

# Complexity; a post-modern science?

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# Complexity as ontology, as worldview

- The world is intrinsically connected
- The future is not fixed, is '*under perpetual construction*'
- Fluctuations/noise/variation/diversity is *essential* to evolution/adaptability/emergence;
- Change happens locally
- However, the present and the future are **not random**; there is form/structure/patterning, whose nature depends on history, context, chance and choice – and is not permanent

## Flow, emergent patterning, form - but not fixed

*Upon those that step into the same rivers different and different waters flow...They scatter and ...gather...come together...and flow away...approach and depart*  
*Heraclitus*

*These rivers flow....they arise from the sea and flow into the sea...these rivers, while they are in the sea, do not know 'I am this river' or 'I am that river'.*  
*Chandogya Upanishads*

*'there is no self-defining discrete reality to cause or effect. Forms or feelings are devoid of inherent existence; it is only on the basis of aggregation of subtle elements that forms exist; form can only be understood in relational terms to their constitutive elements.'*  
*Dalai Lama explaining Milarepa Buddhist text, April 2008*

*Integrity is this sense of becoming whole in one's relations with other things is a co-creative process in which one shapes and is shaped by one's envioning circumstances...*  
*Ames and Hall - commentary on Dao de Jing*

# And then there was the theory of evolution

## Darwin 1859

variation followed  
by selection; species evolve  
into more sophisticated,  
more complex forms

Why, if physics,  
in the form of the second law of  
thermodynamics,  
proposes that matter and form  
degrade into structureless dust,  
does life '*mount the incline that  
matter descends*' (Bergson 1907)

indeterminism

*holism*

Gestalt

archetypes

emergentism

Prigogine gave an answer to Bergson's question in 1947.  
He pointed out that for open systems, entropy  
can decrease and order/patterns emerge

# Epistemological methods – how do you know?

- Models – as aid to thinking; what methodological assumptions, what is included?
- Inquiry – but issues of power, context
- Narrative, but whose?
- Data – but it describes today's relationships but tells us little about the dynamics of change
- Portfolio of **experiments**

# Complexity – a post-modern science?

## Traditional science

- Universal
- Timeless
- Certain
- Principles
- Logical – deductive, inductive
- Separate things

## But...

- Newton vs Leibniz; axioms
- Einstein '*deriving principles is intuitive*'

## Complexity

- Particularity/contingency universally held
  - Evolution of knowledge
- Principles – systemic, role of fluctuations, non-linear relationships
  - Collective emergence, not cause-effect relationships

**Complexity – post-modern, but not just relative/socially constructed?  
Critical realist?**