Tourism:
a systemic approach

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What is "tourism"?

According to Robert W. Macintosh – "Tourism is the sum of the phenomena and relationships arising from the interaction of tourists, business suppliers, host governments and host communities in the process of attracting and hosting these tourists and other visitors".

According to Hermann V. Schullard – "Tourism as an industry comprises the sum total of operations, mainly of an economic nature which directly relate to entry, stay or movement of foreigners inside and out side a certain country, city or region".

According to Hunziker and Krapf – "Tourism is the sum of phenomena and relationship arising from the travel and stay of non-residents, in so far as they do not lead to permanent residence and are not connected with earning activity".

According to W.T.O. recommendations – "Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes".

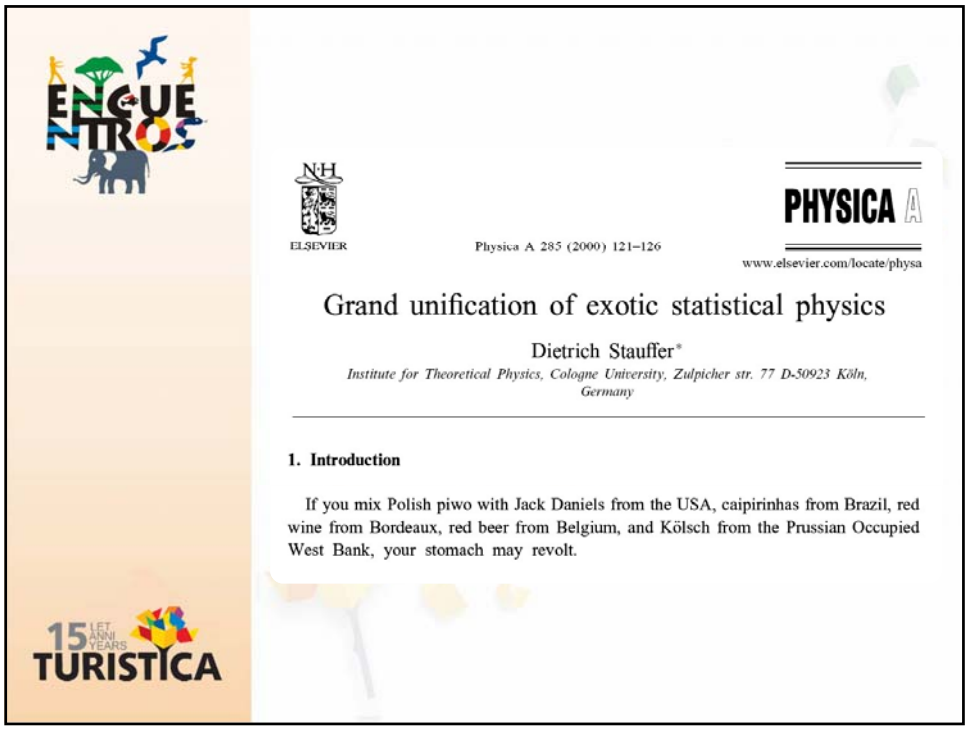
According to L. J. Lickorish – "Tourism embraces all movement of people outside their community for all-purpose except migration or regular daily work. The most frequent reasons for this movement is for holiday but it will also include, for example attendance at conferences and movement on sporadic or infrequent business purpose".

Complicated matter

Multi –
Inter – } disciplinarity
Cross –

Contrary to widely held belief, the popular notion of a multidisciplinary approach is not a systems approach.

[Gharajedaghi, 1999]



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PHYSICA A

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Grand unification of exotic statistical physics

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1. Introduction

If you mix Polish piwo with Jack Daniels from the USA, caipirinhas from Brazil, red wine from Bordeaux, red beer from Belgium, and Kölsch from the Prussian Occupied West Bank, your stomach may revolt.

System thinking

The systemic approach:

consider a whole entity (a “system”) and investigate its structure and static & dynamic behavior

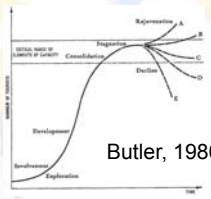
- Define
  - system & tourism
- Methods
  - tools & methods to study statics & dynamics
- Insights
  - structure, past and future behavior

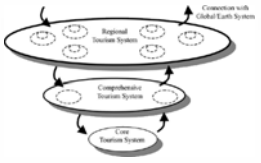
Tourism systems

- Tourism destination
  - basic subsystem
  - a *problematic* concept
    - the goal of travel: a place, a number of different stakeholders, a set of attractions, resources and services to satisfy tourist's needs and wishes
      - N.B.: mainly a spatial (physical) concept, but may be extended to the virtual "collaboration space"


System

- Entity (conceptual or real) made of a number (normally not small) of elements interacting dynamically & generating some global behavior
  - elements, interactions, structure, objective
    - in a system "*the whole is more than the sum of its components*" as behavior depends on interactions as well


Butler, 1980


Farrell et al., 2004

Systems

- Simple
  - few components, linear and predictable interactions, repeatable, decomposable, knowable
- Complicated
  - many components, cause and effect separated over time & space but repeatable, decomposable, analyzable
- Complex
  - nonlinear interactions, sensitivity to initial conditions, dynamic, adaptable to environment, produce emergent structures & behaviors, can become chaotic
    - non decomposable, non predictable, non tractable analytically

Tourism systems are *complex adaptive systems*

i.e. no (full) analytic treatment possible
→ need models

In the life of Mr. Palomar there had been a time in which his rule was this:

first, build a model in his mind, the most perfect, logic, geometric possible model;

second, verify whether the model fits observable practical empirical cases;

third, apply the needed corrections, so that model and reality coincide.

[Italo Calvino, Palomar, 1983]

Complex systems

- Need methods and tools to study global properties
  - non decomposable → consider system as a whole
  - non tractable analytically → use models & simulations
  - non predictable → build scenarios
  - *management* & *control* (???)
    - self-organizing systems!!!
- A (strong) theoretical framework

  Statistical physics
  - proved able to describe phenomena outside the realm of traditional physics → social dynamics

  [Castellano et al., 2009]

Theoretical framework

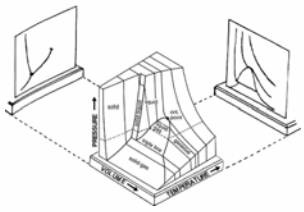
- Statistical physics
  - study of the *statistical* properties of many-body disordered systems considered as elements of an ensemble
  - macroscopic properties derived from extensive and intensive system quantities (order parameters)
    - partition function (expected value of microscopic properties) → state equations
    - can study (quantitatively or qualitatively): dependency on external conditions, boundary conditions, control parameters, phase transitions & critical behaviors, optimization…
  - universality & scaling

Statistical physics

Typical problem formulation:

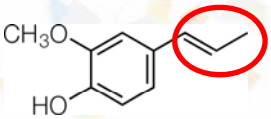
- Given:
  a macroscopic system consisting of a *large* number of microscopic elements AND an *incomplete* set of measurements of *some* system's properties
- Find:
  probability distributions for *other* system's properties

Example: ideal gases
given: gas (N molecules)
given: N, V, T, equilibrium
find: P, S, C_V, C_P, ...

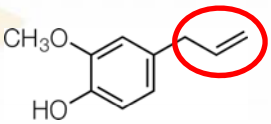


Structure & functions (behaviors)

Isoeugenol: $C_{10}H_{12}O_2$



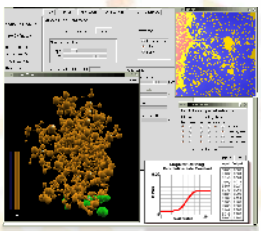
Eugenol: $C_{10}H_{12}O_2$

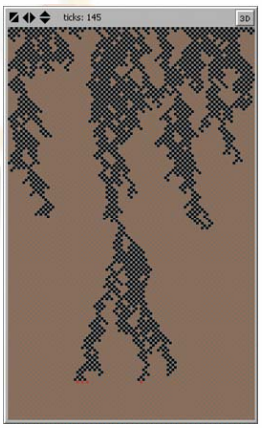


Structure & functions are strongly coupled

Analogy

Percolation





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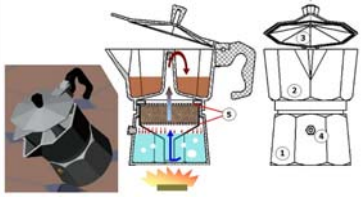
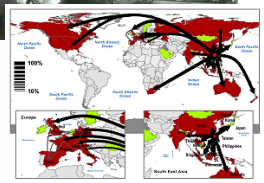


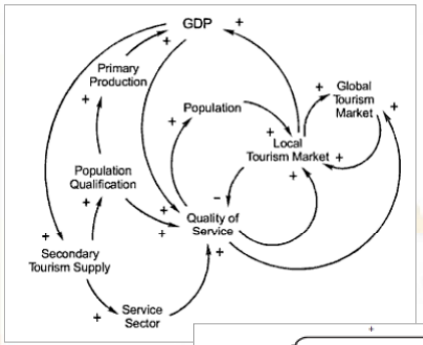


The toolbox

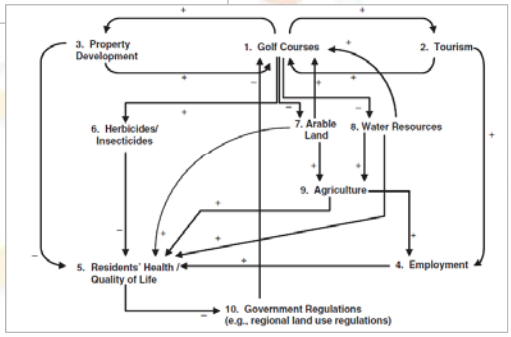
- A wide range of possible tools & techniques
  - most quite “old”, dated back to XIX century, but practical only with recent computer technology
  - based on modeling and simulations
- Toolbox
  - System dynamics
  - Agent-based modeling
  - Nonlinear dynamics (chaos & complexity theory)
  - Network science

System dynamics

- Aim at understanding how a system's feedback structure produces and affects its dynamic behavior
- Modeling based on differential equations describing interactions and feedbacks
- Aggregation of agents into a small number of states assuming perfect mixing and homogeneity



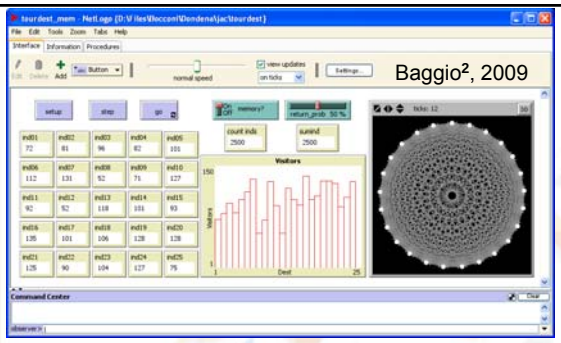
Jere-Lazanski et al., 2006



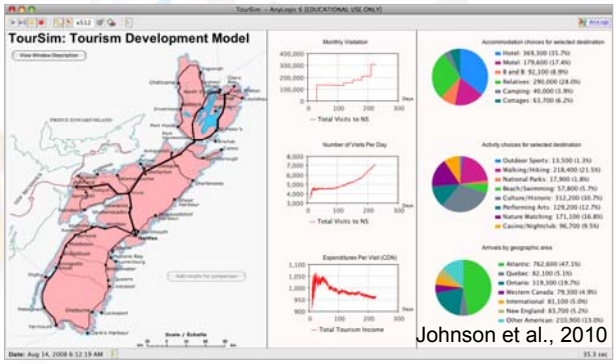
Woodside, 2009

Agent-Based models (ABMs)

- Simulate actions and interactions of autonomous (learning) individual entities
  - a.k.a. individual-based models (IBM)
- Hypothesis:
  the behavior of social systems can be modeled and understood as evolving out of autonomous interacting agents
  - preserves heterogeneity and individual attributes



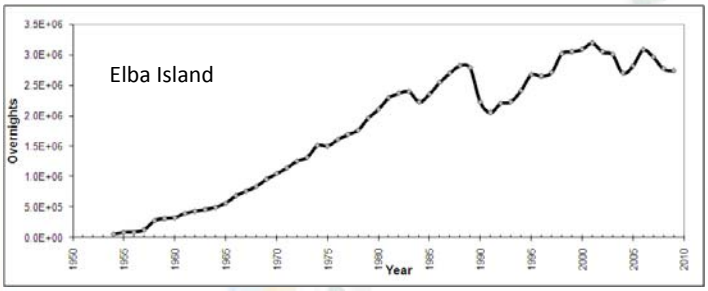
Baggio[2], 2009

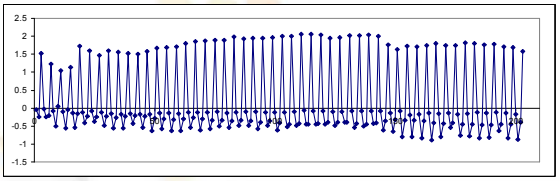


Johnson et al., 2010

Nonlinear dynamics

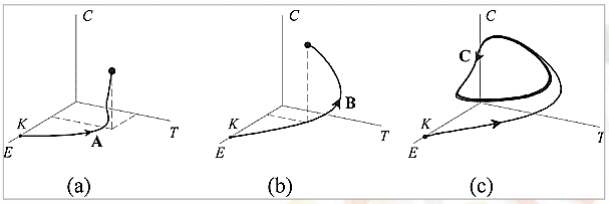
- Methods and techniques to assess the degree of complexity of a system
  - sensitivity to initial conditions
  - resilience
  - emergence and self-organization
  - complex & chaotic behaviors
- Typically analysis of a time series considered to be representative of internal system dynamics
  - stability (stationarity/unit roots), convergence to stable dynamic trajectories (Lyapunov coeff.), memory of past conditions (Hurst analysis), complex & chaotic behaviors (bifurcation diagrams, phase space plots, attractors)

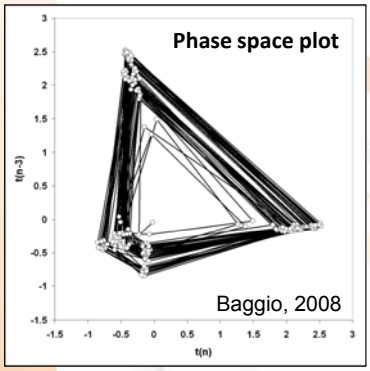


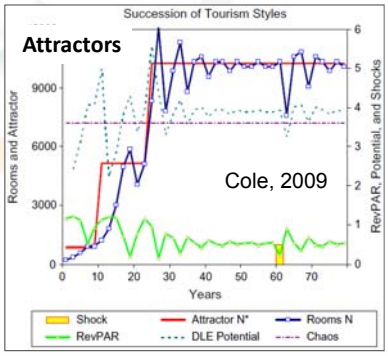


System's internal dynamics

Trajectories in state space Casagrandi et al., 2002



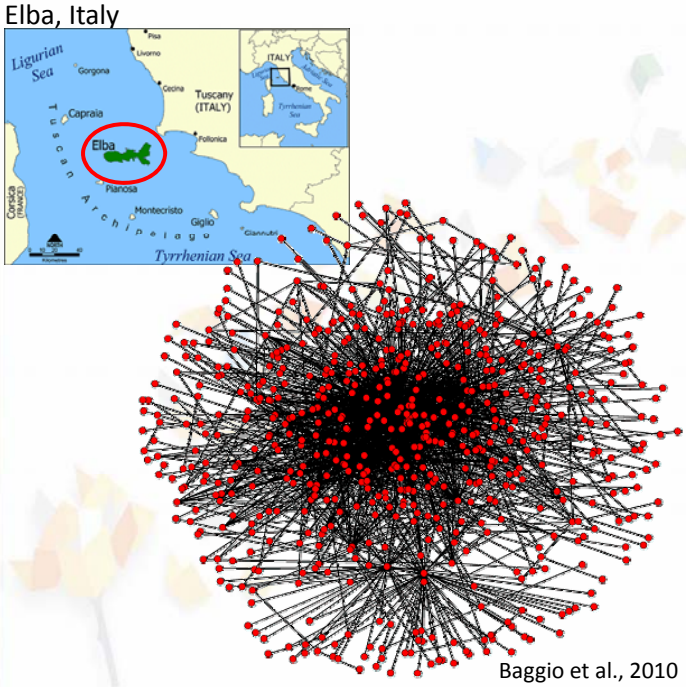




Networks & systems

- A complex system:
  many interconnected elements → network
- Main issues:
  - do universal properties exist?
  - does network topology affect functions?
  - do structure & functions integrate?
  - does dynamic evolution change the properties?
  - can we explain dynamic processes?
    - diffusion processes (viruses, info, messages, …)
    - small perturbations → avalanches
    - optimization, synchronization
    - self-organization
    - robustness and/or fragility

Elba, Italy



Baggio et al., 2010

Tourism network studies

- Structural characteristics of a tourism destination
  - identify & characterize "important" stakeholders
  - measure extent of and attitudes towards collaboration
  - discover *emergent* communities (beyond traditional distinctions by type/geography etc.)
  - assess ICT usage
- Dynamics & optimization
  - resilience towards external shocks
  - diffusion of information & knowledge
  - effectiveness of advertising & word-of-mouth
  - destination's visibility on WWW
  - evolution models

some VERY PERSONAL comments

The sciences do not try to explain, they hardly even try to interpret, they mainly make models.
By a model is meant a mathematical construct which, with the addition of certain verbal interpretations, describes observed phenomena.
The justification of such a mathematical construct is solely and precisely that it is expected to work.

John von Neumann

Tourism research

- Many *x-disciplinary* studies, but little theoretical systematization of acquired results and knowledge
- Too strong push towards *practical* application, which may slow the development of theoretical models

The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living. […] I mean that profounder beauty which comes from the harmonious order of the parts, and which a pure intelligence can grasp.

Henri Poincaré

Tourism research

- Some authors call for new and innovative attempts, but there is little understanding and application of available methods and tools
- Too many *mainstream* works, repeating *standard* approaches
  - example: practically ALL papers using System Dynamics in tourism are published in NON-tourism journals
- Too strong bias towards qualitative *descriptions*
  - and modest innovation in usage of quantitative methods

Qualitative/quantitative?

- No quantitative approach is *reasonable* without a sound qualitative knowledge
  - model → simulation → interpretation
- Also, qualitative analyses rather useless without some form of quantitative verification

> *By abolishing the unfortunate categories of qualitative/quantitative and natural sciences/ social sciences that have been set against each other, and letting them join forces for a common goal - to learn about life - people open up for methodological creativity*
>
> [Gummesson, 2007]

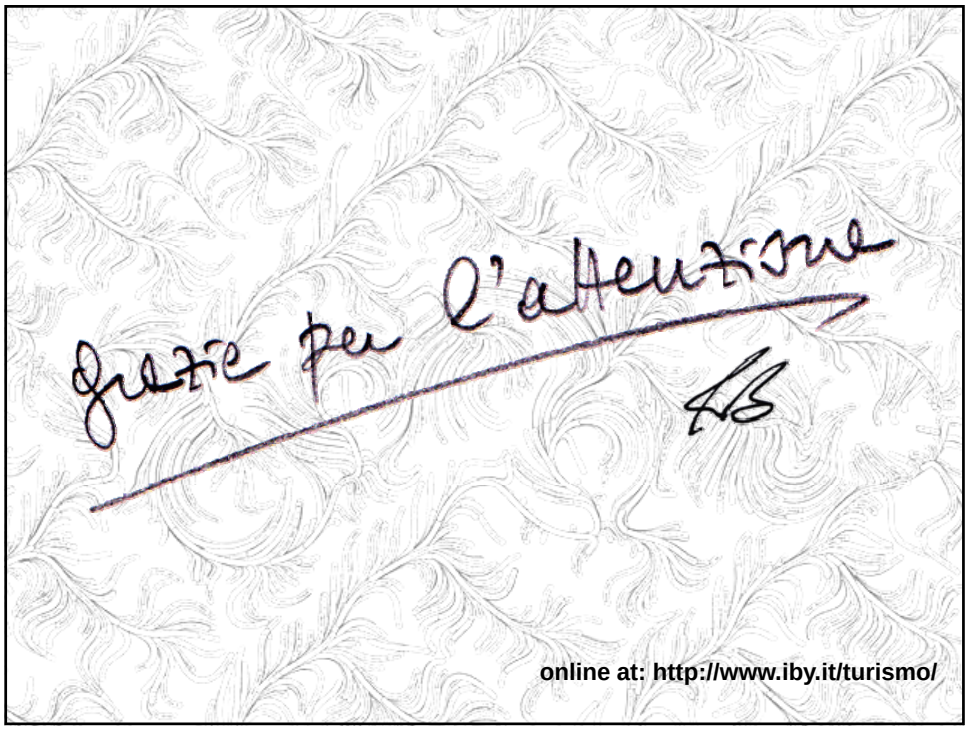
Final remarks

- A tourism destination is a complex adaptive *system* & needs to be studied as such
- Methods & techniques to measure and model behaviors & phenomena are available
- Appealing from a theoretical point of view
- Can become an interesting tool to assist *practical* endeavors

and…

it makes fun!

(remember Richard Feynman)



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