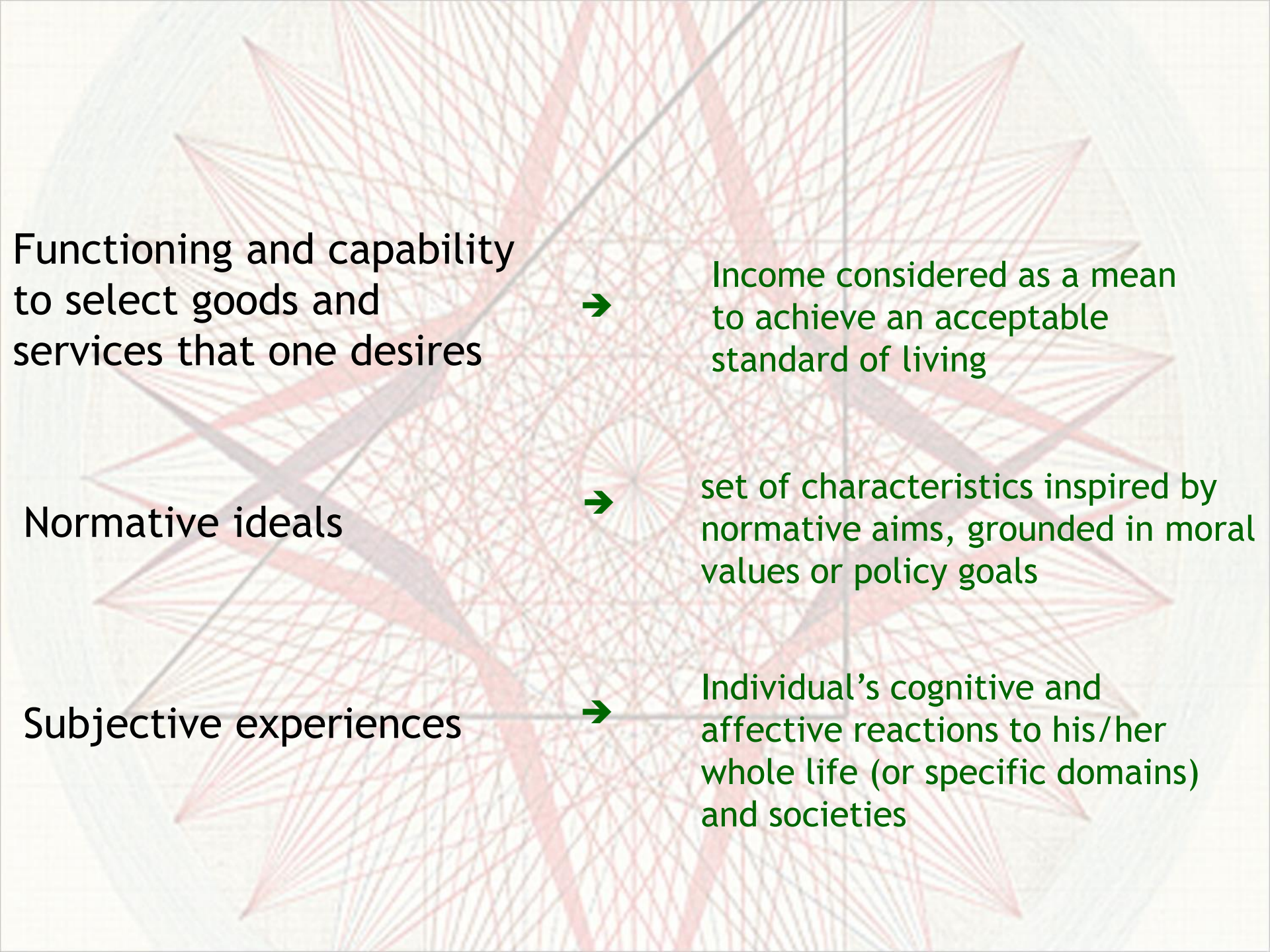
# Construction

## (2) Dealing with complexity

*The reality is complex with reference to*

**(A) STRUCTURE OF VALUES**





Functioning and capability  
to select goods and  
services that one desires



Income considered as a mean  
to achieve an acceptable  
standard of living

Normative ideals



set of characteristics inspired by  
normative aims, grounded in moral  
values or policy goals

Subjective experiences



Individual's cognitive and  
affective reactions to his/her  
whole life (or specific domains)  
and societies



# Construction

## (2) Dealing with complexity

*The reality is complex with reference to*

**(A) STRUCTURE OF VALUES**

**(B) OBSERVATIONAL PERSPECTIVES**



## PROCESSES

- 📌 growth
- 📌 progress
- 📌 development
- 📌 ....

## CONDITIONS

- ✓ availability of resources
- ✓ distribution of resources
- ✓ impact of policies
- ✓ ...

## GOALS

- sustainability
- quality of life
- well-being
- ...



# Construction

## (2) Dealing with complexity

*The reality is complex with reference to*

**(A) STRUCTURE OF VALUES**

**(B) OBSERVATIONAL PERSPECTIVES**

**(C) POINTS OF OBSERVATION**



*individuals*



*Quality  
of life*

- resources approach
- capabilities approach
- subjective well-being approach
- basic needs approach
- objective living conditions and subjective well-being approach

*societies*



*Quality of  
societies*

- liveability and quality of nations
- societal integration, solidarity and stability
  - social cohesion
  - social exclusion
  - social capital
- sustainability
- human development
- social quality



# Construction

## (2) Dealing with complexity

Complexity in constructing indicators ❖ Perspective of observation



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

conglomerative  $\longleftrightarrow$  deprivational

input  $\longleftrightarrow$  outcome

positive  $\longleftrightarrow$  negative

benefits  $\longleftrightarrow$  costs

status  $\longleftrightarrow$  trends



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation



# Construction

## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

micro  $\longleftrightarrow$  macro

internal  $\longleftrightarrow$  external



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics



# Construction

## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

objective  $\longleftrightarrow$  subjective

quantitative  $\longleftrightarrow$  qualitative



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics
- ❖ Level of dis/aggregation



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- Time frame
- Area sizes



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics
- ❖ Level of dis/aggregation
- ❖ Criteria



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- goals
- identifying benchmarks
- reference standards
- ...



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics
- ❖ Level of dis/aggregation
- ❖ Criteria
- ❖ Levels of complication



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- cold indicators
- hot indicators
- warm indicators



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics
- ❖ Level of dis/aggregation
- ❖ Criteria
- ❖ Levels of complication
- ❖ Purposes



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- descriptive
- explicative
- predictive
- normative
- problem-oriented
- evaluating



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- ❖ Perspective of observation
- ❖ Level of observation
- ❖ Nature of the observed characteristics
- ❖ Level of dis/aggregation
- ❖ Criteria
- ❖ Levels of complication
- ❖ Purposes
- ❖ Governance context



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

- public debate
- policy governance
- administrative guidance



## (2) Dealing with complexity

*Complexity in  
constructing  
indicators*

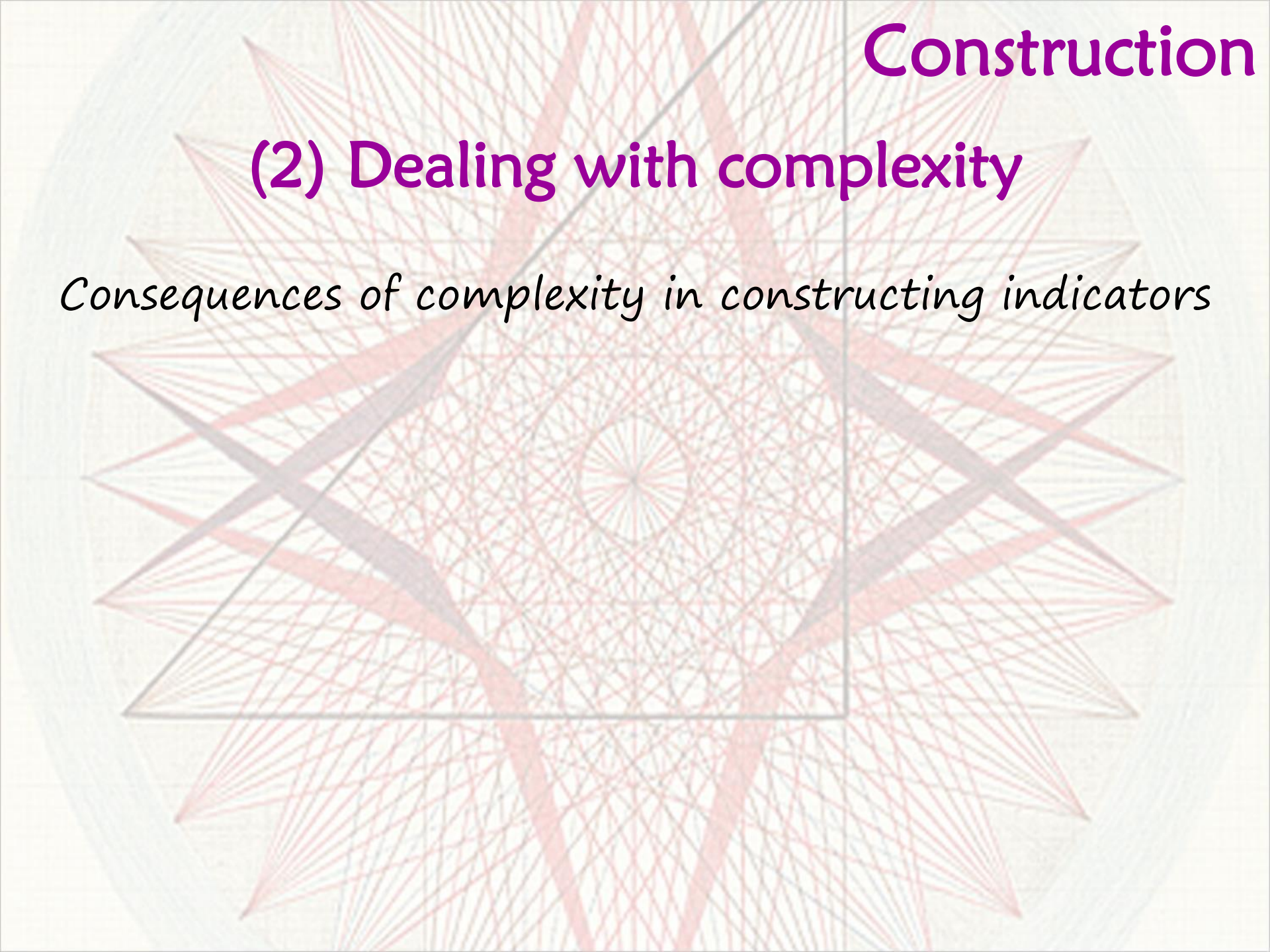
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- ❖ Level of dis/aggregation
- ❖ Criteria
- ❖ Levels of complication
- ❖ Purposes
- ❖ Governance context
- ❖ .....



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*





# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

Indicators → numbers

????



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

An indicator is **not** necessarily a **number**



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

An indicator can be an **object**

*able to preserve the complexity by stylizing it*

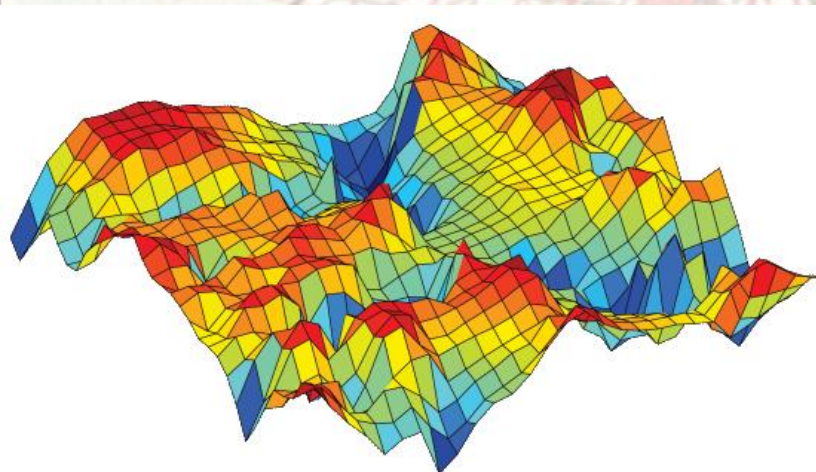
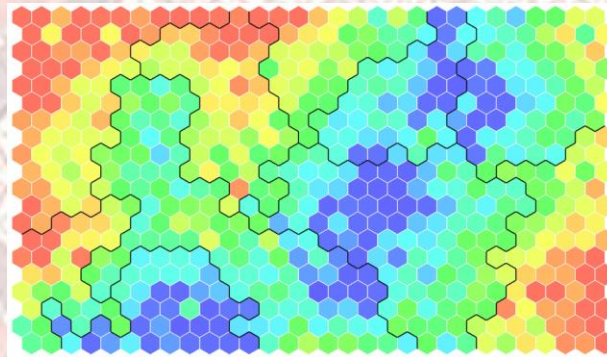


# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

*a map*





# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



*what we are going to construct should be an **authentic representation** of the reality*



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



not a compress / pointfold / pointform representation

*but*



## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



not a compress / pointfold / pointform representation

*but*

*a representation preserving the systemic characteristic of the  
phenomena*

*defined by **elements and their relationships***



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



**from**

**points** (numbers)

**to**

**pattern** (simplified shape and structure)





© Oleg Shuplyak



## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



**multidimensionality**

should not be considered a noise to be removed

**but**

should be an intrinsic characteristic of the synthesis



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

This has methodological consequences



**This could introduce some incomparabilities**

tomorrow presentation



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

ARTS



beautiful examples of constructing synthetic  
representation do the reality

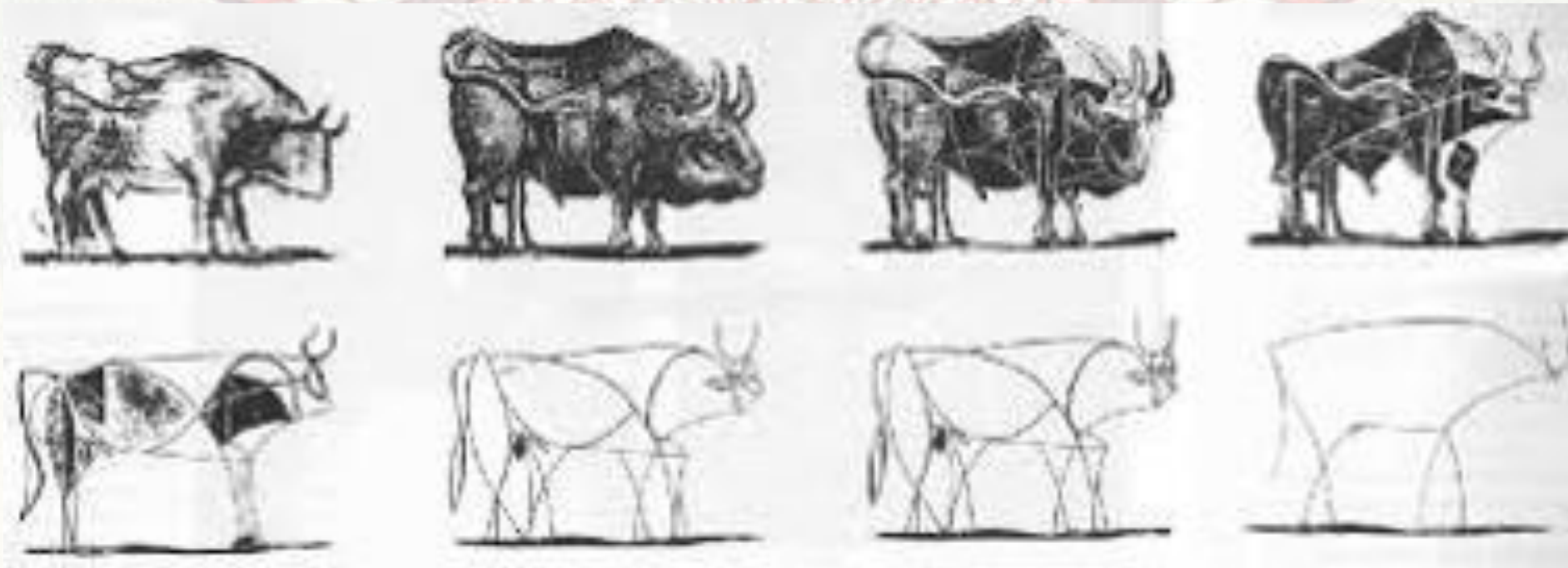


# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

ARTS



Pablo Picasso



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

ARTS

*Soldati*

*(Giuseppe Ungaretti)*

*Si sta come d'autunno sugli alberi le foglie*

*(staying like in fall the leaves on trees)*

Powerful representation of soldiers' life during the First World War (n.b. the use of metaphors)



# Construction

## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

Visual complexity



crossroad of different competences

images

words

numbers

arts



## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

Visual complexity: metaphors

- ***three of life***, able to represent hierarchies and classify elements (particularly useful in hierarchical systems)
- ***networks***, able to represent diversity, decentralization, non-linearity



## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

Visual complexity: metaphors

For example, network visualization may emphasize different aspects (density, organic growth, instability, dynamism) and/or different structure (symmetry, top-down, stable dimensions).



## (2) Dealing with complexity

*Consequences of complexity in constructing indicators*

### Visual complexity: perspectives

- representing complex and dynamic data
  - interactive data collection and communication (social data collection)
  - management of continuous data flows (extracting interesting points from the flow)
  - making data more accessible and meaningful
- visualizing priorities
- ambient visualization
- collective intelligence (cybernetics)



# Outline

1. Construction
- 2. Use**
3. Communication



## (1) Systemic approach

*Avoiding the point representation produces many indicators*

Using them requires a systemic approach



## (1) Systemic approach

*Avoiding the point representation produces many indicators*

Using them requires a systemic approach

Indicators → bricks of knowledge

SET →





## (1) Systemic approach

*Avoiding the point representation produces many indicators*

Using them requires a systemic approach

Indicators → bricks of knowledge

SYSTEM →





## (1) Systemic approach

In other words, indicators should be used

**not**

as separated and schizophrenic elements

**but**

as sensors connected to each other



## (1) Systemic approach

This is  
*important in the monitoring and reporting  
exercise*  
but is  
*essential in defining sustainability policies*



## (1) Systemic approach

*Losing the systemic view  
is risky*



## (1) Systemic approach

*Losing the systemic view  
is risky*

Sparrow paradox





## (1) Systemic approach

*Losing the systemic view  
is risky*

Sparrow paradox

**Indicators:** sparrows and wheat → highly negatively correlated



**Hypothesis:** possible hunger for humans



**Policy action:** Suppression of sparrows



**Indicators:** sparrow and wheat → highly positively correlated (no sparrow and no crop)



## (2) Indicators and goals

### **(Donald) Campbell's Law:**

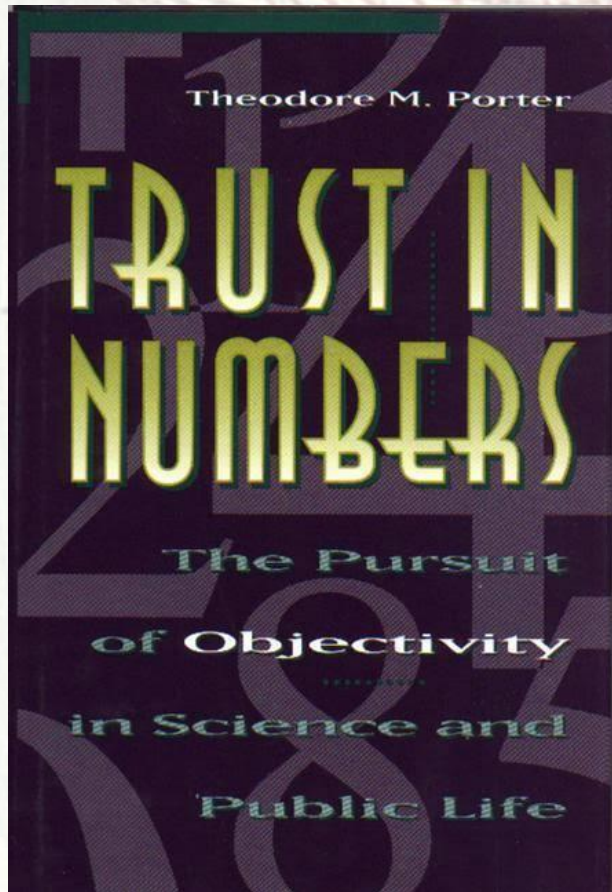
The more any indicator is used for social decision-making, the more subject it will be to corruption pressures and the more apt it will be to distort and corrupt the social processes it is intended to monitor.

### **Also Charles Goodhart:**

When a measure becomes a target it ceases to be a good measure.

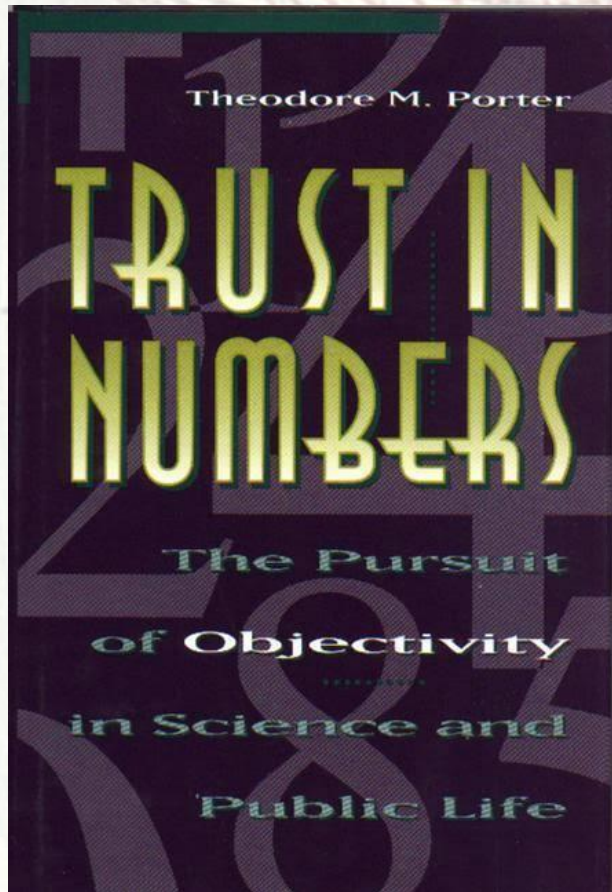


## (2) Indicators and goals





## (2) Indicators and goals



The soft power of numbers and indicators is characteristic of our time.

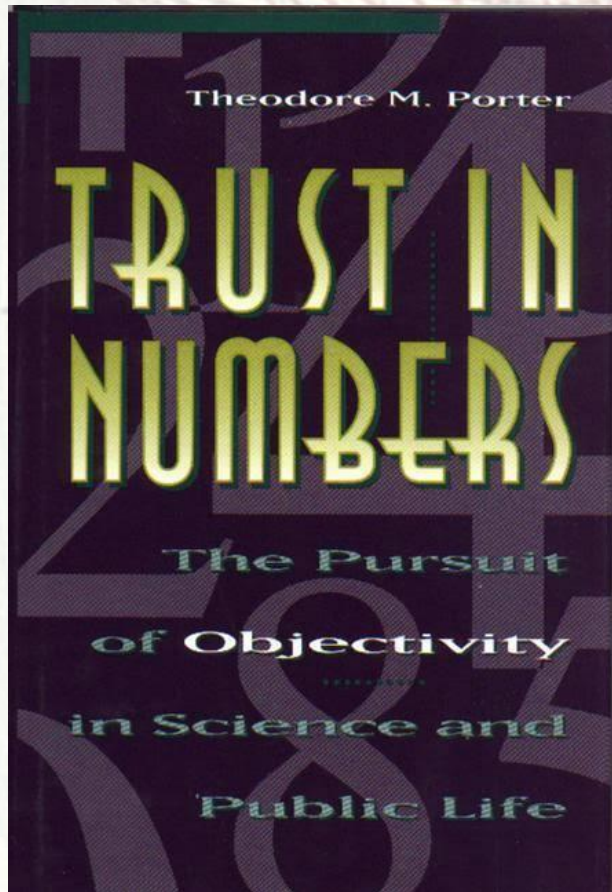
e.g. PISA process (Program for International Student Assessment)

We should admit that it created a problematic and disputable regime of testing.

These tests are not merely measures. They define new structures of incentives whose consensus should be discussed.



## (2) Indicators and goals



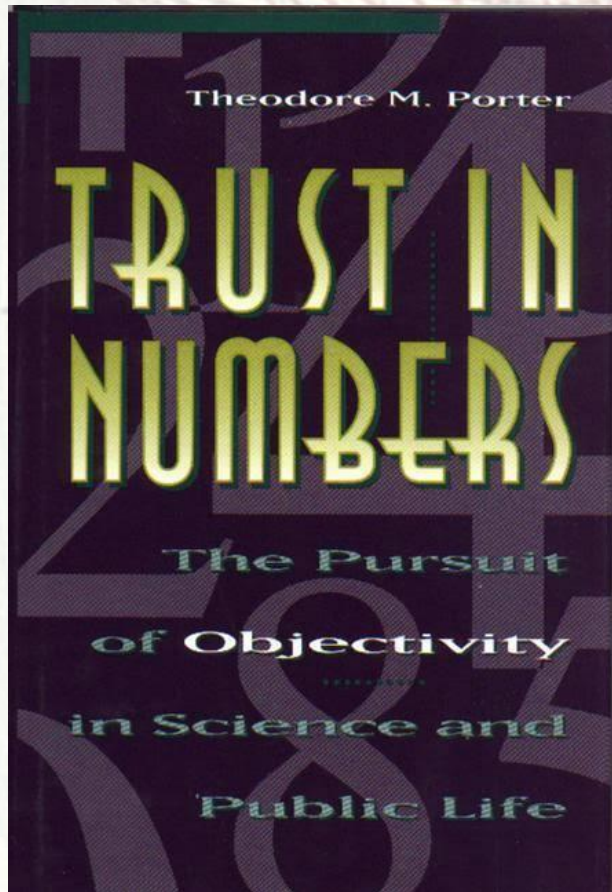
Numerical comparison can be valuable.

However...

1. Better numbers do not always correspond with genuine improvement.
2. Different political, cultural, and economic systems may have good reasons to pursue different goals in differently organized systems



## (2) Indicators and goals



Power from Numbers

Yes, but data don't interpret themselves

We should beware of treating statistics as a **technical** field, in which statisticians and subject specialists (guided, perhaps, by political leaders), seek the best measures even when they do not correspond to the best outcomes.



## **(3) Being normative or not**

The previous considerations urge the following questions



## (3) Being normative or not

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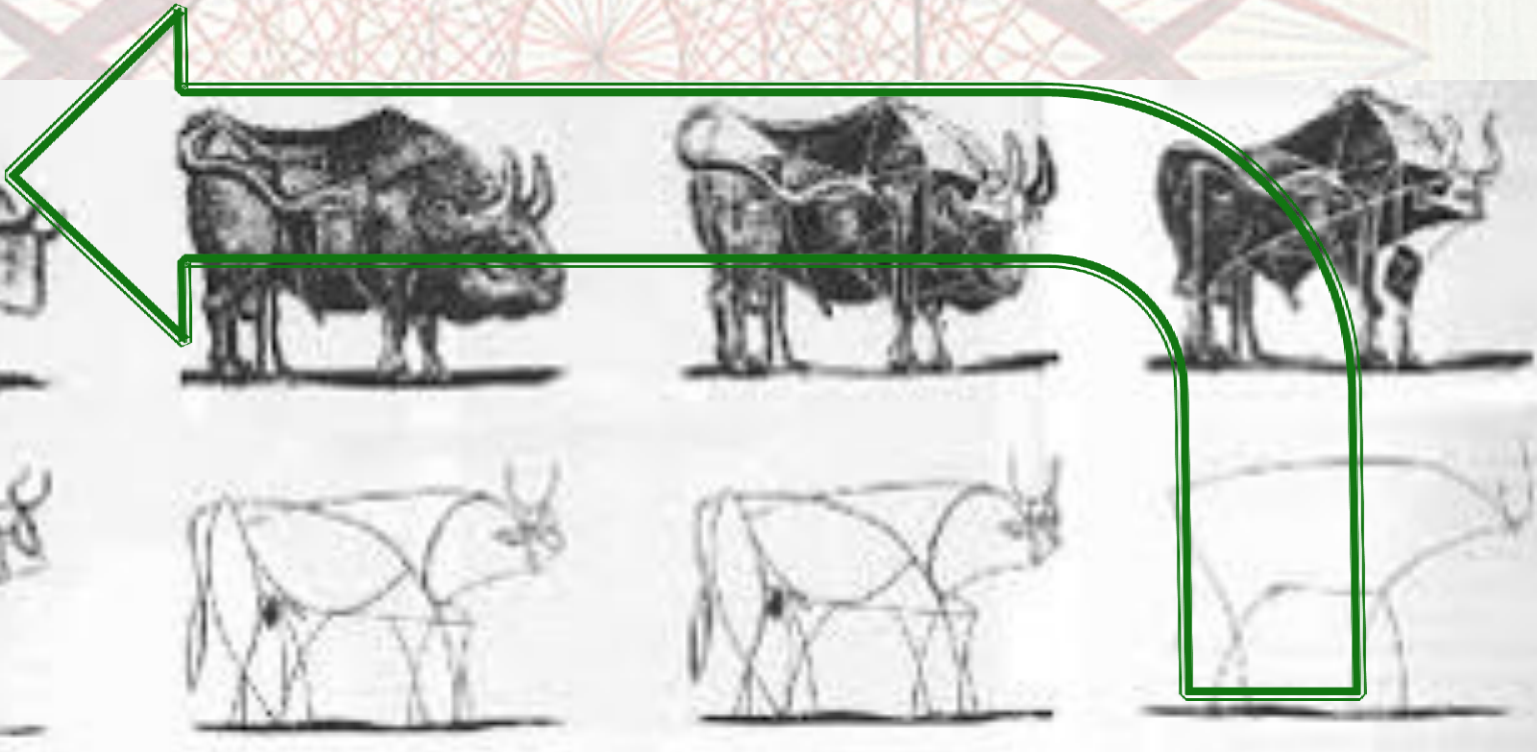
**Complexity:** In front of complexity, should we be normative or not?



## (3) Being normative or not

The previous considerations urge the following questions

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## (3) Being normative or not

The previous considerations urge the following questions

**Complexity:** In front of complexity, should we be normative or not?

**Dashboard:** is it simply a matter of managing a *flight desk* or should it be a factor of growing in the knowledge but also in the awareness (in other words, lever of change for all the actors involved)?



## (3) Being normative or not

The previous considerations urge the following questions

**Complexity:** In front of complexity, should we be normative or not?

**Dashboard:** is it simply a matter of managing a *flight desk* or should it be a factor of growing in the knowledge but also in the awareness (in other words, lever of change for all the actors involved)?

**Ranking:** can we sacrifice the complexity in the name of comparability (which almost always aims at ranking cases, as if we live in a permanent soccer championship)?





# Outline

1. Construction
2. Use
- 3. Communication**



# Communication

## Are indicators enough?

The previous reflections and observations have many implications:



# Communication

## Are indicators enough?

The previous reflections and observations have many implications:

- transparent *information system*, aware of complexity
- *education* of the citizens, educated to complexity
- an important apparatus of *data production*



# Communication

## Are indicators enough?

This means that some institutions play a strategic and important role :

- *Media system*
- *Education and university system*
- *Official statistics*



# Communication

## Are indicators enough?

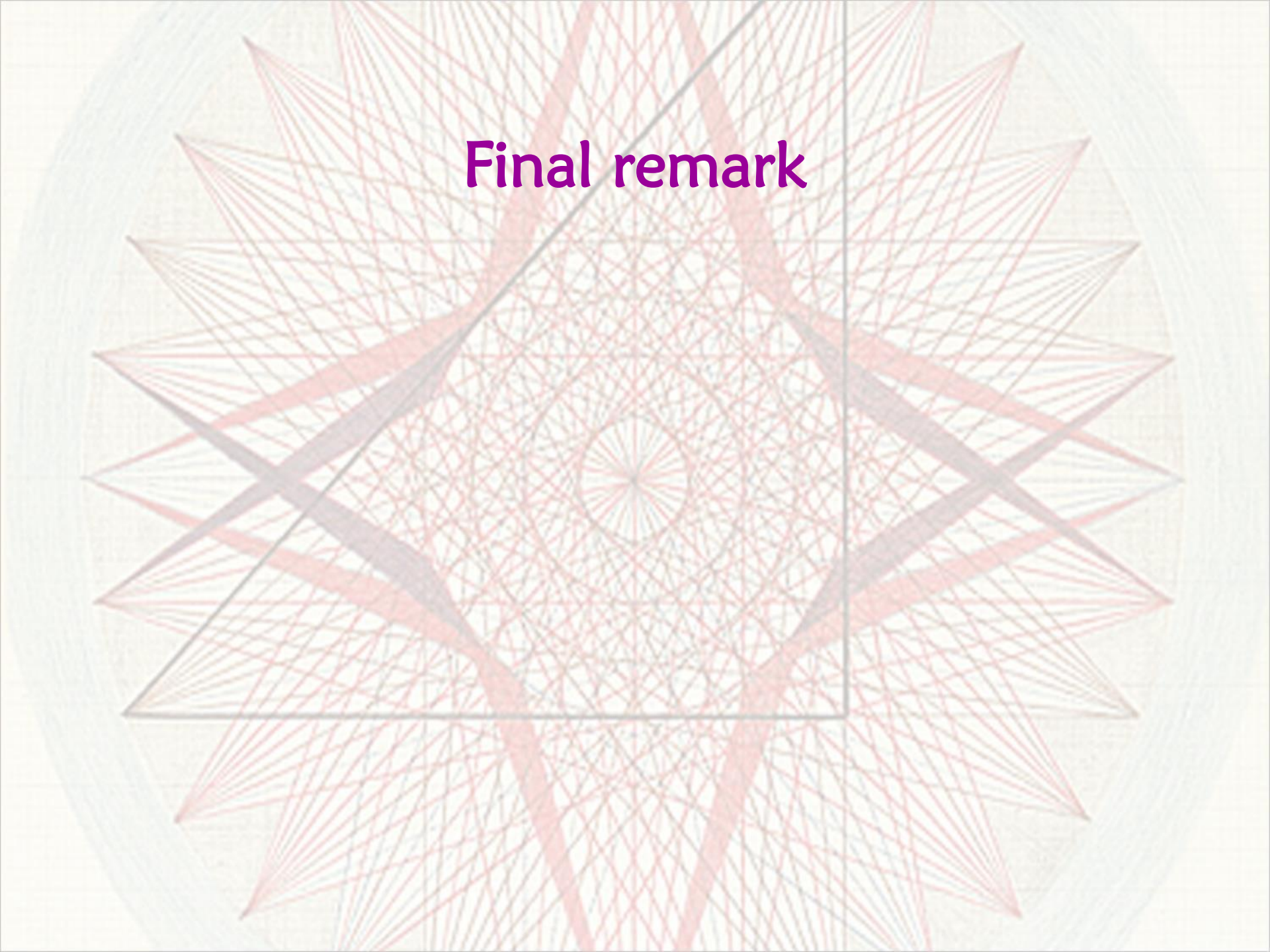
This means that some institutions play a strategic and important role :

- *Media system*
- *Education and university system*
- *Official statistics*

... all should meet social consensus

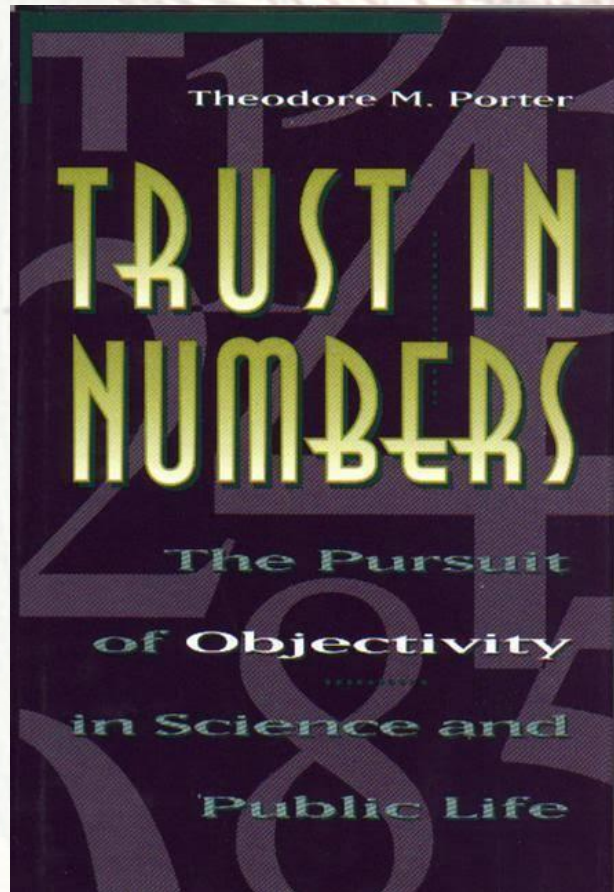


**Final remark**





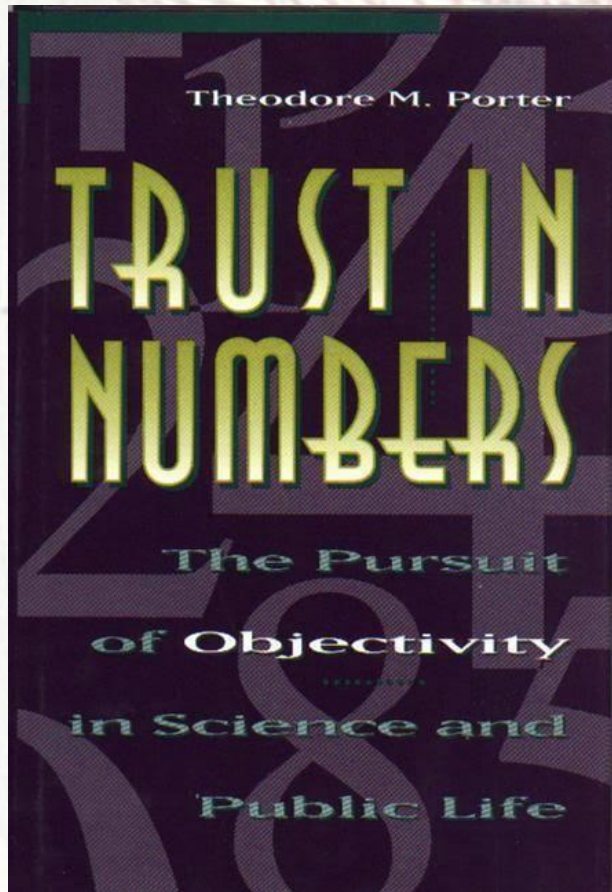
## Final remark



*If you hope to use indicators and other measures to make the world navigable in simpler terms ...*



## Final remark



*If you hope to use indicators and other measures to make the world navigable in simpler terms ...*

*... be careful what you wish for.*





*Many thanks for your attention*

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