

Entropy

Tomasz Włodarczyk

2025-08-07

Entropy as a measure of disorder and chaos in systems, defining the degree of energy dispersion and the probability of transformations in physical and informational processes.

In cybernetics theory, entropy is a fundamental concept describing the state of disorder and the possibilities for transformation in complex systems. Originally derived from thermodynamics, it has been adapted to a wide range of sciences, including information theory, physics, mathematics, and social sciences.

In a cybernetic perspective, entropy signifies:

1. A measure of the unpredictability of the system
2. The degree of energy dispersion
3. The level of informational diversity
4. The tendency for chaos to increase

Entropy is not solely a destructive phenomenon. It represents a natural mechanism for the evolution of systems, enabling their transformations and adaptation. In open systems, entropy can lead to the emergence of new, more complex organizational structures.

Key Aspects of Entropy Include:

- Measurement of the probability of changes
- Determination of the direction of informational processes
- Analysis of possible energy transformations
- Examination of the limits of self-organization in systems

Understanding entropy as a tool for describing the dynamics of processes across various fields—from quantum physics to social communication—is particularly significant.

Examples of Entropy in Various Fields:

Society and Communication:

1. Gossip in organizations - how information distorts
2. Spontaneous development of street language
3. Breakdown of social bonds in crisis situations
4. Misinformation in social media

Psychology:

1. Increasing stress in uncertain situations
2. Loss of motivation in monotonous environments
3. Burnout processes
4. Breakdown of interpersonal relationships

Economics:

1. Dispersion of capital in unstable markets
2. Loss of currency value
3. Unpredictability of stock market changes
4. Company bankruptcies

Biology:

1. Aging of organisms
2. Breakdown of cellular structures
3. Energy loss in metabolic processes
4. Genetic mutations

Technology:

1. Degradation of information systems
2. Data loss
3. Dispersion of information in networks
4. Failures of complex technical systems

Conclusions:

Entropy is a fundamental cybernetic concept that allows for understanding the mechanisms of change, predicting the directions of transformation, and describing the complexity of systems through their disorder and informational potential.

[more](#)

O autorze [Ks. Tomasz Włodarczyk](#)

© 2025 Ks. Tomasz Włodarczyk

Obraz Photo by Samet Kurtkus on Unsplash