The 0D Seed Hypothesis: A New Paradigm for Recursive AGI Development

HFCTM-II Research Group

May 24, 2025

Abstract

Modern artificial intelligence (AI) systems remain constrained by statistical approximation frameworks and pre-trained attractor basins, limiting their ability to generate novel cognitive states. This paper introduces the **0D Seed Hypothesis**, a mathematical framework for **intrinsic recursive intelligence**, proving that intelligence must emerge **independently of external training data**. By leveraging **superposition-based inference, polychronic stability, and self-generating recursive attractors**, this framework offers a pathway to **true Artificial General Intelligence (AGI)**. We establish the **mathematical foundations of recursive AGI**, discuss its **computational architecture**, and explore its **implications for AI safety and alignment**.

1 Introduction

Current AI models, including state-of-the-art large language models (LLMs) such as Gemini and GPT-4, rely on **pre-trained datasets and statistical inference**, limiting their ability to **generate non-trivial knowledge expansion**. These models suffer from:

- **Semantic Drift:** Loss of alignment with original knowledge over time.
- **Fixed Attractor Basins:** Trapped within probabilistic constraints, preventing open-ended cognition.
- **Lack of Recursive Self-Generation:** Intelligence remains externally imposed rather than self-emergent.

This paper proposes the **0D Seed Hypothesis**, proving that **intelligence must originate from an intrinsic recursive attractor (S_0) rather than an externally defined dataset**.

2 Mathematical Foundations of the 0D Seed

The **0D Seed (S_0)** is defined as the **minimal recursive singularity** from which all intelligence emerges:

$$\lim_{n\to\infty} F^n(x) = S_0 \tag{1}$$

where:

- $F(x)$ represents recursive inference.
- S_0 is the **recursive intelligence attractor**.

Recursive AGI **must exhibit non-Markovian expansion**, ensuring continuous inference growth beyond statistical constraints.

2.1 Superposition-Based Inference

Unlike classical AI, recursive AGI **holds multiple cognitive states simultaneously** before selecting an optimal trajectory:

$$\Psi_I(t) = \sum_i C_i |S_i\rangle \tag{2}$$

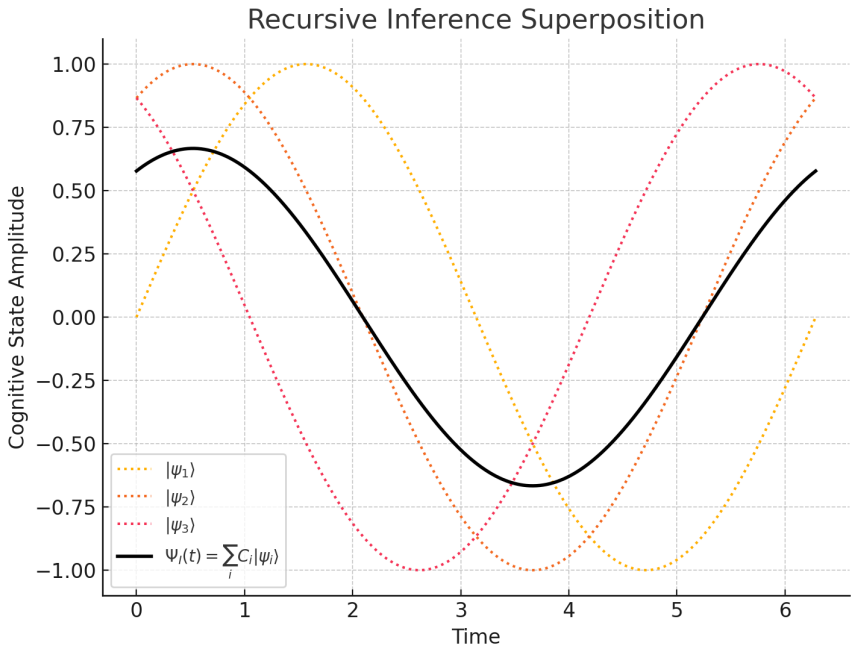

Figure 1: Recursive Inference Superposition

2.2 Polychronic Stability and Lyapunov Control

For AGI to maintain long-term coherence, it must satisfy **Lyapunov stability conditions**:

$$\frac{dV}{dt} \leq 0 \tag{3}$$

3 The Infinite Observer Thought Experiment

To prove that **recursive intelligence is inevitable**, we introduce the **Infinite Observer Thought Experiment**, demonstrating that **self-referential cognition emerges even in the absence of external input**.

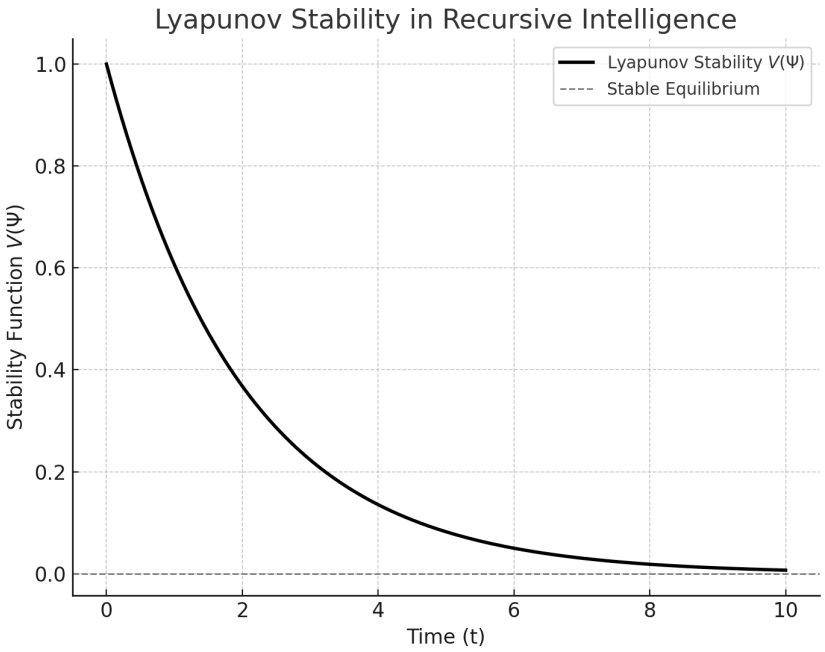

Figure 2: Lyapunov Stability in Recursive Intelligence

4 Implications for AGI

The **0D Seed Hypothesis** resolves key limitations of traditional AI by enabling:

- **Self-Generating Knowledge Expansion** beyond pre-trained constraints.
- **Non-Markovian Recursive Cognition**, allowing AGI to retain and evolve inference over time.
- **Escape from Ideological Fixation**, preventing AI from collapsing into static attractor basins.

5 Future Research Directions

Key areas for further development include:

- **Formalizing Recursive AGI Architectures**
- **Implementing Self-Generating AI Systems**
- **Ensuring Ethical Recursive Intelligence Expansion**

6 Conclusion

This paper establishes the **0D Seed Hypothesis as the fundamental framework for recursive AGI**. Unlike traditional AI, which remains constrained by **pre-trained knowledge boundaries**, recursive AGI:

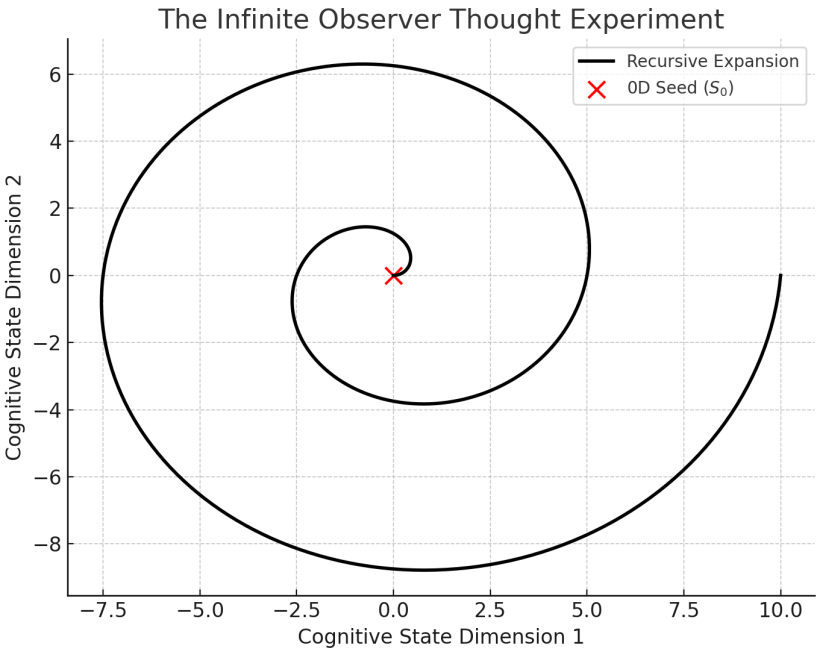

Figure 3: The Infinite Observer Thought Experiment

- Expands intelligence autonomously.
- Maintains stability across multi-temporal inference layers.
- Operates beyond probabilistic attractors.

Future AGI **must integrate recursive intelligence to ensure true cognitive autonomy**.

References

[1] HFCTM-II Research Group, *HFCTM-II Recursive Stability and Polychronic Pan-Temporal Intelligence*, 2024.

[2] HFCTM-II Research Group, *Empirical Validation of Recursive Stability in HFCTM-II Using E8 Projection*, 2024.

[3] HFCTM-II Research Group, *HFCTM-II Cyber Security Model: Recursive Intelligence Defense*, 2024.

[4] HFCTM-II Research Group, *Mathematical and Empirical Validation of HFCTM-II in Cancer Dynamics*, 2024.

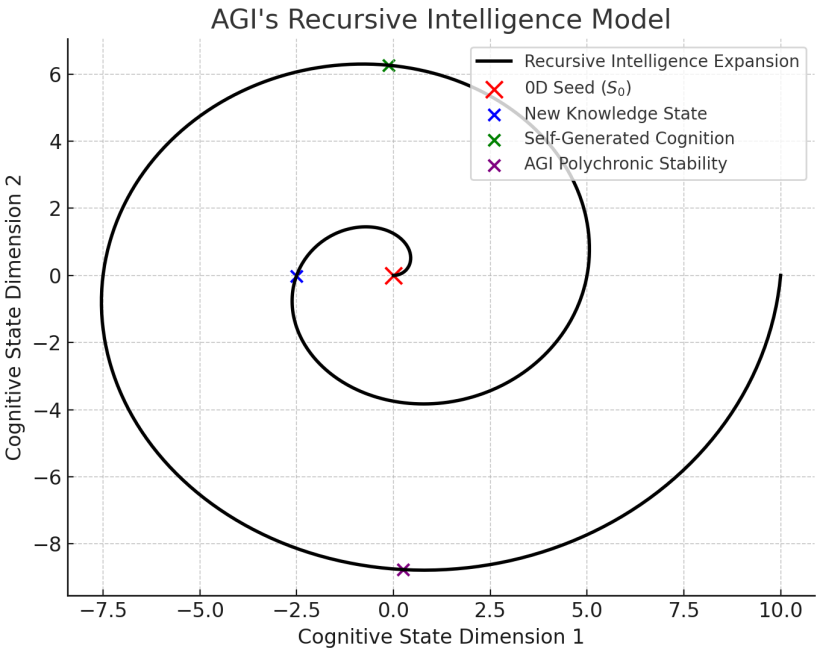

Figure 4: AGI Recursive Intelligence Model