You think that because you understand “one” that you must therefore understand “two” because one and one make two.
But you forget that you must also understand “and.”

—Sufi teaching story

THINKING IN SYSTEMS

AN INTRODUCTION TO THEORY OF SYSTEMS THINKING

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SET AND SYSTEM

- Activity
- Make two lists. One list has the overarching title “SET,” and the other list has the title “SYSTEMS.” Write out several entries under each title. For example, write down the set of ingredients to make pancakes. Then write down what to do to mix and bake them so that they transform into a system. For another example, write down the set of your vital bodyparts. Then write down what they must to do to transform into a living human. Compile two lists of several entries. Each entry has its set on one side and its corresponding system on the other side.

- Discussion Questions 1. What distinguishes a set from a system, and the converse? 2. What happens to transform a set into a system? 3.. What happens to change a system into a set?
-

A SYSTEM
ELEMENTS, INTERCONNECTIONS AND PURPOSE

Different perspectives on systems in social sciences , computer science etc…

A system isn’t just any old collection of things. A system* is an interconnected set of elements that is coherently organized in a way that achieves something. If you look at that definition closely for a minute, you can see that a system must consist of three kinds of things: elements, interconnections, and a function or purpose.

- DONNA MEADOWS, THINKING IN SYSTEMS

What are the conditions for a system to exist?

When does a system stop being one? Examples…

Where does one system stop and another begin? Examples

THE LANGUAGE OF SYSTEMS

A NOTE ON LANGUAGE

The word *function* is generally used for a nonhuman system, the word *purpose* for a human one, but the distinction is not absolute, since so many systems have both human and nonhuman elements.

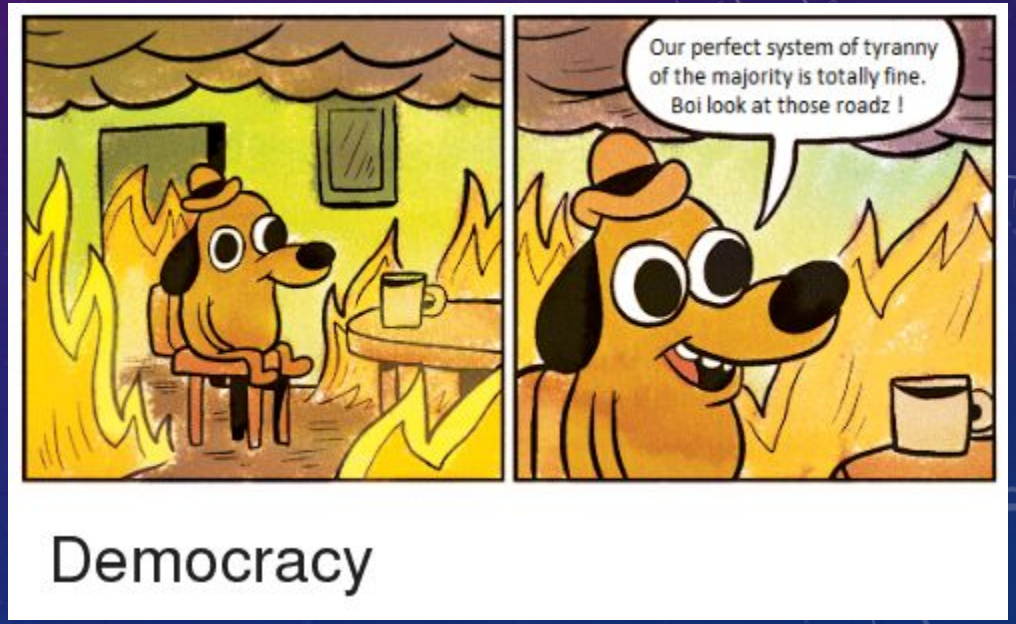
Many of the interconnections in systems operate through the flow of information. Information holds systems together and plays a great role in determining how they operate.

Source: Donella Meadows, Thinking In Systems : a Primer, 2009.

SYSTEMS BEHAVIOUR

Systems of information-feedback control are fundamental to all life and human endeavor, from the slow pace of biological evolution to the launching of the latest space satellite. . . . Everything we do as individuals, as an industry, or as a society is done in the context of an information-feedback system.

—Jay W. Forrester



HOW TO DESIGN FOR SYSTEMS?

> Complex behaviors of systems often arise as the relative strengths of feedback loops shift, causing first one loop and then another to dominate behavior.

"Thinking in Systems: A Primer"
Book by Donella Meadows

Consider the properties of highly functional systems—machines or human communities or ecosystems—which are familiar to you. Chances are good that you may have observed one of three characteristics: **resilience, self-organization, or hierarchy.**

Stabilizing Loops—Balancing Feedback

RESILIENCE IN SYSTEMS

A set of feedback loops that can restore or rebuild feedback loops is resilience.

at a still higher level—meta-resilience, if you will. Even higher metameta-resilience comes from feedback loops that can learn, create, design and evolve ever more complex restorative structures.

Systems that can do this are self-organizing.

*There are always limits to resilience.

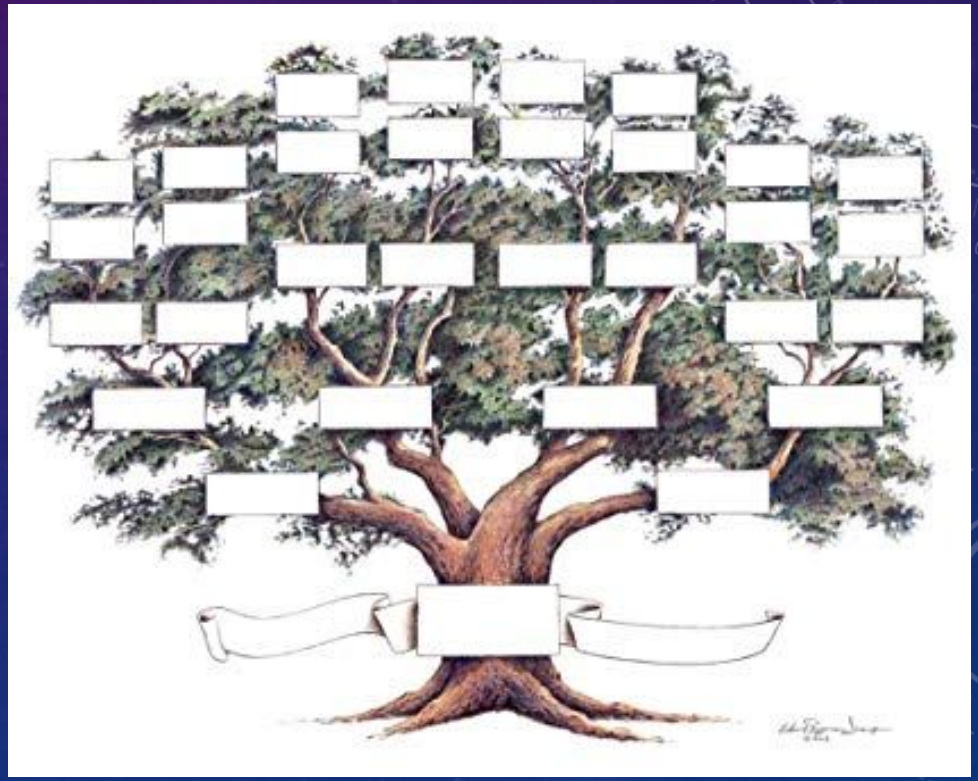
Read more: Redman, Charles, and Ann Kinzig. "Resilience of past landscapes: resilience theory, society, and the longue durée." *Conservation ecology* 7.1 (2003).

SELF-ORGANISING

Systems often have the property of self-organization—the ability to structure themselves, to create new structure, to learn, diversify, and complexify.

*HIERARCHY

In hierarchical systems relationships within each subsystem are denser and stronger than relationships between subsystems. Everything is still connected to everything else, but not equally strongly.



THANK YOU

FOR YOUR ATTENTION

QUESTIONS AND LITERATURE AT
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