



GST 22 Static and Dynamic Structure

Formal Description

This module examines the temporal characteristics of structure. It distinguishes between static and dynamic forms of organisation and explains how structure may persist through recurring change as well as through stability. The module also introduces the concepts of dynamic configuration, dynamic structure, and process as recurring organised change.

Structures do not all exhibit the same temporal characteristics. Some remain relatively unchanged over time, while others undergo recurring transformation.

- A static structure is one in which both configuration and causal relationships persist with little or no change over the timescale of observation.
- A dynamic configuration is one in which the arrangement of entities changes in a recurring and organised way over time.
- A dynamic structure is one in which the causal network between entities changes in a recurring and organised way over time while overall causal connectivity is maintained.

This distinction is important because change does not necessarily eliminate structure. Even where configurations or causal relationships transform continuously, recurring organisation may still persist.

Dynamic organisation therefore provides the basis for understanding processes as structured phenomena. A process may be understood as a sequence of changes in configuration or causal organisation exhibiting recurring organisation across time.

Dynamic structure also raises important questions:

- why recurring causal organisation sometimes generates recurring configuration;
- why some structures remain stable while others transform;
- and how recurring organisation is maintained over time.

These questions prepare the basis for later discussions of systems, environments, constraints, and attractors.

Plain English Explanation

Some structures remain almost unchanged over time. Others change continuously while still remaining organised.

For example:

- a crystal may remain relatively stable and unchanged;
- while a living organism constantly changes internally but still preserves its overall organisation.

This distinction helps us understand the difference between static and dynamic structure.

Static structures involve little visible change.

Dynamic structures, however, maintain organisation through ongoing change.

A good example is the human body.

- Cells die and are replaced.
- Energy and materials constantly flow through the body.
- Relationships between processes continually shift.

Yet the body remains recognisably organised.

The same applies to:



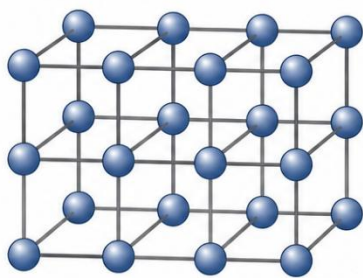
- ecosystems;
- economies;
- weather systems;
- and social institutions.

In such systems, organisation persists not because nothing changes, but because change itself becomes organised.

This idea leads naturally to the concept of process. Processes are not simply random changes. They are recurring and organised transformations occurring across time.

Static and Dynamic Structure

Static Structure

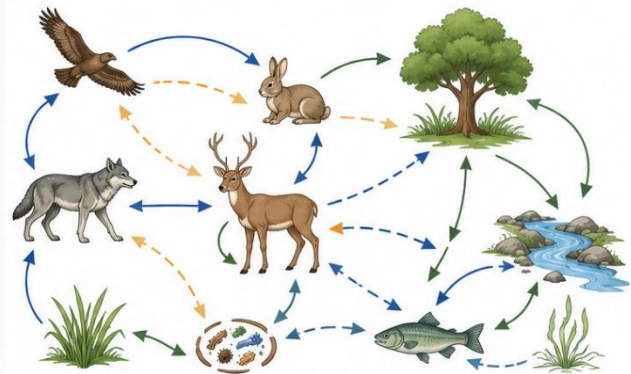


Stable Configuration

Stable Causal Connectivity

Static Structure

Dynamic Structure



Recurring Organised Change

Changing Configuration

Maintained Organisation

Dynamic Structure

Structure may persist through organised change as well as through static continuity.

Example 1 — Crystal Structure

A crystal maintains a relatively stable arrangement and causal organisation over time. This is an example of static structure.

Example 2 — Swinging Pendulum

A pendulum continuously changes position while following a recurring and organised trajectory. This is an example of dynamic configuration.

Example 3 — Living Organism

A living organism constantly exchanges matter and energy with its environment while maintaining organised causal structure.



Example 4 — Traffic System

Traffic flow changes continuously over time, yet recurring pathways and organised patterns may still emerge and persist.

Provenance and Links

The distinction between static and dynamic structure developed in this module draws particularly upon systems theory, thermodynamics, process philosophy, and complexity theory. Classical physics often focused upon relatively stable structures and equilibrium conditions, while later developments in thermodynamics and systems theory increasingly recognised that many forms of organisation persist through ongoing change rather than static permanence. Bertalanffy (1968) emphasised the importance of open systems maintaining organisation through continuous exchange with their environments, while Prigogine and Stengers (1984) explored how far-from-equilibrium systems may sustain organised dynamics through ongoing processes of transformation. Related ideas also appear in process philosophy, particularly in the work of Whitehead (1929), where reality is understood in terms of becoming and organised process rather than static substance alone. Complexity theory and studies of self-organisation have further demonstrated how recurring organisation may emerge and persist within continuously changing systems (Mitchell, 2009). The present framework builds upon earlier discussions of configuration, structure, organised configuration, and causal connectivity by distinguishing between static persistence and dynamic recurring organisation. This distinction prepares the basis for later discussions of pattern, information, attractors, landscapes, and system persistence more generally.

Practical Exercise

- Explain the difference between static and dynamic structure.
- Give three examples of dynamic structure from nature or society.
- Describe how organisation may persist despite continual change.
- Explain why processes may be understood as recurring organised transformations.