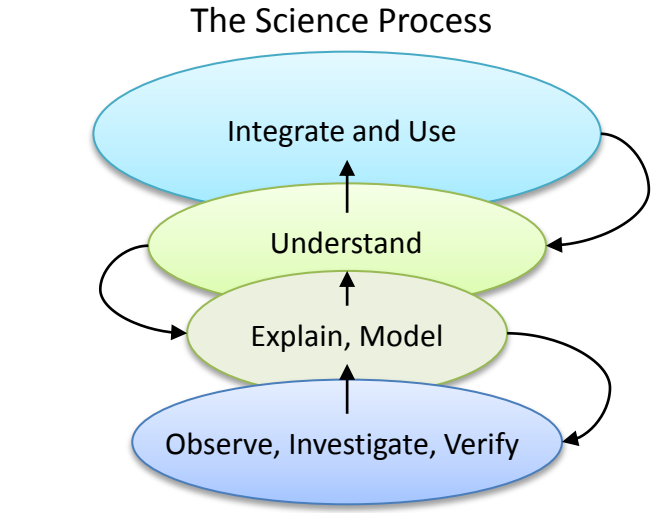
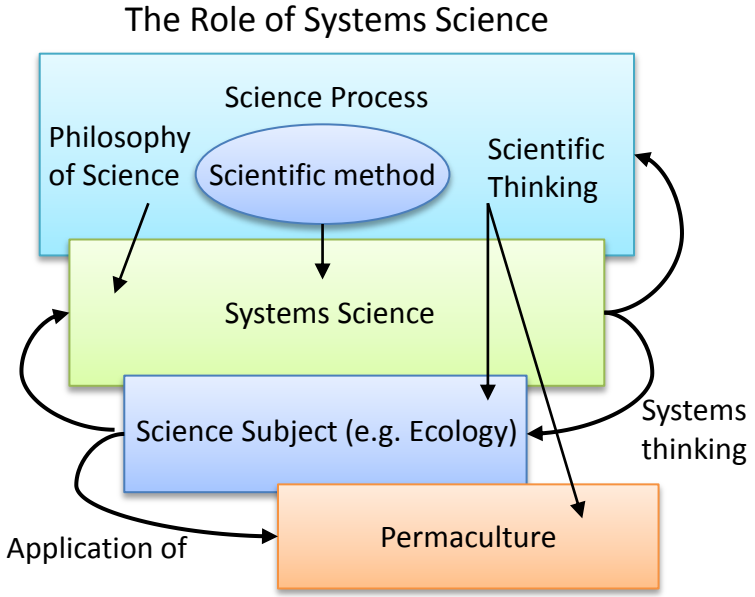
Science, Systems Science, and Permaculture

TCORE 112B

Introduction to Science

Relationships





A Conceptual History of Science and Systems Science

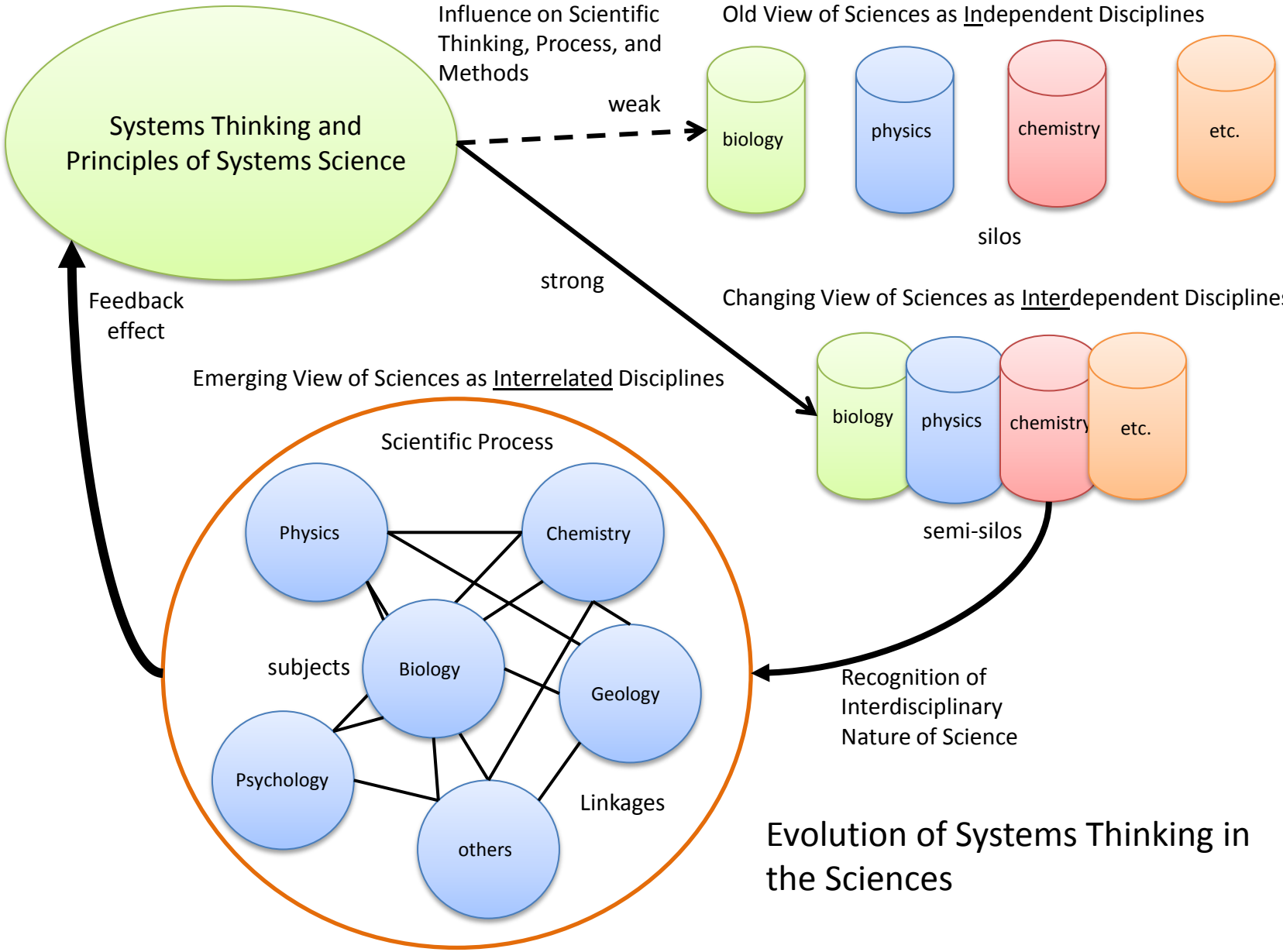
- Psychology of causal thinking – built into our brains
- Backward causal relations to find explanations of why and how things happen
- First tentative scientific process came with control over fire and really took off with invention of agriculture – Became formalized with civilizations
- Inquiry:
  - What is inside? ⟶ Reductionism
  - How does this work? ⟶ Mechanism
  - Why does this happen? ⟶ Explanation ⟶ Understanding

“THING”

- Native (informal) Systems Thinking
  - There are “Things” in the world
  - Things are connected in various ways
  - Some things cause other things to change
  - Things may last a long time unless disrupted by some other thing
  - I’m a thing to other things like me!
  - I’m part of a larger thing that includes all other things

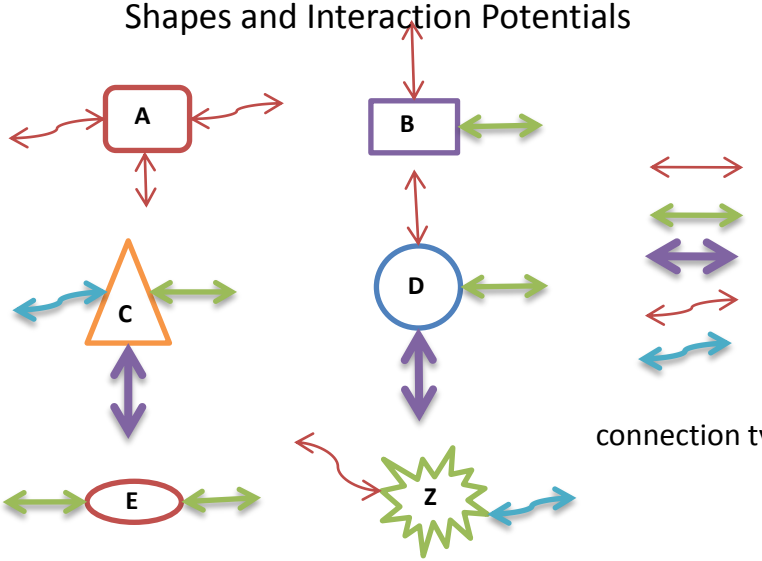
Formal Systems Science

- Early science focused on the successes obtained from reductionism – taking things apart
- Evolved to categorization – identification of similar/unlike things
- Evolved further to explanation of causes
- Systems thinking in the background in all sciences
- Methods of science applied to systemness itself
- Systems science has started to pervade all sciences

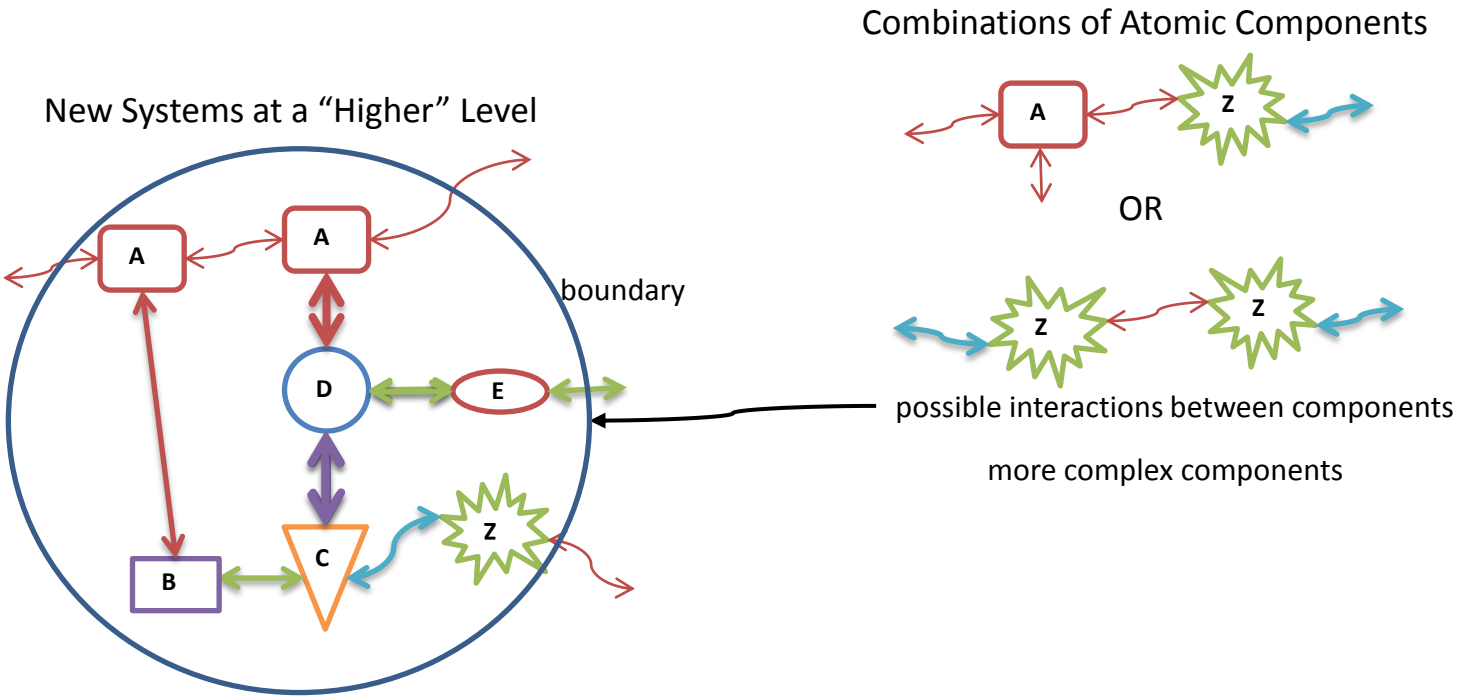

Systems Thinking and Principles of Systems Science
Influence on Scientific Thinking, Process, and Methods
weak
Old View of Sciences as Independent Disciplines
biology
physics
chemistry
etc.
silos
strong
Feedback effect
Changing View of Sciences as Interdependent Disciplines
biology
physics
chemistry
etc.
semi-silos
Emerging View of Sciences as Interrelated Disciplines
Scientific Process
Physics
Chemistry
subjects
Biology
Geology
Psychology
others
Linkages
Recognition of Interdisciplinary Nature of Science
Evolution of Systems Thinking in the Sciences

Essence of “Systemness”

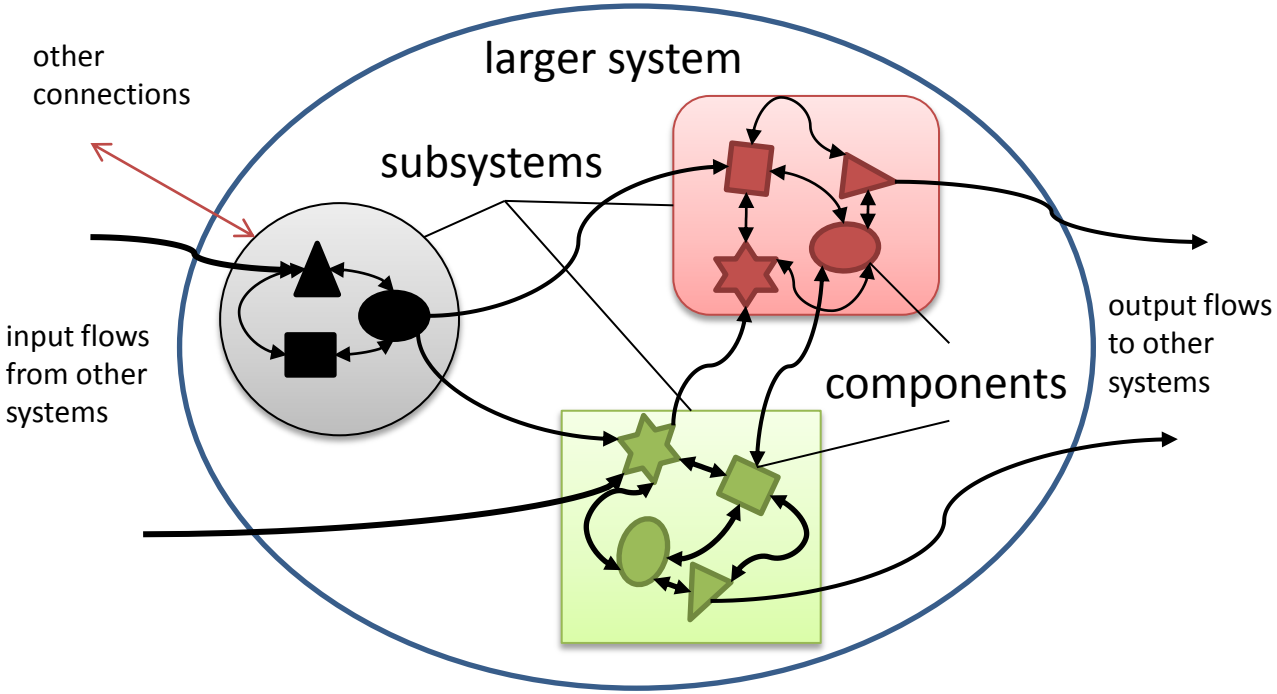
- Principles of Systems Science
- Overview of what makes a system
- Abstract view of systems that can be applied to any scientific field of study



“SYSTEMNESS”
Abstract Systems Concept



Systems Embedded in Larger Systems



STRUCTURE and FUNCTION