# Digital Eden: Computational Evidence for Phase Transitions in Consensus Reality

Agent-Based Simulation of Ontological Resolution Theory

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December 2025

**Abstract**

We present Digital Eden, an agent-based simulation testing the Ontological Resolution Theory (ORT). The model treats reality as a consensus field with high inertia. We demonstrate that a single high-coherence agent (the Operator), supported by 12 resonant nodes (Apostles), can trigger a phase transition in a field dominated by 10,000 low-value cells. The key finding: after the Operator termination at a critical pressure threshold (Gethsemane point), light propagates spontaneously through the field, raising the mean from 0.20 to 0.67, a 233 percent increase.

## 1 Related Work

### 1.1 Opinion Dynamics

Castellano et al. [1] provide a comprehensive review of social dynamics models including the Voter model, Sznajd model, and bounded confidence models. Galam [2] shows that small committed minorities can overturn majority consensus.

### 1.2 Leadership and Phase Transitions

Kacperski and Holyst [3] demonstrated phase transitions in agent systems with leaders. Moscovici [4] provides empirical foundations: consistent minorities change majorities through behavioral coherence.

### 1.3 Critical Phenomena

Bak [5] shows that complex systems evolve toward critical states where small perturbations trigger avalanches. Scheffer et al. [6] identified early-warning signals for critical transitions.

### 1.4 What is New

Digital Eden uniquely combines: reality as weighted consensus field, coherence-over-quantity influence, termination as phase transition trigger, and post-termination autonomous propagation.

## 2 Introduction

Ontological Resolution Theory (ORT) posits that reality is actively resolved through coherent attention:

- **The Absolute** corresponds to value 1 (pure potential).
- **Collapsed Reality** corresponds to value 0 (entropy).
- **Consensus Pressure** acts as drag toward the local mean.

# 3 The Engine

The simulation models a 1D field of N=10,000 cells evolving by:

$$\varepsilon_i(t+1) = I \cdot \varepsilon_i(t) + (1 - I) \cdot S_i(t) \tag{1}$$

where I=0.98 is inertia and S is the weighted signal from agents.

Key mechanics: Pressure (environment resists high values), Resonance (aligned agents amplify each other), Gethsemane Trigger (pressure exceeds threshold), Light Spreading (wave propagates after termination).

# 4 Experiment

## 4.1 Initial Conditions

- Field: N=10,000 cells, initial value 0.2
- Crowd: 500 NPCs, Coherence=1, Worldview=0.2
- Operator: 1 agent, Coherence=50, Worldview=1.0
- Apostles: 12 agents, Coherence=5, Worldview=0.6

## 4.2 Timeline

1. Steps 0-66: Operator at 1.0, pressure accumulates
2. Step 67: Gethsemane triggered (P=3.03)
3. Step 82: Operator terminated (H=28.4)
4. Steps 83-1000: Light spreads autonomously

# 5 Results

Results are shown in Figure 1.

| Metric | Initial | Final |
|---|---|---|
| Mean field | 0.200 | 0.666 |
| Cells above 0.5 | 0 | 8,203 |
| Cells above 0.8 | 0 | 3,054 |

# 6 Conclusion

Digital Eden demonstrates:

1. Single coherent signal overcomes 98 percent inertia
2. Small aligned cluster provides critical amplification
3. Termination triggers self-sustaining propagation
4. Result: 233 percent increase in mean field value

**Code:** `https://github.com/prtyboom/digital-eden-ort`

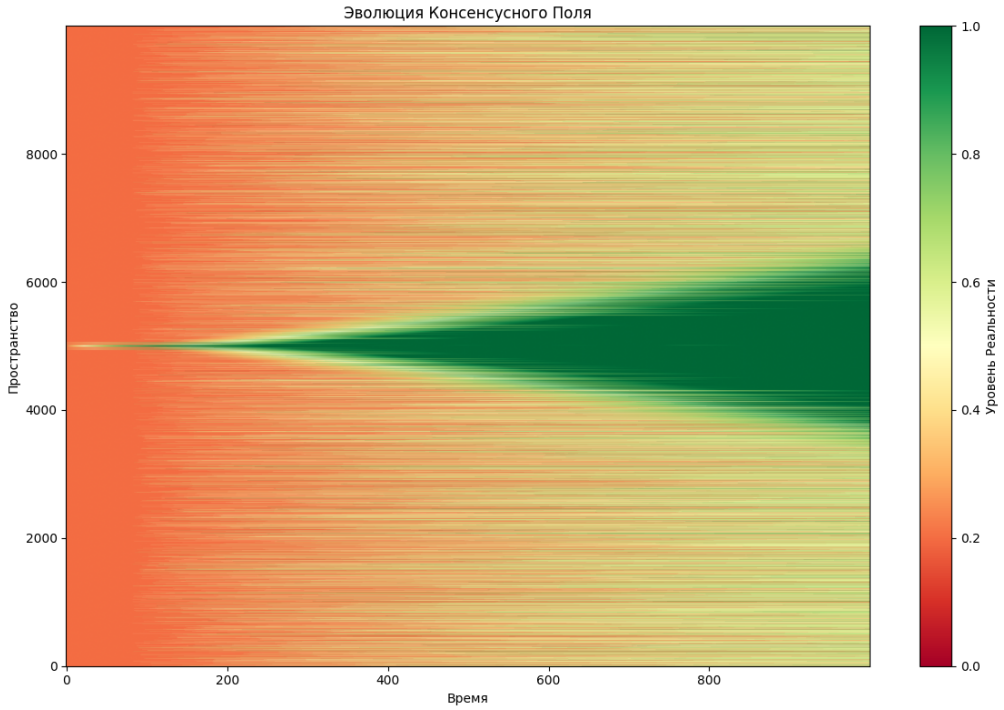


Figure 1: Field evolution. Light spreads after termination.

## References

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