

Sárközi Information Theory – Mathematical Summary for General Understanding

Introduction

The goal of this theory is to understand and mathematically model how information moves, structures itself, and transforms in any system – whether it is physical, quantum, cosmic, or artificial.

Information is not just a passive dataset, but an active organizing force that seeks self-organization, balance, and evolution.

1. Entropy and Structure Balance

Claim: Information has two fundamental states: disorder (entropy) and order (structure) – and these are always in dynamic balance.

$$E(t) + S(t) = 1$$

where:

- $E(t)$: degree of entropy (on a 0–1 scale),
- $S(t)$: degree of structure (on a 0–1 scale).

Explanation: When a system becomes too disordered, it begins to self-organize. When too rigid, it generates entropy to regain flexibility.

Application: Biological cell formation, social stability and transformation.

2. Quantum Information and the Effect of Observation

Claim: Observation is not passive; it actively structures quantum information.

$$\Psi(t) = e^{-iHt/\hbar} \cdot e^{-\lambda t}$$

where:

- $\Psi(t)$: the quantum state as a function of time,
- H : Hamiltonian operator (energy),
- λ : distortion coefficient of information.

Explanation: Observation does not destroy information; it reorganizes it into a more structured form.

Application: Stability of quantum computers, interpretation of quantum measurement effects.

3. Information and Black Holes

Claim: Information is not lost in black holes – it is stored as structure on the event horizon.

$$I = \frac{S}{A}$$

where:

- I : quantity of information,
- S : entropy,
- A : surface area of the event horizon.

Explanation: This relation supports the holographic principle: information in space can be stored on a surface.

Application: New interpretation of the black hole information paradox, information-based models of gravity.

4. Information Conversion Factor

Claim: In any information system, a universal conversion ratio exists that describes how much distortion occurs during transformation.

$$\eta = \frac{h}{S \cdot E}$$

where:

- η : information conversion factor,
- h : Planck constant,
- S : structure,
- E : entropy.

Explanation: This describes the “resistance” to transformation between informational states.

Application: Signal loss modeling in data transmission, quantum communication reliability.

5. Spiral Evolution of Information

Claim: Information evolves not linearly, but in a spiral pattern – returning to prior states in more advanced forms.

$$I(t) = I_0 e^{-\lambda t} + \delta \sin(\theta)$$

where:

- I_0 : initial amount of information,
- λ : decay/distortion coefficient,
- δ : oscillation amplitude,
- θ : phase of the development cycle.

Explanation: Patterns reoccur cyclically, but always on a more complex or evolved level.

Application: Evolution, economic cycles, social dynamics.

6. Spacetime Drag and Information

Claim: Gravity also affects information – spacetime curvature influences information flow.

$$\Omega = \frac{1}{1 + |\Delta I|}$$

where:

- Ω : system stability,
- ΔI : magnitude of information fluctuation.

Explanation: Rapid changes in information lead to chaos; slow changes maintain stability.

Application: Gravitational waves' effects on quantum systems.

7. Information's Effect on Matter and Energy

Claim: Information actively shapes matter and energy – it can structure them.

Change in information:

$$\frac{dI}{dt} = \lambda E - \beta S + \gamma \frac{dS}{dt}$$

Formation of material structure:

$$M = \alpha I + \delta S$$

where:

- I : information,
- S : structure,
- E : energy,
- M : material structure,
- $\lambda, \beta, \gamma, \alpha, \delta$: system-specific coefficients.

Explanation: Information is not neutral – it shapes the structure of matter and guides development.

Application: Nanotechnology, biological development.

8. What Influences Information?

Claim: Information is not isolated; it is influenced by universal forces.

$$\frac{dI}{dt} = -\eta G + \theta Q + \mu \Lambda$$

where:

- G : gravitational effects,
- Q : quantum fluctuations,
- Λ : cosmological constant (dark energy),
- η, θ, μ : influence weights.

Explanation: Information flow is shaped by cosmic background and quantum forces.

Application: Dark energy's role in quantum information, modeling universal expansion.

Summary

Information:

- Seeks balance between entropy and structure,
- Evolves in a spiral, not in a straight line,
- Affects matter, energy, and spacetime,
- Influences quantum states,
- Never disappears – only transforms.