

TRANSITION TO A NEW SOCIETY
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**TRANSFORMATIONS OF PHYSICAL SYSTEMS
AND TRANSITIONS OF HUMAN SOCIETY**

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NATURE OF THE SUBSYSTEMS

- ATOMS

Can even be identical or indistinguishable

Simple types of interactions

- HUMANS

Each individual has his/her own identity

Humans interact in complex, ways.

INSTINCT OF SURVIVAL &

IMITATION

**TRANSFORMATIONS
OF
PHYSICAL SYSTEMS**

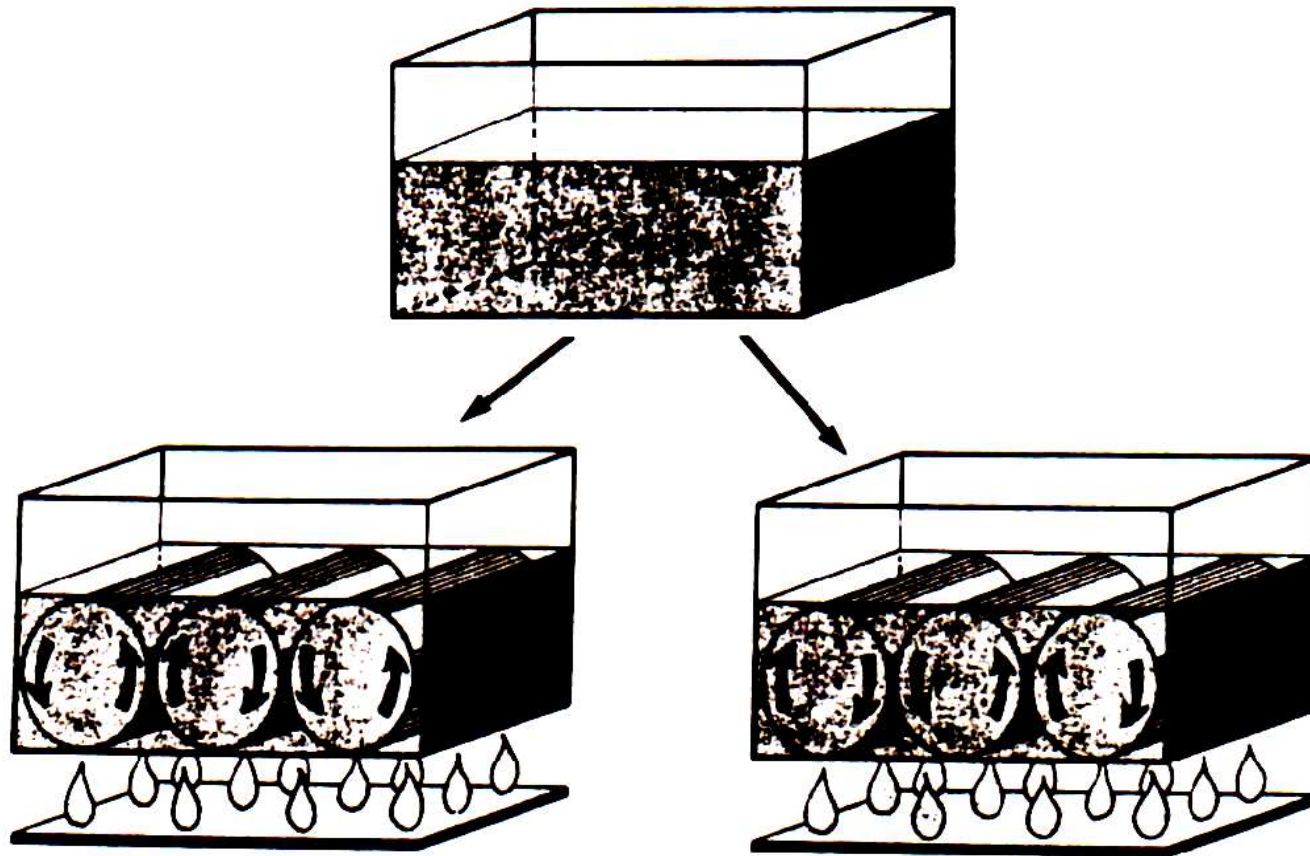
NON-EQUILIBRIUM THERMODYNAMICS

HOW NATURAL STRUCTURES
TRANSFORM

THE RAYLEIGH-BENARD diffusion \rightarrow convection DYNAMIC TRANSFORMATION



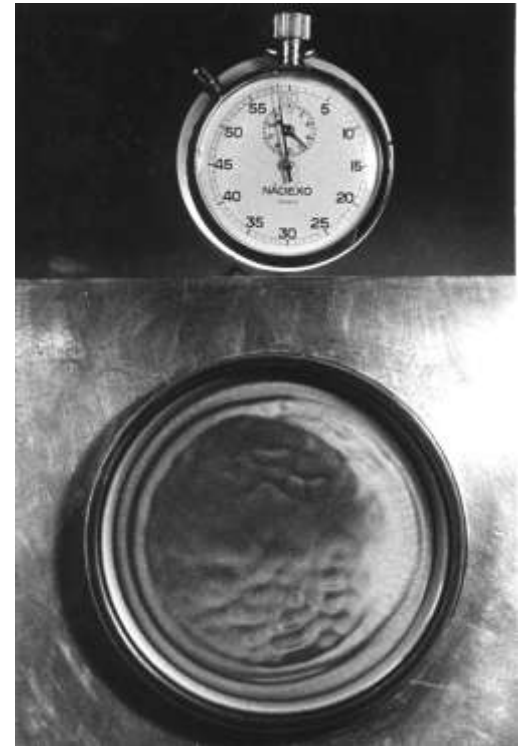
an initially steady liquid
heated from below



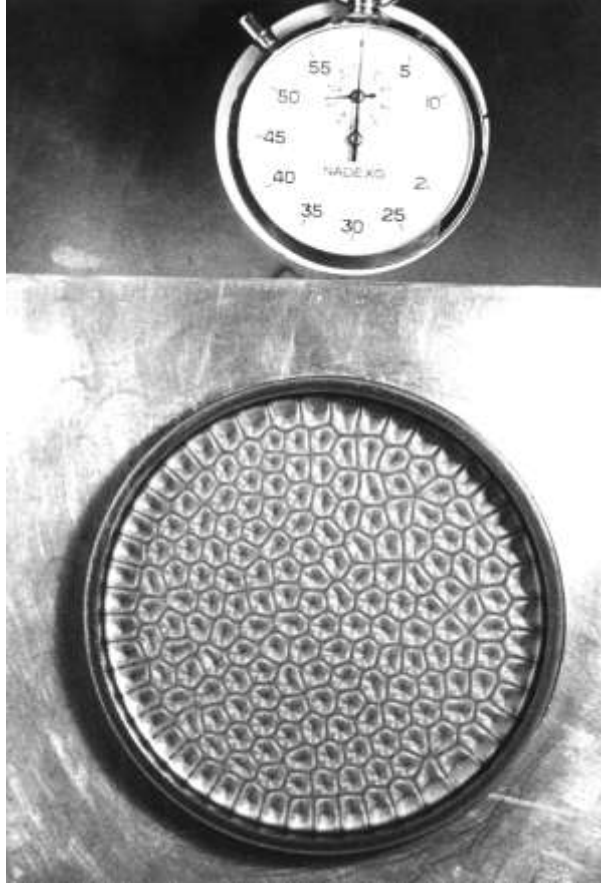
CONTROL PARAMETER
flux of resources



ORDER PARAMETER
emergence of order,
correlations & structure



Coutesy of Manuel G. Velarde



Rayleigh-Benard cells



Courtesy of Manuel G. Velarde



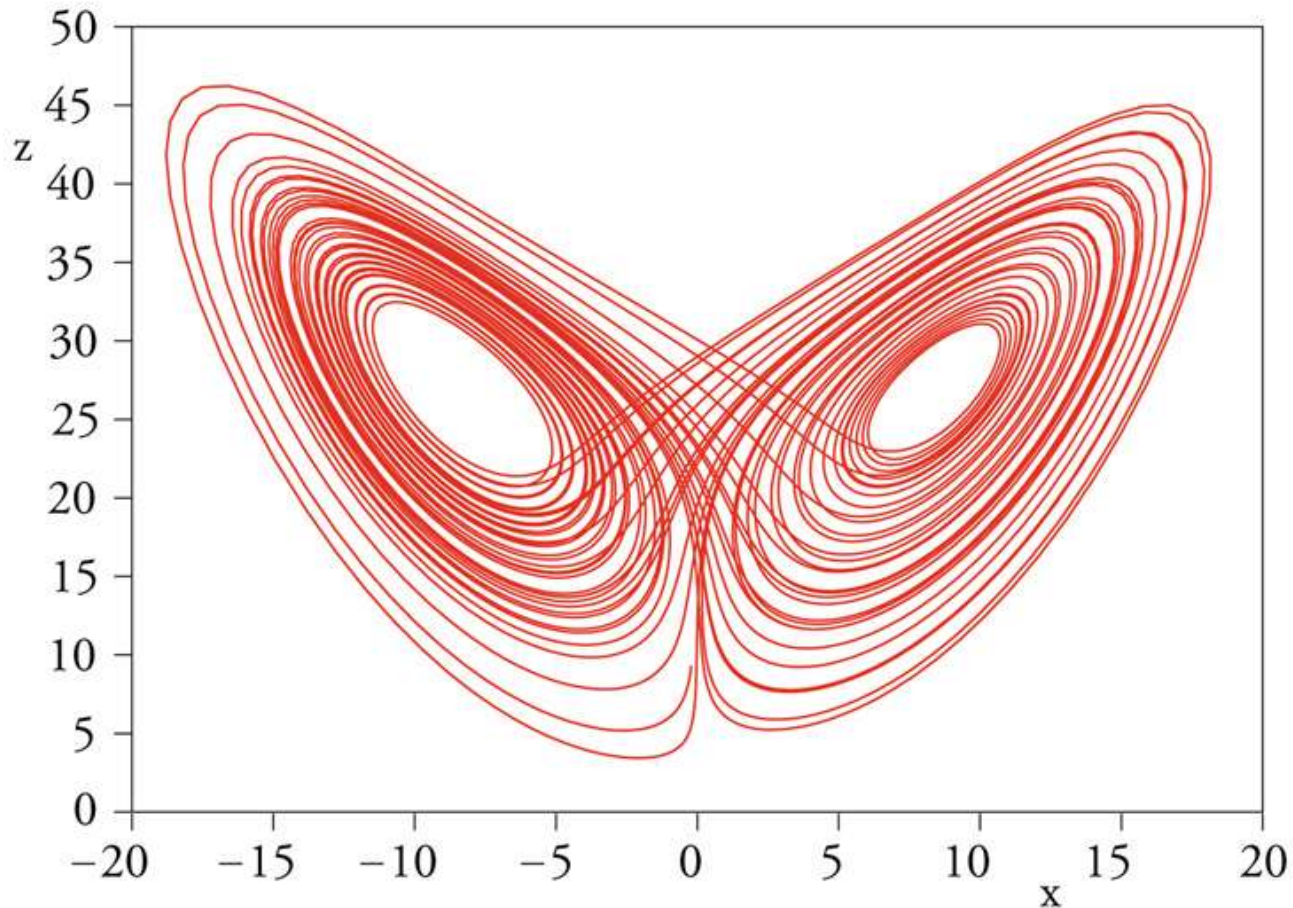
Ireland: the Giant's Causeway

Ireland: the Giant's Causeway



Lorenz model

Simulation of climatic changes



More examples of nonequilibrium dynamic instabilities

- Layered clouds
- The desert sand
- The LASER
- Tornado
- The miracle of a blooming flower







**TRANSITIONS
OF
HUMAN SOCIETY**

NATURE OF THE SUBSYSTEMS ,

Among humans (and living creatures)
individuality vanishes and collective
behavior prevails

□ unexpected dangerous
circumstances trigger the instinct
of survival & imitation

Prey-predator

[by Graham Templeton (2014)]



NATURE OF THE HUMANS

- ❑ Also a shared objective firmly unites individuals: **solidarity**
- ❑ Trade union demonstrations
- ❑ the synchronized, rhythmic applause of an audience that wants to get an encore at the end of an exciting concert.

Giuseppe Pellizza da Volpedo



CONTROL PARAMETER

materials, energy ,
Information → the web

ORDER PARAMETER
emergence of correlations
and structures

2,7 Toe/year

from agricultural
to industrial society

MIS-USE OF THE CONTROL PARAMETER

Business district in Guangzhou



Olimpic Park in Beijing



A HIERARCHY OF CONTROL PARAMETERS

MATTER & ENERGY
0.31% procapite/year

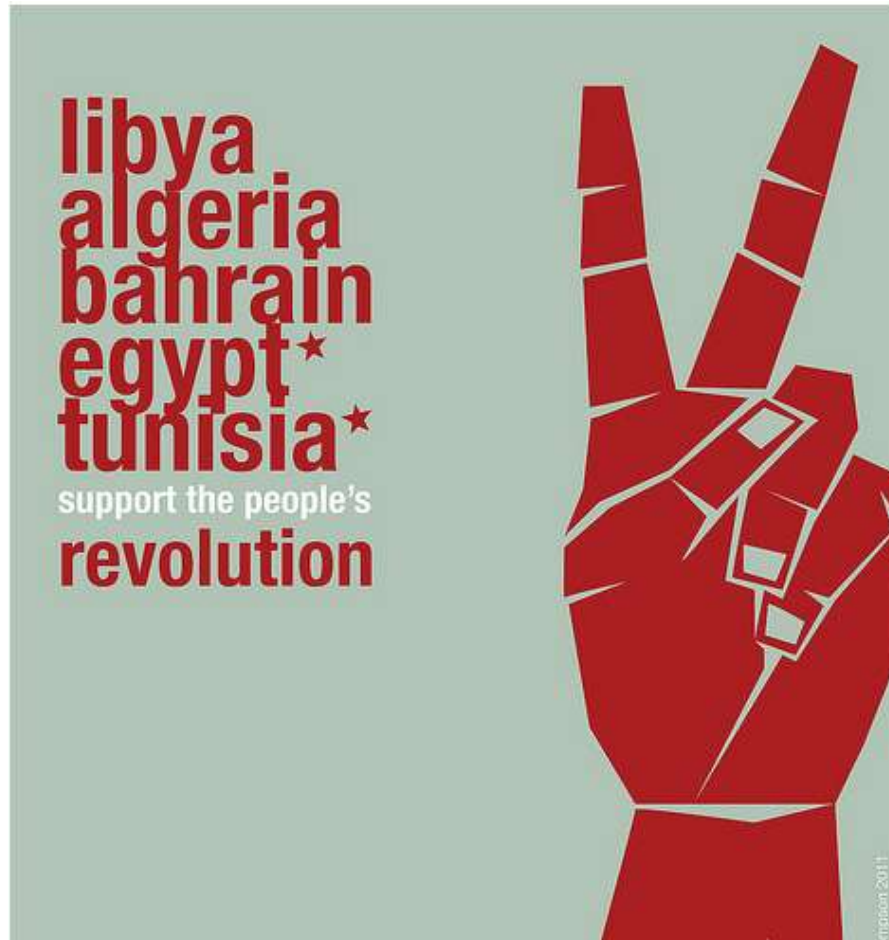
INFORMATION

COMMUNICATION

WEB & MONETARY SYSTEM



the arab spring





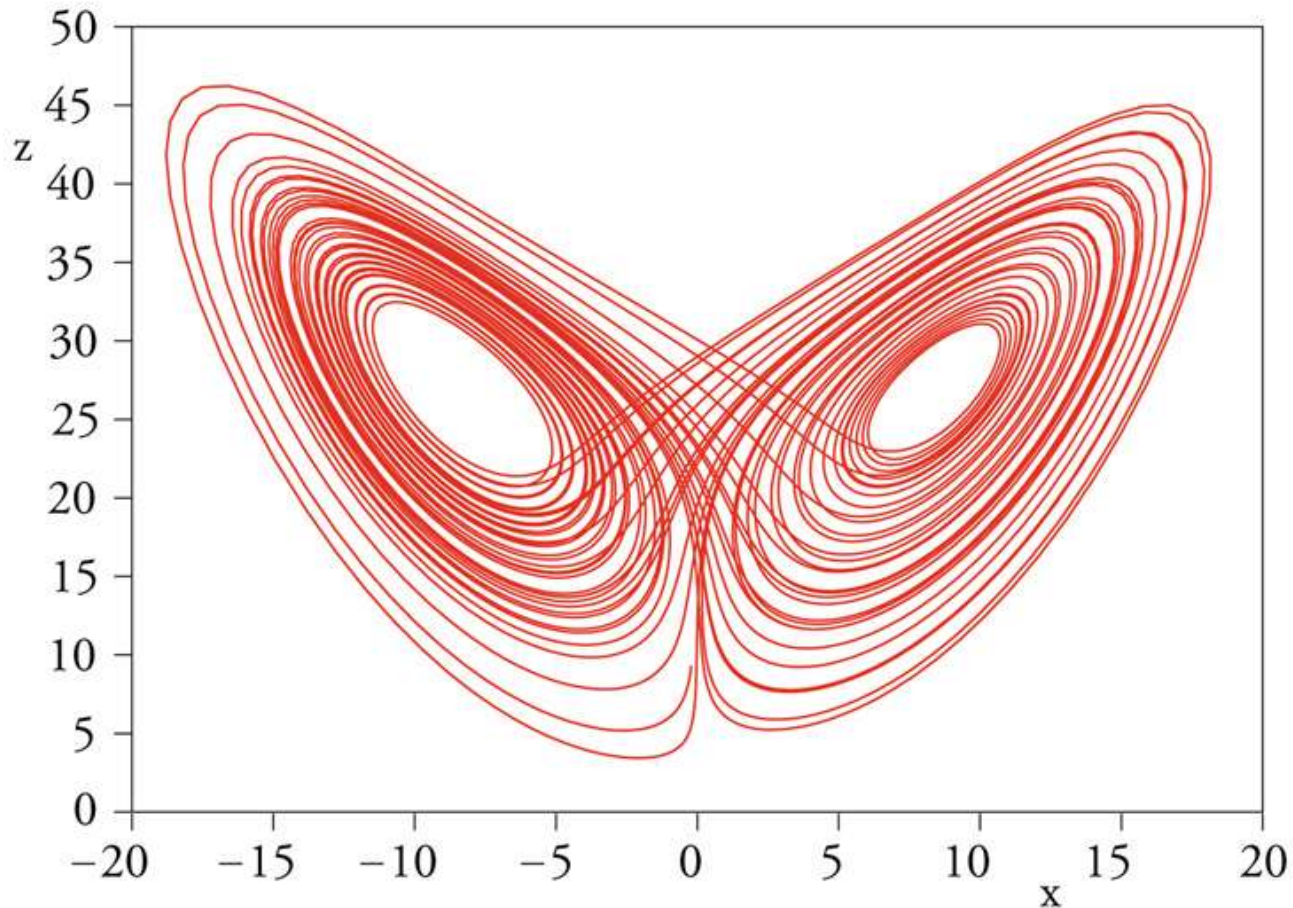
social media activism





Lorenz model

Simulation of climatic changes

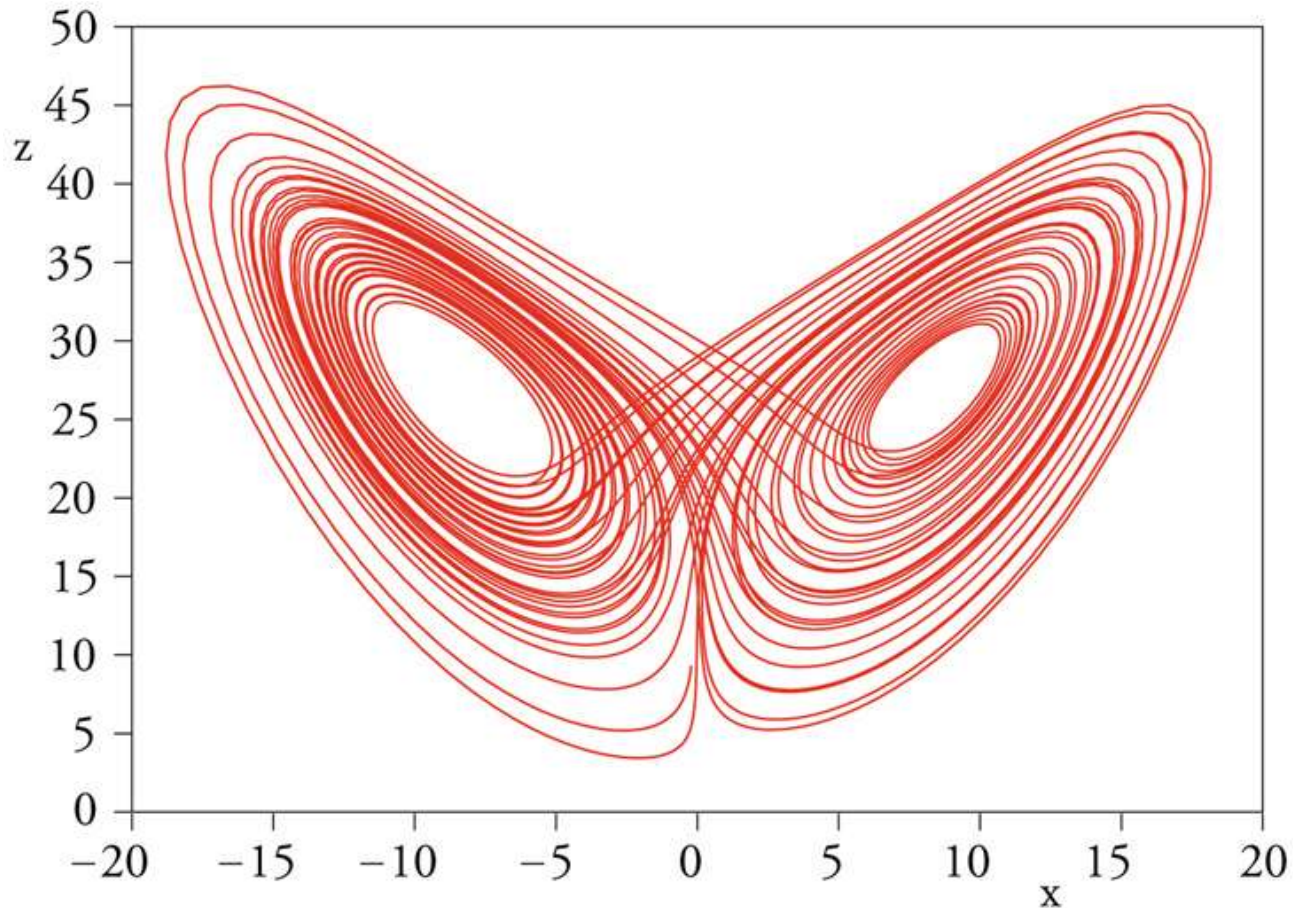


Abnormal increase of
the control parameters

Critical fluctuations

Deterministic chaos

An asymptotic route-to-chaos of the human society ?



turbulence & tornados



CONCLUSIONS

- TRANSFORMATIONS OF PHYSICAL SYSTEMS AND TRANSITIONS OF HUMAN SOCIETY are characterized by control and order parameters
- CRITICAL FLUCTUATIONS
- If – locally or globally - control parameters will exceed critical values a sort of deterministic chaos could be produced with unpredictable consequences

