

A Mathematical Representation of Tao

Liwei Zhang

道可道也 非恆道也

The Tao that can be described is not the Constant Tao.

The section with mathematical symbols is a preliminary conceptual model,
~70% AI-generated based on the original "Purely Descriptive" section.

Context

S : Environment with state.

S_s : Sub-environment of S ($S_s \subseteq S$).

C : Set of Causes relevant to a specific S_s .

E : Set of Effects relevant to a specific S_s .

Rule

r : A rule operates within S_s .

r is an immutable, causal, directional map:

$$r : C \rightarrow E$$

Where:

- C are causes detectable in S_s .
- E are effects manifesting in/relevant to S_s .

Rule Space

R : Set of all rules r .

$$R = \{r \mid r \text{ is a rule}\}$$

$D(\{r_1, \dots, r_i\}_{i \geq 1}, r_{new})$: Rule $r_{new} \in R$ is derived from a non-empty set $\{r_1, \dots, r_i\} \subseteq R$.

Properties of R :

- $|R| = \infty$
- Universal Derivability: Any rule r is derived from a non-empty set of other rules from R .

$$\forall r \in R, \exists \{r'_1, \dots, r'_i\}_{i \geq 1} \subseteq R \setminus \{r\} : D(\{r'_1, \dots, r'_i\}, r)$$

(No base rules)

- Closure under Derivation: If r_{new} is derived from any non-empty set of rules within R , then r_{new} is also in R .

$$\forall \{r_1, \dots, r_i\}_{i \geq 1} \subseteq R : [D(\{r_1, \dots, r_i\}, r_{new}) \implies r_{new} \in R]$$

Tao (道)

T : Tao.

$$T \equiv R$$

The Tao That Can Be Described (道可道)

T_b : The Tao that can be described.

$P(r)$: The predicate “Rule r is recognizable and describable by humans.”

$$T_b = \{r \in R \mid P(r)\}$$

T_b is a finite set.

$$T_b \subset R$$

The Constant Tao (恆道)

$$r_x \rightarrow Dr_y \iff \exists \{r_1, \dots, r_i\}_{i \geq 1} \subseteq R : D(\{r_1, \dots, r_i\}, r_y) \wedge r_x \in \{r_1, \dots, r_i\}$$

$\rightarrow D^*$: The transitive closure of $\rightarrow D$.

$r_x \rightarrow D^*r_y$ means r_x is a direct or indirect prerequisite for r_y .

T_c : The Constant Tao.

$$T_c = \{r \in T \mid (r \notin T_b) \wedge (\exists r_b \in T_b : r \rightarrow D^*r_b)\}$$

Properties of T_c :

- $T_c \subset T$.
- $T_c \cap T_b = \emptyset$.
- $|T_c| = \infty$.

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Rule

The immutable causal relationships in each dimension, level, and sub-environment of the universe.

From cause to effect, the rule exhibits a directional nature.

Relationships Between Rules

The relationships between rules can be derivative, unidirectional, or interactive.

Some background knowledge before proceeding:

Set

A fundamental mathematical model that refers to a collection of distinct objects. The objects in a set are called elements or members, and they can be any type of mathematical object: numbers, symbols, variables, points in space, lines, surfaces, or even other sets.

Space

Reference: A vector space is a special set consisting of mathematical entities (such as real numbers or even functions) that can be scaled and added together, with the property that the result of scaling and addition still belongs to the set. These mathematical entities are called vectors.

Infinite Set

An infinite set is a set composed of an infinite number of elements. Common examples of infinite sets include the set of natural numbers, the set of integers, and the set of rational numbers. Infinite sets are divided into countable and uncountable sets.

The Rule Space

A special set composed of all rules.

- The rule space is an infinite set.
- Any rule within this set must be derived from at least one other rule within the set.
- Any rule(s) derived from the rule(s) within the set also belong(s) to this set.
- The inherent causal relationship within each rule gives it an abstract directionality, which is why this set is referred to as a space.

Tao (道)

Tao = Rule Space

The Tao That Can Be Described (道可道)

A sub-rule space within the rule space, defined by what can be described.

"can be described" refers to the rules that humans can recognize and describe.

The Constant Tao (恆道)

Another sub-rule space from which the sub-rule space, “The Tao That Can Be Described”, is derived.

- Each rule in the Constant Tao must satisfy the following conditions:
 1. It is not a rule within “The Tao That Can Be Described.”
 2. In “The Tao That Can Be Described,” there exists at least one rule for which one or all of the direct or indirect preconditions for derivation is this rule.
- The Constant Tao is an infinite set.

“Constant” does not imply actual immutability. For example, the term "恒星" translates to "star" in English. The "恒" in "恒星" suggests a sense of constancy or permanence, although stars do undergo changes over astronomical timescales.

Words convey meaning; meaning conveys Tao.

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