How far can Q-analysis go into social systems understanding ?

Jacky LEGRAND

Département Informatique
Université Paris 2
legrand@u-paris2.fr

Expose outlines

To motivate the more formal written paper

To give an intuitive feeling for Q-analysis

1) A fishing story among islands

2) Theoretical assessment

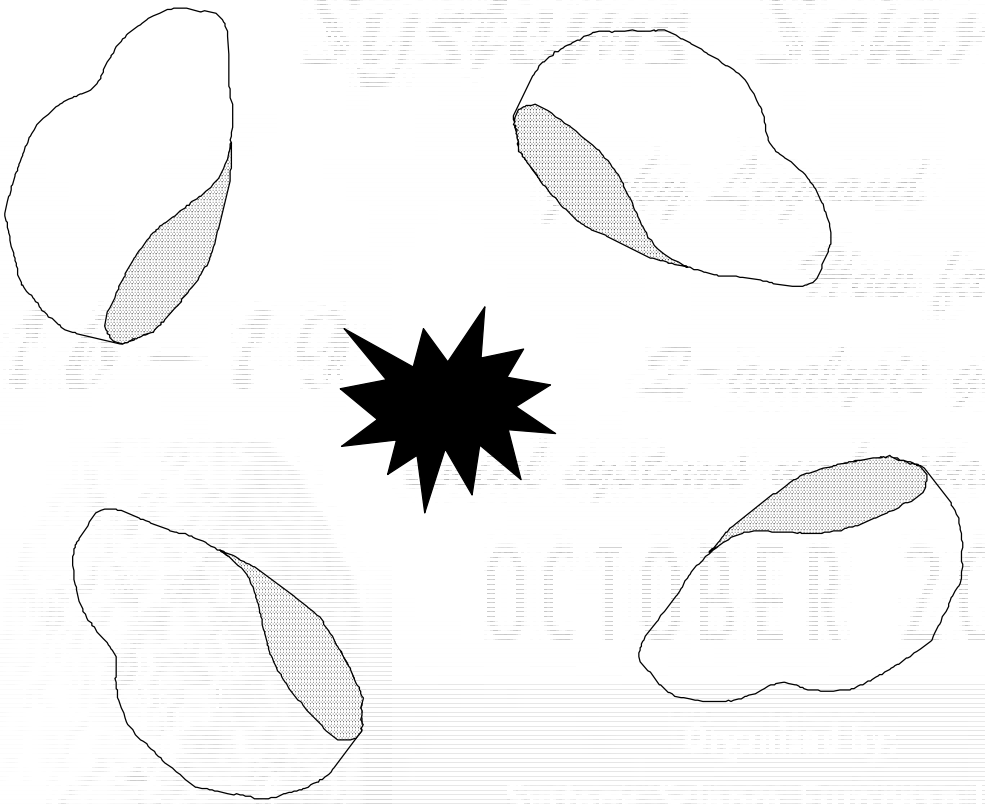
3) Systemic assessment

Topological feeling 1 : description

Once upon a time

The country of the sea …

Four islands with a sandy beach and a rock …



A golden place for fishing with nets

Topological feeling
2 : interpretation

Outside the islands the sea is rough
Life takes place on a disk with one hole

The fishermen move round the rock

The fishermen drag from the rock to the sandy beaches

The fishes are in a doughnut

The fishing nets
from the fishermen point of view
any closed curve creates 2 disjoint surfaces
hope for fishing

The fishing nets
from the fishes point of view
only a sphere creates 2 disjoint volumes
hope for life

Any loop including the abrupt rock cannot be retracted

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OCTOBER 2002
Organized by:
Systems Science European Union
President: Evelyne Andreewsky
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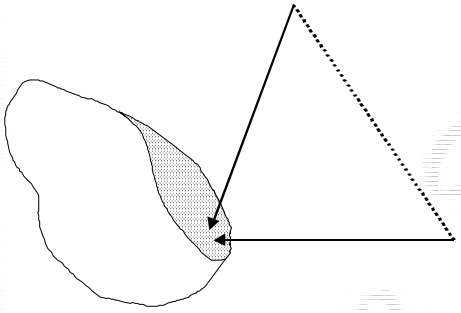
President: Michael Peckos
Conference President: Nicholas C. Rantos

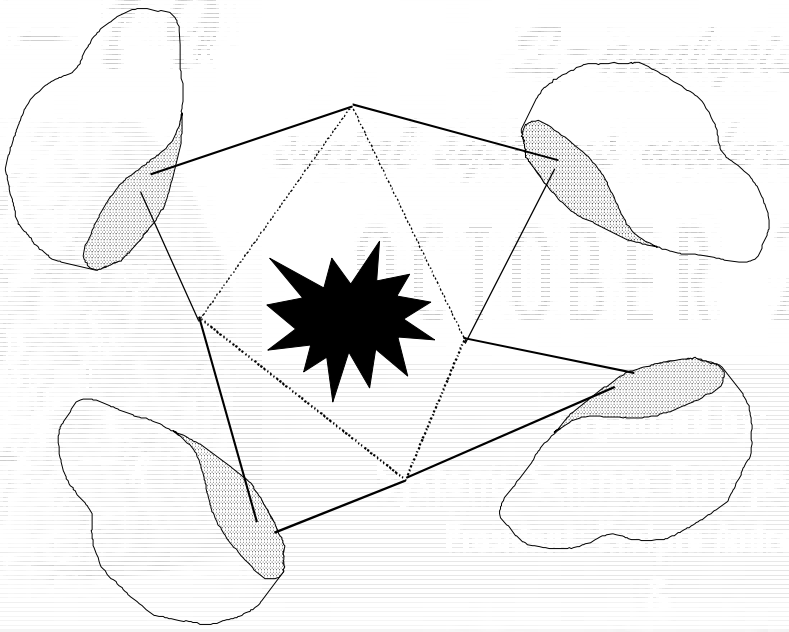
Simplicial complexes feeling 1 : description

Going on with additional constraints :



Net fishing is performed by dragging from a beach
technical norm
(including ropes length)

Previously dropped nets cannot intersect
legal norm
(regulates at a lower level to insure
a higher level freedom : actual fishing)



Simplicial complexes feeling 2 : interpretation

3 points represent each fishing net
(x_1, x_2, x_3) (a **simplex** of dimension 2)

Fishing geometry results from a triangulation (simplices)

The **complex** is the union of the simplices

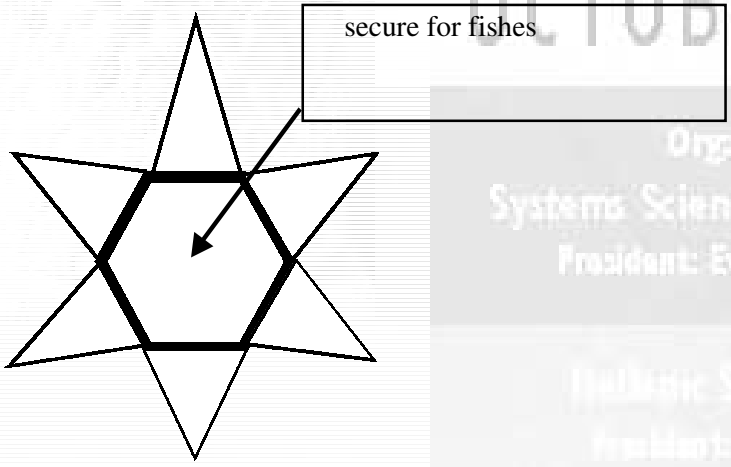
Faces or vertices **sharing** is allowed
(intersection is a nonsense)

Some simplices are missing (in the middle)

The rock is a "hole"

Either nets are the "boundary" of fishing actions

Or the net are **not** the "boundary" of fishing actions



Q-analysis feeling
1 : description

The fishermen may live on the islands (but not necessarily)

The sandy beaches are not fishermen's properties
but
Fishermen are associated in direct relations (family link)

The alternative ways of fishing are :

1) a fisherman drops a net and sail back to drag

2) one fisherman drops a net
   another one stands on the beach

3) two fishermen drop the net (one for each end)
   a third one stands on the beach

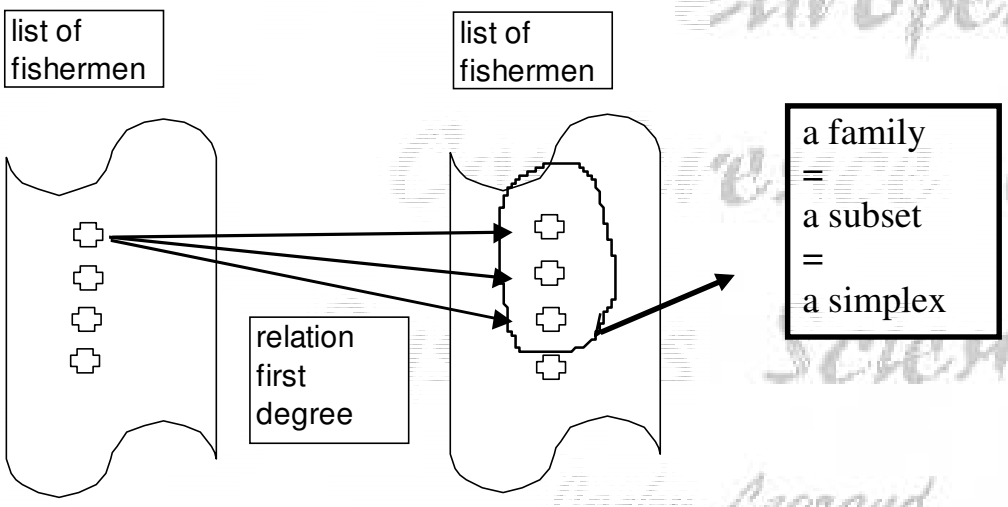
The choice may be economically guided

The choice may be normative according to safety regulation

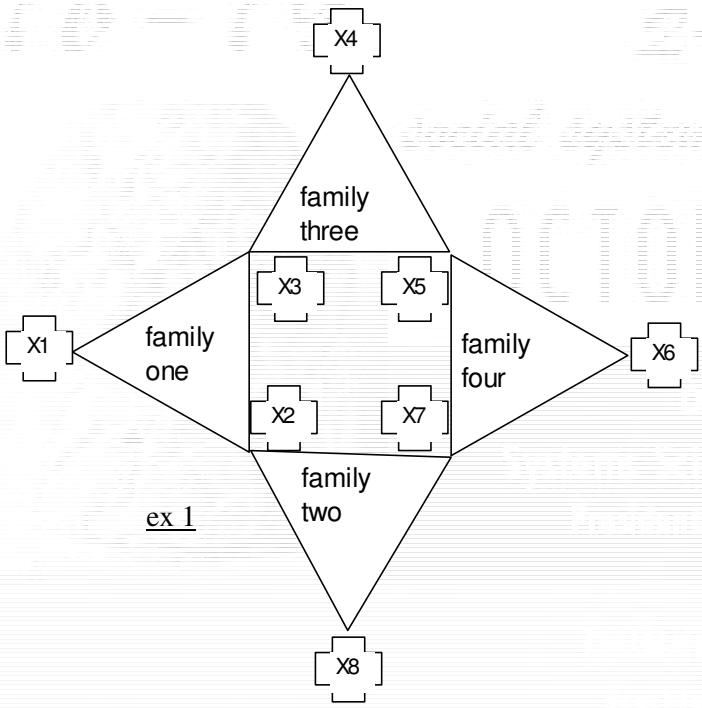
A fishing action is performed within a family

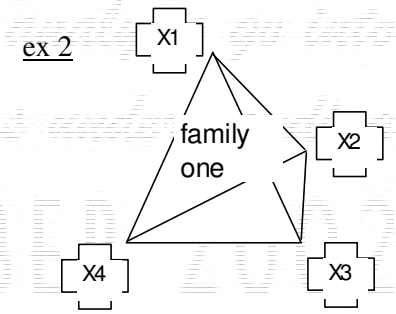
A custom issued from common sense
(testimony and confidence notions)

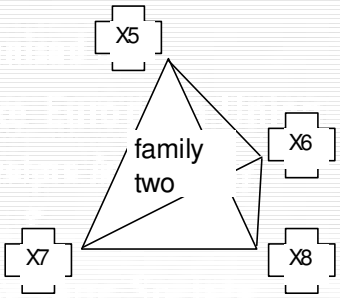
Q-analysis feeling
1 : description (continued)



According to the relations, a complex may be constructed







Q-analysis feeling
2 : interpretation

EX 1

Fishing teams method 2 (two fishermen)
How many choices :
- 4 different simultaneous teams
- 2 different constructions

Many allowed rotations when less than 4 teams

Fishing teams method 3 (three fishermen)
How many choices :
- 2 different simultaneous teams
- 2 different constructions

No other choice

The more teams the more fishing zones

The more constructions the more flexibility

Does EX 2 allow more or less flexibility ?

The complex as a backcloth for social life modelling

a

The degree of connectivity

a

The number of parts at a given degree of connectivity

Backcloth and traffic feeling
1 : patterns modification

EX 1

What about fishing teams when the family links are extended to the transitive closure (any degree relations) ?

The 8 fishermen allow 2 teams of 3 but anybody may play
56 possibilities

The complex "organizes"
The "octahedron" is maximum flexibility

Let a binary function describing activity
(having Active/Inactive as value for any fisherman)

Let the value at T_0 be
(A A A I I A A A) for (X1 X2 X3 X4 X5 X6 X7 X8)

Let X1 be injured at T_1 and become Inactive

How freely can the vector change to continue fishing ?

(I ? ? ? ? ? ? ?) for (X1 X2 X3 X4 X5 X6 X7 X8)

"family" complex + requested teams dimension

Backcloth and traffic feeling 2 : traffic generator

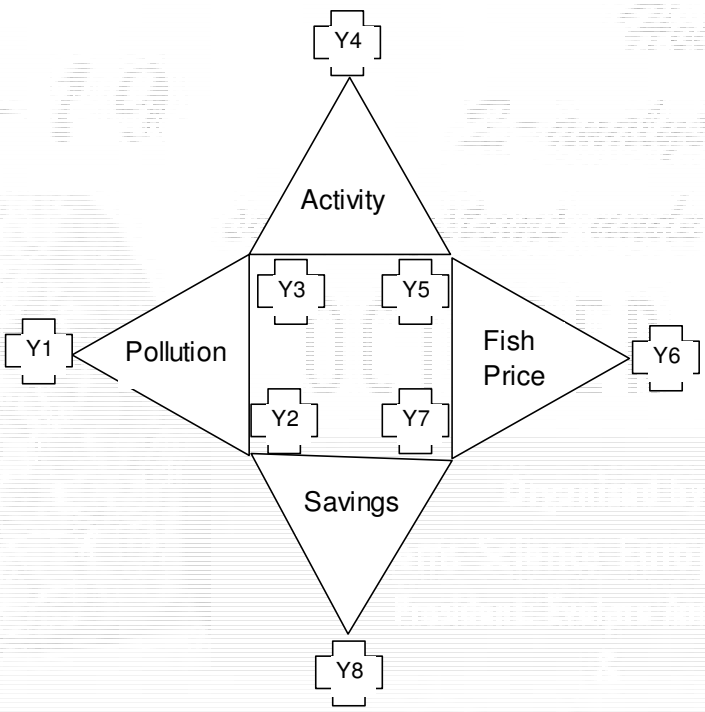
Let consider a set of vertices :

Y1 : Tide, Y2 : Living Standards, Y3 : Diesel Oil,
Y4 : Forecast, Y5 : Fish Quantity, Y6 : Grants,
Y7 : Sold Quantity, Y8 : Outgoings

Let consider a set of simplices :

Savings, Pollution, Fish Price, Activity

The constructed complex may be visualized as :



Backcloth and traffic feeling
2 : traffic generator (continued)

Let consider a set of topoï describing the economic life

When Diesel Oil quantity decreases, Activity decreases
When Fish Quantity decreases, Activity increases
etc ...

For example a cycle in the complex may be described as

Fish Quantity ↗ Fish Price ↘ Sold Quantity ↗ Savings ↗
Living Standards ↗ Pollution ↗ Diesel Oil ↘ Activity ↘
Fish Quantity ↘ Fish Price ↗ Sold Quantity ↘ Savings ↘
Living Standards ↘ Pollution ↘ Diesel Oil ↗ Activity ↗
Fish Quantity ↗ and so on

Let a simplex be added to figure subjective behaviour

Laziness : (Y2 , Y5 , Y7)
Living Standards, Fish Quantity, Sold Quantity

The cycle may be retracted

Fish Quantity ↗ Fish Price ↘ Sold Quantity ↗ Savings ↗
Living Standards ↗ Laziness ↗ Fish Quantity ↘
Fish Price ↗ Sold Quantity ↘ Savings ↘
Living Standards ↘ Laziness ↘ Fish Quantity ↗ and so on

Holes are both generator and obstruction for the traffic

Theoretical assessment

Similar mathematical forms for different things
From mathematical tools to metaphorical discourse
The implicit semantic choices are to be studied

1) From topology to complexes : combinatorial & algebraic

2) From complexes to complexes on a relation : Dowker 52

3) Relationships between what and what ?
What does the complexes describe?
Atkin (72) and Q-analysis exponents' constructions

4) Meaning of the simplices
Binary relations induce n-ary relations
Hypergraphs or not hypergraphs

5) Meaning of connectivity
What does it mean to share elements
Nearness VS transitive closure of nearness

6) Meaning of "missing simplices"
What does the holes in connectivity mean ?
Atkin pseudo-homotopy VS homology

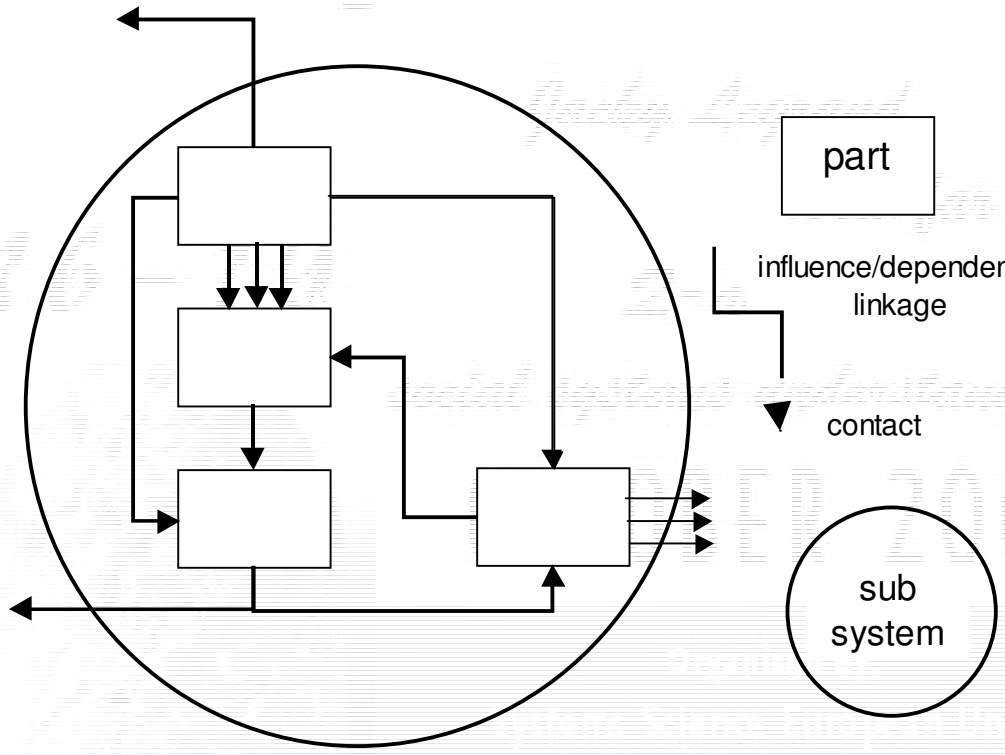
Careful examination of these steps in the written paper

Systemic assessment

The fishing nets dropping : static structure
simplicial complexes as a triangulation

The fishing teams management : external process
simplicial complexes as representations for searches

The economic cycles : internal dynamics
simplicial complexes as interaction hypergraphs



	external	**internal**
vertices	contacts	parts
simplices	parts	subsystems