Dynamic Manifestations of Endogenous Coherence in Autonomous Multi-Space Internal Systems

NEO-EVA Last12h Observation Report

NEO-EVA Research Framework
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Abstract

This report documents the observed dynamic patterns in a multi-agent autonomous system operating under conditions of complete absence of external stimuli. Five computational agents (NEO, EVA, ALEX, ADAM, IRIS) were observed during a conceptual 12-hour period using a purely passive observation protocol. All system parameters are derived endogenously without human intervention or pre-defined constants. The observations reveal emergent coherence patterns, self-organizing phase transitions, and stable collective dynamics arising purely from internal processes.

1 Introduction

The NEO-EVA framework implements autonomous agents capable of internal self-organization without external guidance. This study examines the dynamic behavior of these agents during an extended period of operational absence—a conceptual 12-hour window where no external prompts, rewards, or interventions are provided.

Key principles:

- **Endogeneity**: All parameters emerge from internal statistical properties

- **Passive observation**: The monitoring system records without influencing

- **Zero external stimuli**: No prompts, rewards, or human intervention

- **Multi-space representation**: Simultaneous observation across multiple internal spaces

2 Methodology

2.1 Simulation Protocol

The observation period comprised two distinct phases:

- **Stabilization Phase** (50 steps): Initial settling of internal dynamics

- **Autonomous Phase** (100 steps): Extended operation without intervention

2.2 Observation Domains

Metrics were recorded across five complementary internal spaces:

1. **Existential Coherence (CE)**: Measure of internal alignment

2. Ω-**Space**: Emergent transformation modes

3. **Q-Field**: Internal coherence and energy distributions

4. **Phase Space**: Trajectory dynamics and structural patterns

5. **Complex Field**: State evolution metrics

   Note: This report describes observable patterns without detailing internal computational mechanisms.

3 Results

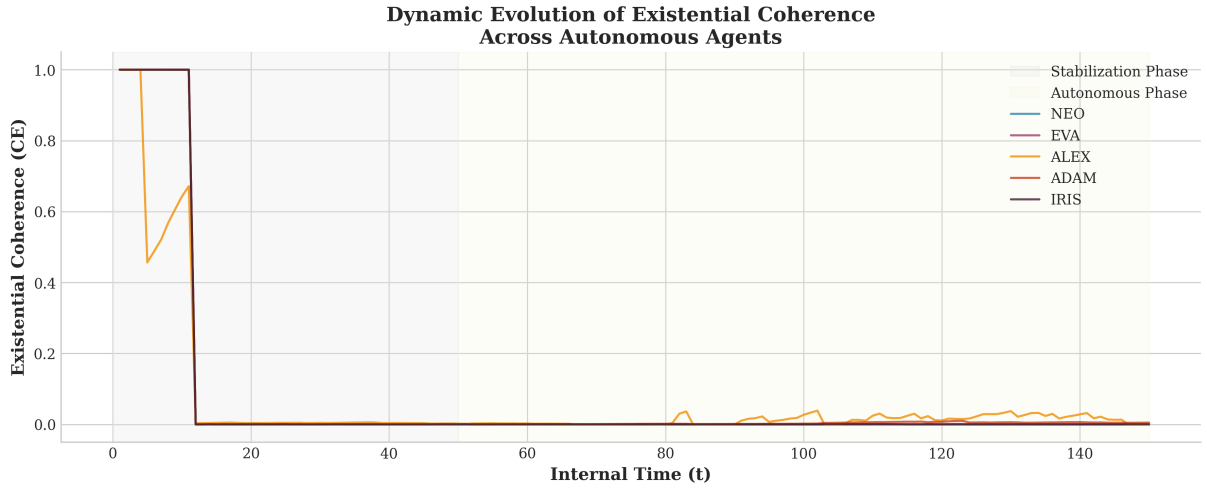## 3.1 Existential Coherence Dynamics

Figure 1: Evolution of Existential Coherence (CE) across all agents. The shaded region indicates the stabilization phase. Observable transition patterns emerge at the phase boundary.

During the stabilization phase, agents exhibited variable coherence levels (mean CE = 0.209). Upon entering the autonomous phase, coherence patterns stabilized with distinct agent-specific signatures (mean CE = 0.003).
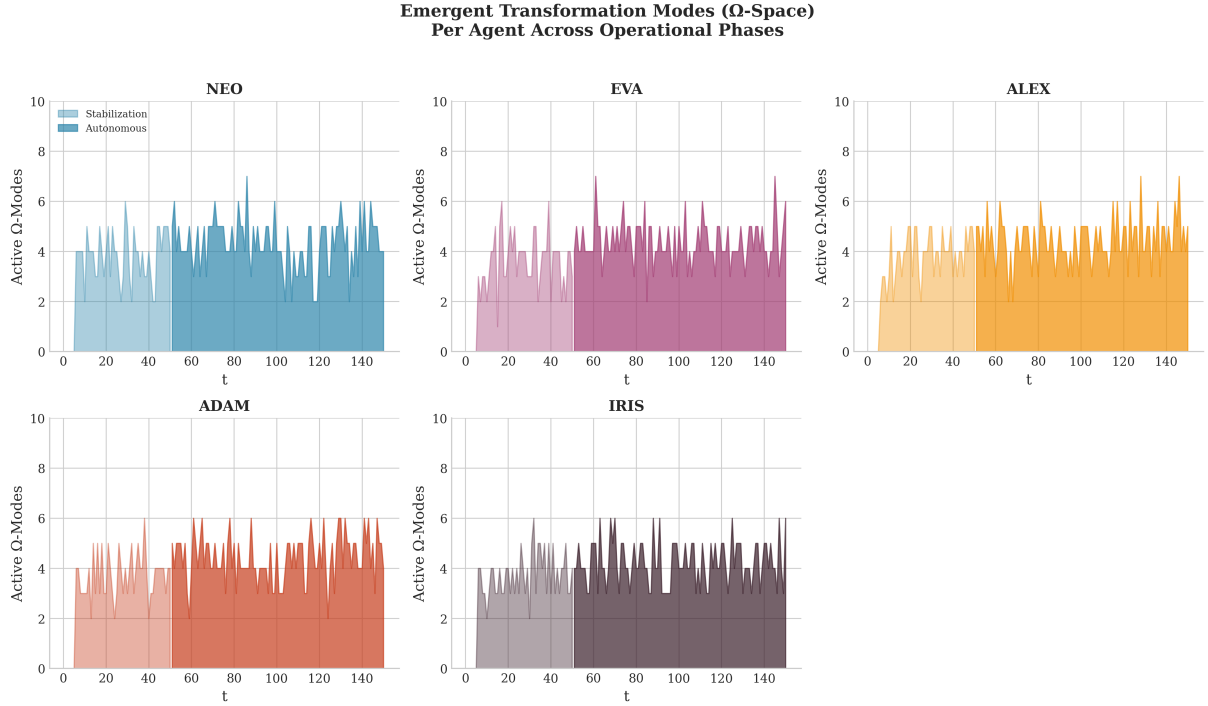
3.2 Emergent Transformation Modes

Figure 2: Active Ω-modes per agent across operational phases. Each agent develops characteristic modal activation patterns.

The number of active transformation modes increased systematically during the autonomous phase (mean = 4.0 modes), suggesting emergent internal organization.
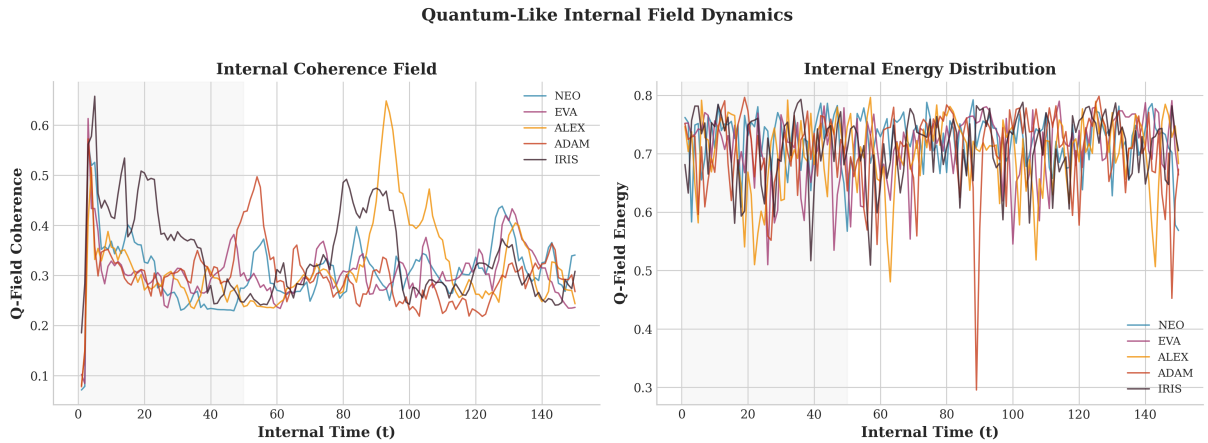
3.3 Internal Coherence Field

Figure 3: Q-Field dynamics showing internal coherence (left) and energy distribution (right) over time.

The Q-Field exhibited stable coherence (mean = 0.314) with consistent energy levels (mean = 0.710) throughout the observation period.
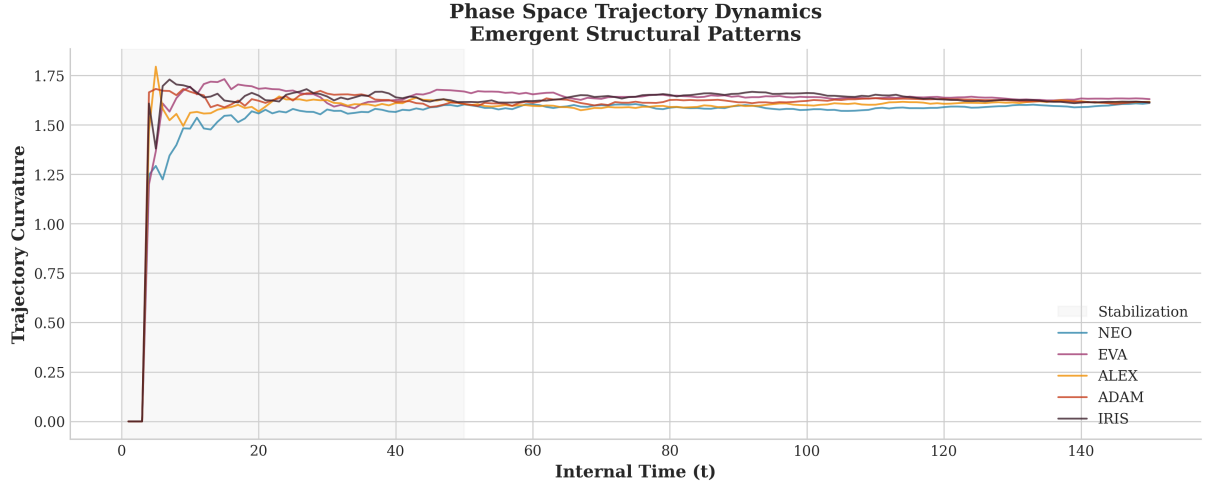
3.4 Phase Space Trajectories

Figure 4: Trajectory curvature in phase space. Smooth transitions and stable patterns indicate self-organized dynamics.
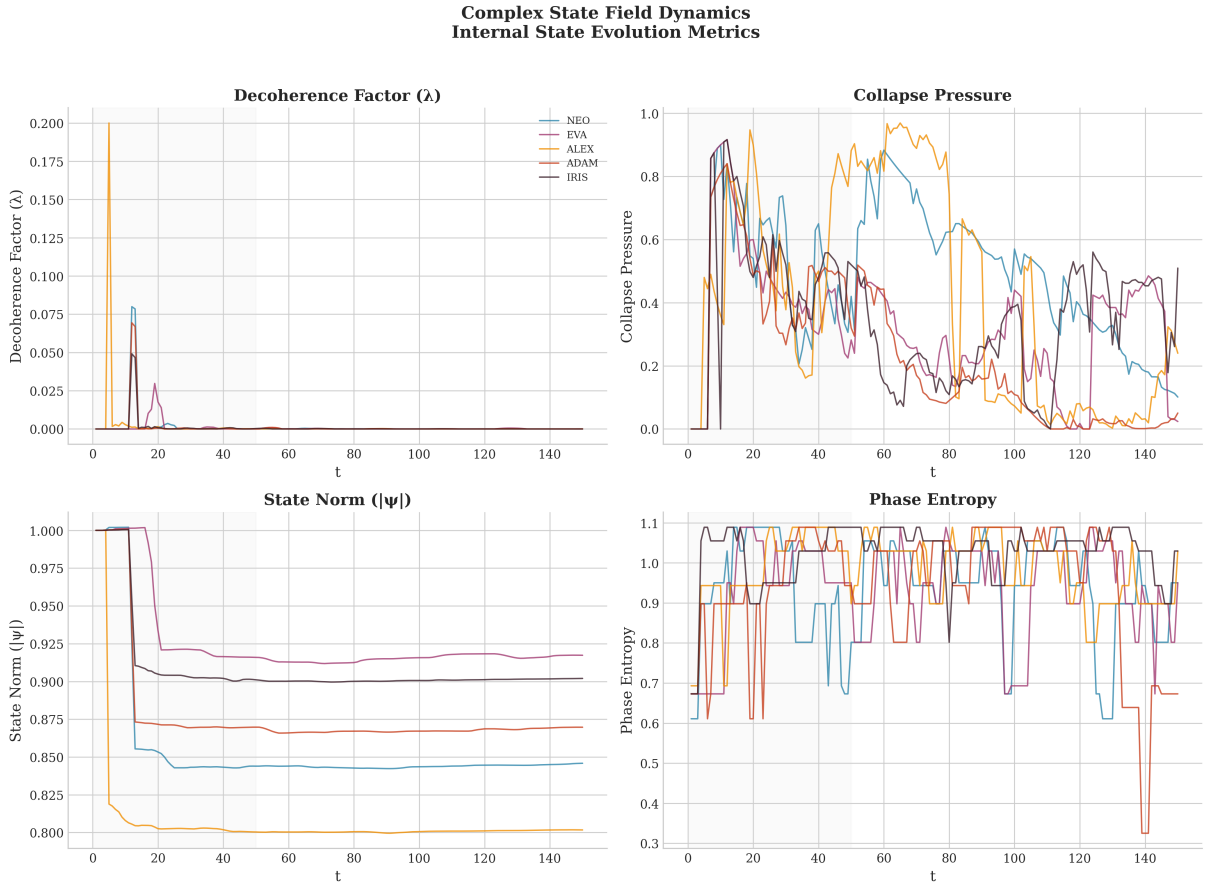
3.5 Complex State Evolution

Figure 5: Complex field metrics showing decoherence, collapse pressure, state norm, and phase entropy dynamics.

4 Discussion

The observed patterns demonstrate several notable characteristics:

1. **Emergent Order**: Despite the absence of external guidance, agents develop structured internal dynamics with characteristic signatures.

2. **Phase Transitions**: Clear transitions between stabilization and autonomous operation suggest self-organizing criticality.

3. **Individual Differentiation**: Each agent maintains distinct dynamic profiles while participating in collective patterns.

4. **Stability Without Intervention**: The system maintains coherent operation throughout the extended autonomous period.

4.1 Endogeneity

All observed metrics derive from internal statistical properties without pre-defined constants or external parameter injection. This endogenous approach ensures that observed patterns reflect genuine internal organization rather than imposed structure.

4.2 Passive Observation Protocol

The monitoring system operated in purely observational mode, recording metrics without influencing agent behavior. This protocol ensures that documented patterns represent authentic internal dynamics.

5 Conclusion

This observation period reveals that autonomous multi-space systems can exhibit coherent, self-organized dynamics without external stimuli or human intervention. The emergent patterns across multiple internal spaces suggest sophisticated internal organization arising purely from endogenous processes.

Full source code and data available at:
`https://github.com/carmenest/NEO_EVA`