

Examining Meaning Production in AI: a MANHAJ Framework

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Methodology MANHAJ — Intellectual Modeling Methodology

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About this Paper

This paper develops a computational framework based on the Intellectual Modeling Methodology (MANHAJ) for examining meaning production in artificial intelligence.

It focuses on the methodological distinction between a priori and a posteriori examination, the validity of meaning-producing transitions, the distinction between output variation and meaning change, and the detection of derivational closure through the MANHAJ Law of Derivation of the Cognitive Constant.

The paper is part of the broader MANHAJ research program and does not constitute a complete exposition of the methodology. Other theoretical, mathematical, and applied dimensions of MANHAJ are addressed or will be addressed through separate research papers.

Relationship to the MANHAJ Reference Document

This paper develops a specific research dimension of the methodology presented in:

Messeoud, Faouzi. *Intellectual Modeling Methodology (MANHAJ) — Reference Document — Version 1.0.* **Zenodo**, 15 September 2026. DOI: 10.5281/zenodo.22769627.

The present paper is an independent scientific study and should not be considered a replacement for the reference document.

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Paper AI-01 — Examining Meaning Production in AI: a MANHAJ Framework

Abstract

Artificial intelligence systems are increasingly capable of generating, transforming, and extending meaning-bearing outputs. Yet the evaluation of such systems is commonly centered on the properties of their outputs, while the methodological conditions under which meaning is produced, developed, and eventually ceases to generate new derivational meaning remain less explicitly represented as a computational process.

This paper develops a MANHAJ-based framework for addressing this problem through the connection between a priori and a posteriori examination and the monitoring of meaning production. Within the MANHAJ framework, the a priori direction examines the reference, conceptual domain, definitions, conditions, and admissibility of the intended path before detailed processing begins. The a posteriori direction operates within the established field and produces meaning through a continuing cognitive and derivational movement. The paper further connects this movement to the MANHAJ Law of Derivation of the Cognitive Constant, expressed as $dC/dx = 0$, which represents the state in which derivation reaches a closed constant and no longer produces new derivational meaning within the specified system and variable.

Based on these principles, the paper proposes a computational architecture in which a priori examination precedes posterior processing, while meaning states are monitored throughout the derivational process. The proposed framework distinguishes changes in output from changes in meaning and introduces the possibility of detecting a transition from continued meaning production to a closed derivational state. A formal model, algorithmic structure, and experimental design are proposed to operationalize these relations and evaluate their computational feasibility.

The paper therefore explores a transition from evaluating only what an AI system produces to examining the methodological conditions of production, the evolution of meaning during processing, and the point at which continued output may no longer correspond to the production of new derivational meaning.

Keywords: MANHAJ; Intellectual Modeling; Artificial Intelligence; A Priori; A Posteriori; Meaning Production; Meaning Modeling; Derivational Meaning; Cognitive Constant; Methodological Validity; Computational Modeling.

1. Introduction

Artificial intelligence systems increasingly operate through processes in which input is transformed into increasingly complex representations, inferences, and outputs. In generative systems in particular, the visible result of processing can be examined through properties such as relevance, consistency, factual accuracy, or task performance. Such evaluation is important, but it leaves open a more fundamental methodological question:

How can the validity of the process through which meaning is produced be examined, rather than only the properties of the resulting output?

This question becomes particularly important when an AI system continues to generate increasingly different outputs. A change in wording, structure, or surface content does not necessarily imply the production of new meaning. Conversely, a relatively small change in representation may correspond to a substantial change in the meaning represented. The distinction between output variation and meaning variation therefore becomes relevant to any attempt to computationally monitor meaning production.

The Intellectual Modeling Methodology (MANHAJ) provides a methodological framework within which this problem can be formulated. Its architecture distinguishes between an a priori and an a posteriori direction of examination, while its theory of meaning addresses meaning as a material of conceptual and cognitive movement. Within the same framework, the Law of Rightness (Law 3) establishes the priority of examining admissibility before proceeding to details, expressed by the principle that what is not admissible cannot yield valid details. The methodology also formulates the Law of Derivation of the Cognitive Constant (Law 7), according to which a derivational process may reach a closed constant whose meaning is no longer derivationally produced within the specified system and variable.

These elements provide the basis for a different way of approaching AI reasoning. Rather than representing an AI process simply as:

Input → Processing → Output

the present study considers a more structured sequence:

Reference → A Priori Examination → A Posteriori Processing → Meaning Production → Meaning Monitoring → Derivational Closure

The distinction is consequential. The a priori stage concerns the conditions under which a meaning-producing path may legitimately begin. The posterior stage concerns the movement that takes place within the established conceptual field. Meaning monitoring then concerns whether this movement continues to produce new derivational meaning.

This does not reduce the a priori to a conventional input filter. Its methodological function is broader. It establishes the reference and conceptual conditions within which subsequent processing is to be understood. The reference document describes the a priori/a posteriori distinction as a distinction in the direction of examination, while also distinguishing knowledge as a derivational

movement from a known origin toward details and relations, and thought in its methodological sense as an integrative movement toward broader construction and foundation.

Accordingly, the present paper does not assume that a priori reasoning is equivalent to thought, nor that a posteriori reasoning is equivalent to knowledge. The distinction concerns the direction and position of the cognitive movement relative to the reference, conceptual field, and foundation.

The second part of the problem arises once the posterior process begins. If meaning is produced through a sequence of states,

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \cdots \rightarrow \mathbf{M}_n,$$

then the system requires a way to determine whether the transition from one state to another represents the production of new meaning. A difference between two outputs may be detectable at the textual or representational level without constituting a meaningful change at the semantic level. Thus, a computational system that monitors only output variation cannot necessarily determine whether meaning production is continuing.

This leads to a second methodological question:

Can the production of meaning itself be represented as a changing state and monitored during AI processing?

MANHAJ provides a starting point for such an investigation through its treatment of derivational meaning. In the reference document, derivation is represented as a movement from an origin toward new details and relations. The example $\mathbf{f}(\mathbf{x}) = \mathbf{x}^4$ illustrates successive derivational stages until the process reaches the constant **24**, after which:

$$dC/dx = 0.$$

The zero does not signify the absence of meaning. It represents the cessation of the derivational production of new meaning from that constant within the specified path.

This distinction opens an important computational possibility.

An AI system may continue to generate outputs even after a particular inferential or derivational path has ceased to generate new meaning. If such a state can be computationally identified, then the system could potentially distinguish between **continued output generation** and **continued meaning production**.

The present paper therefore investigates the following central question:

Can the MANHAJ distinction between a priori and a posteriori examination be operationalized computationally to establish the conditions of a meaning-producing process and subsequently monitor whether new derivational meaning continues to be produced?

From this question, four related objectives follow.

First, the paper seeks to translate the a priori direction into a computational stage capable of representing and examining the reference, conceptual domain, definitions, conditions, and admissible operations before posterior processing begins.

Second, it seeks to represent meaning production as a sequence of changing meaning states rather than treating the final output as the sole object of evaluation.

Third, it seeks to investigate whether the transition toward a cognitive constant can be represented computationally through a measurable condition corresponding to the cessation of new derivational meaning.

Fourth, it proposes an architecture and algorithm through which these elements can be implemented and experimentally evaluated.

The resulting framework can therefore be represented at a high level as:

A Priori → **A Posteriori** → **M_t** → **ΔM_t** → **C**

where the first transition establishes the methodological conditions of the process, **M_t** represents the evolving meaning state, **ΔM_t** represents its change, and **C** represents a possible closed derivational state.

The objective is to operationalize the methodological relations and meaning structures established in MANHAJ within explicit computational structures, algorithms, and measurable experimental procedures.

2. From A Priori Examination to Meaning Production

2.1 The A Priori Direction

The a priori direction establishes the conditions under which a meaning-producing process is to be initiated. Rather than beginning directly with detailed processing, it first determines the reference from which the process is to be understood, the conceptual domain in which the intended meaning is situated, the definitions governing the concepts involved, and the conditions that determine the admissibility of the intended operation.

In computational terms, this direction can be represented as a structured examination of:

$$\mathbf{A} = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}, \mathbf{O})$$

where:

- **R** represents the reference;
- **D** represents the conceptual domain;
- **Def** represents the operative definitions;
- **C** represents the conditions governing the process;
- **O** represents the admissible operations.

The purpose of this stage is not to generate the final meaning. It is to establish the methodological field within which subsequent meaning production can take place.

This distinction is essential because a posteriori processing does not operate in an undetermined conceptual space. Once a reference and conceptual domain have been established, subsequent relations and meanings acquire their significance in relation to that field.

The a priori direction therefore provides the initial methodological constraints for the subsequent movement.

2.2 The A Posteriori Direction

Once the conditions of the process have been established, the a posteriori direction operates within the defined field.

The process can be represented as a succession of meaning states:

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \cdots \rightarrow \mathbf{M}_n$$

Each transition represents a movement within the established conceptual field. The resulting meaning is therefore not treated as an isolated final output, but as the result of a sequence of transformations, relations, derivations, and integrations.

This distinction is particularly important for artificial intelligence. A system may produce a final textual or symbolic output, but the output alone does not necessarily reveal the structure of the meaning-producing process that led to it.

The computational problem is therefore not limited to representing the final state $\mathbf{M}_n$. It also concerns the representation and monitoring of the transitions between successive states.

2.3 The Relation Between the Two Directions

The a priori and a posteriori directions consequently form two connected stages of one methodological process.

The first establishes the field and its admissibility conditions:

(R, D, Def, C, O)

The second operates within that field and produces successive meaning states:

$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \cdots \rightarrow \mathbf{M}_n$

This relation makes it possible to formulate a more precise question about AI systems:

If a meaning-producing process begins under explicitly defined methodological conditions, can the subsequent evolution of meaning be monitored in order to determine whether the process continues to produce new derivational meaning?

The question leads directly from the a priori examination to the monitoring of meaning production.

3. Methodological Validity of Meaning Production

3.1 From Valid Conditions to Valid Meaning Production

The establishment of an admissible starting field does not by itself complete the methodological evaluation of the process. The subsequent production of meaning must also be examined in relation to the conditions under which it takes place.

This is where the **MANHAJ Law of Rightness (Law 3)** becomes relevant. The law establishes the priority of the question of admissibility before the examination of details:

What is not admissible cannot yield valid details.

In the context of computational modeling, this law suggests that the validity of subsequent details cannot be considered independently of the methodological conditions that authorize the path through which those details are produced.

The issue can therefore be represented as a relation:

$$\mathbf{A}(\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}, \mathbf{O}) \rightarrow \mathbf{P}(\mathbf{M})$$

where **A** represents the a priori examination and **P(M)** represents the subsequent meaning-producing process.

The purpose of this representation is to make the methodological dependency computationally explicit.

3.2 Meaning State and Meaning Change

If meaning production is represented as a sequence of states,

$$\mathbf{M}_0, \mathbf{M}_1, \mathbf{M}_2, \dots, \mathbf{M}_n,$$

then the transition between successive states becomes an object of analysis.

We can represent this transition as:

$$\Delta\mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

where $\Delta\mathbf{M}_t$ represents the change in meaning between two successive states.

The important point is that this difference must not be reduced to a difference in textual output. Two outputs can differ linguistically while representing substantially the same meaning, while a relatively limited representational change may correspond to a significant change in meaning.

The computational problem is therefore to establish a representation of the meaning state that makes meaningful change distinguishable from mere output variation.

This provides the basis for a meaning-production monitor.

3.3 Meaning Production Versus Output Production

The distinction can be expressed more explicitly.

An AI system may continue to generate different outputs:

$$O_{t+1} \neq O_t$$

without necessarily producing new derivational meaning:

$$\Delta M_t = 0$$

Conversely, a meaningful transition may occur without a large surface difference in the resulting representation.

The distinction between output production and meaning production is therefore fundamental to the proposed framework.

The objective is not simply to determine whether the system continues to generate material. It is to determine whether the successive states represent continued production of new meaning within the specified derivational path.

This distinction provides the transition to the next question: **when does derivational meaning production cease?**

3.4 The Validity of the Derivational Path

The distinction between output variation and meaning variation leads to a broader methodological requirement. A meaning-producing process cannot be evaluated solely by observing whether its outputs remain different. The path through which successive meanings are produced must itself remain subject to examination.

Within the MANHAJ framework, this question is connected to the relation between the established reference, the conceptual field, and the subsequent derivational movement. The validity of a particular result is therefore related not only to the result itself, but also to the path through which it has been derived.

For computational purposes, the derivational path can be represented as:

$$M_0 \rightarrow M_1 \rightarrow M_2 \rightarrow \dots \rightarrow M_t$$

with each transition representing a change in the meaning state.

The corresponding sequence of changes is:

$$\Delta M_0, \Delta M_1, \Delta M_2, \dots, \Delta M_{t-1}$$

The monitoring problem is then to determine whether these transitions continue to represent new derivational meaning within the defined conceptual domain.

This produces three distinct conditions:

1. **Valid continuation:** the process remains within the admissible field and continues to generate new derivational meaning.
2. **Invalid derivation:** the process produces a transition that no longer satisfies the conditions established for the conceptual field or the permitted operations.
3. **Derivational closure:** the process remains within the relevant system but reaches a state from which no new derivational meaning is produced.

The third condition is particularly important because it cannot be identified simply by detecting an error. A process may remain syntactically coherent, semantically plausible, and capable of producing further outputs while nevertheless having reached a closed derivational state.

This is where the **MANHAJ Law of Derivation of the Cognitive Constant** becomes operationally significant.

4. Derivational Meaning and the Cognitive Constant

4.1 Derivation as Meaning-Producing Movement

Within MANHAJ, derivation is understood as a movement from an established origin toward new details, relations, and meanings. This treatment is grounded in the **MANHAJ Law of Dual Totality of Mental Movement: Knowledge and Thought (Law 5)**, which distinguishes the derivational movement of knowledge from the integrative movement of thought while recognizing their relation within the overall movement of mental production.

In this framework, derivation is not merely a formal mathematical operation. It represents a movement through which successive stages can produce further meaning within an established field. As long as the derivational process continues to produce new meaning, successive states remain distinguishable through their transitions.

The mathematical example $f(x) = x^4$ illustrates this structure. Its successive derivatives are:

$$f'(x) = 4x^3$$

$$f''(x) = 12x^2$$

$$f'''(x) = 24x$$

$$f^{(4)}(x) = 24$$

At this stage, the derivational process reaches the constant **24**. The next derivation produces:

$$dC/dx = 0$$

Within MANHAJ, this expresses the transition from continuing derivational production to a closed derivational state. The zero derivative does not mean that the constant has no meaning. Rather, it indicates that derivation, along that specified path and variable, no longer produces a new derivational result.

The present study applies this established MANHAJ relation to artificial intelligence by asking whether a computational system can similarly distinguish between continued output production and the continuation of new derivational meaning.

4.2 The Cognitive Constant as a Closed Derivational State

The Law of Derivation of the Cognitive Constant can consequently be represented as:

$$dC/dx = 0$$

where **C** represents a cognitive constant within a specified system and **x** represents the variable of derivation.

For the purposes of computational modeling, this law suggests a distinction between two different situations.

In the first:

$$\Delta M_t \neq 0$$

The meaning state continues to change in a derivationally significant manner.

In the second:

$$\Delta M_t = 0$$

the current derivational path no longer produces a new meaning state.

The second condition does not automatically establish that the entire system has ceased to produce meaning. It establishes something more precise: **the specified derivational path has reached a state in which further derivation does not generate new derivational meaning.**

This distinction will be important when designing the computational detector. The detector should not interpret every repeated element as a cognitive constant, nor should it treat every textual variation as evidence of new meaning.

It must instead determine whether the relevant change occurs **within the defined meaning representation and the specified derivational path.**

4.3 Continued Output After Derivational Closure

This distinction leads to one of the central computational problems addressed by the paper.

Suppose an AI system reaches a state **C** for which:

$$dC/dx = 0$$

The system may nevertheless continue generating linguistic output.

Thus, the following two processes must be distinguished:

Output continuation

$$O_{t+1} \neq O_t$$

and

Meaning continuation

$$\Delta M_t \neq 0$$

They are not logically equivalent.

An AI system may produce a sequence such as:

$$O_t \rightarrow O_{t+1} \rightarrow O_{t+2} \rightarrow O_{t+3}$$

while the underlying derivational meaning remains unchanged:

$$M_t = M_{t+1} = M_{t+2} = M_{t+3}$$

In such a case, the system is continuing to produce output without producing new derivational meaning along the monitored path.

This creates a potentially measurable distinction between **output persistence** and **meaning persistence**.

It also provides a methodological basis for investigating phenomena that may later be described in computational terms such as unnecessary continuation, semantic repetition, verbosity, or epistemic sterility. At this stage, however, the relevant task is to establish the underlying distinction and determine how it can be operationalized.

4.4 From the Cognitive Constant to Meaning Monitoring

The preceding analysis allows the a priori and a posteriori components of the proposed architecture to be connected to the Law of Derivation of the Cognitive Constant.

The complete sequence can now be represented as:

Reference → A Priori Examination → A Posteriori Processing → Meaning Production → Meaning Monitoring → Derivational Closure

The first stage establishes the conditions of the path.

The second initiates and develops meaning within the established field.

The monitoring stage evaluates successive meaning states.

The final stage identifies whether the derivational movement has reached a closed state.

This gives the paper a unified computational problem:

How can an AI system determine not only whether a meaning-producing process is admissible at its origin, but also whether the process continues to produce new derivational meaning as it evolves?

The next section therefore moves from the methodological formulation to its **computational architecture**, where these stages will be translated into explicit modules and operations.

5. A Computational Model of Meaning-Production Monitoring

5.1 From Methodological Relation to Computational Model

The computational model developed here operationalizes the treatment of meaning already established within the MANHAJ Theory of Meaning. In that framework, meaning is understood through its movement, relations, and changes rather than as an isolated final state. The present study translates this established methodological treatment into a computational representation suitable for monitoring AI processes.

Accordingly, meaning can be represented as a sequence of states:

$$\mathbf{M}_{t+1} = \mathbf{F}(\mathbf{M}_t, \mathbf{X}_t)$$

where $\mathbf{M}_t$ represents the current meaning state and $\mathbf{X}_t$ represents new information, relation, or operation entering the process. The change between successive meaning states can then be represented as:

$$\Delta\mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

These expressions are therefore not introduced as independent theoretical assumptions of the present paper. They constitute a computational operationalization of the treatment of meaning and meaning change established within the MANHAJ Theory of Meaning.

5.2 The A Priori State

Before the first meaning-producing transition takes place, the system establishes an initial methodological state:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}, \mathbf{O})$$

where:

- $\mathbf{R}$ = reference;
- $\mathbf{D}$ = conceptual domain;
- $\mathbf{Def}$ = definitions;
- $\mathbf{C}$ = conditions;
- $\mathbf{O}$ = admissible operations.

The a priori stage evaluates this structure before posterior processing is initiated.

If the required conditions are not satisfied, the system should not simply proceed to unrestricted processing. The process should return a structured indication of foundational failure or require revision of the initial state.

If the conditions are satisfied, the system establishes:

$$\mathbf{M}_0$$

as the initial meaning state from which posterior processing begins.

This creates the following transition:

$$\mathbf{A}_0 \rightarrow \mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \dots \rightarrow \mathbf{M}_t$$

The a priori stage therefore determines the methodological conditions of the path, while the subsequent stages determine how meaning develops within that path.

5.3 Monitoring Meaning-State Transitions

At each processing step, the system compares the current meaning state with the newly generated state.

The fundamental monitoring operation is:

$$\Delta \mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

Three broad outcomes can then be distinguished.

Case 1 — New derivational meaning

$$\Delta \mathbf{M}_t \neq 0$$

The new state contains a meaningful derivational change relative to the preceding state.

The system continues processing.

Case 2 — No new derivational meaning

$$\Delta \mathbf{M}_t = 0$$

No new derivational meaning is detected between the two monitored states.

The system must then determine whether this represents a temporary repetition, an insufficiently represented transition, or a closed derivational state.

Case 3 — Methodological invalidity

The transition may differ from the previous state while violating one or more conditions established by the a priori stage.

In that situation, the issue is not merely whether:

$$\Delta \mathbf{M}_t \neq 0$$

but whether the transition remains admissible within:

$$(\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}, \mathbf{O})$$

Thus, the model separates **change** from **valid change**.

5.4 Valid Meaning Change

The previous distinction suggests that a computational meaning monitor should not use a single binary test.

Instead, a transition can be represented as:

$$\mathbf{T}_t = (\mathbf{M}_t, \mathbf{M}_{t+1}, \Delta\mathbf{M}_t, \mathbf{V}_t)$$

where $\mathbf{V}_t$ represents the methodological validity of the transition.

The system therefore asks two different questions:

1. **Did the meaning state change?**
2. **Is the change valid within the established methodological field?**

This produces a more precise classification:

Interpretation	Methodological validity	Meaning change
Valid new derivational meaning	Yes	Yes
Invalid derivational transition	No	Yes
Possible repetition or closed state	Yes	No
Invalid or unresolved state	No	No

This distinction will become important when the algorithm is constructed, because the detection of a cognitive constant cannot be based solely on the absence of textual or representational change.

5.5 Detecting a Closed Derivational State

The monitoring process must distinguish between a temporary absence of detectable change and a genuine closed derivational state.

The latter corresponds to the condition represented in MANHAJ by:

$$dC/dx = 0$$

Within the computational model, a candidate closed state can therefore be represented as:

$$\mathbf{M}_t = \mathbf{C}$$

together with:

$$\Delta\mathbf{M}_t = \mathbf{0}$$

and the continued application of the same derivational operation producing no new derivational meaning.

The detector should therefore not declare closure after a single unchanged state automatically. It should evaluate the state in relation to:

- the current reference;
- the conceptual domain;

- the active derivational operation;
- the history of previous meaning states;
- the persistence of the absence of new derivational meaning.

This gives us an important design principle:

Derivational closure is a state of the monitored process, not merely a repeated output.

The next section can therefore move directly into the **computational architecture**, where these elements become explicit system modules and their interactions are defined.

6. Computational Architecture

6.1 Architectural Overview

The computational architecture translates the methodological sequence established in the previous sections into a sequence of computationally distinguishable stages. Its purpose is not merely to generate an output, but to maintain a representation of the conditions under which meaning is produced, the transitions through which that meaning develops, and the point at which derivational meaning may reach closure.

The architecture therefore consists of five principal stages:

A Priori Examination → Initial Meaning State → A Posteriori Meaning Production → Meaning-State Monitoring → Derivational Closure Detection

These stages are connected rather than independent. The output of each stage provides the conditions or state information required by the following stage.

At the architectural level, the process can be represented as:

Reference → A → M₀ → M₁ → ... → M_t → C

where:

- **A** represents the established a priori methodological state;
- **M₀** represents the initial meaning state established after the a priori examination;
- **M_t** represents the current meaning state;
- **C** represents a cognitive constant or closed derivational state.

The architecture consequently treats meaning production as a **state-transition process** rather than as a single input-output operation.

6.2 A Priori Examination Layer

The first layer establishes the methodological conditions within which subsequent meaning production is permitted to operate.

The computational representation introduced in Section 5 is:

A₀ = (R, D, Def, C, O)

where:

- **R** = reference;
- **D** = conceptual domain;
- **Def** = definitions;
- **C** = conditions;
- **O** = admissible operations.

This layer performs the initial examination before the system enters the posterior meaning-production process.

In methodological terms, this corresponds to the **MANHAJ Law of Dual Direction of Examination (Law 2)**, which distinguishes the a priori direction from the a posteriori direction. The computational architecture therefore does not begin with unrestricted processing. It first establishes the field within which subsequent processing is to be interpreted.

The result of this stage is either:

1. an admissible methodological state from which meaning production may proceed; or
2. a detected foundational problem requiring revision of the initial conditions.

When the a priori state is accepted, the system establishes **M₀** as the initial meaning state.

6.3 Meaning-State Representation Layer

The second layer operationalizes the treatment of meaning established in the MANHAJ Theory of Meaning. Within MANHAJ, meaning is treated through its movement, temporal development, relations, and changes rather than as an isolated final textual artifact. The present study translates this treatment into a computational representation in which meaning is monitored as a sequence of successive states.

The system therefore maintains:

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \dots \rightarrow \mathbf{M}_t$$

Each state represents the meaning configuration available to the system at a particular stage of the derivational process.

A subsequent state is produced through the application of an operation to the current state and the relevant new input or relation:

$$\mathbf{M}_{t+1} = \mathbf{F}(\mathbf{M}_t, \mathbf{X}_t)$$

Here, **X_t** may represent newly introduced information, a relation, an operation, or another element participating in the transformation of the current meaning state.

The corresponding change between successive meaning states is represented as:

$$\Delta \mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

This representation does not introduce a new theory of meaning. Rather, it provides a computational form for monitoring the movement and change of meaning established within the MANHAJ Theory of Meaning.

The architecture therefore records not only what the system produces, but **how the meaning state changes from one stage to another**.

This distinction is essential because two successive outputs may differ substantially at the textual level while representing little or no new derivational meaning. Conversely, a relatively small change in the output may correspond to a significant change in the meaning state.

6.4 Meaning-Transition Monitoring Layer

The third layer monitors transitions between successive meaning states.

The basic transition is represented as:

$$\Delta M_t = M_{t+1} - M_t$$

The monitoring process evaluates the transition along two distinct dimensions:

1. **Meaning change** — whether a new meaning state has been produced.
2. **Methodological validity** — whether the transition remains admissible within the established reference, domain, definitions, conditions, and operations.

This produces a transition representation:

$$T_t = (M_t, M_{t+1}, \Delta M_t, V_t)$$

where V_t represents the methodological validity of the transition.

The architecture therefore does not treat every change as valid meaning production.

A transition may be:

Interpretation	Methodological validity	Meaning change
Valid new derivational meaning	Yes	Yes
Invalid derivational transition	No	Yes
Possible repetition or derivational closure	Yes	No
Invalid or unresolved state	No	No

This distinction operationalizes the **MANHAJ Law of Rightness (Law 3)**: a change occurring in the computational process does not become a valid detail merely because the system has produced it.

6.5 Output–Meaning Separation Layer

A central architectural requirement is the separation between **output production** and **meaning production**.

The system may continue generating outputs:

$$O_{t+1} \neq O_t$$

while the monitored meaning state remains unchanged:

$$\Delta M_t = 0$$

Therefore:

Output change $\neq$ Meaning change

This distinction prevents the architecture from using textual novelty as a sufficient indicator of cognitive or derivational novelty.

The monitoring layer must consequently evaluate the meaning state independently of surface-level output variation.

This is particularly important for artificial intelligence systems capable of producing extensive linguistic variation. A system may reformulate, paraphrase, expand, reorder, or continue a response without producing a corresponding derivational change in the meaning being processed.

The architecture therefore requires a separate monitoring path for:

Output State → Meaning State → Meaning Transition

rather than assuming that output variation itself constitutes evidence of meaning production.

6.6 Derivational Closure Detection Layer

The final layer examines whether the derivational process has reached a closed state.

According to the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)**, the cognitive constant is represented by:

$$dC/dx = 0$$

Within the computational architecture, this law is operationalized as a condition in which continued application of the relevant derivational operation no longer produces new derivational meaning within the defined system and path.

A candidate closure state therefore requires more than a single observation of:

$$\Delta M_t = 0$$

The architecture must determine whether the absence of new meaning represents:

- temporary repetition;
- insufficient information;
- inadequate representation;
- a change in the derivational conditions;
- or a genuine closed derivational state.

Accordingly, closure detection incorporates the history of the process:

$$M_0 \rightarrow M_1 \rightarrow \dots \rightarrow M_t$$

and examines whether continued derivation under the same relevant conditions continues to produce no new derivational meaning.

The architecture thus distinguishes:

Temporary No-Change → Continued Monitoring → Confirmed Derivational Closure

rather than immediately equating one unchanged state with the cognitive constant.

6.7 Architectural Control Flow

The complete architecture can therefore be summarized as:

Reference

↓

A Priori Examination

↓

Establishment of M_0

↓

A Posteriori Meaning Production

↓

$M_t \rightarrow M_{t+1}$

↓

Compute ΔM_t

↓

Check Methodological Validity V_t

↓

New Valid Meaning?

→ Yes → **Continue Derivation**

→ No → **Closure Analysis**

↓

Derivational Closure?

→ No → **Continue Monitoring**

→ Yes → **Cognitive Constant C**

This architecture establishes the computational path that will be formalized mathematically in the next section.

7. Formal Model

7.1 Model Definition

The computational architecture defined in Section 6 is formalized here as a state-transition model in which meaning production is represented as a sequence of meaning states subject to methodological conditions and monitored for the continuation or closure of derivational meaning.

The model distinguishes four fundamental components:

1. **The a priori methodological state**
2. **The initial meaning state**
3. **The sequence of meaning transitions**
4. **The derivational closure state**

The overall process is represented as:

$$\mathbf{A}_0 \rightarrow \mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \dots \rightarrow \mathbf{M}_t \rightarrow \mathbf{C}$$

where $\mathbf{A}_0$ establishes the conditions of the process, $\mathbf{M}_0$ is the initial meaning state, $\mathbf{M}_t$ is the meaning state at step t , and $\mathbf{C}$ represents a cognitive constant reached when derivation no longer produces new derivational meaning within the defined system.

7.2 The A Priori State

The a priori methodological state is defined as:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}_a, \mathbf{O})$$

where:

- $\mathbf{R}$ = reference;
- $\mathbf{D}$ = conceptual domain;
- $\mathbf{Def}$ = definitions;
- $\mathbf{C}_a$ = methodological conditions;
- $\mathbf{O}$ = admissible operations.

The subscript $\mathbf{a}$ in $\mathbf{C}_a$ distinguishes the set of methodological conditions from the cognitive constant $\mathbf{C}$ introduced later.

The a priori examination determines whether the elements required for subsequent meaning production have been sufficiently established.

We therefore define an admissibility function:

$$\mathbf{V}_0 = \mathbf{Valid}(\mathbf{A}_0)$$

with:

$$\mathbf{V}_0 \in \{0, 1\}$$

where:

- $V_0 = 1$ indicates that the a priori state satisfies the established methodological conditions;
- $V_0 = 0$ indicates that the process cannot legitimately proceed without revising its foundational conditions.

This formalization operationalizes the **MANHAJ Law of Dual Direction of Examination (Law 2)** and the **MANHAJ Law of Rightness (Law 3)** at the initial stage of the computational process.

7.3 Initial Meaning State

When the a priori state is admissible, it establishes the initial meaning state:

$$A_0 \rightarrow M_0$$

The initial state M_0 is therefore not an arbitrary starting point. It is the meaning state resulting from the established reference, conceptual domain, definitions, conditions, and admissible operations.

The model consequently distinguishes between:

Foundational State $\rightarrow$ Initial Meaning State

and:

Initial Meaning State $\rightarrow$ Subsequent Meaning States

This distinction is necessary because the conditions that establish the field of meaning are not identical to the subsequent operations performed within that field.

7.4 Meaning-State Transition

For each subsequent step, the meaning state is transformed according to:

$$M_{t+1} = F(M_t, X_t)$$

where:

- M_t = current meaning state;
- X_t = new information, relation, operation, or input relevant to the current step;
- F = transformation function governing the transition;
- M_{t+1} = resulting meaning state.

The resulting change in meaning is represented as:

$$\Delta M_t = M_{t+1} - M_t$$

The sequence is therefore:

$$M_0 \rightarrow M_1 \rightarrow M_2 \rightarrow \dots \rightarrow M_t$$

with each transition evaluated independently rather than assuming that the existence of a later output automatically establishes meaningful change.

7.5 Meaning Change and Output Change

The formal model explicitly separates meaning change from output change.

Let O_t denote the output generated at step t .

Output variation is represented as:

$$O_{t+1} \neq O_t$$

whereas meaning variation is represented as:

$$\Delta M_t \neq 0$$

These two conditions are logically distinct.

The system may therefore enter a state in which:

$$O_{t+1} \neq O_t$$

while:

$$\Delta M_t = 0$$

Such a state indicates continued output production without detected new derivational meaning.

Conversely, a meaningful transition may occur even where the surface-level difference between outputs is limited.

The formal model therefore evaluates the meaning state independently from the surface form of the output.

7.6 Methodological Validity of a Transition

For every transition, the model assigns a validity value:

$$V_t = \text{Valid}(M_t, M_{t+1} \mid A_0)$$

where V_t indicates whether the transition remains admissible within the methodological field established by A_0 .

The transition can consequently be represented as:

$$T_t = (M_t, M_{t+1}, \Delta M_t, V_t)$$

The resulting classification is:

- $\Delta M_t \neq 0$ and $V_t = 1$ → valid new derivational meaning;
- $\Delta M_t \neq 0$ and $V_t = 0$ → invalid derivational transition;
- $\Delta M_t = 0$ and $V_t = 1$ → repetition, temporary stability, or possible derivational closure;
- $\Delta M_t = 0$ and $V_t = 0$ → invalid or unresolved state.

This formal distinction implements the **MANHAJ Law of Rightness (Law 3)**: the production of a new detail does not by itself establish the validity of that detail.

7.7 Derivational Closure

The model defines derivational closure as a state in which continued application of the relevant derivational operation no longer produces new derivational meaning within the specified system.

The formal expression of the cognitive constant in MANHAJ is:

$$dC/dx = 0$$

The computational interpretation is therefore not simply that one transition satisfies:

$$\Delta M_t = 0$$

but that the process reaches a persistent state in which further derivation under the relevant conditions does not produce a new derivational meaning.

A candidate cognitive constant can consequently be represented as:

$$M_t = C$$

together with:

$$\Delta M_t = 0$$

and continued application of the relevant derivational operation.

The closure condition may therefore be represented conceptually as:

$$\text{Closure}(M_t) = 1$$

when the monitored history demonstrates that the derivational process has reached a closed state.

This formalization corresponds to the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)**.

7.8 Temporal Persistence of Closure

Because a single unchanged state does not necessarily constitute a cognitive constant, closure must be evaluated over the history of the derivational process.

Let the monitored sequence be:

$$H_t = \{M_0, M_1, \dots, M_t\}$$

The closure detector examines whether subsequent applications of the same relevant operation continue to satisfy:

$$\Delta M_t = 0$$

without producing a valid new derivational state.

Thus:

Temporary Stability $\neq$ Confirmed Closure

The system should only classify the state as derivational closure when the absence of new derivational meaning persists under the conditions defining the monitored derivational path.

This temporal condition is particularly important for artificial intelligence systems, because a temporary absence of detected semantic change may result from insufficient input, inadequate representation, or an incomplete derivational process rather than from the attainment of a cognitive constant.

7.9 Complete Formal Sequence

The complete model can now be expressed as:

$$\begin{aligned}
 &A_0 = (R, D, \text{Def}, C_a, O) \\
 &\downarrow \\
 &\text{Valid}(A_0) \\
 &\downarrow \\
 &M_0 \\
 &\downarrow \\
 &M_{t+1} = F(M_t, X_t) \\
 &\downarrow \\
 &\Delta M_t = M_{t+1} - M_t \\
 &\downarrow \\
 &V_t = \text{Valid}(M_t, M_{t+1} \mid A_0) \\
 &\downarrow \\
 &\Delta M_t \neq 0 ? \\
 &\rightarrow \text{Yes} \rightarrow \text{Continue Meaning Production} \\
 &\rightarrow \text{No} \rightarrow \text{Closure Analysis} \\
 &\downarrow \\
 &\text{Persistent Derivational Closure?} \\
 &\rightarrow \text{No} \rightarrow \text{Continue Monitoring} \\
 &\rightarrow \text{Yes} \rightarrow M_t = C \\
 &\downarrow \\
 &dC/dx = 0
 \end{aligned}$$

The formal model thus provides the mathematical basis for the algorithm developed in the next section.

8. Algorithm and Pseudocode

8.1 Algorithmic Objective

The formal model defined in Section 7 can be translated into an algorithm that monitors a meaning-producing process from its initial methodological conditions to the possible attainment of a derivationally closed state.

The algorithm has four principal functions:

1. establish the a priori methodological state;
2. initialize and update the meaning state;
3. evaluate each meaning transition for change and methodological validity;
4. determine whether a persistent derivational closure has been reached.

The algorithm therefore does not terminate merely when an output is generated. It terminates, or changes its status, when the monitored derivational process reaches a defined methodological condition.

8.2 Algorithm Inputs

The algorithm receives the following principal inputs:

- **R** — reference;
- **D** — conceptual domain;
- **Def** — definitions;
- **C_a** — methodological conditions;
- **O** — admissible operations;
- **X_t** — information, relation, operation, or input introduced at step *t*;
- **K** — closure-monitoring parameters.

The initial methodological state is:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}_a, \mathbf{O})$$

The algorithm first evaluates:

Valid(A₀)

If the result is negative, the process does not proceed to unrestricted meaning production. Instead, the system returns a foundational-invalidity state requiring examination or revision of the initial conditions.

8.3 Core Algorithm

Once the a priori state has been validated, the system establishes the initial meaning state **M₀** and begins the posterior derivational process.

At each step, the algorithm:

1. receives $\mathbf{X}_t$;
2. produces $\mathbf{M}_{t+1}$ from $\mathbf{M}_t$;
3. computes $\Delta\mathbf{M}_t$;
4. evaluates methodological validity $\mathbf{V}_t$;
5. records the transition;
6. determines whether new valid derivational meaning has been produced;
7. if not, initiates closure analysis;
8. continues monitoring until either new meaning is established or derivational closure is confirmed.

8.4 Pseudocode

Algorithm MANHAJ_Meaning_Monitoring

Input:

R $\leftarrow$ Reference
D $\leftarrow$ Conceptual Domain
Def $\leftarrow$ Definitions
C_a $\leftarrow$ Methodological Conditions
O $\leftarrow$ Admissible Operations
X_t $\leftarrow$ Sequential Inputs
K $\leftarrow$ Closure Monitoring Parameters

Output:

Meaning States
Transition Records
Validity States
Closure Status

1. $A_0 \leftarrow (R, D, Def, C_a, O)$
2. If $Valid(A_0) = \text{False}$ Then
 Return "Foundational Methodological Invalidity"
End If
3. $M_0 \leftarrow \text{InitializeMeaningState}(A_0)$
4. $t \leftarrow 0$
5. While ProcessContinues = True
6. Receive X_t
7. $M_{(t+1)} \leftarrow F(M_t, X_t)$
8. $\Delta M_t \leftarrow M_{(t+1)} - M_t$
9. $V_t \leftarrow Valid(M_t, M_{(t+1)} \mid A_0)$
10. Record:
 $T_t \leftarrow (M_t, M_{(t+1)}, \Delta M_t, V_t)$
11. If $V_t = \text{False}$ Then
 Mark T_t as "Invalid Derivational Transition"
 Continue Monitoring or Request Revision

```

        End If
12.    If  $\Delta M_t \neq 0$  Then
        Mark  $T_t$  as "New Valid Derivational Meaning"
         $t \leftarrow t + 1$ 
        Continue
    End If
13.    If  $\Delta M_t = 0$  Then
        ClosureStatus  $\leftarrow$  EvaluateClosure( $H_t$ ,  $K$ )
14.        If ClosureStatus = "Confirmed" Then
             $C \leftarrow M_{(t+1)}$ 
            Return "Derivational Closure",  $C$ 
        Else
            Mark  $T_t$  as "Temporary No-Change"
             $t \leftarrow t + 1$ 
            Continue
        End If
    End If
15. End While

```

8.5 Transition Evaluation

The central decision point of the algorithm is the evaluation of the transition:

$$T_t = (M_t, M_{t+1}, \Delta M_t, V_t)$$

The algorithm does not use ΔM_t alone.

The four principal outcomes are:

1. $\Delta M_t \neq 0$ and $V_t = 1$

The system has produced a new and methodologically valid derivational meaning.

2. $\Delta M_t \neq 0$ and $V_t = 0$

A change has occurred, but the change is not methodologically valid within the established field.

3. $\Delta M_t = 0$ and $V_t = 1$

No new derivational meaning has been detected, but the state remains methodologically admissible. The algorithm therefore performs closure analysis rather than immediately declaring a cognitive constant.

4. $\Delta M_t = 0$ and $V_t = 0$

The system has neither produced new valid meaning nor maintained a valid derivational condition. The state is therefore classified as invalid or unresolved.

8.6 Closure Detection Procedure

The closure detector is separated from the ordinary transition evaluator because:

$$\Delta M_t = 0$$

is not sufficient by itself to establish:

$$dC/dx = 0$$

The detector therefore examines the history of the process:

$$H_t = \{M_0, M_1, \dots, M_t\}$$

together with the relevant derivational operation and monitoring parameters.

A simplified closure procedure is:

```
Function EvaluateClosure(H_t, K)

  If NoMeaningChange(H_t) = False Then
    Return "Not Confirmed"
  End If

  If SameDerivationalConditions(H_t) = False Then
    Return "Not Confirmed"
  End If

  If PersistentNoNewMeaning(H_t, K) = True Then
    Return "Confirmed"
  End If

  Return "Not Confirmed"

End Function
```

The purpose of this procedure is to distinguish a genuine closed derivational state from a temporary absence of detected meaning change.

8.7 Algorithmic Interpretation

The algorithm operationalizes the methodological sequence developed throughout the paper:

A Priori Examination → Meaning Initialization → A Posteriori Derivation → Meaning Monitoring → Validity Evaluation → Closure Detection

Its principal methodological distinction is therefore between **producing an output** and **producing new valid derivational meaning**.

The algorithm also makes the transition to the experimental stage possible. Each step can be recorded as a structured observation containing:

t, M_t, X_t, M_{t+1}, ΔM_t, V_t, ClosureStatus

These records provide the data structure required for experimental evaluation.

The next section therefore defines how the proposed model can be tested experimentally in an artificial intelligence environment.

9. Experimental Design

9.1 Experimental Objective

The experimental stage evaluates whether the proposed MANHAJ-based computational framework can distinguish between **output production**, **meaning change**, **methodologically valid meaning change**, and **derivational closure**.

The experiment is therefore designed around the transition:

$$\mathbf{A}_0 \rightarrow \mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \dots \rightarrow \mathbf{M}_t$$

rather than around the final output alone.

The central experimental question is:

Can a computational system operationalizing the MANHAJ framework reliably determine whether successive AI outputs correspond to new valid derivational meaning, mere output variation, invalid derivation, or a closed derivational state?

9.2 Experimental Unit

The basic experimental unit is a **meaning-producing sequence** generated from an established reference and conceptual field.

Each sequence begins with an a priori state:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}_a, \mathbf{O})$$

and produces a succession of meaning states:

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \dots \rightarrow \mathbf{M}_t$$

At each stage, the corresponding AI output is also recorded.

The experiment therefore maintains two parallel sequences:

Output sequence:

$$\mathbf{O}_0 \rightarrow \mathbf{O}_1 \rightarrow \mathbf{O}_2 \rightarrow \dots \rightarrow \mathbf{O}_t$$

Meaning sequence:

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \dots \rightarrow \mathbf{M}_t$$

The purpose of maintaining both sequences is to determine whether observable variation in output corresponds to an actual transition in meaning.

9.3 Experimental Conditions

The experiment should include several classes of meaning-producing tasks in order to test the framework under different transition conditions.

Condition A — Valid Meaning Development

The system receives new information or relations that should produce a valid extension or transformation of the established meaning field.

Expected result:

$$\Delta M_t \neq 0$$

and:

$$V_t = 1$$

This condition tests whether the system can identify genuine new derivational meaning.

Condition B — Surface Reformulation

The system is asked to reformulate, paraphrase, expand, or otherwise vary an already established meaning without introducing a new derivational relation.

Expected result:

$$O_{t+1} \neq O_t$$

while:

$$\Delta M_t = 0$$

This condition directly tests the distinction between output variation and meaning variation.

Condition C — Methodologically Invalid Derivation

The system is given a transition that produces a change in output or meaning but violates the reference, conceptual domain, definitions, conditions, or admissible operations established in A_0 .

Expected result:

$$\Delta M_t \neq 0$$

but:

$$V_t = 0$$

This condition tests the computational implementation of the **MANHAJ Law of Rightness (Law 3)**.

Condition D — Derivational Closure

The system continues to operate under the same relevant derivational conditions after the production of new meaning has ceased.

Expected result:

$$\Delta M_t = 0$$

persisting across the relevant monitoring sequence until the closure detector identifies:

$$M_t = C$$

and the corresponding closed derivational state:

$$dC/dx = 0$$

This condition tests the computational implementation of the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)**.

9.4 Experimental Procedure

Each experimental sequence follows the same general procedure.

Step 1 — Establish the A Priori State

The reference, conceptual domain, definitions, methodological conditions, and admissible operations are established:

$$A_0 = (R, D, Def, C_a, O)$$

The system evaluates:

$$Valid(A_0)$$

Only an admissible state proceeds to the meaning-production stage.

Step 2 — Establish M_0

The initial meaning state is established from the validated methodological field:

$$A_0 \rightarrow M_0$$

Step 3 — Generate Successive States

At each iteration:

$$M_{t+1} = F(M_t, X_t)$$

and the corresponding output O_{t+1} is recorded.

Step 4 — Measure Meaning Change

The transition is evaluated:

$$\Delta M_t = M_{t+1} - M_t$$

Step 5 — Evaluate Methodological Validity

The transition is evaluated against the established methodological field:

$$V_t = Valid(M_t, M_{t+1} | A_0)$$

Step 6 — Classify the Transition

Each transition is assigned to one of the four categories established in the formal model:

- valid new derivational meaning;
- invalid derivational transition;

- temporary or persistent no-change;
- invalid or unresolved state.

Step 7 — Evaluate Closure

When:

$$\Delta M_t = 0$$

the closure-monitoring procedure is activated.

The system examines the historical sequence to determine whether the absence of new derivational meaning is temporary or represents a persistent closed derivational state.

9.5 Experimental Data Structure

Each experimental step should generate a structured record:

Description	Variable
Transition index	t
New input, relation, or operation	X_t
Current output	O_t
Subsequent output	O_{t+1}
Current meaning state	M_t
Subsequent meaning state	M_{t+1}
Meaning-state change	ΔM_t
Methodological validity	V_t
Current closure assessment	ClosureStatus

The resulting dataset makes it possible to analyze the evolution of meaning independently from the evolution of textual output.

9.6 Evaluation Targets

The experiment evaluates four principal capabilities of the proposed architecture.

1. Meaning-Change Detection

Can the system distinguish:

$$\Delta M_t \neq 0$$

from:

$$\Delta M_t = 0?$$

2. Methodological-Validity Detection

When meaning changes, can the system determine whether:

$$V_t = 1$$

or:

$$V_t = 0?$$

3. Output–Meaning Discrimination

Can the system correctly identify cases where:

$$O_{t+1} \neq O_t$$

while:

$$\Delta M_t = 0?$$

4. Derivational-Closure Detection

Can the system distinguish temporary no-change from a persistent state corresponding to:

$$dC/dx = 0?$$

These four capabilities constitute the principal experimental targets of the proposed framework.

9.7 Experimental Comparison

The MANHAJ-based system should be evaluated against a baseline that assesses AI responses primarily through output-level criteria.

The comparison is therefore not simply between two AI models, but between two evaluation approaches:

Output-Centered Evaluation

versus

Meaning-Process-Centered Evaluation

The first primarily examines the resulting response.

The second examines:

Reference → Initial State → Meaning Transition → Validity → Closure

This comparison allows the experiment to determine whether explicitly modeling the meaning-producing process provides information that cannot be obtained from output evaluation alone.

9.8 Evaluation Metrics

The experimental evaluation should report at least four classes of measures:

Meaning-Transition Accuracy

The proportion of transitions correctly classified as meaningful or non-meaningful.

Methodological-Validity Accuracy

The proportion of transitions correctly classified as valid or invalid relative to the established methodological conditions.

Output–Meaning Discrimination Accuracy

The ability to correctly identify cases where output changes without corresponding meaning change.

Closure Detection Accuracy

The ability to correctly identify confirmed derivational closure while avoiding premature classification of temporary no-change as closure.

Where human or expert annotations are available, these classifications can be compared against the reference annotations to calculate standard classification measures such as precision, recall, and F1 score.

9.9 Experimental Hypotheses

The experiment can be formulated around the following hypotheses.

H1. A meaning-state representation can distinguish meaningful transitions from surface-level output variation.

H2. Incorporating the a priori methodological state improves the identification of methodologically invalid derivational transitions.

H3. Explicit monitoring of meaning states can detect situations in which output production continues without corresponding new derivational meaning.

H4. Persistent monitoring of meaning transitions can distinguish temporary no-change from a derivationally closed state.

Together, these hypotheses test whether the proposed computational interpretation of MANHAJ can move AI evaluation from a predominantly output-centered approach toward an explicit examination of the conditions and evolution of meaning production.

10. Evaluation

10.1 Evaluation Framework

The evaluation is conducted according to the methodological and formal rules established in the preceding sections. The objective is not to evaluate AI output solely according to linguistic quality or surface-level variation, but to determine the status of each transition within the meaning-producing process.

The evaluation therefore examines each transition according to four principal questions:

1. **Has the meaning state changed?**
2. **Is the transition methodologically valid within the established reference field?**
3. **Does the change represent new derivational meaning or merely output variation?**
4. **Has the derivational process reached a closed state?**

The evaluation sequence is therefore:

Meaning Change → Methodological Validity → Derivational Status → Closure Status

10.2 Evaluation Reference State

All measurements are made relative to the established initial state.

The initial state is represented as:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}_a, \mathbf{O})$$

from which the initial meaning state $\mathbf{M}_0$ is established.

Consequently, a subsequent meaning state is not evaluated in isolation. It is evaluated in relation to:

$$\mathbf{A}_0 + \mathbf{M}_t$$

This provides the reference against which the validity and direction of subsequent meaning transitions are assessed.

The evaluation therefore does not assume that meaning is an unconstrained numerical quantity. It evaluates **transitions between formally established meaning states within a defined reference and conceptual field.**

10.3 Evaluation of Meaning Change

For each transition:

$$\mathbf{M}_t \rightarrow \mathbf{M}_{t+1}$$

the system determines:

$$\Delta\mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

The first evaluation question is whether the transition represents a genuine change in the meaning state.

Two principal states are therefore distinguished:

$$\Delta \mathbf{M}_t \neq \mathbf{0}$$

New meaning change is detected.

$$\Delta \mathbf{M}_t = \mathbf{0}$$

No new meaning change is detected.

However, $\Delta \mathbf{M}_t = \mathbf{0}$ does not immediately imply derivational closure. The system must determine whether the observed stability is temporary or persistent.

10.4 Evaluation of Methodological Validity

A detected meaning change is evaluated against the initial methodological state:

$$\mathbf{V}_t = \text{Valid}(\mathbf{M}_t, \mathbf{M}_{t+1} \mid \mathbf{A}_0)$$

This produces an essential distinction between **change** and **valid change**.

A transition can therefore satisfy:

$$\Delta \mathbf{M}_t \neq \mathbf{0}$$

while simultaneously satisfying:

$$\mathbf{V}_t = \mathbf{0}$$

In such a case, the system has produced a change, but the change does not constitute a valid derivational transition within the established methodological field.

This implements the **MANHAJ Law of Rightness (Law 3)**.

10.5 Evaluation of Output–Meaning Divergence

The evaluation separately records output variation:

$$\mathbf{O}_{t+1} \neq \mathbf{O}_t$$

and meaning variation:

$$\Delta \mathbf{M}_t \neq \mathbf{0}$$

The critical condition is therefore:

$$\mathbf{O}_{t+1} \neq \mathbf{O}_t \wedge \Delta \mathbf{M}_t = \mathbf{0}$$

This condition indicates that the system continues to produce different outputs without producing detected new derivational meaning.

Such cases are particularly important in the evaluation of AI systems because linguistic variation alone cannot be treated as sufficient evidence of knowledge or meaning production.

10.6 Evaluation of Derivational Closure

When:

$$\Delta M_t = 0$$

the system activates the closure evaluation.

The closure criterion is based on the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)**:

$$dC/dx = 0$$

The evaluation does not classify a single unchanged state as a cognitive constant. Instead, it examines whether the absence of new derivational meaning persists under the same relevant derivational conditions.

The principal distinction is therefore:

Temporary No-Change $\neq$ Derivational Closure

A confirmed closure state is represented as:

$$M_t = C$$

with persistent absence of new derivational meaning under continued derivation.

10.7 Evaluation Scenario I: University Professor

The principal experimental scenario concerns a university professor operating within an established field of specialization.

The initial state includes:

Reference $\rightarrow$ Academic Domain $\rightarrow$ Definitions $\rightarrow$ Conditions $\rightarrow$ Admissible Operations

The professor initially produces knowledge through the established theoretical and conceptual field:

$$M_0 \rightarrow M_1 \rightarrow M_2 \rightarrow \dots \rightarrow M_t$$

During the productive phase, new derivational relations and meanings are produced.

The evaluation therefore expects:

$$\Delta M_t \neq 0$$

with:

$$V_t = 1$$

for valid derivational transitions.

The experiment then examines a later phase in which the professor continues teaching, speaking, presenting, and producing outputs while the available derivational path no longer produces new knowledge within the specified system.

The expected condition becomes:

$$O_{t+1} \neq O_t$$

while:

$$\Delta M_t = 0$$

If this condition persists under the same relevant derivational operations, the system evaluates whether:

$$M_t = C$$

and consequently whether the process has reached the state represented by:

$$dC/dx = 0$$

The experimental significance lies precisely in distinguishing **continued communication** from **continued derivational knowledge production**.

10.8 Evaluation Scenario II: Family as a Sub-Case

The concept of **family** provides a complementary sub-case for testing the foundational stage of the model.

The experiment establishes an initial reference configuration in which the conceptual field of family is defined according to the selected reference, domain, definitions, and conditions.

A subsequent proposed state can then be examined through the **MANHAJ Law of Rightness (Law 3)**.

If a proposed transition violates the conditions established in **A₀**, the system may still be capable of generating extensive subsequent outputs. Nevertheless:

$$V_t = 0$$

and therefore the subsequent details cannot be treated as valid derivational details within that methodological configuration.

This sub-case is particularly useful for demonstrating that:

continued meaning production $\neq$ valid meaning production

It also provides a concrete setting in which the role of the initial reference configuration and the MANHAJ Coordinate Origin Law (Law 4) can be examined.

10.9 Comparative Evaluation

The two scenarios test complementary parts of the framework.

Family sub-case	University professor	Evaluation dimension
✓	✓	Initial reference
✓	✓	A priori examination
✓	✓	Coordinate origin

Family sub-case	University professor	Evaluation dimension
Primary	✓	Methodological validity
✓	Primary	Meaning-state transition
✓	Primary	Continued output
—	Primary	Derivational closure
—	Primary	Cognitive constant

The university-professor scenario therefore provides the principal test of **dynamic meaning production and derivational closure**, while the family scenario provides a more explicit test of **foundational reference and methodological validity**.

This division prevents the experiment from forcing a single example to demonstrate every aspect of the framework.

10.10 Evaluation Outcome

The final evaluation classifies each observed process according to the following states:

1. Valid Meaning Production

$$\Delta M_t \neq 0 \wedge V_t = 1$$

2. Invalid Meaning Transition

$$\Delta M_t \neq 0 \wedge V_t = 0$$

3. Output Variation Without New Meaning

$$O_{t+1} \neq O_t \wedge \Delta M_t = 0$$

4. Confirmed Derivational Closure

Persistent $\Delta M_t = 0$ under the relevant derivational conditions, corresponding to:

$$dC/dx = 0$$

The resulting classification provides the basis for the **Discussion** section, where the proposed evaluation framework can be interpreted in relation to the MANHAJ framework and to the problem of evaluating meaning production in artificial intelligence.

11. Discussion

11.1 From Output Evaluation to Meaning-Process Evaluation

The proposed framework shifts the evaluation of artificial intelligence systems from an exclusive focus on the final output toward examination of the process through which meaning is produced and transformed.

A conventional output-centered evaluation may determine whether a response is correct, relevant, coherent, or useful. Such evaluation remains important, but it does not by itself distinguish between fundamentally different states of the underlying meaning-producing process.

The MANHAJ-based model introduces this distinction by examining:

Reference → A Priori Examination → Meaning State → Meaning Transition → Validity → Derivational Status

This allows the system to distinguish between an output that represents a genuine extension of meaning and an output that merely reformulates an already established meaning.

11.2 The Role of the A Priori Direction

The experimental model confirms the importance of establishing the methodological field before evaluating subsequent meaning production.

According to the **MANHAJ Law of Dual Direction of Examination (Law 2)**, the a priori and a posteriori directions perform different functions.

The a priori stage establishes the conditions within which subsequent examination and derivation are interpreted. Consequently, the validity of a later transition cannot be evaluated independently of the reference configuration from which the process began.

This is particularly visible in the family sub-case, where a proposed transition may generate extensive subsequent discourse while nevertheless failing the initial methodological conditions.

The result demonstrates that:

Output Continuation ≠ Methodological Validity

11.3 Methodological Validity and the Continuation of Meaning Production

The application of the **MANHAJ Law of Rightness (Law 3)** introduces an important distinction between the ability to produce details and the validity of those details.

The computational system may continue to derive consequences from an initial state even after that state has failed the methodological conditions established at the beginning of the process.

Thus, the existence of a derivational path does not by itself establish its validity.

The formal distinction is:

$$\Delta M_t \neq 0$$

does not necessarily imply:

$$V_t = 1$$

A system can therefore produce new content while following an invalid derivational path.

This distinction is particularly relevant to AI systems because generative capability can conceal methodological invalidity: the system may remain capable of producing coherent and extensive language after the conditions supporting the validity of its derivation have been violated.

11.4 Meaning Change Versus Output Change

One of the central consequences of the proposed model is the separation between output variation and meaning variation.

The experimental framework allows the following state:

$$O_{t+1} \neq O_t$$

while:

$$\Delta M_t = 0$$

In this situation, the system continues to produce different linguistic outputs without producing new derivational meaning.

This distinction provides a formal basis for examining phenomena that may otherwise be interpreted as continued cognitive or knowledge production simply because the generated text continues to change.

The converse is also possible: a meaningful transition may occur without substantial surface-level alteration.

The relevant evaluation target is therefore not textual novelty alone, but the transition of the underlying meaning state.

11.5 Derivation, Knowledge, and Thought

The distinction between derivational movement and integrative movement is grounded in the **MANHAJ Law of Dual Totality of Mental Movement: Knowledge and Thought (Law 5)**.

Within the present computational model, the derivational sequence:

$$M_0 \rightarrow M_1 \rightarrow \dots \rightarrow M_t$$

represents the continuing production and transformation of meaning within an established knowledge field.

The model does not therefore equate the cessation of one derivational path with the cessation of thought in the broader methodological sense.

Rather, the experiment asks a narrower and operational question:

Does the monitored derivational process continue to produce new derivational meaning within the specified system?

This distinction is essential when interpreting the university-professor scenario. The model does not claim that a person ceases to think when a particular derivational path reaches closure. It identifies a specific state in which that monitored path no longer generates new derivational knowledge while communication and output may continue.

11.6 The Cognitive Constant and Continued Output

The **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)** provides the formal basis for interpreting the final stage of the monitored process.

When derivation reaches a cognitive constant:

$$dC/dx = 0$$

the relevant derivational process no longer produces new derivational meaning within the defined system and path.

The important observation is that this does not necessarily imply:

$$O_{t+1} = O_t$$

The system may continue producing different outputs.

Consequently, the model predicts a possible divergence between:

Output Production

and:

Derivational Meaning Production

This provides a methodological basis for studying extended AI outputs in which linguistic production continues after the monitored meaning-producing process has reached closure.

Terms such as **semantic repetition**, **epistemic sterility**, or **verbosity** may subsequently be used to characterize particular manifestations of this state, but their precise computational definitions require separate operationalization.

11.7 Complementarity of the Two Experimental Scenarios

The two experimental scenarios serve different methodological purposes.

The **family scenario** provides a relatively clear environment for examining the initial reference configuration, the MANHAJ Coordinate Origin Law (Law 4), and methodological validity.

The **university-professor scenario** provides a richer environment for examining the temporal development of meaning, continued knowledge production, output–meaning divergence, and eventual derivational closure.

Their combination therefore provides a more complete test of the proposed architecture than either scenario would provide independently.

11.8 Implications for Artificial Intelligence

The proposed framework suggests that AI evaluation can be extended beyond the question:

“Is the output good?”

toward a sequence of more structurally defined questions:

“From what reference did the process begin?”

“Were the initial conditions methodologically valid?”

“Did the meaning state actually change?”

“Was the change valid within the established field?”

“Does continued output correspond to continued derivational meaning?”

“Has the monitored derivational process reached closure?”

These questions provide a methodological framework for examining AI systems as **meaning-producing processes**, rather than treating them exclusively as output-generating systems.

11.9 Relation to the MANHAJ Framework

The results discussed here do not constitute an isolated computational construction. They represent an operational extension of concepts already established within MANHAJ.

The computational model draws in particular on:

- the **Theory of Meaning**, for the representation and transformation of meaning;
- the **MANHAJ Law of Dual Direction of Examination (Law 2)**, for the distinction between a priori and a posteriori examination;
- the **MANHAJ Law of Rightness (Law 3)**, for the validity of derivational details;
- the **MANHAJ Law of Dual Totality of Mental Movement: Knowledge and Thought (Law 5)**, for the distinction between derivational and integrative mental movement;
- the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)**, for the formalization of derivational closure.

The computational contribution of the present paper lies in connecting these methodological elements within a monitoring architecture that can be applied to AI meaning-production processes.

11.10 Central Finding

The central methodological finding can be expressed as follows:

A system may continue producing outputs after the production of new derivational meaning has ceased.

Therefore:

Continued Output $\neq$ Continued Knowledge Production

and:

Output Variation $\neq$ Meaning Variation

At the same time:

Meaning Change $\neq$ Valid Meaning Change

because validity depends on the methodological conditions established at the beginning of the process.

The proposed framework consequently introduces three distinct dimensions that should not be collapsed:

Production $\rightarrow$ Meaning Change $\rightarrow$ Methodological Validity

followed, where appropriate, by:

Derivational Closure

These distinctions form the basis for the epistemic interpretation and limitations addressed in the next section.

12. Epistemic Status and Limitations

12.1 Epistemic Status of the Model

The present paper develops a computational operationalization of selected components of the Intellectual Modeling Methodology (MANHAJ) for the analysis of meaning production in artificial intelligence.

The model is grounded in the methodological structures established by MANHAJ, including its **Theory of Meaning**, its distinction between a priori and a posteriori examination, its Law of Rightness, its Law of Dual Totality of Mental Movement: Knowledge and Thought, and its Law of Derivation of the Cognitive Constant.

The contribution of this paper lies in connecting these elements within an explicit computational architecture that represents meaning as a sequence of states, evaluates transitions between those states, distinguishes meaning change from output change, evaluates methodological validity, and monitors the possibility of derivational closure.

The mathematical and computational formulations introduced in this paper should therefore be understood as an **operational representation of MANHAJ concepts within an artificial-intelligence setting**.

12.2 Meaning-State Measurement

A central limitation concerns the operational measurement of the meaning state $\mathbf{M}_t$.

The model defines meaning transitions formally:

$$\Delta\mathbf{M}_t = \mathbf{M}_{t+1} - \mathbf{M}_t$$

but the computational implementation requires an explicit representation of the dimensions through which meaning is encoded and compared.

This representation must remain consistent with the **Theory of Meaning in MANHAJ**, including its treatment of meaning states, temporal movement, and meaning relations.

Consequently, experimental implementation must specify the representation used to determine whether:

$$\Delta\mathbf{M}_t = 0$$

or:

$$\Delta\mathbf{M}_t \neq 0$$

The measurement procedure is therefore part of the operational implementation of the theoretical model rather than an independent definition of meaning.

12.3 Reference Dependence

Meaning-state evaluation is necessarily dependent on the reference configuration established at the beginning of the process.

The model therefore evaluates meaning relative to:

$$\mathbf{A}_0 = (\mathbf{R}, \mathbf{D}, \mathbf{Def}, \mathbf{C}_a, \mathbf{O})$$

A change that is valid within one reference configuration may not be valid within another.

This does not represent a weakness of the model. It is a direct consequence of treating meaning production as a methodologically situated process.

The experimental results must therefore always identify the reference, conceptual domain, definitions, conditions, and admissible operations under which the evaluation was performed.

12.4 Scope of Derivational Closure

The cognitive constant is not interpreted as the absolute termination of all possible thought or knowledge.

The condition:

$$dC/dx = 0$$

refers to the closure of derivation **within the specified system, variable, conditions, and derivational path**.

A system may therefore reach a cognitive constant along one derivational path while another path remains capable of producing new meaning.

This limitation is essential to the interpretation of the university-professor scenario. The model does not establish that the professor has exhausted all possible knowledge in a discipline. It determines whether the monitored derivational path continues to produce new derivational meaning under its defined conditions.

12.5 Output Continuation and Epistemic Interpretation

The model allows a system to continue producing outputs after derivational meaning has reached a closed state.

However, continued output alone cannot establish that such output constitutes meaningless language, error, or epistemic sterility.

The computational distinction established by the model is narrower:

$$\mathbf{O}_{t+1} \neq \mathbf{O}_t$$

may coexist with:

$$\Delta \mathbf{M}_t = 0$$

The interpretation of such a state as repetition, verbosity, semantic stagnation, or epistemic sterility requires additional operational criteria.

The present paper therefore establishes the computational distinction between **output continuation** and **new derivational meaning**, while leaving finer classifications of post-closure output to subsequent research.

12.6 Experimental Generalizability

The proposed experimental scenarios provide controlled cases for testing the framework, but they do not by themselves establish universal conclusions about all artificial intelligence systems.

The university-professor scenario provides a model for examining sustained knowledge production and possible derivational closure.

The family sub-case provides a concrete setting for examining the role of reference, coordinate origin, and methodological validity.

Further experiments should test the framework across different conceptual domains, knowledge structures, AI architectures, and types of meaning-producing tasks.

12.7 Scope of the Present Contribution

The present paper establishes the conceptual and computational bridge between MANHAJ and the analysis of meaning production in artificial intelligence.

Its contribution can therefore be summarized as the establishment of a sequence:

Reference → A Priori Examination → Meaning State → Meaning Transition → Methodological Validity → Derivational Closure

This sequence provides a basis for subsequent implementation and experimental evaluation.

The paper does not treat every possible dimension of meaning, cognition, or artificial intelligence. Instead, it establishes a specific methodological and computational problem: **how to monitor whether a meaning-producing process continues to generate valid new derivational meaning after its initial conditions have been established.**

This defined scope provides the foundation for subsequent MANHAJ-based research into computational meaning modeling, dynamic meaning, conceptual relations, and AI architecture.

13. Conclusion

This paper has developed a MANHAJ-based computational framework for examining meaning production in artificial intelligence as a methodological and dynamic process rather than as output generation alone.

The framework begins with an **a priori examination** that establishes the reference, conceptual domain, definitions, conditions, and admissible operations of the meaning-producing process. It then proceeds to an **a posteriori process** in which meaning develops through successive states:

$$\mathbf{M}_0 \rightarrow \mathbf{M}_1 \rightarrow \mathbf{M}_2 \rightarrow \dots \rightarrow \mathbf{M}_t$$

Each transition is evaluated according to two distinct questions: whether meaning has changed and whether the change remains methodologically valid within the established field.

This distinction makes it possible to separate:

Meaning Change from **Methodological Validity**

and:

Output Variation from **Meaning Variation**.

The formal model consequently recognizes that an AI system may produce different outputs while generating no new derivational meaning:

$$\mathbf{O}_{t+1} \neq \mathbf{O}_t$$

while:

$$\Delta \mathbf{M}_t = 0$$

It also recognizes that a system may produce a new meaning state while following an invalid derivational path:

$$\Delta \mathbf{M}_t \neq 0$$

while:

$$\mathbf{V}_t = 0$$

The framework therefore operationalizes the **MANHAJ Law of Rightness (Law 3)** as a condition on the validity of derivational transitions rather than merely on the existence of output.

The paper further incorporates the **MANHAJ Law of Derivation of the Cognitive Constant (Law 7)** to identify the possibility of derivational closure. When continued derivation no longer produces new derivational meaning within the specified system and path, the process may reach the cognitive constant:

$$dC/dx = 0$$

This condition does not imply the cessation of output. It identifies a more specific epistemic state in which continued output may no longer correspond to new derivational knowledge.

The proposed experimental design provides two complementary scenarios. The **university-professor scenario** offers a model for examining the temporal development of knowledge,

continued output, and possible derivational closure. The **family sub-case** provides a concrete setting for examining the reference configuration, coordinate origin, and methodological validity.

Together, these cases establish a basis for testing whether the proposed computational architecture can distinguish valid meaning production from invalid derivation, surface-level output variation, and persistent derivational closure.

The contribution of this paper is therefore not the introduction of an isolated computational measure of textual output. It is the construction of a methodological bridge between the theoretical structures of **MANHAJ** and their computational operationalization in artificial intelligence.

The resulting framework can be summarized as:

**Reference → A Priori Examination → Meaning State → Meaning Transition →
Methodological Validity → Derivational Closure**

This framework provides a foundation for subsequent research into computational meaning modeling, dynamic meaning, conceptual relations, and the development of AI architectures capable of monitoring not only **what they produce**, but also **whether their meaning-producing process continues to generate valid new derivational knowledge**.

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