

Appendix ENT — Limit Structures in Information Theory and Entropy

A Difference Log with Dualbind (Non-integration / Non-justification)

Document Version: v1.00

Author: Keiji Sakamoto (Structural Architect)

Affiliation: Dualbind Laboratory, Tokyo, Japan

Date: January 12, 2026

Version DOI: [10.5281/zenodo.18239398](https://doi.org/10.5281/zenodo.18239398)

Concept DOI: [10.5281/zenodo.18239397](https://doi.org/10.5281/zenodo.18239397)

License: CC BY 4.0

Contact: laboratory@dualbind.com

0. Positioning and Purpose

This text records **structural differences in which information appears as a boundary**, taking as background the scope and formal conditions presupposed by Shannon's information theory and the concept of entropy. What is examined here is not the domain in which information theory functions effectively, but rather where its presuppositions diverge from observational structures.

This text does not introduce a new theoretical system, nor does it aim to use information theory to justify Dualbind theoretically. It also carries no intention to integrate, connect, or reduce information theory to Dualbind. The focus lies in clearly identifying **the area where their scopes do not coincide**, as well as the points at which they stand on different presuppositions.

What is recorded here is **the area where the conditions under which information is treated as an object of quantification, manipulation, and transmission, and the observational structure presupposed by Dualbind, do not coincide**. Appendix ENT functions as a boundary log that statically presents this difference.

1. The Basic Character of Entropy in Information Theory

In Shannon's information theory, entropy is a quantity defined on the basis of probability distributions, serving as a measure of uncertainty or average information content of an information source. Within this framework, entropy does not directly address concepts such as meaning, value, or truth, but is concerned solely with the **statistical structure of symbol sequences**.

What is crucial is that the "information" treated by information theory is not semantic content, but is strictly limited to **operability in encoding, transmission, and decoding**.

2. The Non-Identity of Information and Meaning

An increase in “information quantity” (entropy) in Shannon’s theory does not imply an increase in semantic content. Signals with high randomness exhibit high entropy, but are not necessarily rich in meaning.

This non-identity follows from the **formal scope** of Shannon’s framework: within that scope, semantics is **abstracted away** so that information can be treated as a quantity definable over probability distributions and communication channels. This is not a flaw in the theory, but a specification that secures engineering rigor and reproducibility within the domain the formalism targets.

3. Presuppositions Concerning the Observing Subject

In the standard framework of information theory, the observing subject is positioned outside the probability distribution. Probabilities are treated as given models, and questions such as **who adopted the probability, why it was adopted, and under what conditions** are not addressed within the theory itself.

In this respect, information theory does not formally handle the existence or position of an observing subject. This is an intentional presupposition that clearly delimits the theory’s range of applicability.

4. The Principle of Maximum Entropy and Its Scope

The principle of maximum entropy is employed as a method for selecting the least informative (least biased) probability distribution under given constraints. This principle serves as an operational rule to ensure consistency in inference and estimation, and does not directly define truth or reality.

Accordingly, maximum entropy concerns not “what exists,” but rather **how distributions are selected**.

5. Difference in Scope with Dualbind

What matters in Dualbind is not the magnitude of information or optimal encoding, but **where meaning operations stop, are retained, or become exposed**. Here, priority is given not to changes in information quantity, but to boundary conditions under which meaning becomes inoperable.

From this perspective, the entropy treated in information theory does not directly correspond to Dualbind’s layers of meaning operation or existence. The two are designed to respond to different questions and therefore operate with different scopes.

6. Repositioning Informational Limits (Non-adoption)

Limits identified within information theory—such as noise limits, channel capacity, and coding efficiency—are defined as constraints internal to operational systems. Dualbind does not adopt or integrate these limits, but may position them as examples in which **the non-closure of an operational system becomes exposed**.

This, however, merely indicates a possibility of reinterpretation and does not imply incorporating information-theoretic limits into Dualbind’s theory.

7. Non-conclusive Conclusion

Information theory and entropy are powerful tools for precisely describing the limits of operable symbolic systems. At the same time, they presuppose that issues of observing subjects and meaning generation are outside their scope.

Dualbind does not attempt to alter this presupposition, but instead **places the two side by side as designs with different scopes**. They neither compete, nor complement each other, nor stand in a causal relationship.

Keiji Sakamoto — Structural Architect

This document was structured from questions, intuitions, and structural hypotheses presented by a human author, and developed through sustained dialogue and verification with Dualbind AI systems (multiple role-differentiated dialogic AIs).

AI systems contributed to logical development, syntactic design, specification drafting, contradiction detection, and scope verification. However, full responsibility for the theoretical position, acceptance of definitions, structural finalization, and publication decisions rests entirely with the human author.

This document is not the product of consensus or automatic generation, but a record of design decisions grounded in the observing subject, supported by interactions with multiple intellectual auxiliary systems.