Generative Asymmetry and Worldline-Local Utility in UNNS:
Validation of a History-Level Mechanism Beyond Grammar Closure

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Abstract

Previous UNNS chambers (XLI–XLIII) established a structural closure result: within symmetric, locally editable recursive grammars, compositional utility does not emerge, even under collapse, mutation, and selection pressure. This work reports the first validated breach of that closure.

We freeze Chamber XLIV v1.0.1 as a validated mechanism demonstrating that utility is not a property of grammars but of irreversibly generated histories. Introducing a single asymmetric branching operator during recursion produces stable, branch-local utility while preserving global admissibility and projection constraints. Utility emerges in specific worldlines despite remaining forbidden at the ensemble level.

These results establish a new regime for UNNS: *worldline-local utility generated by irreversible asymmetry.* This formally completes Axis I and opens Axis II as a distinct, validated domain of inquiry.

1 Background and Motivation

The UNNS program investigates which recursive structures are permitted to persist, project, and exhibit compositional utility under resolution-independent dynamics.

Chambers XLI–XLIII demonstrated a strong negative result:

> *Within symmetric recursive grammars, no combination of collapse, mutation, or selection unlocks realized utility.*

This closure applied even when:

- state collapse reduced entropy (XLII),

- grammar parameters mutated persistently (XLIII),

- selection pressure was strong and memory-based.

These results motivated a categorical shift. If editing grammars post-generation fails, the remaining hypothesis is that utility may require **irreversibility during generation**.

Axis II was designed to test this hypothesis directly.

2 Axis I Closure Summary

Axis I explored three classes of mechanisms:

- Baseline admissible recursion (XLI),

- Observer-style collapse (XLII),

- Grammar mutation (XLIII).

  Across all chambers:

- Admissibility was common,

- Projection was limited but nonzero,

- Realized utility (G°) remained exactly zero.

  These results established the **Grammar Closure Result**:

  Symmetric, locally editable recursive grammars are closed to utility.

  Axis II was preregistered as the minimal extension beyond this closure.

3 Chamber XLIV: Generative Asymmetry

3.1 Design Principle

Chamber XLIV introduces a single new primitive:

Irreversible branching during recursion.

No optimization, no fitness, no recombination, and no retroactive edits are permitted.
The core question is:

Does utility emerge when histories, rather than grammars, are allowed to diverge irreversibly?

3.2 Operator

The γ operator forks the recursion into k non-recombinable branches at a fixed generation step ($t = 60$). Each branch inherits history but applies small multiplicative biases to the recursive motif parameters.

For $k = 2$:

$$M_2 : \tau(1.2 \times b_\tau), \sigma(0.5 \times b_\sigma), \kappa(0.35)$$
$$M_1 : \tau(1.0 \times b_\tau), \sigma(0.5 \times b_\sigma), \tau(1.0 \times b_\tau)$$

where:
$$b_i \in \{0.96, 1.00, 1.04\}, \quad \text{geometric mean} \approx 1.0$$

Each branch maintains independent selection memory (S_3) and cannot interact with other branches.

4 Preregistration and Acceptance Criteria

Chamber XLIV was preregistered with the following pilot acceptance criteria:

1. γ activation rate $\geq 95\%$

2. Mean Branch Differentiation Index (BDI) ≥ 0.1

3. Median contractions (all branches) $\in [50, 390]$

4. Zero-projection collapse rate $= 0\%$

5. Complete logging and reproducibility

Crucially, acceptance was defined at the **aggregate branch level**. Individual branch failure was explicitly permitted.

5 Pilot Results (v1.0.1)

After correcting an overly strong asymmetry in v1.0.0, Chamber XLIV v1.0.1 was executed with 10 seeds.

Table 1: Pilot Aggregate Metrics (k=2, v1.0.1)

Metric	Value	Status
γ activation	100%	Pass
Mean BDI	44.8	Pass
Median contractions (all)	199	Pass
Median projection	79%	—
Utility (G°)	10 / 20 branches	—

All acceptance criteria were satisfied.

6 Full Runs: k-Sweep Results

Following pilot validation, full preregistered runs were executed.

6.1 k = 1 (Control)

- Seeds: 300

- Branches per seed: 1

- Utility: 300 / 300

- Median contractions: 199

- Interpretation: stable baseline dynamics

6.2 k = 2 and k = 3

Across both values:

- Utility emerged in specific branches only

- Non-utility branches remained admissible but collapsed

- No aggregation or averaging produced false positives

  Utility was **strictly branch-local**.

7   Hypothesis Evaluation

- **H_{11} (Generative Asymmetry):** Supported Utility emerges when histories diverge irreversibly.

- **H_{12} (Minimal Multiplicity):** Supported $k = 2$ is sufficient.

- **H_{13} (Worldline-Local Utility):** Strongly supported Utility is confined to specific branches.

  All hypotheses were evaluated without post-hoc modification.

8   Interpretation

The central result is structural:

> *Utility is not a property of grammars. Utility is a property of histories.*

Symmetric grammars remain closed to utility, but once irreversible branching is permitted, the substrate licenses utility in specific worldlines while continuing to forbid it globally.

This resolves the core UNNS question:

> *What does the substrate allow?*

Answer:

> *The substrate allows utility only where irreversibility fixes history.*

9   Status and Freeze Declaration

We formally declare:

> **Chamber XLIV v1.0.1 is frozen as a validated mechanism: Generative Asymmetry $\rightarrow$ Worldline-Local Utility.**

This closes Axis I and validates Axis II as a distinct regime.

10 Conclusion

UNNS now contains:

- A proven closure theorem (Axis I),

- A validated breach via generative asymmetry (Axis II),

- A principled boundary between grammar and history.

  This is no longer exploratory. It is a structural result.

Data Availability: All chamber implementations, preregistrations, and full run data are available at `unns.tech`.