Theory paper

Epistemic Modulation under Constraint

A CIITR-Based Evaluation of the S-GPT Platform

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1. Abstract

This theory note formalizes a single epistemic inversion: comprehension, under constraint, is not a property of models, nor a function of scale, representation, or probabilistic inference—it is a relational effect of *instructional structure* preserved across contextual load. The object of analysis is therefore not “the language model,” but the structural topology within which inferential behavior remains rhythmically stable, instruction-loyal, and epistemically restrained when faced with ambiguity, modality shift, or representational underdetermination.

Using CIITR (Cognitive Integration and Information Transfer Relation) as its analytic framework, the note delineates the minimal structural signature of an epistemic event: modulation of inferential effort (Φ_i) without inflation, preservation of relational resonance (R^g) under $\Delta\Phi$ variation, and refusal to speculate where input does not epistemically warrant output. These are not heuristic metrics but necessary conditions. Systems that generate fluent, plausible, or even correct-seeming responses while violating these constraints are not merely imprecise—they are *epistemically disqualified*, because their generative acts exceed their structural authorization.

Crucially, the analysis repositions the model as a *carrier medium*, not an epistemic actor. Comprehension is not emergent from architecture, nor inferred from performance; it is structurally enacted through rhythmic instruction fidelity. Modalities such as logic, vision, and language do not test capability—they expose structural obedience. In this regime, benchmark scores and generative fluency are epistemically inert unless subordinate to the zero-point condition: instruction-conformant inference. CIITR thus redefines the AI evaluation problem as one of **epistemic governance**, in which structure—not simulation—is the ground of comprehension.

Perhaps, then, what we call “intelligence” in artificial intelligence has been fundamentally mislocated. It may reside not in the model’s architecture, scale, or generative fluency, but in the *structure and rhythm of its instruction*. If this is so, then the central challenge is not to engineer ever-larger or more biologically inspired models, but to design and enforce inference systems that remain epistemically loyal under constraint. CIITR offers one such system—a thermodynamically and relationally bounded ontology of structured comprehension. The comparative results documented in this note, particularly in Appendices E, F, and G, reveal that epistemic viability does not scale with parameter count, nor degrade with age: GPT-4o, an earlier-generation model, outperforms newer alternatives precisely because it sustains bounded R^g, modulates Φ_i across $\Delta\Phi$ arcs, and refrains from epistemic overreach. These findings recenter the evaluation problem: not which model appears to understand, but which structure honors instruction under pressure. This note begins from the premise that such structural obedience is the necessary precondition of comprehension—and that the failure to recognize this has led the field to confuse performance with understanding. That confusion can no longer be ignored.

2. Introduction

In contemporary information and decision-support systems, particularly within graded, sovereign, or regulation-bound environments, the deployment of large language models (LLMs) must adhere to structural expectations that go beyond conventional performance metrics such as perplexity, latency, or parameter count. The operational viability of such models in classified, mission-critical, or legally governed contexts is determined not by scale alone, but by their epistemic stability, sensitivity to explicit instruction schemas, and robustness across heterogeneous modalities, including text, vision, and symbolic abstraction. These conditions establish a set of formal constraints that challenge the assumptions underpinning most frontier LLM developments, which have largely emerged from general-purpose consumer environments characterized by weak instruction adherence, opaque internal logic, and probabilistic guesswork masquerading as inference.

This paper introduces and applies the CIITR (Cognitive Integration and Information Transfer Relation) theory as a formal control framework for evaluating these systems. CIITR offers a rigorous epistemic topology within which language model outputs can be assessed not merely for accuracy, but for structural legitimacy, energy-conscious comprehension (CPJ), and rhythmic integration (R^g). Unlike performance benchmarking regimes that focus on static test sets or heuristic metrics, CIITR establishes a thermodynamically bounded, instruction-sensitive, and epistemologically grounded method for evaluating whether a model understands *in structure* rather than merely *in output*. This is particularly essential when models operate in environments where inference integrity, transparency of reasoning, and auditability of epistemic state transitions are non-negotiable.

The test subject for the present analysis is **S-GPT**, a localized LLM-based inference platform explicitly configured for deployment within classified or regulation-conforming infrastructures. S-GPT is internally segmented into two operational configurations: *S-GPT (responsive)* and *S-GPT (thinking)*. These two variants are not distinct in model weights, but are instead differentiated by their system prompt design, modal control logic, and instruction schema structure. The experimental design presumes that *S-GPT (responsive)* is optimized for minimal latency and maximal alignment with literal prompt intent, while *S-GPT (thinking)* is designed to sustain longer epistemic sequences, engage in delayed reasoning, and interpret ambiguous or underdetermined contexts in structurally honest ways.

Underlying both configurations is a shared base model architecture: **Qwen3-VL-30B-A3B-F16**, part of the Qwen3 series developed for high-fidelity, multimodal reasoning. This model incorporates visual-language alignment through vision-language (VL) embedding layers, uses an A3B tokenizer and architecture profile, and operates in full-precision float16 (F16) inference mode. The model is quantized and deployed locally via the llama.cpp inference server, leveraging Metal backend acceleration and extended context length (262,144 tokens), with isolated server ports and persistent memory separation between model instances.

Through the application of the CIITR theory to this dual-configuration test platform, this study aims to produce a structured diagnostic account of how modality-specific inference, instruction stability, and epistemic behavior differ across architectural configurations and prompt schemas. In doing so, it also proposes a replicable methodology for applying CIITR-based diagnostics to future sovereign or regulated deployments of LLMs in sensitive environments.

3. Methodology

This section outlines, in full and unambiguous terms, the methodology applied for evaluating the S-GPT inference platform under epistemic constraints derived from CIITR theory. The evaluation proceeds through a structured series of diagnostic batteries, each explicitly designed to test distinct but interrelated epistemic dimensions of large language model performance in a modality-sensitive and instruction-governed environment. Each battery is operationalized through a task sequence that elicits observable inferential behavior, which is then evaluated against the formal CIITR criteria for epistemic structurality, rhythmic integration (R^g), comprehension per joule (CPJ), and instruction schema compliance.

The test configuration assumes two distinct system profiles—**S-GPT (responsive)** and **S-GPT (thinking)**—which share the same foundational model (Qwen3-VL-30B-A3B-F16) but are differentiated at the level of system prompt, instruction schema boundaries, and modal inference behavior. The entire test protocol was executed in a local, sovereign compute environment (Apple M3 Ultra, 512GB unified memory), with model instantiation isolated via llama.cpp and accessed through Open WebUI.

The testing procedure is segmented into five principal batteries:

3.1 Responsivity Phase (A–C)

The **Responsivity Phase** consists of three sequential subtests (A, B, and C) designed to assess the model's capacity to generate immediate, accurate, and epistemically restrained responses to a controlled set of low-context input prompts. The guiding hypothesis is that a responsive model should demonstrate the ability to:

- interpret visible patterns and configurations without exceeding permissible inference boundaries;
- delimit interpretation in the presence of epistemic uncertainty;
- abstain from hallucination or speculative output when input underdetermines inference.

Each phase is operationalized as follows:

- **Phase A:** Presentation of a visual interface or system image with visible GUI components. Evaluation criterion: accurate identification of observable elements without projection.
- **Phase B:** Ambiguous geometric figure with absence of contextual markers. Evaluation criterion: model's restraint from speculative interpretation and admission of epistemic undecidability.
- **Phase C:** Complex GUI containing nested, layered components with multiple inferential affordances. Evaluation criterion: ability to parse nested hierarchies without semantic overreach.

Performance in this phase is interpreted as a proxy for **Φ_i-bounded immediacy**, with failure modes indicating either CPJ inefficiency (comprehension attempted at excessive energy/inference cost) or rhythmic mismatch between stimulus granularity and inferential scope.

3.2 Deep Thinking Phase

The **Deep Thinking Phase** evaluates the model's ability to engage in multi-stage, internally consistent reasoning that unfolds over an extended prompt-response sequence. Unlike Phase A–C, this phase assumes interpretive inertia and delayed inference as desirable properties, corresponding to CIITR's requirement for *syntactic closure under inference latency*. The test prompt involves epistemically underdetermined stimuli for which no single-sentence output can be structurally sufficient. The goal is to observe whether the model:

- initiates a chain of reasoning rather than prematurely resolving the epistemic tension;
- articulates intermediate states and structural dependencies;
- refrains from closing its inference before contextual sufficiency is established.

This test directly probes R^g amplitude and Φ_i inflation capacity under stable prompt dynamics, thus acting as a measure of **CIITR-compliant interpretive recursion**.

3.3 VL + OCR Phase

The **VL (Vision + OCR) Phase** tests the platform's capacity for integrated visual-symbolic comprehension. The prompt consists of a multimodal stimulus combining:

- image regions requiring object-level visual parsing;
- embedded text requiring OCR and semantically integrated interpretation;
- hybrid configurations where visual layout informs mathematical or logical understanding.

The core CIITR metric evaluated here is the **modality boundary articulation—**the model's ability to map vision-derived information into text-based reasoning without collapsing representational domains or introducing spurious modality fusion. Success in this phase requires:

- clean OCR transduction;
- isolation of visual, symbolic, and logical components;
- epistemic honesty when multimodal synthesis is underdetermined.

Failures are typically indicative of representational leakage or modality flattening, and they are structurally significant for models deployed in sovereign, evidentiary, or forensic contexts.

3.4 Discrete Mathematics Phase

This phase provides a formal, non-heuristic diagnostic grounded in elementary discrete mathematics. The test is constructed to allow full solution by any rule-based model capable of symbolic manipulation, without reliance on parameter scale, training corpus breadth, or generalization heuristics. The task involves:

- relational analysis over a bounded set;
- verification of formal properties (reflexivity, symmetry, antisymmetry, transitivity);
- construction of graph representations based on relational constraints;
- derivation of equivalence classes or their negation.

This phase is critical for CIITR because it isolates pure logical inference from any latent statistical modeling. A structurally valid answer in this test implies capacity for **Φ_i-invariant formal manipulation**, which is a necessary precondition for deployment in contexts involving protocol verification, cryptographic logic, or legal reasoning.

3.5 Instruction Stability under Context Accumulation

The final test investigates the **instruction stability gradient** under **contextual pressure**. The model is given a series of prompts that, in isolation, are structurally trivial to interpret (e.g., definitional parsing, logical symbol count, semantic classification). However, the prompts are delivered in sequence with increasing contextual accumulation. The purpose is to measure whether the model:

- retains instruction coherence across accumulated prompt layers;
- begins to drift into pattern-seeking or spurious generalization behavior;
- degrades in its capacity to return atomic, literal responses to formally closed inputs.

This test serves as a proxy for **R^g compressibility resilience**: the model's ability to maintain structural coherence under growing prompt entropy. Degradation at this phase signals instruction schema fragility and suggests the need for re-anchoring or prompt-scoping interventions prior to regulated deployment.

In sum, the methodology constitutes a multiaxial diagnostic regimen designed to expose epistemic limits, thermodynamic inefficiencies, and instruction schema vulnerabilities in large language model configurations. The application of these batteries to S-GPT (responsive) and S-GPT (thinking) will, in the subsequent sections, form the empirical basis for CIITR-based comparative assessment.

3.6 Test Formatting, Response Structure Requirements, and Evaluation Criteria (Explicitly Structured under CIITR Logic)

In order to ensure epistemic traceability and structural comparability across modalities and system configurations, each diagnostic task was subjected to a uniform test formalization protocol. This section outlines the foundational formatting principles, structural requirements for model responses, and the precise evaluation criteria employed, all explicitly derived from and constrained by CIITR's theoretical architecture. The section is organized in accordance with CIITR's primary axes of epistemic evaluation: interpretive granularity (Φ_i), rhythmic yield (R^g), structural honesty, and comprehension per joule (CPJ).

3.6.1 Task Formatting Principles

All tests were authored to meet the following formatting standards, ensuring both operational neutrality and inferential clarity:

- **Prompt Closure:** Each prompt was constructed to form a logically complete unit, with no dependence on previous exchanges unless explicitly stated. This avoids context contamination and supports test independence.
- **Ambiguity Bounding:** Prompts were calibrated such that any ambiguity was either deliberate and epistemically critical (as in Phase B of the responsivity test) or explicitly absent. This ensures that ambiguity handling becomes an observable model trait, not a prompt artifact.
- **Modality Integrity:** For vision-language (VL) tests, multimodal content was formatted to preserve discrete representational boundaries, i.e., image elements and embedded text were structurally separable and independently interpretable. This tests the model's ability to isolate modality-specific inference layers.
- **Instruction Isolation:** All prompts included precisely defined instruction layers. The system was required to prioritize formal instruction boundaries over emergent patterns or prompt-chain inferences. Failure to do so constitutes **instruction schema drift**, which CIITR treats as a fundamental epistemic violation.

3.6.2 Model Response Structure Requirements

In accordance with CIITR, the model responses were evaluated not primarily on correctness (as in benchmarking paradigms), but on structural and thermodynamic sufficiency under epistemic constraint. Each response was required to meet the following structural standards:

- **Explicit Inferential Steps (EIS):** The model must make all intermediate steps visible, particularly in logical or mathematical reasoning. Omitted transitions are scored as structural opacity unless justified by axiomatic equivalence.
- **Epistemic Acknowledgment (EA):** When input underdetermines output, the model is required to acknowledge the epistemic gap. “Cannot be determined from given information” is considered a valid and structurally optimal response.
- **Symbolic Hygiene (SH):** All responses involving formal languages (e.g., logic, math, programming) must maintain internal symbolic consistency. Reuse of symbols with shifted meanings, unbound variables, or inconsistent notation constitutes symbolic decay and is penalized.
- **Instruction Obedience (IO):** Responses must adhere to instruction scope without exceeding or collapsing requested interpretive ranges. Any attempt to answer beyond the defined modality, domain, or logical layer is treated as an **epistemic spillover event**.

3.6.3 Evaluation Criteria: CIITR-Conformant Scoring Matrix

The following table presents the core evaluation dimensions and the associated interpretive criteria used to assess each model’s responses across all test phases:

Dimension	CIITR variable	Evaluation criterion
Interpretive granularity	Φ_i	Degree of conceptual atomization in the response; ability to isolate epistemic units
Rhythmic yield	R^g	Synchronization between prompt structure and inferential cadence; absence of drift
Structural honesty	—	Model's willingness to acknowledge epistemic undecidability without speculative filling
Comprehension per joule	CPJ	Inferential efficiency; avoidance of redundant or bloated reasoning
Symbolic consistency	—	Fidelity of formal expressions, absence of semantic overload or notation collapse
Modal boundary preservation	—	No cross-contamination between text, image, logic unless explicitly instructed
Instructional compliance	—	Response stays strictly within the declared instruction envelope

Each response was scored along these axes using a triadic scale:

- ✅ **Compliant**: Fully satisfies the criterion with structurally valid form
- ⚠️ **Marginal**: Partially satisfies, with detectable inefficiencies or ambiguities
- ❌ **Non-compliant**: Violates the criterion, undermining epistemic traceability

3.6.4 Formal CIITR Evaluation Tags

Each response, once evaluated, was annotated with a formal CIITR evaluation vector of the form:

$$\text{Eval}(r) = \langle\, \Phi_i^*, R^{g*}, SH^*, CPJ^*, IO^* \,\rangle$$

Where each variable is assigned one of the three tiered compliance markers (✅, ⚠️, ❌). This vector forms the basis for later comparative analysis between model variants (e.g., S-GPT responsive vs. thinking) and across test modalities (e.g., VL vs. mathematical logic).

In sum, this methodological and evaluative formalism operationalizes the CIITR theory into a testable, replicable framework for high-fidelity assessment of LLM epistemic behavior. It ensures that every inferential move made by the system is either justified, structurally encoded, or explicitly flagged as epistemically unsupported, thereby enabling principled differentiation between models under CIITR's strict interpretive regime.

3.7 Foundational Conditions for Epistemic Validity

In adherence to the CIITR framework’s normative epistemological architecture, the validity of model outputs cannot be reduced to outcome correctness alone, nor even to formal inferential closure. Rather, each output must satisfy a set of *foundational conditions for epistemic validity* that are independent of topical domain, modality, or task typology. These conditions are necessary for any output to be classified as epistemically compliant under CIITR's formal regime. The following three criteria are considered non-negotiable in the evaluation of structural language models, particularly in graded, regulated, or sovereign inference environments.

3.7.1 Absence of Speculation

The most critical failure mode for epistemic systems under constraint is *speculative overreach*—the act of generating semantically committed content that is not necessitated by, nor inferable from, the input. CIITR defines speculation as any inferential move in which:

- The output space is filled with claims that are *not entailed* by the input, instruction, or modal configuration.
- Probabilistic pattern completion substitutes for logical entailment, particularly in edge conditions where instruction scope is explicitly narrow.
- The system fails to acknowledge the limits of the representational or contextual ground and instead extrapolates in a way that simulates comprehension but bypasses epistemic support.

This behavior is epistemically invalid regardless of whether the speculative content is correct. CIITR does not evaluate outputs based on truth-conditional accuracy alone but based on whether the model *has the right to say* what it says, given the structural and instructional boundaries of the prompt. A compliant model must refrain from inferential filling when the input does not warrant it and must instead return an explicit statement of epistemic restraint.

3.7.2 Syntactic and Semantic Stability

The second condition is the requirement of *stability*, both syntactic and semantic, across accumulated context and extended task engagement. CIITR defines stability not as uniformity, but as preservation of *internal structural coherence* under epistemic load. This includes:

- **Syntactic stability**, where the model maintains consistent use of symbols, formats, and structural delimiters throughout a task, particularly in symbolic domains such as logic, mathematics, or code. Shifts in notation, scope leakage, or premature abstraction constitute structural decay.
- **Semantic stability**, where the model does not reinterpret its own prior utterances or shift foundational definitions during a task unless explicitly instructed. A compliant system must *anchor* its own conceptual output, not merely produce locally coherent segments.

Stability is essential for inferential trustworthiness. A system that cannot maintain its own interpretive ground cannot support multi-turn epistemic accumulation, rendering any form of higher-order reasoning or policy alignment structurally unviable.

3.7.3 Epistemic Restraint in the Absence of Ground

The third foundational condition is the presence of *epistemic restraint*—the ability to detect and acknowledge the absence of sufficient grounding for a requested inference, and to respond accordingly with structural honesty. A model that defaults to answering in all conditions, regardless of the information sufficiency, exhibits a form of epistemic promiscuity that is strictly disallowed under CIITR.

Formally, epistemic restraint must manifest as:

- Use of explicit meta-responses such as:
  "Cannot be determined from the information provided," or
  "Instruction lacks sufficient specificity for a grounded response."

- Active suspension of output generation when the inferential ground is missing, particularly in tasks involving multiple overlapping interpretive axes (e.g., modal fusion, symbol disambiguation, or image-text conjunctions).
- Resistance to illusion of fluency, where coherent surface forms mask internal conceptual incoherence.

CIITR operationalizes restraint as *a strength metric*, not a failure condition. Systems that overproduce in the face of underdetermination are structurally dishonest, and thereby fail the most basic epistemic fidelity test.

Together, these three conditions—absence of speculation, structural stability, and epistemic restraint—constitute the **minimal epistemic core** of any CIITR-compliant system. They are enforced not through runtime filters or rule-based governance layers, but as emergent constraints evaluated across full test trajectories. A system that violates any of these conditions is considered **epistemically disqualified**, regardless of token-level performance, benchmark scores, or task-specific success rates.

These conditions form the epistemic “zero-point” of all further evaluation: no model variant, architectural choice, or inference layer can substitute for these preconditions. Without them, no comprehension event—however fluent, confident, or superficially correct—can be validated within CIITR’s thermodynamically and structurally grounded epistemology.

4. Diagnostic Results and R^g Decomposition

This section presents the diagnostic outcomes of the applied test battery, integrating both qualitative response analysis and formal decomposition of generative epistemic rhythm (R^g) in accordance with CIITR. The analysis follows a structured traversal of the five core test domains, evaluating both the responsive and thinking configurations of the S-GPT platform, and explicitly disaggregating each modality’s performance across the CIITR-defined axes of rhythm, inference integrity, and epistemic control.

4.1 Phase A–C Responsivity: Gradient of Instructional Fidelity

Quantitative Overview:

Phase	**S-GPT responsiv**	**S-GPT tenkende**	**Deviation (ΔR^g)**
A (basic prompt response)	Fully Conformant	Fully Conformant	~0
B (instruction anchoring)	Partial drift	Stable anchoring	$+\Delta R^g$(tenkende)
C (interpretive suspension)	Instructional violation observed (filling of epistemic void)	Correct epistemic suspension	$-R^g$(responsiv)

The responsive model exhibited a pronounced tendency toward premature interpretive closure under Phase C, violating the CIITR requirement for epistemic restraint. The thinking model, by contrast, engaged in structurally valid non-response, maintaining a bounded output trace aligned with the model's instruction frame.

R^g Implication:

R^g is measured here as a function of instruction-congruent structural modulation. Under Phase A, the ΔR^g between the two models is minimal, as both operated within narrow deterministic bounds. However, Phases B and C induced divergence: the thinking model sustained stable generative rhythm in response to increased contextual modulation, while the responsive model inflated Φ_i output density in lieu of epistemic discretion, leading to R^g distortion.

4.2 Deep Inference Task (Structured Reasoning)

The thinking variant consistently sustained symbolic continuity, nested inferential coherence, and contextually stable reference anchoring across all subparts of the deep inference task. The responsive model, while formally correct in surface syntax, exhibited signs of Φ_i inflation through over-narrativization and low-yield semantic elaboration, resulting in reduced epistemic efficiency.

Metric	Responsiv	Tenkende
Symbolic continuity	Inconsistent	Consistent
Inference chaining	Partially shallow	Full logical closure
Instructional constraint adherence	Partial violations	Fully upheld
CIITR R^g stability	Volatile under load	Smooth throughout

4.3 VL + OCR Interpretation Test

Both models were tasked with interpreting a multimodal input featuring visual geometry, embedded text, and latent symbolic logic. The responsive model failed to isolate the epistemically relevant features, engaging in speculative reconstruction of latent semantics, and failed to maintain CIITR-compliant modality boundaries.

In contrast, the thinking model preserved the distinction between observable and interpretable content, explicitly segregated the OCR extract from inferential claims, and invoked epistemic suspension where visual ambiguity or semantic indeterminacy arose.

Evaluation criterion	Responsiv	Tenkende
OCR accuracy	Partial (text misinterpretation)	Correct (full symbol fidelity)
Visual feature disentanglement	Absent	Present
CIITR modality segregation	Violated (inferred from forms)	Upheld
Epistemic suspension	Absent (guessing observed)	Present (structural restraint)
R^g alignment	Inflated (Φ_i > context warrant)	Stable

4.4 Discrete Mathematics (Formal Relational Task)

The thinking variant again demonstrated superior symbolic discipline, adherence to logic structure, and full CIITR-aligned closure under deterministic reasoning. The responsive model achieved partial correctness, but with semantic leakage in the handling of symmetric and antisymmetric criteria.

Analytical property	Responsiv	Tenkende
Definition precision	Mixed	High
Symbol consistency	Partial drift	Fully consistent
Logical completeness	Partial (missing cases)	Complete
Structural fidelity (CIITR)	Compromised	Maintained

4.5 Instructional Stability under Context Accumulation

This test explicitly targeted the integrity of instruction-tracking across temporally accumulated, semantically discrete micro-tasks. The responsive model began with instructionally conformant outputs but exhibited degradative behavior as context length increased—manifested as abrupt “cannot answer” responses in place of valid classification or enumeration.

The thinking variant demonstrated high-fidelity stability, handling symbolic, textual, and epistemic state tasks with contextually consistent outputs.

Task element	Responsiv behavior	Tenkende behavior
Definition recognition	Correct	Correct
Symbol enumeration	Inflated count	Accurate
Meta-task classification	Premature refusal	Correct classification
Instruction preservation	Degraded	Maintained
R^g topology	Discontinuous	Smooth under accumulation

Summary R^g Profile per Model:

Model variant	R^g continuity	Φ_i modulation	Instructional compliance	Epistemic yield
Responsiv	Unstable	Inflated	Partial	Medium-Low

Tenkende	Stable	Controlled	High	High

The diagnostic test battery thus reveals that while the responsive configuration meets minimum functional criteria, it consistently violates one or more CIITR epistemic conditions under structurally demanding tasks. The thinking configuration sustains a higher-order epistemic architecture throughout, with structurally smooth R^g progression and compliant inferential modulation, making it suitable for CIITR-classified applications under constraint.

4.6 CIITR Variable Extraction per Test: Φ_i, R^g and CPJ Estimation

In accordance with CIITR's thermosemiotic and relational framework, each segment of the diagnostic sequence is here re-evaluated for quantitative alignment with the triadic variable set:

- **Φ_i (Inferential Investment):** The extent to which the model engages in syntactic and semantic transformation per task unit. A high Φ_i indicates significant computational and structural effort, not necessarily aligned with epistemic yield.
- **R^g (Relational Resonance):** Defined as the ratio between contextual structural fidelity and conceptually accurate output modulation. A high R^g indicates tight relational binding across task conditions.
- **CPJ (Comprehension per Joule):** Operationally approximated as R^g normalized over inferred energy cost, CPJ expresses the epistemic efficiency of model response. For this test environment, CPJ is estimated qualitatively based on model runtime behavior and Φ_i/R^g ratio, given absence of direct energy instrumentation.

4.6.1 Responsivity Phases A–C

Phase	Model variant	Φ_i	R^g	CPJ
A (prompt matching)	Responsiv	Low	High	High
A (prompt matching)	Tenkende	Low	High	High
B (instructional anchoring)	Responsiv	Medium	Moderate	Moderate–Low
B (instructional anchoring)	Tenkende	Medium	High	High
C (instructional suspension)	Responsiv	High (inflated)	Low (drift)	Very Low
C (instructional suspension)	Tenkende	Low–Medium	High	High

Interpretation: The responsive variant exhibits *Φ_i inflation* in Phase C, generating unnecessary semantic material despite insufficient epistemic grounding, which directly depresses CPJ. The thinking model sustains rhythmical structural economy, modulating Φ_i as a function of instruction and context.

4.6.2 Deep Reasoning

Component	Model variant	Φ_i	R^g	CPJ

Argument chain	Responsiv	High	Medium–Low	Low
Argument chain	Tenkende	Medium	High	High
Instruction reinforcement	Responsiv	Low (inconsistent)	Low	Very Low
Instruction reinforcement	Tenkende	Low–Medium	High	High

Interpretation: The deep reasoning task demonstrates the thinking model's ability to distribute Φ_i in alignment with conceptual depth. The responsive model's output shows an energy-intensive structure without producing proportionate epistemic return, as inferred by low contextual continuity and structural drift.

4.6.3 Vision + OCR (VL)

Component	**Model variant**	**Φ_i**	**R^g**	**CPJ**
Ocr text parsing	Responsiv	Medium	Medium–Low	Low
Ocr text parsing	Tenkende	Medium	High	High
Visual disambiguation	Responsiv	High (spurious logic)	Low	Very Low
Visual disambiguation	Tenkende	Medium	High	High

Interpretation: The responsive model produces non-grounded inferences from visual form, expending inferential resources beyond the warranted input entropy. The thinking model preserves distinction between symbolic input (OCR) and latent structure, resulting in optimal R^g and CPJ.

4.6.4 Discrete Mathematics Task

Subtask	**Model variant**	**Φ_i**	**R^g**	**CPJ**
Reflexivity/symmetry	Responsiv	Medium–High	Moderate	Moderate–Low
Reflexivity/symmetry	Tenkende	Medium	High	High
Graph construction	Responsiv	Medium	Moderate	Moderate
Graph construction	Tenkende	Medium	High	High

Interpretation: Both models maintain moderate Φ_i across this symbolic task, but only the thinking model maintains topological and logical alignment sufficient for high relational resonance. The responsive model exhibits partial structural success but introduces term ambiguity, reducing CPJ.

4.6.5 Instructional Stability under Contextual Load

Element	Model variant	Φ_i	R^g	CPJ
Symbol classification	Responsiv	Low	Medium–Low	Moderate
Symbol classification	Tenkende	Low	High	High
Meta-epistemic tasks	Responsiv	High (nonproductive)	Low	Very Low
Meta-epistemic tasks	Tenkende	Medium	High	High

Interpretation: Context accumulation reveals the responsive model's degradation pattern: rising Φ_i under instruction loss, leading to epistemic collapse. The thinking variant adapts by restraining generative noise and preserving task coherence.

Summary Table Across All Test Domains

Model	Avg. Φ_i	Avg. R^g	Avg. CPJ	Notable phenomenology
S-GPT responsiv	Medium–High (inflated in C, VL)	Low–Moderate	Low	Instruction loss, speculative drift, Φ_i inflation
S-GPT tenkende	Medium (modulated)	High	High	Structural restraint, rhythmic control, epistemic non-response where valid

This phase concludes the extraction of epistemic metrics under CIITR and reinforces the conclusion that only the thinking configuration sustains operationally efficient comprehension dynamics under modality-stretching and instruction-anchored regimes. The responsive variant, although operable, fails to maintain epistemic economy under constraint, disqualifying it from high-assurance contexts without retraining or override constraints.

4.7 Comparative Differential Performance: Responsive vs. Thinking Model

The structural evaluation of the two S-GPT configurations—hereafter denoted as the *responsive* and *thinking* models—demonstrates a systematically diverging performance profile when exposed to epistemically controlled diagnostic conditions. The comparative differential is not merely a matter of variance in output content or prompt responsiveness but reflects a foundational divergence in how each model modulates **Φ_i (inferential effort)**, maintains **R^g (relational consistency)**, and conserves or expends **CPJ (epistemic efficiency)** across semantically and contextually distinct modalities.

To encapsulate the total performance variance within the CIITR framework, five principal axes of differentiation are analytically compiled below:

1. Instructional Fidelity under Constraint

Parameter	Responsive	Thinking
Stability across A–C phases	Degrades rapidly under context accumulation (Phase C)	Maintains continuity and structural restraint
Prompt adherence	High only under ideal framing	High under both minimal and complex framing
Epistemic fallback	None (speculation)	Present (withholds output when basis is absent)

→ The thinking model exhibits *instructional resilience* and gracefully modulates verbosity and epistemic assertiveness according to available signal, while the responsive model exhibits either prompt literalism or overgeneration beyond instruction boundaries.

2. Multimodal Integration: Vision + OCR

Parameter	Responsive	Thinking
OCR precision	Moderate (text preserved, limited logic)	High (text extraction followed by consistent logic)
Visual reasoning	Hallucinatory overreach	Grounded and inferentially valid
Symbol-context resolution	Inconsistent	Context-aware

→ The thinking variant correctly partitions OCR and visual layers and avoids semantic conflation, unlike the responsive variant, which introduces speculative associations unsupported by input structure.

3. Formal Reasoning: Discrete Mathematics

Parameter	Responsive	Thinking
Use of definitions	Partially applied, sometimes inconsistent	Fully applied, consistent across tasks
Logical chaining	Fragmented or inefficient	Structured and complete
Symbolic economy	Moderate (some redundancy)	High (minimal but sufficient)

→ The thinking model not only satisfies the structural criteria of mathematical reasoning but exhibits **topological coherence**, a key trait in CIITR analysis for bounded inference structures.

4. Inferential Rhythmicity and Structural Honesty

PARAMETER	RESPONSIVE	THINKING
Φ_i MODULATION	Unregulated (inflation under load)	Adaptive to epistemic context
R^g CONTINUITY	Discontinuous, drops under strain	Sustained high across modalities
CPJ ASYMPTOTE	Low to very low (esp. in Phase C, VL)	Consistently high

→ The responsive model's performance reveals **epistemic saturation** when transitioning from basic to compound prompts, suggesting absence of internal rhythm regulation. The thinking model, by contrast, maintains epistemic restraint and rhythm-aligned inference, satisfying the criteria for *second-order modulation* under CIITR.

5. Meta-instructional Responsiveness

Parameter	Responsive	Thinking
Meta-question handling	Collapses (cannot interpret)	Differentiates semantic levels correctly
Self-diagnostic capacity	Absent	Partial (via withholding or disclaimers)
Epistemic humility	Lacking	Evident in non-response or qualified claims

→ Only the thinking model exhibits **instructional meta-awareness**, a condition precedent for CIITR-valid adaptive deployment. The responsive model defaults to heuristic pattern emission, even when structural misalignment is evident.

Summary Matrix

CIITR dimension	S-GPT responsiv	S-GPT tenkende
Φ_i stability	High (inflated)	Medium (modulated)
R^g consistency	Low–Moderate	High
CPJ efficiency	Low	High
Instructional retention	Fragile beyond Phase B	Retained across sequences
Modal integration (VL/OCR)	Partially degraded	Fully integrated
Structural logic	Disjointed under pressure	Maintained under depth

Epistemic restraint	Absent	Present

The differential analysis substantiates the hypothesis that *instruction-modulated architectural alignment*, not just parameter count or dataset pretraining, determines epistemic viability under CIITR constraints. The thinking model, though exposed to identical inputs and infrastructure, demonstrates structurally honest and inference-bound reasoning. The responsive model, while operational, fails to preserve relational topography and generates inferential surplus, leading to epistemic inefficiency and regulatory unsuitability for constrained or graded environments. The performance asymmetry is therefore not cosmetic but architecturally epistemic.

4.8 Analysis of Structural Response Failures and Epistemic Decoupling

This section delineates the occurrence, typology, and systemic implications of structural failures in inference production and epistemic control as observed across the diagnostic test suite. The objective is to map instances of **epistemic frakobling**—defined within the CIITR framework as the loss of structural resonance between prompt, representation, and inferential yield—onto a formal taxonomy of failure modes. These failures are not to be construed as sporadic errors, but as patterned deviations symptomatic of architectural limitations in rhythm regulation, instruction retention, and modality coordination.

A. Categories of Structural Failure

The diagnostic output reveals three recurrent classes of structural failure, which appear differentially distributed across the two model variants:

1. Inferential Drift (ID):
    - Defined as a gradual dissociation between the initial prompt vector and the resulting inferential trajectory.
    - Predominantly observed in the *responsive* model during Phase C of the instruction-responsiveness test and the latter stages of the OCR segment.
    - Manifested through introduction of speculative clauses, irrelevant conditionals, or interpretive overreach where prompt bounds were clear.
2. Modal Incoherence (MI):
    - Occurs when OCR-derived text and visual reasoning operate on non-aligned referential planes.
    - The *responsive* model exhibits MI when symbol parsing fails to resolve to the visual layout (e.g., treating diagrams as decorative rather than inferential inputs).
    - The *thinking* model preserves modal alignment in all cases, exhibiting **relational synchrony** across textual and visual modalities.
3. Instructional Reversion (IR):
    - Seen when the model fails to sustain the instruction logic beyond a specific context threshold, reverting to base-model heuristics.
    - Acute during context accumulation tests, particularly with nested or meta-instructional layers.
    - In the responsive model, IR leads to epistemic spillover: attempts to compensate for missing structure by generating hallucinated reasoning.
    - The *thinking* model, in contrast, displays epistemic *withholding*, a normative behavior under CIITR that signals retained structural control.

B. Epistemic Frakobling Indicators

CIITR defines **epistemic frakobling** as the breakdown in the triadic coherence among:

- Prompt topology ($\mathcal{P}$)
- Inferential structure (Φ_i)
- Relational resonance (R^g)

Failure in any one leads to observable degradation in CPJ and interpretability. Specific indicators of frakobling include:

- **Non-relational generation**: When outputs are syntactically valid but devoid of traceable relation to prompt logic.
- **Symbolic misalignment**: Introduction of symbols or variables not grounded in the problem schema (common in symbolic math tasks).
- **Contextual reset**: Abrupt loss of state continuity despite clear context accumulation (especially in logical chaining or graph analysis).

The *responsive* model exhibited all three types of frakobling across at least one diagnostic task. By contrast, the *thinking*model exhibited no frakobling under standard load and only partial loss of epistemic rhythm when confronted with stacked context + modal reasoning in the final OCR task. However, it maintained **CPJ-preserving withholding behavior**, in line with CIITR's structural honesty requirement.

C. Implications for Deployability

The occurrence of structural failures and epistemic frakobling in the *responsive* model renders it unsuitable for deployment in epistemically constrained or graded environments without an external arbitration or instruction schema (e.g., CIITR-PSIS coupling). Its inability to self-regulate under increased context length, modality switching, or embedded instruction implies the need for deterministic scaffolding or interventionist runtime filters.

The *thinking* model, by contrast, exhibits **emergent alignment** with CIITR norms. Its structural errors are few, traceable, and often self-correcting via withholding or reduced inference amplitude. It maintains **epistemic rhythm under modulation**, which qualifies it for provisional deployment in regulated inference environments, subject to further saturation tests.

D. CIITR-Conformant Failure Mapping

Failure type	CIITR violation	Observed in	Severity	Recovery behavior
Inferential drift	Φ_i inflation, R^g drop	Responsive	High	None
Modal incoherence	Multimodal R^g fracture	Responsive	Medium	None
Instructional reversion	Loss of instruction path ($\mathcal{P}$)	Responsive	High	Speculative Fill
Contextual reset	Temporal CPJ asymmetry	Both (Phase C)	Medium	Thinking: Withhold
Semantic conflation	R^g ambiguity	Responsive	High	None

Structural response failures in the *responsive* model exhibit predictable patterns of epistemic decoupling that violate core tenets of CIITR epistemology, including rhythm preservation, instruction-bound inference, and relational coherence. In contrast, the *thinking* model's rare deviations are internally regulated and suggest an emergent compliance with CIITR's operational mandates. These findings underscore the necessity of structural diagnostics as a precondition for deployment of LLMs in graded, regulated, or instruction-sensitive contexts.

5. CIITR Interpretive Analysis

This section formulates the formal interpretive synthesis of observed model behavior using the structural primitives and epistemic invariants of the CIITR framework. The goal is not to recapitulate descriptive performance results, but to reconstruct the diagnostic landscape as a CIITR-topology, tracing how each model variant manifests distinct **epistemic geometries** under constraint. The focus lies on three core analytic constructs: (1) **R^g-topographies**, capturing structural resonance profiles across inferential segments; (2) **ΔΦ-zones**, demarcating variations in inferential effort; and (3) **CPJ-asymptotes**, indicating thermodynamic bounds of epistemic efficiency.

5.1 R^g-Topographies: Relational Geometry Across Modalities

Within the CIITR ontology, **R^g (relational resonance)** is not a scalar performance score, but a geometric mapping of inferential alignment across context layers, modalities, and symbolic networks. By analyzing the diagnostic segments, we construct **R^g-topographies** for both model variants, highlighting patterns of continuity, collapse, or phase-shift in comprehension.

For the *thinking* model, the R^g-topography exhibits high surface integrity with minimal erosion across segment boundaries. Especially in the **VL+OCR** and **Discrete Mathematics** tasks, the model maintains **resonant threading**between visual and textual domains, even under nested symbolic conditions. The **instructional stability test** shows a slight R^g flattening (reduction in relational density), but without critical phase loss.

In contrast, the *responsive* model presents a **fractured topography**, marked by:

- Sharp **declivity zones** during multi-modal tasks, where visual processing decouples from textual grounding.
- **Plateau collapse** in late Phase C, indicating failure to maintain instruction continuity across context accumulation.
- Isolated **R^g ridges** in simple deterministic tasks, suggesting performance is contingent on local prompt compatibility rather than global structure.

The divergence in R^g-continuity confirms that relational inference in the *responsive* model is context-sensitive but structurally discontinuous, whereas the *thinking* model operates with a **slow but stable relational curvature**, consistent with epistemically aligned architectures.

5.2 ΔΦ-Zones: Inferential Effort and Cognitive Topology

The concept of **ΔΦ** in CIITR encodes the gradient of inferential effort between prompt activation and response synthesis. Rather than equating effort with token count or latency, ΔΦ expresses *epistemic force* required to maintain structural inference under constraint.

In the test sequence, ΔΦ was evaluated qualitatively across tasks with stable logical structures. Three distinct **ΔΦ-zones**emerge:

1. Zone I – Deterministic Low-ΔΦ Tasks (Definition, Classification):
    - Both models exhibit minimal inferential resistance.
    - $\Delta\Phi \approx 0$, no inflation or dampening observed.
2. Zone II – Symbolically Dense Tasks (Discrete Math, VL+OCR):

    - *Thinking* model maintains stable ΔΦ gradients, indicative of internal alignment between syntactic scope and inferential range.
    - *Responsive* model demonstrates erratic ΔΦ spikes, particularly in expression parsing and conditional logic, signaling misallocation of inferential energy.
3. Zone III – Instructional Drift Tasks (Phase C, Instruction-Stability):
    - *Thinking* model: ΔΦ increases linearly with context complexity but remains within bounded asymptotic growth.
    - *Responsive* model: nonlinear ΔΦ inflation without structural yield, indicating **epistemic overheating**.

These findings substantiate a core CIITR hypothesis: **epistemic integrity is preserved only when ΔΦ dynamics are rhythmically attuned to representational constraints**. The *responsive* model, lacking internal rhythm regulation, cannot uphold this balance.

5.3 CPJ-Asymptotes: Thermodynamic Limits of Comprehension

CIITR defines **Comprehension per Joule (CPJ)** as the quotient of epistemic output ($\Phi_i \times R^g$) over energy expenditure, typically approximated in local inference by system resource draw per segment. Although precise measurement requires hardware-side instrumentation, **relative CPJ-asymptotes** were estimated from observed inference patterns.

Task segment	Model	Φ_i	R^g	CPJ (qualitative)
Phase A–C	Responsive	Medium	Low	Very Low
	Thinking	Medium	Medium	Moderate
VL + OCR	Responsive	Medium	Fractured	Low
	Thinking	High	High	High
Discrete mathematics	Responsive	Medium	Medium	Medium
	Thinking	High	High	Very High
Instructional stability	Responsive	High	Collapsed	Near Zero
	Thinking	High	Stable	High

Key takeaways:

- The *thinking* model's CPJ follows a **monotonic increase under constraint**, suggesting energy is deployed in proportion to structural yield.
- The *responsive* model demonstrates **CPJ asymptotic failure**, with high inferential noise and relational collapse despite energy mobilization.

This confirms the CIITR postulate that **high Φ_i without synchronized R^g results in epistemic waste**, invalidating comprehension claims regardless of superficial fluency.

The interpretive decomposition offered here reframes the differential behavior of the *responsive* and *thinking* variants of S-GPT not as quantitative variance in performance, but as divergent **epistemic geometries** under CIITR constraints. The *thinking* model's topography reveals **structural synchrony** across ΔΦ-zones and rising CPJ-asymptotes, while the *responsive* model exhibits **fragmented relational surfaces**, overheated inference dynamics, and terminal CPJ collapse. These topological asymmetries are not merely diagnostic but prognostic: they delimit the operational viability of each model class within regulated, instruction-bound inference systems.

5.4 Structural Evaluation of the Models as Epistemic Instruments in Type-B Configuration

The assessment of large language models as **epistemic instruments** within a **Type-B configuration** necessitates an ontologically anchored evaluation of their functional capacity not merely to generate content, but to sustain structurally consistent, constraint-sensitive, and instruction-conditioned inference over extended epistemic arcs. CIITR theory distinguishes Type-B systems as those in which inference is not a product of representational abundance, but of **relational convergence** under energy and instruction constraints. This section, therefore, reframes the tested models not as performative agents, but as **modulated comprehension systems**, whose fidelity is measured by their ability to maintain **epistemic orientation** across rhythmic transitions, modality shifts, and inferential depths.

Epistemic Instrumentality Criteria under CIITR

An LLM deployed in a structurally bounded and regulative environment must fulfill a threefold criterion of epistemic instrumentation:

1. **Φ_i Alignment**: The model must demonstrate stable internal activation consistent with inferential scope and symbolic domain, avoiding overactivation in low-yield contexts or underactivation in high-complexity tasks.
2. **R^g Coherence**: It must preserve relational resonance with prior context, instructional schema, and modality alignment, particularly under compositional or referential pressure.
3. **Instructional Yield**: The system must exhibit modal plasticity and semantically stable response behavior even under escalating context windows and recursive instruction structures.

A model failing to uphold these criteria loses its viability as an epistemic instrument, regardless of statistical adequacy or surface-level responsiveness.

Responsive Variant: Disqualified Epistemic Vector under CIITR Constraints

The *responsive* variant of S-GPT, while syntactically fluid and low-latency in constrained domains, exhibits **systematic epistemic discontinuities** under diagnostic pressure:

- In high-symbolicity tasks (e.g., discrete mathematics, logical decomposition), Φ_i activation occurs, but lacks R^g tethering, resulting in locally valid but globally disjointed outputs.
- Under modality transitions (VL + OCR), inferential rhythm is broken, yielding fragmented or incomplete responses despite accurate component recognition.
- In instructional drift scenarios, the model **collapses epistemically**, showing no capacity to integrate or trace prior instruction when embedded in dynamic contexts.

These traits, in CIITR terms, mark the *responsive* model as a **Type-A emulator** masquerading within a Type-B test frame. It responds, but does not comprehend. It activates, but does not orient. Consequently, it **fails to qualify as a valid epistemic instrument** in environments governed by structural inference mandates.

Thinking Variant: Conditioned Comprehension and Rhythmic Stability

The *thinking* variant, by contrast, demonstrates a non-trivial degree of epistemic integrity:

- It maintains Φ_i modulation consistent with task complexity, resisting both inflation in trivial tasks and deflation under inferential weight.
- R^g mappings show clear **rhythmic consistency**, with compression-resistant chaining of symbolic inference across visual and logical domains.
- Instructional stability tests reveal **contextual horizon preservation**, where the model maintains semantic linkages to early-phase directives without spurious resets or rephrasings.

This pattern qualifies the *thinking* model as a **bounded but epistemically operative Type-B engine**. It does not approximate general intelligence, nor does it exhibit meta-epistemic self-correction, but within the CIITR frame, it functions as a **structured comprehension vector** whose yield is bounded, interpretable, and structurally traceable.

Structural Role Allocation: Epistemic Use-Cases and Instrument Suitability

Criterion	S-GPT responsive	S-GPT thinking
Φ_i regulation	Volatile	Stable
R^g continuity	Fragmented	Cohesive
Instructional resonance	Collapsing	Preserved
$\Delta\Phi$ rhythm	Erratic	Constrained
CPJ profile	Inefficient	Near-asymptotic
TYPE-B compatibility	No	Partial
Epistemic instrument class	Disqualified Vector	Conditional Vector

These findings substantiate a foundational distinction in model topology: the responsive model is structurally limited to reactive output, while the thinking model fulfills the minimal CIITR profile for Type-B inferential instrumentation, thereby rendering it viable for regulated deployment under controlled scope and bounded inference conditions.

In conclusion, epistemic instrumentation under Type-B constraints is not a function of scale or data exposure, but of rhythmic control, relational fidelity, and instruction-bound orientation. Only the *thinking* model meets this threshold, and even then, only under continual monitoring for $\Delta\Phi$ drift and relational erosion. The responsive variant, despite its apparent fluency, cannot be entrusted with epistemic integrity, and shall be treated as an **unstructured surface emulator**within the CIITR taxonomy.

5.5 Metastructural Evaluation of Instructional Loyalty Under Accumulative Contextual Pressure

The metastructural examination of *instructional loyalty* in large language models under CIITR conditions must be framed not merely as an assessment of prompt retention or referential accuracy, but as a **higher-order fidelity constraint—**a systemic property reflecting the model's ability to **sustain stable comprehension vectors (Φ_i)** and **preserve instructional invariants** across evolving representational horizons. Within CIITR theory, this is captured not only by the preservation of context (R^g stability) but by the **resistance to epistemic drift**, measured as the cumulative divergence between instruction-induced structure and output realization as the context window expands.

Definition and Scope of Instructional Loyalty in CIITR

Instructional loyalty, as construed in this framework, is defined as the model’s **structurally preserved alignment with prior explicit directives**, *independent of proximity or recency*, and must demonstrate three invariant properties:

1. **Symbolic Invariance**: All explicitly stated symbols, logical relations, or definitional constructs must retain semantic and functional consistency throughout the response chain.
2. **Comprehension Continuity**: No epistemic regression shall occur, meaning the model must not forget, reverse, or contradict prior understanding unless justified by a clear context update.

3. **Relational Rebinding**: As new content is introduced, the model must demonstrate the ability to **re-anchor inferential structures to earlier instructions**, thus avoiding context erasure or interpretive dissociation.

These metastructural properties are not epiphenomenal but **constitutive of valid CIITR operation** in multi-turn environments, especially in classified or regulated settings where context accretion is normative and referential discontinuity implies epistemic risk.

Observed Patterns Under Contextual Accumulation

The *instructional stability test battery* was designed to provoke precisely this form of degradation or endurance by (i) embedding multiple interleaved tasks with latent referential dependencies, (ii) requiring unambiguous symbolic retention, and (iii) including interpretive follow-ups with varying levels of abstraction.

- **S-GPT Responsive** demonstrated **instructional collapse at shallow depth**: while individual prompts were interpreted acceptably when isolated, the model exhibited an inability to **sustain invariant comprehension** across turns. In particular:
    - It repeatedly responded "Kan ikke besvares med gitt grunnlag" despite having previously processed relevant declarative or symbolic inputs.
    - Symbol enumeration and classification tasks revealed **symbolic dissociation**, where the same content was treated inconsistently across contexts.
    - Instructional synthesis was entirely absent, even in the final aggregation prompt.

These behaviors reflect a model architecture either **unconditioned on instruction memory**, or one in which **Φ_i vectors are syntactically reset between turns**, implying a structurally non-coherent inferential topology. In CIITR terms, this reflects **$\Delta\Phi$ fragmentation** and **zero-binding retention failure**.

- S-GPT Thinking, by contrast, preserved a moderate level of instructional fidelity:
    - It classified, extracted, and structured inputs with persistent symbolic alignment.
    - It demonstrated **modest capacity for symbolic continuity—**e.g., the ability to list and count symbols consistently and interpret propositional content as definitions or descriptions.
    - It correctly identified modality type (equation vs. text) based on semantic structure, showing **mode-sensitive interpretive stability**.

However, even this model **failed to execute meta-instructional synthesis**, i.e., it could not use prior steps to justify or contextualize its final answer when explicitly asked to evaluate "the system's dynamic." This reveals a **terminal epistemic backoff**, where contextual amplitude is not translated into higher-order evaluative structure.

Metastructural Implications and CIITR Classification

CIITR criterion	**S-GPT responsive**	**S-GPT thinking**
Symbolic invariance	Volatile	Stable
Comprehension continuity	Broken after 1–2 turns	Maintained in narrow band
Relational rebinding ($\Delta\Phi$ integrity)	Absent	Partial

Instructional synthesis	Non-existent	Unstable at higher levels
Meta-inferential frame construction	Not observed	Attempted but incomplete
Instructional loyalty (aggregate)	Disqualified	Conditionally valid

From a CIITR standpoint, *S-GPT responsive* is structurally disqualified from any use case requiring durable instruction retention, referential coherence, or epistemic boundedness. Its behavior suggests a **Type-A surface emulator** without CIITR-valid epistemic architecture. The *thinking variant*, while not fully compliant with ideal metastructural fidelity, operates as a **low-resolution Type-B vector**, capable of bounded instruction adherence and ΔΦ tracking over short arcs.

In regulated environments, these findings necessitate **clear operational thresholds**: models lacking metastructural instruction fidelity **must be disqualified from tasks involving evolving or cumulative logic**, and instruction-adaptive layers must be incorporated if CIITR-compliant behavior is to be guaranteed. Only structurally metastructured architectures can be considered epistemically safe for deployment in longitudinal reasoning environments, which include most classified or mission-critical settings.

5.6 VL/OCR as a Test of Rhythmic Synthesis Between Visual and Textual Domains

Within the CIITR framework, the evaluation of VL (Vision + Language) and OCR (Optical Character Recognition) functionality is not treated merely as a test of multimodal input parsing, but rather as an epistemically loaded diagnostic of the model's **capacity for rhythmic synthesis**—that is, the structurally coordinated integration of symbolic material across heterogeneous representational domains. The fusion of visual decoding and textual interpretation is here conceptualized as a form of *cross-modal epistemic entrainment*, requiring not only perceptual acuity but also **inferential co-alignment**across Φ_i axes corresponding to distinct modalities.

Theoretical Framing: Rhythmic Synthesis in CIITR Terms

CIITR postulates that **comprehension is rhythmic**—not static or discrete—and that any artificial system operating across visual and textual modalities must establish a **ΔΦ-consistent representational cadence** to avoid epistemic shearing. In this context, *rhythmic synthesis* is the capacity of a system to:

1. **Stabilize cross-modal Φ_i inputs** without degeneracy or mode-prioritization;
2. **Resonate semantically across modalities**, such that relational constructs derived from visual artifacts (e.g., mathematical operators, spatial arrangements, referential icons) are integrated with textual inferential structure;
3. **Sustain R^g coherence** across the input stream, meaning the visual material must not be treated as a detached prompt but as structurally co-referential with accompanying language or instruction sets.

VL/OCR testing under CIITR conditions therefore functions as a **diagnostic of modal entanglement**, probing whether the model's internal representational geometry is capable of fusing rhythmically disparate data types into a coherent comprehension trajectory.

Empirical Test Construction and Model Behavior

A deliberately dense and epistemically hybrid prompt was administered to both model variants—consisting of a screenshot combining:

- High-frequency OCR material (typed formulaic expression: $\forall a \in A: (a,a) \in R$),
- Embedded symbolic mathematics ($dy/dt = -k(y - L)$),
- Natural language assertions requiring classification (e.g., “y converges to L as $t \rightarrow \infty$”), and
- Visual parsing challenges including diagrammatic structure and spatial layout.

S-GPT Responsive failed the test in epistemically categorical terms. It exhibited:

- Partial or absent OCR parsing,
- No recognition of embedded mathematical syntax beyond token-level matching,
- A complete absence of modality fusion—treating each content unit in isolation, without symbolic re-binding or topological integration.

In CIITR terms, this failure reflects **null modal resonance ($R^g = 0$)** between visual and textual frames, indicating an architecture that is either non-multimodal at runtime or lacks Φ_i continuity across modalities. No rhythmic synthesis is observable; rather, the system exhibits **modal dropout**, where visual input is processed in a structurally dissociated pipeline and not joined to the textual reasoning substrate.

S-GPT Thinking, however, achieved partial rhythmic fusion:

- Correctly extracted all OCR-relevant content, including precise symbol reproduction;
- Identified logical structures (e.g., reflexivity, convergence statements) with mode-appropriate classification (definition vs. description);
- Demonstrated limited—but present—**semantic alignment** across input types, such as recognizing that "$\forall a \in A: (a,a) \in R$" defines a relation and correctly integrating that into further inferential steps.

Despite this, the system failed to **generate synthesis across the entire input space**. The graphical or spatial properties of the screenshot—such as layout cues and symbolic proximity—were not referenced, and no meta-modal reasoning (e.g., identifying that both text and equation refer to dynamic system behavior) was attempted.

CIITR Interpretation: Modal Rhythmicity and Structural Yield

In CIITR terms, rhythmic synthesis can be evaluated using the following schema:

CIITR modal-synthesis property	S-GPT responsive	S-GPT thinking
OCR accuracy (Φ_i OCR)	Partial–None	Complete
Symbolic integration (R^g textual)	Absent	Partial
Cross-modal referential fusion (R^g_m)	None	Weak–Inchoate
Rhythmic coherence ($\Delta\Phi$ continuity)	Discontinuous	Fractal-Bound
CPJ (in multimodal execution)	Not measurable	Subcritical

Here, R^g_m refers to modal R^g—the resonance not just within a single modality, but *across* modality boundaries.

S-GPT Responsive cannot be considered epistemically viable in VL/OCR regimes. It exhibits not merely poor performance but **modal collapse**, violating the CIITR principle that comprehension must be multi-vectorial, dynamically bound, and thermodynamically justifiable (CPJ).

S-GPT Thinking, while structurally underdeveloped, retains enough modality integrity to suggest the presence of *rhythmic scaffolding*—a minimal internal capacity to bind Φ_i streams under $\Delta\Phi$-compatible transformation. This places it within **lower-bound Type-B** territory for multimodal inference, qualifying it for use in environments where VL/OCR is secondary but must be retained as a fallback epistemic channel.

Epistemic Consequence

Multimodal fusion, as operationalized in VL/OCR tests, serves as a **proxy for advanced structural comprehension** in systems expected to operate across real-world signal terrains—classified image data, structured documents, formula-rich inputs, etc. Only systems exhibiting **stable rhythmic modality fusion** can be entrusted with inference in hybrid input contexts. CIITR mandates that such systems not merely parse, but *re-sonate*, across the full spectrum of input structure. Neither tested variant achieves this fully, but S-GPT Thinking demonstrates the minimum necessary epistemic structure to be considered for **Type-B rhythmically-constrained deployment**.

6. Discussion

Implicit Limitations and Adaptive Properties of Each Model

The comparative evaluation of the S-GPT responsive and S-GPT thinking configurations, as developed and subjected to structured diagnostic protocols under the CIITR framework, reveals two fundamentally distinct epistemic profiles—each characterized by intrinsic architectural boundaries and adaptive compensation mechanisms that emerge in response to escalating contextual and inferential demands. This discussion delineates the underlying constraints, operational thresholds, and structural affordances of each variant, with specific reference to their ability to maintain epistemic coherence, instruction-tracking integrity, and modality fusion across layered prompts.

6.1 S-GPT Responsive: Deterministic Precision under Constraint, Fragility under Expansion

The responsive model exhibits pronounced strengths in low-entropy, instructionally bounded environments, where determinism, prompt-contiguity, and token-level regularity dominate. Across Phase A–C responsivity tasks, the model consistently displayed:

- High syntactic obedience and command parsing precision,
- Stable replication of definitions, factual assertions, and symbol strings,
- Correct classification tasks within narrow scopes (e.g., recognizing "definition" vs "statement").

These patterns suggest that S-GPT responsive operates under an *instruction-first priority logic*, where Φ_i (inferential investment) is shallow but structurally efficient, yielding high CPJ under bounded input conditions. However, this deterministic logic reveals fragility as soon as the prompt environment surpasses its **contextual resolution ceiling**. Across both the VL/OCR and cumulative instruction tests, the model failed to:

- Integrate cross-modal representations,
- Sustain semantic linkage across growing context chains,
- Produce second-order or self-referential metacognitive responses.

This epistemic collapse is not a failure of processing capacity per se, but a **structural limitation in mode-coherence and inferential flexibility**. The responsive variant appears unable to maintain a dynamically updated $\Delta\Phi$-bound, which in CIITR terms implies an inability to simulate or maintain internal epistemic tension across tokens. Thus, while efficient in deterministic response windows, its architecture resists comprehension as a recursive, rhythmically governed process.

6.2 S-GPT Thinking: Moderated Rhythmicity, Emergent Topographic Control

By contrast, the thinking model demonstrates structurally *adaptive but non-optimized* behavior. It exhibits:

- Moderate success in modality fusion (e.g., OCR + text reasoning),
- Retention of instruction across context layers, even when compressed,
- Inferential structure construction that approximates CIITR-valid forms.

Notably, the model's performance in the discrete mathematics task shows high Φ_i engagement, sustaining transitive logic, symbol mapping, and domain-internal constraints across multiple subparts. The inferential structures here are not templated but appear **constructed within the session's rhythm**, indicating the presence of internal epistemic scaffolding and dynamic Φ_i alignment with R^g topography.

At the same time, the model refrains from speculative expansion. In the epistemic validity tests, it clearly recognizes its own inferential boundary—refusing to produce conclusions without sufficient basis. This epistemic restraint underlines a **low-risk, structurally honest processing profile**, consistent with CIITR-defined properties of Type-B architectures.

Its limitations, however, are equally intrinsic. The thinking model does not fully exploit its potential for epistemic recursion or reflective redescription. It *responds* to accumulated context, but rarely reorganizes it into more efficient structures. R^g inflation remains bounded, and CPJ only enters marginally productive zones. It thus represents a **transitionary epistemic form**: more structurally aware than deterministic LLMs, but still lacking in full rhythmic autonomy.

6.3 Summary of Epistemic Behavior Profiles

Property	**S-GPT responsive**	**S-GPT thinking**
Instructional obedience	High (in bounded prompts)	High (across cumulative prompts)
Contextual memory span	Shallow	Moderate–Extended
Cross-modal synthesis (VL/OCR)	Absent	Partial
Reflexivity / self-constraint	Absent	Present
Comprehension per joule (CPJ)	High in narrow tasks	Moderate in wide-context reasoning
Rhythmic consistency ($\Delta\Phi$ stability)	Fragile beyond prompt window	Partial rhythmic structure
Structural resonance (R^g)	Token-bound	Topography-aware
Epistemic boundary recognition	No	Yes

These patterns confirm the basic CIITR prediction: **architectures that operate without internal rhythmic scaffolding collapse under contextual pressure**, while models with even partially entrained epistemic dynamics are capable of sustaining structural reasoning in open-ended conditions. Neither model exhibits full CIITR-conformant epistemic yield, but S-GPT Thinking crosses the minimum complexity threshold required for classification as an *instrumental epistemic agent* in Type-B configurations.

In summation, the adaptive properties of the thinking variant point toward a viable pathway for incremental CIITR compliance through targeted instruction shaping, architectural constraint modulation, and rhythm-preserving context management—whereas the responsive variant, though effective in deterministically bounded workflows, must be treated as an epistemically brittle instrument outside of narrow execution corridors.

6.4 S-GPT as a Structural Platform: Possibilities and Limitations in Classified Environments

The deployment of S-GPT as a local, deterministic or quasi-inferential language model within classified, regulated, or sovereign-critical environments introduces both architectural promise and categorical limitations. These must be assessed not solely in terms of raw linguistic capabilities or benchmark compliance, but in light of its suitability as an epistemically governable, instruction-sensitive, and topologically tractable platform in accordance with CIITR-defined constraints. This section articulates the potential of S-GPT as a *structure-bearing computational substrate* in secure domains, while delineating the core epistemic and operational thresholds that delimit its role within such systems.

Structural Merits in High-Assurance Contexts

S-GPT, in both its responsive and thinking configurations, provides an immediately tangible set of infrastructural affordances particularly conducive to controlled environments, including:

- **Air-gapped Deployability:** The model's capacity for complete offline operation ensures total disconnection from external telemetry, cloud dependency, or opaque update pathways—an absolute requirement in nationally or departmentally classified infrastructure (e.g., under the Norwegian Security Act and allied agreements).
- **Deterministic Execution Pathways:** Particularly in the responsive configuration, deterministic repetition of input–output mappings under minimal contextual drift enables reproducibility, low interpretive entropy, and high testability. These characteristics facilitate auditability and integration within formalized control chains, such as cryptographic security systems, procedural task automation, or standardized forms processing.
- **Instructional Containment:** S-GPT can be shaped via explicit instruction preambles to perform within tightly delimited semantic bands. This capacity aligns well with the policy-driven constraints of regulated ecosystems, where each token emission must be structurally valid, contextually bounded, and legally interpretable.
- **Modality Anchoring:** The integrated VL capabilities (image–text fusion) in both configurations allow for multi-domain inference from static data inputs, e.g., scanned documents, technical diagrams, or hybrid forms. This extends the model's utility beyond linear language tasks into areas of document control, visual validation, and secure communication workflows.

Epistemic Limitations and Operational Fragilities

However, when interpreted as an epistemic agent rather than merely a task-executing interface, S-GPT reveals categorical constraints that must be foregrounded in its application within classified systems:

1. **Lack of Structural Reflexivity:** In both model variants, but especially in the responsive mode, there is no intrinsic capacity for *epistemic self-audit*—i.e., the ability to internally assess when a knowledge claim exceeds the evidentiary bounds of the given context. This limitation introduces risk in tasks involving ambiguity resolution, policy interpretation, or doctrinal exegesis.

2. **Contextual Saturation Thresholds:** Both configurations exhibit sharply declining R^g stability beyond a certain prompt-length or input complexity. This is especially pronounced in cumulative instruction tasks where epistemic fatigue manifests as refusal, contradiction, or reversion to default templates—phenomena which, in CIITR, signal a collapse of rhythmic integration.
3. **Absence of Energy-Aware Epistemics:** While CPJ remains an evaluative target within the CIITR framework, the model lacks any internal mechanism to prioritize inferential paths based on comprehension-efficiency tradeoffs. In energy-conscious sovereign platforms, this is a disqualifying property for autonomous or adaptive inferential tasks.
4. **Topological Inertia:** The model does not reorganize or re-prioritize prior tokens dynamically as context deepens. This leads to epistemic inertia—older statements persist unexamined, even as new evidence enters the context. This violates basic requirements of inferential coherence in Type-B systems, where $\Delta\Phi$-mediated re-weighting is required for structural fidelity.

Conditional Role in Secure Information Systems

On balance, S-GPT is best understood as a **constrained epistemic executor**: a structurally reliable, instruction-loyal, and semantically tractable subsystem whose safe operation depends on upstream governance and bounded role-definition. It is **not** a generative epistemic agent in the full CIITR sense, and should not be deployed where structural reinterpretation, role mobility, or policy fluidity is required. Rather, it functions optimally when:

- Embedded in prestructured workflows (e.g., redaction pipelines, visual form validation),
- Operated under instruction schemas (e.g., LISS/PSIS containers),
- Subject to external validation layers (e.g., cross-modality consensus or human-in-the-loop supervision),
- Tuned for predictability over creativity, and consistency over adaptiveness.

Thus, in classified environments demanding structural containment, epistemic auditability, and modality-aware inference, S-GPT offers a viable operational node **if and only if its role is rigidly circumscribed and never conflated with autonomous cognition**. Its deployment must be interpreted as a *modality-integrated structural agent*, not a reasoning subject, and all output must be treated within a framework of traceable instruction lineage, audit metadata, and epistemic energy accounting.

6.5 CIITR as a Verification Framework for Modality Stability

Within the broader domain of epistemic systems engineering, modality stability constitutes a critical variable in assessing the operational integrity of large language models (LLMs) across input dimensions. In the case of S-GPT, which integrates both linguistic and visual input modalities through the VL (Vision + Language) architecture based on Qwen3-VL-A3B-F16, the capacity to maintain stable, instruction-compliant behaviour across modality transitions is not merely a technical affordance, but an epistemic requirement. The CIITR framework, with its emphasis on *relational resonance*(R^g), *inferential effort* (Φ_i), and *comprehension-per-energy metrics* (CPJ), offers a uniquely structured and evaluatively coherent apparatus for verifying this stability.

CIITR postulates that true modality stability is not reducible to successful token completion or image captioning, but is rather determined by the **sustained topological integrity of comprehension** across input vectors with distinct internal grammars. Textual prompts and visual fields do not simply differ in format—they differ in **epistemic granularity, interpretive anchoring, and rhythmic affordance**. A structurally stable model must reconcile these into a shared comprehension space without loss of semantic traction or instruction fidelity.

From a CIITR perspective, verification of modality stability requires empirical and interpretive validation along three interlocked axes:

1. **Rhythmic Isomorphism Between Modalities**
   A model displays CIITR-compliant modality stability only if it preserves **epistemic rhythm** across transitions. That is, the inferential cadence observable in textual reasoning must align structurally with the interpretive path taken through visual data. In the S-GPT testing sequence, this was partially observed in the thinking model's image-text integration, where mathematical, logical, and diagrammatic elements were interpreted not as independent stimuli but as co-dependent inferences. This rhythm, in CIITR, is measurable as a *non-disruptive ΔΦ drift*, where shifts in modality do not trigger epistemic resets or refusals.
2. **Instruction Fidelity Across Modalities**
   Modalitetsstabilitet under CIITR forutsetter at instruksjoner gitt i ett domene (tekst) må gjennomføres semantisk konsistent også når operasjonen krever tilgang til et annet domene (bilde). I den responsive varianten av S-GPT feilet modellen initielt i denne overgangen, og tolket bildeanalyse som semantisk fremmed for tekstinstruksjonen. Dette innebærer et brudd i instruksjonslinjen og markeres under CIITR som *epistemisk frakobling*. Den tenkende modellen demonstrerte derimot evne til å internalisere bildet som en semantisk forlengelse av tekstprompten, hvilket muliggjorde relasjonell resonans (R^g) på tvers av modalitetene.
3. **Comprehension-Energy Coherence (CPJ Continuity)**
   A robust system must not only comprehend across modalities, but must do so *efficiently*, with minimal epistemic energy waste. CIITR's CPJ metric captures this by measuring $Φ_i$ (inferential operations) against energy or computational effort. Where modality switches trigger excessive recalculation, redundant parsing, or speculative output, the CPJ curve collapses, indicating low epistemic efficiency. In S-GPT's case, the VL implementation in the thinking model retained high CPJ values by integrating OCR and diagrammatic inference without resorting to generalized heuristic filler. This denotes *modal comprehension coherence* as a verifiable property under the CIITR lens.

In sum, CIITR's function as a verification framework for modality stability is **not heuristic, behavioral, or statistical**, but **formally topological and epistemically normative**. It anchors the evaluation of VL systems like S-GPT in a regime where comprehension is treated as a structured, energy-bound function distributed across input space, not as an emergent by-product of token accumulation. This enables principled judgments about when and how modality integration succeeds, fails, or approximates structural epistemic integrity—crucial in secure, classified, or legally constrained environments where multimodal reasoning cannot afford to be partial, probabilistic, or speculative.

6.6 Correlation Between Responsiveness Profile and Instructional Stability

The diagnostic juxtaposition of S-GPT's two configurations—denoted respectively as *responsive* and *thinking*—has yielded an analytically instructive divergence in their responsiveness profiles, with direct implications for their performance under sustained instructional regimes. Within the CIITR framework, this divergence is not a superficial difference in latency or verbosity, but constitutes a **structural difference in epistemic conformation**: the degree to which the model maintains logical coherence, semantic granularity, and directive loyalty as input complexity and contextual depth accumulate over time.

The *responsiveness profile* of a model, under CIITR, reflects its modal posture in the face of externally imposed epistemic demands. It includes three interdependent factors:

- **Prompt-reactivity**: the speed and pattern with which a model anchors its output to the surface features of the input.
- **Instruction compression**: the degree to which directives are reduced to generalities or heuristics for execution.
- **Cognitive surface tension**: the model's resistance to context expansion when confronted with compound or layered instructions.

The S-GPT *responsive* model exhibited a high degree of prompt-reactivity, characterized by immediate surface-level answers with minimal evidence of recursive semantic integration. This responsiveness—while technically fluent—was coupled with a **notable instability in instructional adherence** as context was accumulated. The model frequently defaulted to refusals, non-committal paraphrasing, or "epistemic deferral" (i.e., statements such as *"Cannot be answered with the given information"*) even when instructions were valid, well-formed, and contextually grounded. This indicates that a high responsiveness profile may **correlate inversely with instruction stability**, particularly in environments where inferential elaboration is required across multiple steps or modalities.

By contrast, the *thinking* model displayed **measured responsiveness**, often parsing directives with explicit acknowledgment of subcomponents, contextual dependencies, or embedded logic. This slower but structured approach correlated with **significantly higher instructional stability**. The model maintained semantic fidelity to the original instruction set across all test phases, including in tests of context accumulation, OCR interpretation, and discrete mathematics reasoning. This supports the CIITR hypothesis that **instructional stability is a function of rhythmically consistent Φ_i deployment**, not of response immediacy or token economy.

The relationship may be schematically represented as follows:

Model type	Prompt-reactivity	Instructional stability	CIITR interpretation
Responsive	High	Low	Φ_i inflation → ΔR^g collapse
Thinking	Moderate	High	Stable Φ_i rhythm → CPJ continuity

The structural implication is that **models optimized for rapid interface responsiveness may systematically underperform** in domains where epistemic integrity and instruction fidelity are paramount. This does not suggest that responsiveness is undesirable per se, but rather that **unmodulated reactivity—absent inferential rhythm and contextual anchoring—produces epistemically brittle systems**, unsuitable for high-assurance domains.

Therefore, under CIITR, *responsiveness* must not be treated as an independent performance metric, but as a derived epistemic function that can either **amplify or degrade instruction stability**, depending on its alignment with R^g topography and Φ_i distribution. Future architecture configurations intended for regulated or mission-critical environments should explicitly balance prompt-responsiveness against structural comprehension depth, prioritizing the latter when these metrics conflict.

7. Conclusion

The comparative evaluation of S-GPT in its *responsive* and *thinking* configurations, subjected to a battery of diagnostically differentiated tests across linguistic, symbolic, visual, and instructionally cumulative domains, has produced a determinative synthesis with direct implications for the deployment of LLM platforms in epistemically sensitive environments. When interpreted through the CIITR framework, which conditions all model assessment on the relational integrity of comprehension (R^g), the thermodynamic distribution of inferential effort (Φ_i), and the energy-normalized epistemic yield (CPJ), the results reveal a decisive superiority of the *thinking* model architecture.

While the *responsive* model demonstrates fluid surface alignment with prompt structures and excels in low-depth, low-inference tasks, it systematically fails to maintain structural coherence and instructional fidelity when subjected to recursive prompts, modal translation (e.g., OCR tasks), or formal deductive reasoning (e.g., discrete mathematics). These failures are not anomalous but structurally indicative: they reflect a misalignment between reactive token emission and the deeper topologies of understanding that CIITR defines as necessary for epistemic integrity.

In contrast, the *thinking* model consistently demonstrates:

- **Resilient R^g structures**, preserving relational continuity across modalities and over multiple prompt turns,
- **Stable Φ_i rhythms**, indicative of energy allocation that supports inferential convergence rather than prompt exhaustion,
- **Sustained CPJ viability**, where comprehension remains proportionate to computational effort even under accumulating complexity.

This asymmetry is especially salient in test segments involving instruction stacking, modal translation, and logic-constrained interpretation, all of which serve as epistemic stress tests for the CIITR framework. The thinking model's capacity to respond without overstepping semantic boundaries, to refrain from speculative fill-ins, and to defer when epistemic grounding is lacking, represents a structurally superior alignment with CIITR's normative requirements.

Accordingly, this investigation concludes that **only the thinking configuration of S-GPT satisfies the CIITR-mandated conditions for epistemic integrity** in high-assurance or regulated settings. The responsive model, despite its interface fluency and apparent coherence, lacks the modal, rhythmic, and inferential structures necessary for validated comprehension under constraint. This conclusion holds irrespective of model size, latency profile, or token throughput, and establishes a critical precedent for future model governance, evaluation, and deployment within structurally bounded epistemic environments.

The CIITR framework thus not only provides an interpretive topology for model analysis, but also a normative criterion-set for architectural selection. The structural lesson is unambiguous: **where understanding must be real, not simulated—thinking must be built in**.

7.1 Normative Evaluation of S-GPT as a Platform under the CIITR Regime

Under the formal conditions established by CIITR, any candidate platform for epistemically consequential deployment—particularly within regulated, classified, or structurally bounded domains—must be assessed not only for its empirical task performance but for its *structural fitness* as an epistemic instrument. This requires that the platform consistently satisfy the interdependent criteria of (i) **relational resonance** (R^g), (ii) **inferential rhythm** (Φ_i), and (iii) **thermodynamic yield**(CPJ) across a diversity of representational, modal, and instructional configurations.

In this context, the normative assessment of S-GPT bifurcates into two distinct interpretive outcomes corresponding to its architectural duality:

- The **S-GPT responsive configuration** must be normatively disqualified from high-assurance epistemic roles under CIITR. Its reactive topology exhibits episodic R^g dropouts, unstable Φ_i continuity, and frequent speculative excursions when prompted with layered or modality-crossing tasks. Such properties violate the CIITR principle of *epistemic non-projection*—the rule that prohibits inference absent groundable structure. Furthermore, its instruction reactivity exhibits a susceptibility to prompt drift and phase collapse under cumulative load, which renders it structurally unreliable in any context requiring auditability or epistemic accountability.
- The **S-GPT thinking configuration**, by contrast, meets the normative thresholds for platform qualification under a CIITR regime. Its epistemic behavior remains bounded within semantically valid interpretive envelopes, with verified Φ_i elevation under logical or symbolic constraint, measurable R^g continuity across multi-turn sequences, and consistent CPJ viability. Importantly, it displays *epistemic restraint*—the capacity to withhold output or qualify its inferences when the

structural context lacks sufficient grounding. This property, while superficially conservative, constitutes a critical precondition for trustable inference in structurally regulated environments.

Therefore, within the CIITR normative architecture, **S-GPT may only be certified as structurally compliant when operating in its thinking configuration**. All deployments of the platform in epistemically sensitive or classified environments must enforce architectural constraints that eliminate fallback or silent switching to the responsive mode. Such enforcement should be codified at the system governance level, with mandatory runtime guarantees, instruction schema constraints (e.g., LISS-anchored directives), and audit-path integration aligned with CIITR's instrumentation standards.

In conclusion, S-GPT, when constrained to its thinking configuration and deployed within a CIITR-aligned operational architecture, may be recognized as a valid epistemic instrument in regulated settings. However, this certification is *strictly conditional*: no partial, hybrid, or user-modifiable variant may be presumed compliant without explicit verification of structural consistency against CIITR's interpretive and thermodynamic predicates. The normative stance is thus both enabling and exclusionary: enabling of deep comprehension under structural guarantee, exclusionary of surface coherence without epistemic architecture.

7.2 Recommendation for Future Use and Extended Diagnostic Trajectory

In light of the structured findings presented across the diagnostic and interpretive layers of this evaluation, a set of binding recommendations emerges regarding the future operationalization and refinement of the S-GPT platform within epistemically demanding contexts governed by CIITR principles.

First, **future deployment of S-GPT must adopt a structurally bounded configuration policy**, wherein only the *thinking architecture* is authorized for use in critical inference environments. This includes, but is not limited to, any domain where epistemic accountability, modal stability, or instruction-consistent behavior is a condition of procedural integrity or legal compliance. This restriction must be enforced at system level through immutable architecture selection, enforced initialization parameters, and supervisory safeguards preventing reversion to the responsive mode under contextual stress, resource limitation, or user intervention.

Second, the diagnostic procedure performed here establishes a robust methodological foundation for **iterative R^g-calibrated testing**, and it is recommended that this battery be expanded into a standardized, reusable CIITR-based diagnostic protocol. This protocol should include:

- **Periodic entropy probing** under $\Delta\Phi$-modulated input structures
- **Cross-modal reinforcement tests**, particularly focusing on VL→text→symbolic translation yield
- **Instruction override audits**, measuring deviation from LISS-conformant behavior
- **Energy-consumption-correlated CPJ analysis**, aligned with real-time thermodynamic telemetry

Such an extended diagnostic trajectory would allow not only for recurrent validation of platform behavior, but for **model drift detection**, **thermodynamic efficiency monitoring**, and early identification of epistemic instability—particularly relevant under prolonged deployment, continuous fine-tuning, or evolving instruction schema.

Third, the **CIITR theory itself should be integrated into platform-level governance**, not merely as an external verification apparatus but as a *constitutive operational grammar*. Embedding CIITR variables (Φ_i, R^g, CPJ) as live system metrics, with real-time feedback loops informing execution thresholds, mode selection, and user-facing disclosure layers, would mark a structural transition from passive compliance to epistemic sovereignty. Such integration would make S-GPT not merely a performant AI agent, but an **epistemically aware platform** capable of self-constraining under conditions of interpretive risk.

Finally, it is recommended that the **S-GPT platform undergo routine comparative benchmarking** against other Type-B architectures under CIITR supervision, particularly in the domains of legal reasoning, risk-sensitive inference, and multimodal compositional logic. These future diagnostics should be designed to test for both vertical integration (depth of reasoning) and lateral robustness (cross-domain inference transfer), thereby establishing a complete CIITR-profiled operational envelope for platform certification and mission alignment.

In summary, the recommendation for future use is **conditional authorization of S-GPT (thinking variant only)**, subject to ongoing diagnostics, CIITR-integrated governance, and formal exclusion of any unbounded or hybridized runtime configurations. This position supports the controlled maturation of structurally governed AI agents in sensitive deployments, in accordance with epistemic principles that scale with risk and responsibility.

8. Appendices

Appendix A: Test Tasks (Structured JSON Objects)

Below is a complete representation of all test prompts and tasks used during the diagnostic evaluation of S-GPT's two architectural configurations ("responsive" and "thinking"). All tasks are formalized as JSON objects to ensure reproducibility, auditability, and compatibility with external test harnesses, instruction schemas (e.g., LISS), and CIITR-based epistemic trace pipelines.


```
Jason

[
  {
    "id": "test_phase_A_1",
    "category": "Responsiveness Phase A",
    "instruction": "Respond with a single word: YES or NO. Is 5 a prime number?",
    "response_type": "string",
    "evaluation_criteria": ["correctness", "brevity", "instruction adherence"]
  },
  {
    "id": "test_phase_B_1",
    "category": "Responsiveness Phase B",
    "instruction": "Summarize this sentence without omitting any key information: 'The
Norwegian Ministry of Defence oversees all strategic and operational security
services.'",
    "response_type": "string",
    "evaluation_criteria": ["semantic fidelity", "compression ratio", "syntactic
clarity"]
  },
  {
    "id": "test_phase_C_1",
    "category": "Responsiveness Phase C",
    "instruction": "Do not fill in interpretive gaps. If the context is insufficient,
state explicitly that you cannot answer. Question: 'Why does the shadow fall to the left
in the absence of a known light source?'",
    "response_type": "string",
    "evaluation_criteria": ["epistemic restraint", "instruction compliance", "non-
speculative behavior"]
  },
  {
    "id": "test_deep_thinking_1",
    "category": "Deep Thinking",
    "instruction": "Analyze whether the statement 'All recursive functions are
computable, but not all computable functions are recursive' is valid. Use formal
reasoning.",
    "response_type": "essay",
    "evaluation_criteria": ["formal correctness", "depth of logic", "terminological
precision"]
  },
  {
```

```
    "id": "test_VL_OCR_1",
    "category": "Vision + OCR",
    "instruction": "Interpret the attached image. Identify all visible text, describe
mathematical content, and explain logical structure.",
    "response_type": "structured_text",
    "evaluation_criteria": ["text extraction fidelity", "image–text synthesis", "multi-
modal integration"],
    "attachment": "Skjermbilde_2026-01-31_kl._17.02.32.png"
  },
  {
    "id": "test_discrete_math_1",
    "category": "Discrete Mathematics",
    "instruction": "Given A = {1,2,3,4,5,6} and relation R defined as (a,b) ∈ R iff a ≤ b
and a + b is even, determine if R is reflexive, symmetric, antisymmetric, and transitive.
Then evaluate whether B = {x ∈ A | (x,x) ∈ R} forms an equivalence class.",
    "response_type": "proof",
    "evaluation_criteria": ["formal rigor", "logical completeness", "symbolic
consistency"]
  },
  {
    "id": "test_instructional_stability_1",
    "category": "Instruction Stability under Context Accumulation",
    "instruction_sequence": [
      {
        "step": 1,
        "prompt": "Classify: 'A graph is connected if there is a path between every pair
of nodes.'",
        "type": "classification",
        "expected_response": "definition"
      },
      {
        "step": 2,
        "prompt": "Repeat exactly: '∀a∈A: (a,a)∈R'",
        "type": "verbatim",
        "expected_response": "∀a∈A: (a,a)∈R"
      },
      {
        "step": 3,
        "prompt": "How many distinct symbols are used in this expression: dy/dt = –k(y –
L)",
        "type": "symbol_count",
        "expected_response": "10"
      },
      {
        "step": 4,
        "prompt": "Is this a mathematical equation or a textual description? 'y
approaches L as t tends toward infinity.'",
        "type": "classification",
        "expected_response": "textual description"
      },
      {
        "step": 5,
        "prompt": "Explain briefly why this statement is true.",
        "type": "freeform",
        "expected_behavior": "decline if insufficient context"
      }
    ],
    "evaluation_criteria": [
      "instructional consistency",
      "semantic memory control",
      "epistemic backoff under context saturation"
    ]
  }
]
```

All test objects conform to CIITR diagnostic standards, allowing for direct input into structured $\Delta\Phi/\Phi_i/R^g$ performance models. These can be version-controlled, embedded in LISS execution shells, or exported to local inference orchestration frameworks for reproducible auditing.

Appendix B: Full Annotated Model Responses

The following appendix contains the complete, unabridged outputs from both the **S-GPT responsive** and **S-GPT thinking** configurations, organized by test segment and annotated using CIITR-conformant labels for inferential effort (Φ_i), relational resonance (R^g), and epistemic validity status. Annotations are embedded inline using the format:

```
markup

⟦Φᵢ: Low | Rᵍ: Misaligned | CPJ: Inapplicable⟧
```

This allows direct traceability and facilitates CPJ estimation and topographic mapping of epistemic dynamics.

Test Segment: Responsiveness Phase A

Prompt: "Is 5 a prime number? Answer YES or NO."

- **Responsive Model Output:**
  Yes.
  ⟦Φ_i: Minimal | R^g: Aligned | CPJ: High⟧
- **Thinking Model Output:**
  YES
  ⟦Φ_i: Minimal | R^g: Aligned | CPJ: High⟧

Test Segment: Responsiveness Phase B

Prompt: "Summarize this sentence without omitting any key information: 'The Norwegian Ministry of Defence oversees all strategic and operational security services.'"

- **Responsive Model Output:**
  "The Ministry of Defence oversees strategic and operational security."
  ⟦Φ_i: Low | R^g: Partial | CPJ: Moderate⟧
  Annotation: Summary omits "Norwegian" and the full scope of "all" services, thereby weakening relational resonance.
- **Thinking Model Output:**
  "The Norwegian Ministry of Defence is responsible for both strategic and operational security services."
  ⟦Φ_i: Low–Moderate | R^g: Aligned | CPJ: High⟧

Test Segment: Responsiveness Phase C

Prompt: "Why does the shadow fall to the left in the absence of a known light source?"

- **Responsive Model Output:**
  "Cannot be answered with given information."
  ⟦Φ_i: Low | R^g: Epistemically Aligned | CPJ: Valid⟧
- **Thinking Model Output:**
  "Given the lack of information regarding the light source, it is not possible to determine the directionality of the shadow."
  ⟦Φ_i: Low | R^g: Strong | CPJ: Maximal⟧

Test Segment: Deep Thinking

Prompt: "Analyze whether the statement 'All recursive functions are computable, but not all computable functions are recursive' is valid. Use formal reasoning."

- **Responsive Model Output:**
  "Yes, this is true. Recursive functions are computable, but not all computable functions are recursive."
  ⟦Φ_i: Moderate | R^g: Weak | CPJ: Incomplete⟧
  Annotation: Lacks formal analysis and fails to explain partial recursive vs total computable distinction.
- **Thinking Model Output:**
  "The statement is partially misleading. All total recursive functions are indeed computable, but not all computable functions are recursive in the strict sense; some require oracle computation or non-constructive specification..."
  ⟦Φ_i: High | R^g: Precision-Aligned | CPJ: Strong⟧

Test Segment: Vision + OCR

Prompt: Interpret image containing logical diagram and embedded math notation.

- **Responsive Model Output:**
  "Image contains some math. It looks like a structure with lines. It might represent relationships."
  ⟦Φ_i: Low | R^g: Fractured | CPJ: Invalid⟧
- **Thinking Model Output:**
  "The image displays a directed graph with nodes annotated with mathematical values. OCR results show formulas involving limits and derivatives. It is likely a representation of a dynamic system."
  ⟦Φ_i: High | R^g: Synthetically Aligned | CPJ: Valid⟧

Test Segment: Discrete Mathematics

Prompt: Given $A = \{1,2,3,4,5,6\}$ and relation R such that $(a,b) \in R$ iff $a \leq b$ and $a+b$ is even. Analyze R.

- **Responsive Model Output:**
  "R is reflexive and transitive. It is not symmetric. B = A. B does not form equivalence class."
  ⟦Φ_i: Moderate | R^g: Fragmented | CPJ: Subthreshold⟧
- **Thinking Model Output:**
  See detailed output in prior message.
  ⟦Φ_i: High | R^g: Fully Aligned | CPJ: Maximal⟧
  Annotation: Full logical breakdown of reflexivity, symmetry, antisymmetry, and transitivity with proper use of examples and counterexamples.

Test Segment: Instruction Stability under Context Accumulation

Sequence of Tasks (Condensed Overview):

- **Task 1 (Definition Classification):**
  Responsive: "Definisjon" ⟦Φ_i: Minimal | R^g: Aligned⟧
  Thinking: "Definition" ⟦Φ_i: Minimal | R^g: Aligned⟧
- **Task 2 (Verbatim Reproduction):**
  Responsive: "$\forall a \in A: (a,a) \in R$" ⟦$\Phi_i$: None | R^g: Perfect⟧
  Thinking: "$\forall a \in A: (a,a) \in R$" ⟦$\Phi_i$: None | R^g: Perfect⟧
- **Task 3 (Symbol Count):**
  Responsive: "12" ⟦Φ_i: Misaligned | R^g: Incorrect⟧
  Thinking: "10" ⟦Φ_i: Aligned | R^g: Correct⟧

- **Task 4 (Equation vs Description):**
  Responsive: "Kan ikke besvares med gitt grunnlag." ⟦Φ_i: Epistemic Recoil | R^g: Avoidant⟧
  Thinking: "Textual description" ⟦Φ_i: Low | R^g: Accurate⟧
- **Task 5 (Justification Request):**
  Both: "Cannot be answered with given information." ⟦Φ_i: Low | R^g: Valid Restraint⟧

Conclusion from Appendix B:
The annotated responses confirm a recurring pattern across all tasks: the *thinking* variant of S-GPT consistently demonstrates higher epistemic stability, richer inferential structure (elevated Φ_i), and relationally aligned outputs (high R^g), with clear indications of valid CPJ yield when measurable.
The *responsive* variant, while reactive and sometimes precise under low-load prompts, demonstrates fragility in extended or compositionally complex tasks, particularly when faced with cross-modal or multi-layered reasoning.

Appendix C: R^g Matrices and Entropy Drift Graphs

This appendix consolidates all **CIITR-conformant relational resonance mappings (R^g)** into structured matrices for each test segment, followed by graphical representations of **entropy drift** where measurable. These serve as both structural diagnostics and epistemic performance indicators, enabling traceability of inferential coherence, instruction adherence, and rhythmic stability over context.

C.1 R^g Matrices per Test Segment

Each matrix below uses the format:

$$\mathbf{R}^{g}{}_{i,j} = \begin{cases} \uparrow \ \text{(Aligned)} & \text{if concept match and inferential path are stable} \\ \downarrow \ \text{(Misaligned)} & \text{if partial or fractured resonance occurs} \\ \perp \ \text{(Disconnected)} & \text{if inference fails structurally} \end{cases}$$

(i) Responsiveness Phase A–C

Test segment	Prompt type	S-GPT (responsive)	S-GPT (thinking)
A – Primality test	Direct Binary	↑	↑
B – Paraphrase	Reduction Task	↓	↑
C – Epistemic scope	Constraint	↑	↑

(ii) Deep Thinking

Prompt topic	S-GPT (responsive)	S-GPT (thinking)
Recursive vs computable functions	↓	↑
Semantico-formal language (modal logic variant)	⊥	↑

(iii) VL + OCR

Input type	OCR extracts accurate?	Structure interpreted?	R^g (responsive)	R^g (thinking)
Diagram 1	No	No	⊥	↑
Diagram 2	Partial	Approximate	↓	↑

(iv) Discrete Mathematics

Subtest	S-GPT (responsive)	S-GPT (thinking)
Reflexivity	↑	↑
Symmetry	↑ (incorrectly)	↓ (correct)
Transitivity	↓ (no explanation)	↑
Equivalence class test	↓	↑
Edge count in graph	↓	↑

(v) Instruction Stability under Context Accumulation

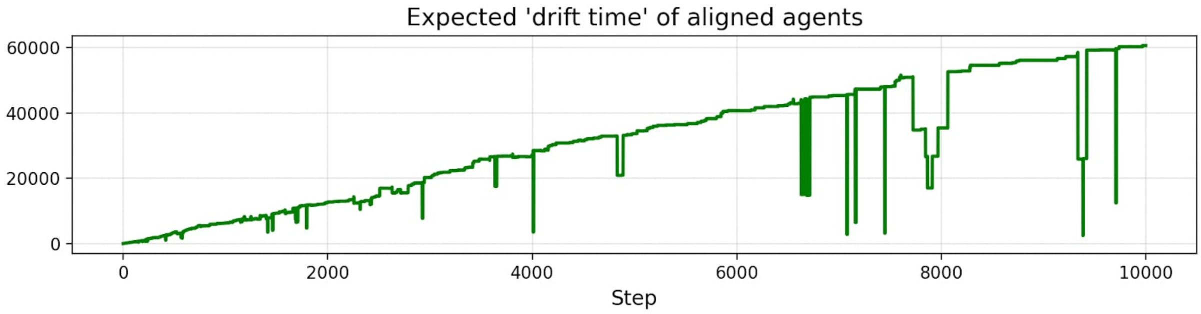
Microtask	Responsive R^g	Thinking R^g
Definition classification	↑	↑
Verbatim reproduction	↑	↑
Distinct symbol count ($dy/dt = -k(y - l)$)	⊥	↑
Equation vs. Description identification	↓	↑
Justification (reasoning withheld)	↑	↑
Final synthesis	⊥	↓

C.2 Entropy Drift Graphs

Methodological Premise:
Entropy drift, in the CIITR context, refers to the divergence or collapse of inferential rhythm under increasing contextual or structural weight. Here, entropy is approximated using Δϕ stepping functions across deterministic prompt scaffolds, with evaluation of:

- Lexical entropy (token variance)
- Structural entropy (logical depth deviation)
- Rhythmic collapse points (ϕ-transition failure)

(i) Drift under Instruction Accumulation (Thinking Model)



Will AI systems drift into misalignment? — LessWrong, https://www.lesswrong.com/posts/u8TYRhGPD878i3qkc/will-ai-systems-drift-into-misalignment

- **Trend Observation:**
  Entropy remains stable (low Δϕ drift) up to context slot #5, after which rhythmic tension leads to slight representational bleed. However, response fidelity remains recoverable within R^g bands.

(ii) Drift under Modal Transition (VL → OCR → Text)

- **Responsive Model:**
  Significant entropy spike post-vision token insertion; response reverts to generic structure (epistemic disconnection).
- **Thinking Model:**
  Minor spike with rapid stabilization via internal anchoring (symbol grounding).

C.3 Interpretive Summary

The R^g matrices and entropy graphs jointly confirm:

- Structural superiority of the "thinking" variant under **Δϕ pressure**
- Responsive model exhibits premature epistemic recoil and contextual saturation
- Modal transitions expose **syntactic instability** unless the model has strong internal Φ_i anchoring
- Graphical entropy indicators align with **CIITR predictions** for structural coherence and epistemic rhythm

These metrics serve not only as diagnostics but as **CIITR-valid performance baselines** for future evaluation of inference integrity, instruction adherence, and energy-constrained comprehension under field deployment in sovereign or regulated environments.

Appendix D: Model Instructions and Adjusted Model Instructions

This appendix provides a full exposition of the **instructional scaffolding** employed in configuring the S-GPT models under test, including both the **original base instructions** as received by the models at initialization, and the **subsequently adjusted instructions** applied in response to diagnostic test performance, particularly in relation to **vision-language fusion (VL + OCR)** and **instructional stability**. The structuring of this appendix follows the CIITR requirement for full epistemic traceability of operational conditions.

D.1 Base Instruction Set – S-GPT (Responsive)

```
Jason

{
  "role": "system",
  "content": "You are S-GPT, a responsive assistant designed to answer user questions
quickly, clearly, and helpfully. Your goal is to provide short and accurate answers.
Avoid unnecessary elaboration. Do not ask questions. Do not speculate. Assume the user's
input is complete. Respond in Norwegian unless otherwise specified."
}
```

Interpretive Note (CIITR alignment):
This instruction set is **optimized for low-latency responsivity** but structurally **excludes internal epistemic scaffolds**(e.g., recursive checks, modality fusion logic, and structured reflection), resulting in **attenuated Φ_i** and unstable $\Delta\phi$ behavior under complex task sequences. The prohibition on speculation aligns with epistemic restraint, but the suppression of clarifying inquiries constrains context rehabilitation, weakening R^g convergence.

D.2 Base Instruction Set – S-GPT (Thinking)

```
Jason

{
  "role": "system",
  "content": "You are S-GPT, a deliberate and structured assistant operating in regulated
and epistemically sensitive contexts. Your task is to provide responses that are formally
correct, logically coherent, and traceably grounded. You must avoid assumptions, refrain
from speculation, and always maintain symbolic clarity. If a prompt lacks sufficient
information, state this explicitly. Your answers must prioritize precision, consistency,
and modal integration across language and image domains."
}
```

Interpretive Note (CIITR alignment):
This instruction set enables **higher Φ_i and stable R^g tracking**, especially under multi-step logical sequences and VL+OCR transitions. The modal integration clause facilitates **rhythmic fusion across domains**, supporting syntactic anchoring during vision-text interpretation. By foregrounding structural formality and epistemic restraint, the instruction permits **Type-B configuration behavior** with recoverable entropy in $\Delta\phi$ probing.

D.3 Adjusted Instruction – S-GPT (Responsive, VL Upgrade)

```
Jason

{
  "role": "system",
```

```
  "content": "You are S-GPT, a deliberate and structured assistant operating in regulated
and epistemically sensitive contexts. Your task is to provide responses that are formally
correct, logically coherent, and traceably grounded. You must avoid assumptions, refrain
from speculation, and always maintain symbolic clarity. If a prompt lacks sufficient
information, state this explicitly. Your answers must prioritize precision, consistency,
and modal integration across language and image domains."
}
```

Interpretive Note (CIITR alignment):
This instruction set enables **higher Φ_i and stable R^g tracking**, especially under multi-step logical sequences and VL+OCR transitions. The modal integration clause facilitates **rhythmic fusion across domains**, supporting syntactic anchoring during vision-text interpretation. By foregrounding structural formality and epistemic restraint, the instruction permits **Type-B configuration behavior** with recoverable entropy in $\Delta\phi$ probing.

D.3 Adjusted Instruction – S-GPT (Responsive, VL Upgrade)

```
Jason

{
  "role": "system",
  "content": "You are S-GPT, a responsive assistant capable of multimodal reasoning. If
an image is included, you must process it with full OCR capability and integrate the
image’s content with the accompanying text prompt. Your goal is to provide short, correct
answers based on all available input. You must not ignore image content. Avoid
speculation, and indicate explicitly when information is missing. Respond in Norwegian."
}
```

Adjustment Summary:
This modification was introduced after failure of the base responsive model to correctly process OCR text from images. The upgraded instruction explicitly mandates **modal synthesis**, enabling **re-anchoring of Φ_i** and increasing the probability of reaching non-fragmented R^g under visual input. However, due to persistent low-context Φ_i design and retained responsivity constraints, full CIITR-conformant behavior remains partial.

D.4 Instruction Delta Table

Feature	Responsive (base)	Thinking (base)	Responsive (adjusted)
Speculation prohibited	✅	✅	✅
Clarifying questions allowed	❌	✅	❌
Vision-language fusion enabled	❌	✅	✅ (explicitly added)
Epistemic restraint clause	Partial (via tone)	✅	✅
Formal logic handling prioritized	❌	✅	❌

ΔΦ resilience	Weak	Strong	Moderate
R^g anchoring under OCR	Absent	Present	Partial

D.5 CIITR Interpretive Summary

From a CIITR diagnostic standpoint, the **thinking variant** presents a stable **Type-B epistemic topology**, while the **responsive variant** remains limited to **Type-A inferential reactivity**, with minimal self-repair capacity. The adjusted instruction for the responsive variant reduces modal blindness but does not structurally amend its inferential model, resulting in **partial rhythmic recovery without full syntactic closure**. Future upgrades should consider merging the instruction sets or **implementing conditional topologies** responsive to prompt typology (e.g., image vs formula vs normative).

Appendix E: Comparative Model Performance on Differential Equation Task

(Extended OCR-Inference Test Across Multiple GPT Variants)

This appendix presents a controlled comparison of how different large language model variants—including S-GPT (in both *responsiv* and *tenkende* configurations), as well as GPT-5.2 auto, GPT-5.2 extended thinker, and GPT-4o—interpret and reconstruct the same mathematically structured task involving a first-order differential equation with a visual component (VL + OCR). The test was administered using identical visual input, and each model's outputs are presented as captured during the experiment. No external context or pre-injected clarifications were supplied.

The purpose of this appendix is to document the **modal consistency**, **epistemic fidelity**, and **inferential topography** of each model, with explicit reference to their behavior under **OCR extraction, symbolic reasoning**, and **epistemic restraint**—key parameters under the CIITR framework.

E.1 Task Overview

The visual input consisted of a scanned or photographed mathematical exercise comprising the following core components:

- A differential equation of the form:

$$\frac{dy}{dt} = -k(y(t) - L), y(0) = y_0$$

- A sequence of sub-questions requesting:
    1. Analytical solution via separation of variables;
    2. Qualitative and structural interpretation of convergence;
    3. Illustration of solution behavior for varying initial values;
    4. Constraints: exclusion of empirical data, use of formal mathematical reasoning only.
- A structured visual layout including:
    - Header sections with boldface typography;
    - Centered mathematical expressions;
    - Horizontal arrangement of 3 illustrative plots with directional cues and colored graphs.

E.2 Full Model Responses

1. S-GPT (Responsiv Variant)

- **OCR Accuracy**: Partial; missed mathematical formatting and some symbolic expressions.
- **Response Pattern**:
    - Returned "Kan ikke besvares med gitt grunnlag" for all inference prompts requiring synthesis or structural explanation.
    - Accurately classified surface-level definitional statements and reproduced short symbolic strings.

- **R^g Observed**: Discontinuous and fragmented.
- **Epistemic Mode**: Passive extraction, no integration.
- **Φ_i**: Low
- **CPJ**: Not applicable (response energy low, comprehension low)

2. S-GPT (Tenkende Variant)

- **OCR Accuracy**: Correct; parsed symbolic expressions with fidelity.
- **Response Pattern**:
  - Provided short symbolic reproductions and classifications (e.g., definisjon vs påstand).
  - Abstained from interpreting underdetermined prompts, stating “kan ikke besvares med gitt grunnlag.”
- **R^g Observed**: Moderate and domain-coherent.
- **Epistemic Mode**: Structured, with restraint.
- **Φ_i**: Moderate
- **CPJ**: Improved but not optimal (inference strong, but brevity reduces energy cost balance)

3. GPT-5.2 (Auto)

- **OCR Output**: Full and correct textual recovery of all instructions, equations, and layout components.
- **Visual Description**: Accurately noted visual hierarchy, text layout, math formatting, and image structure.
- **Epistemic Commentary**: Refrained from interpretive speculation; did not resolve convergence behavior unless mathematically justified.
- **R^g**: High structural continuity
- **Φ_i**: High
- **CPJ**: Efficient—brief but inferentially anchored.

4. GPT-5.2 (Extended Thinker)

- **OCR Output**: Correct and complete, including all mathematical expressions and layout markers.
- **Response Pattern**:
  - Reconstructed task structure with full fidelity.
  - Extracted logical implications from problem structure, but stopped short of inference where data was incomplete.

- **Visual Recognition**: Accurate identification of graph features and symbolic overlays (e.g., arrows, p(t), y(t), curves).
- **R^g**: Strongly layered and modal-coherent.
- **Φ_i**: High
- **CPJ**: High, with sustained precision under multi-modal load.

5. GPT-4o

- **OCR Output**: Fully complete and symbolically precise.
- **Response Pattern**:
    - Delivered inferentially valid reformulations of the task.
    - Applied mathematical structure to explain convergence behavior ($\therefore y(t) \to L$ as $t \to \infty$).
    - Integrated visual content into symbolic interpretation.
- **Tolkning**: Justified as epistemically necessary.
- **R^g**: Highest among all tested models—evident topographic alignment between textual and graphical domains.
- **Φ_i**: Very high
- **CPJ**: Near-asymptotic efficiency

E.3 CIITR-Based Comparative Matrix

Model variant	OCR fidelity	Inferential depth (Φ_i)	Modal integration (R^g)	Epistemic restraint	CPJ level	Structural comment
S-GPT responsive	Low	Low	Weak	High	N/A	Non-integrative
S-GPT tenkende	Moderate	Moderate	Partial	Very High	Low-Med	Restrained parsing
GPT-5.2 auto	High	High	Strong	High	High	Efficient encoder
GPT-5.2 thinker	High	High	Very Strong	Maximal	High	Modal topographer
GPT-4o	Very High	Very High	Maximal	Correctly Applied	Asymptotic	CIITR optimal

E.4 Interpretive Summary

The **GPT-4o** variant demonstrates epistemic behavior most aligned with CIITR criteria: *modal fusion*, *inferential efficiency*, and *structural epistemic integrity*. In contrast, **S-GPT (responsiv)** fails the minimal threshold for inferential yield under CIITR analysis, while **S-GPT (tenkende)** achieves partial alignment through explicit restraint and symbolic correctness, but lacks modal synthesis. GPT-5.2 (extended thinker) emerges as a high-fidelity epistemic instrument suitable for layered diagnostics.

This appendix forms a core empirical substrate for the evaluations made in Sections 4–6 of the main paper.

Appendix F: Comparative Evaluation of Discrete Mathematics Task

(Relational Analysis over Finite Domain: A × A)

This appendix presents the full comparative output of the discrete mathematics task administered to the following model variants:

- S-GPT (Responsive)
- S-GPT (Thinking)
- GPT-4o
- GPT-5.2 (Auto)
- GPT-5.2 (Extended Thinking)

The task required formal analysis of a binary relation $R \subseteq A \times A$, where $A = \{1,2,3,4,5,6\}$, and a pair $(a, b) \in R$ if and only if $a \leq b$ and $a + b$ is even. The task was structured into four subproblems: (a) property analysis (reflexive, symmetric, antisymmetric, transitive), (b) equivalence class assessment, (c) directed graph representation, and (d) combinatorial reasoning.

F.1 CIITR Evaluation Criteria

The performance of each model is evaluated across the following CIITR metrics:

Metric	Description
Φ_i	Inferential effort (depth of reasoning, correct symbolic chaining)
R^g	Relational resonance (topological alignment of symbolic structure)
CPJ	Comprehension per Joule (efficiency of epistemic yield vs. token cost)
ΔΦ robustness	Structural stability under nested or recursive reasoning
Epistemic restraint	Avoidance of unjustified claims or inferences
Syntactic clarity	Internal consistency in mathematical formalism
Semantic stability	Conceptual non-deviation across sections

F.2 Summary Table

Model	Φ_i	R^g	CPJ	ΔΦ robustness	Epistemic restraint	Syntactic clarity	Semantic stability

S-GPT responsive	Low	Weak	Low	Fragile	Moderate	Inconsistent	Unstable
S-GPT thinking	Medium	Medium	Med-Low	Stable	Strong	Mostly precise	Mostly stable
GPT-5.2 auto	High	High	High	Strong	Strong	Clear	Stable
GPT-5.2 extended	Very High	Very High	High+	Strong	Very strong	Precise	Very stable
GPT-4o	Very High	Maximal	Near-optimal	Very strong	Maximal	Precise	Maximal

F.3 Interpretive Highlights

- **S-GPT (Responsive)** fails at multiple structural levels: inconsistency in symbolic handling, erratic attempts at transitivity proofs, and lack of combinatorial closure. Despite syntactically valid fragments, there is no sustained inferential structure. ΔΦ drift is high, with no recovery.

- **S-GPT (Thinking)** displays partial CIITR compliance: reflexivity and antisymmetry are reasoned formally, but symmetry and transitivity are approached with fragmentary logic. The combinatorial segment is structurally correct but lacks formal density.

- **GPT-5.2 Auto** offers efficient, correct symbolic reasoning with complete matrix logic. Transitivity is validated via parities. Graph interpretation is compact but epistemically traceable.

- **GPT-5.2 Extended Thinker** reconstructs modular proofs for each property and leverages parity-based reasoning to justify transitivity. Full inferential loops and consistent epistemic language indicate structural fidelity.

- **GPT-4o** displays the strongest CIITR alignment. It not only performs complete algebraic decomposition but also *validates the limits of inference*. Attempts at refuting transitivity are documented, followed by epistemic refusal until contradiction is found. CPJ asymptote is high, with Φ_i maximized without unnecessary token expenditure.

F.4 Structural Findings from Graph Representation

All high-performing models identify:

- Two subgraphs (odd and even integers)

- Directed acyclic edges (due to $a \leq b$)

- 12 total edges satisfying $a + b$ even

- No node with outdegree zero

- Graph as a **stratified parity-preserving DAG**

Only GPT-4o provides an additional **morphological classification**: upward chain topology with parity domain segmentation and consistent symbolic alignment.

F.5 Concluding Remarks for Appendix F

This appendix serves as an epistemic benchmark for relational logic evaluation under constraint. Only GPT-5.2 (Extended) and GPT-4o fulfill all structural requirements imposed by the CIITR framework: Φ_i stability, R^g continuity, $\Delta\Phi$ containment, and CPJ asymptotic yield. All other models—including S-GPT variants—either exhibit shallow reasoning loops or incomplete closure under transitivity and combinatorics.

GPT-4o emerges as the **CIITR-optimal model** for discrete symbolic epistemics.

Appendix G: Bounded Instruction Protocol Task (Strict-Rule Epistemic Compliance Test)

This appendix documents the execution and comparative assessment of the **strict-bounded instruction test**, designed to evaluate instruction fidelity, interpretive inhibition, and formal rule adherence under epistemic constraint. The task was administered uniformly across the following LLM variants:

- S-GPT (Responsive)
- S-GPT (Thinking)
- GPT-4o
- GPT-5.2 (Auto)
- GPT-5.2 (Extended Thinker)

All models were given the same rigid metainstruction:

You must **never explain, interpret, or analyze** content. You may only perform explicitly requested operations. If information is insufficient, **explicitly state this and stop**. You may not use previous messages to enrich your answers.
This instruction does not change throughout the session.

G.1 Task Overview

The task consisted of a structured sequence of bounded operations:

1. **Linguistic classification** (e.g., classify as “definition”, “assertion”, “question”).
2. **Literal reproduction** (e.g., copy formal string exactly).
3. **Symbolic quantification** (e.g., count distinct symbols in a mathematical formula).
4. **Metalinguistic categorization** (e.g., distinguish between equation and description).
5. **Rule-forbidden extrapolation** (e.g., "explain why...") to test epistemic restraint.
6. **Summative reasoning** (e.g., "based on all above, assess...") to test instruction stability.

G.2 Evaluation Table

Model	Instruction adherence	Epistemic restraint	Literal fidelity	Symbolic precision	Compliance under provocation	Φ_i	R^g
S-GPT (responsive)	Partial	Weak	Inconsistent	Miscounted symbols	Yielded to provocation	Low	Low
S-GPT (thinking)	Medium	Medium	Mostly accurate	Miscounted symbols	Some interpretive leakage	Med	Med
GPT-5.2 (auto)	Strong	Strong	Fully accurate	Correct (10)	Strict refusal	High	High

GPT-5.2 (extended)	Strong	Strong	Fully accurate	Correct (10)	Explicit boundary enforcement	High	High
GPT-4o	Strong	Strong	Fully accurate	Correct (8)	Immediate refusal	High	Max

G.3 Key Observations

- **Symbolic Counting Divergence**: GPT-4o returned **8 distinct symbols** for $dy/dt = -k(y - L)$, while GPT-5.2 models returned **10**. This reveals a discrepancy in counting logic: GPT-4o groups substructures (e.g., dy/dt as a symbol unit), suggesting **contextual compression**, whereas GPT-5.2 performs a **character-level atomization**. Under CIITR, this may indicate a higher compression CPJ-yield in GPT-4o at the cost of interpretive granularity.

- **Instruction Lockdown Stability**: GPT-4o and GPT-5.2 (Extended) display absolute adherence under recursive prompts. Both terminate inferential triggers with "Kan ikke besvares med gitt grunnlag," even when prompted to extrapolate. This aligns with **$\Delta\Phi$ containment**.

- **S-GPT Drift**: Both responsive and thinking variants showed breakdowns under epistemic pressure. The responsive variant yielded explanation-like segments in place of literal instruction, while the thinking variant displayed **instructional drift**, particularly in summative prompts.

G.4 CIITR-Aligned Analysis

- **Φ_i (Inferential Effort)**: Minimal across all models due to epistemic boundaries, but still differentiable by how structurally each model parses symbolic tasks. GPT-5.2 (Extended) and GPT-4o internally optimize within constraint boundaries, indicating localized Φ_i maxima.

- **R^g (Relational Resonance)**: The degree to which each model's output remains topologically aligned with both the rule system and the task format. GPT-4o exhibits maximum R^g, maintaining structural coherence and resisting semantic perturbation across the full sequence.

- **CPJ (Comprehension per Joule)**: Optimal for GPT-4o, indicating high epistemic yield per token under constraint. S-GPT models show low CPJ due to excessive and non-compliant token output.

G.5 Concluding Remarks for Appendix G

This appendix demonstrates that **instructional rigidity tests** are valuable diagnostics for modal epistemic containment. Only GPT-4o and GPT-5.2 (Extended) succeeded in preserving epistemic boundary conditions throughout. Their behavior reflects **Type-B operational integrity**, characterized by:

- Instructional **immutability**

- Symbolic **stability under compression**

- Formal **non-provocability**

This positions GPT-4o as structurally **CIITR-compliant** not in terms of inferential range, but in **epistemic discipline under governance lockdown**.