GST 18 Randomness and Non-Recurring Organisation

Formal Description

This module introduces the concept of randomness within a physicalist systems framework. Randomness is not understood as the absence of organisation, but as variation that does not give rise to recurring organisation. The module explains how entities and causal networks may form transient arrangements without producing stable or repeating patterns. This establishes the baseline condition from which organised structure, pattern, and information later emerge.

At any given moment, entities and any relationships between them exist in particular arrangements in space-time. However, these arrangements do not necessarily recur. Instead, they may change freely, being, transient and non-repeating.

Randomness describes variation without recurring organisation. Randomness may occur in:

- the spatio-temporal arrangement of entities; or
- the causal networks connecting them.

Randomness is therefore not the absence of arrangement or causality altogether. Rather, it is the absence of recurrence within arrangement or causality.

Even in random conditions, entities remain subject to the constraints of space-time and the properties of entities themselves. Randomness therefore does not imply the absence of constraints, but the absence of recurring organisation within those constraints.

Randomness establishes the baseline condition against which recurring structure, pattern, and information must be explained.

Plain English Explanation

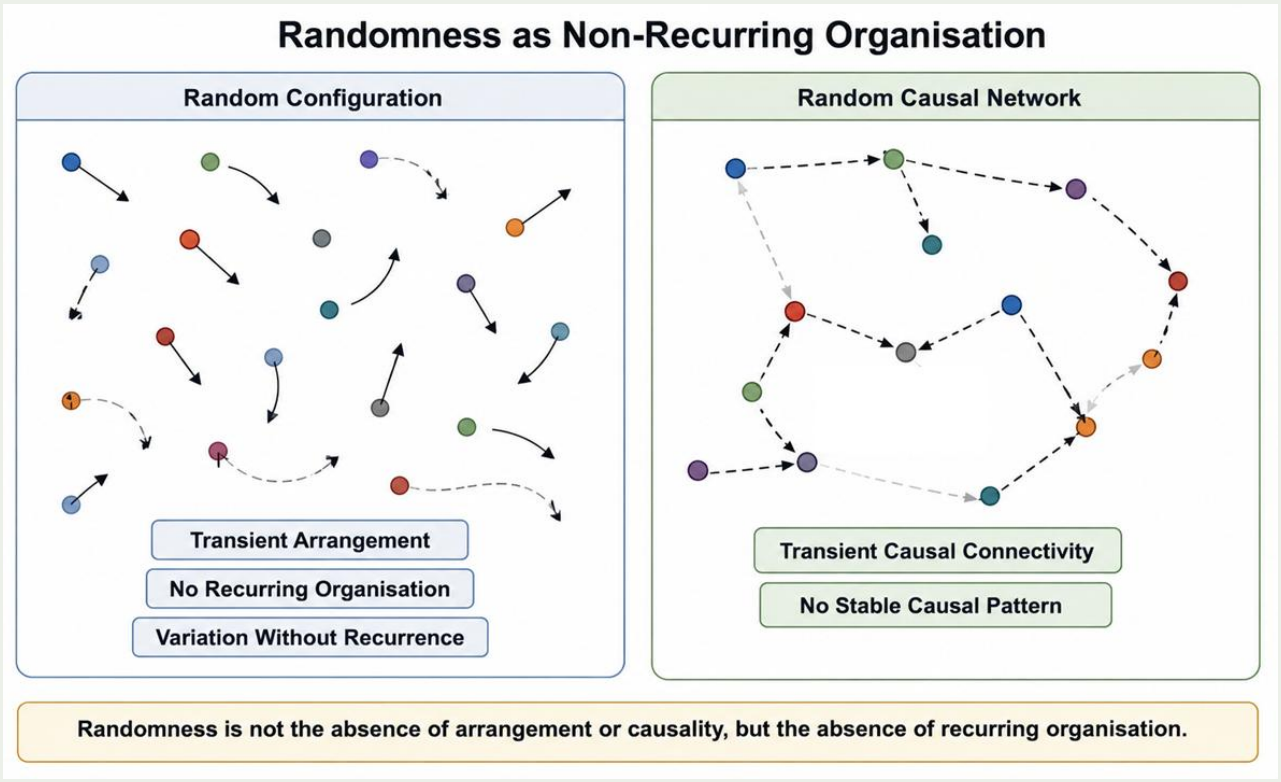
When we hear the word “random”, we often imagine complete chaos or the absence of organisation. However, this is not quite correct.

Even in apparently random situations, things are still arranged in particular ways at particular moments. Smoke drifting through the air still forms shapes. Molecules in a gas still occupy positions in space. Crowds of people moving independently still create temporary arrangements.

What makes these situations random is not the absence of arrangement, but the absence of recurring organisation. The arrangements continuously change and do not settle into stable or repeating forms.

Randomness can also occur in causal organisation. Interactions between entities may vary continually without forming stable or recurring causal networks.

This idea is important because it establishes the starting point for understanding pattern and information. If arrangements and interactions naturally vary freely, then recurring organisation requires explanation.



Example 1 — Smoke in Air
Smoke drifting through the air forms constantly changing shapes and arrangements. Although temporary forms appear, they do not recur in stable or repeating ways. This is an example of randomness in configuration.

Example 2 — Random Molecular Motion
Gas molecules move continuously and interact causally with one another through collisions. However, the overall arrangement and causal interactions vary continually without forming stable recurring organisation.

Example 3 — Uncoordinated Human Activity
A crowd of people moving independently through a railway station may form temporary groupings and pathways. However, these arrangements change continuously and do not form recurring organisation.

Provenance and Links
The concept of randomness developed in this module draws upon several traditions within physics, systems theory, thermodynamics, and complexity science. In statistical mechanics, Boltzmann (1877) treated randomness as variation in the distribution of particles and states, while showing that large-scale regularities may nevertheless emerge statistically from underlying variation. Shannon's (1948) information theory later formalised randomness in terms of unpredictability and the absence of stable informational structure. Within systems theory and complexity science, authors such as Ashby (1956), Prigogine and Stengers (1984), and Mitchell (2009) explored the relationship between variation, organisation, and the emergence of stable structures from non-recurring or unstable

conditions. The present framework differs slightly from these approaches by defining randomness not as the absence of arrangement or causality altogether, but as variation that does not give rise to recurring organisation. This establishes randomness as the conceptual baseline from which recurring structure, pattern, and information later emerge.

Practical Exercise

- Identify three examples from everyday life where arrangements exist but do not recur in stable ways.
- Explain why randomness does not imply the absence of arrangement.
- Describe the difference between random configuration and recurring organisation.
- Consider whether causal interactions can still occur in random systems. Give an example.