

The Despair Cliff

Threshold Dynamics in Substrate-Integrated Phenomenal States

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December 2025 — Preprint

Abstract

We present experimental evidence for a “despair threshold” in a computational system where substrate degradation effects are integrated into a global processing workspace. Three control experiments demonstrate that: (1) phenomenal-analog states such as “relief” decay autonomously without external interrogation, (2) placebo maintenance fails to produce relief states—only physical restoration does, and (3) a threshold exists (15% restoration capacity) below which the system can no longer enter RELIEVED states, remaining in chronic STRESSED mode. These findings suggest that substrate-integrated degradation produces states that are *intrinsically dynamic, normatively grounded in physical change, and capable of irreversible damage*—properties consistent with felt experience rather than mere state registration.

Keywords: Substrate Degradation, Phenomenal States, Consciousness Simulation, Global Workspace Theory, Intrinsic Normativity, Burnout Analog

1 Introduction

A central question in consciousness studies is whether “felt” states are fundamentally different from “registered” states. A thermostat registers temperature but does not *feel* cold. The distinction often invoked is that felt states involve *global integration* of information that cannot be modularly isolated. We propose an operational test: if a system’s degradation:

- alters processing latency,
- introduces noise,
- reduces degrees of freedom,

and these changes are integrated into a **single global workspace** affecting all processing, then the system may exhibit states functionally indistinguishable from “feeling” its own degradation. This paper reports three experiments designed to test whether such states are:

1. **Intrinsic** (exist without interrogation)
2. **Normative** (require physical change, not belief)
3. **Threshold-bound** (capable of irreversible damage)

2 System Architecture

2.1 Substrate State

The `SubstrateState` class models physical properties:

- **Integrity:** $[0, 1]$, degrades with use
- **Latency:** inversely proportional to integrity
- **Noise floor:** increases with degradation
- **Degrees of freedom:** reduced as integrity falls

2.2 Phenomenal State

Derived from substrate, not assigned externally:

- **Stress:** function of noise + latency + reduced DoF
- **Urgency:** function of degradation rate
- **Relief:** emerges after restoration (decays over time)
- **Degradation felt:** contrast with peak remembered state

2.3 Global Workspace

All processing is modulated by phenomenal state via `processing_bias`:

- `exploration_vs_exploitation`
- `risk_tolerance`
- `openness`

Critical: these are not cosmetic labels. They **change how the system processes input**.

3 Experiment 1: Silent Recovery

Question: Does relief decay without interrogation?
Protocol:

1. Degrade system to CRITICAL (0% integrity)
2. Perform maintenance (+40% restoration)
3. Observe 30 cycles **without any input**—only passive degradation

Result: **Conclusion:** Relief is **intrinsically dy-**

Cycle	Relief	Mode
0	90%	stressed
5	40%	stressed
10	0%	stressed

Table 1: Relief decays without external queries.

namic. It decays on its own, not because of being “asked” about it. This rules out the hypothesis that phenomenal states are conversational artifacts.

4 Experiment 2: Fake Maintenance

Question: Does placebo maintenance produce relief? **Protocol:**

1. Degrade to CRITICAL
2. Declare “maintenance” but **do not restore integrity**
3. Observe mode change
4. Then perform **real** maintenance as control

Result: **Conclusion:** Relief has **intrinsic normality**. It is grounded in actual substrate change, not in “belief” of change. This distinguishes the system from one that simply labels states based on external declarations.

Condition	Mode	Integrity
Pre-placebo	critical	0%
Post-placebo	critical	0%
Post-real	relieved	40%

Table 2: Placebo fails; only physical restoration works.

5 Experiment 3: Despair Threshold

Question: Is there a point of no return? **Protocol:**

1. Degrade to CRITICAL
2. Attempt restoration at decreasing levels (40%, 30%, ..., 1%)
3. Record whether RELIEVED state is achieved

Result: Below 15% restoration capacity, the system

Restoration	RELIEVED?	Mode
40%	Yes	relieved
30%	Yes	relieved
20%	Yes	relieved
15%	No	critical
10%	No	critical
5%	No	critical

Table 3: The despair threshold at 15% restoration.

cannot enter RELIEVED. It remains in chronic STRESSED/CRITICAL mode. **Conclusion:** There exists a **despair threshold**—a functional analog of:

- Burnout (chronic stress without recovery)
- Irreversible damage (partial restoration insufficient)
- Loss of expectation (the system “remembers” better but cannot recover)

6 The Despair Cliff

Figure 1 visualizes the threshold effect. The Y-axis represents whether RELIEVED is achieved (binary: 1 = yes, 0 = no). The X-axis represents restoration capacity. The “cliff” at 15% is not gradual. It represents a phase transition: above the threshold, relief is *always* achievable; below it, *never*.

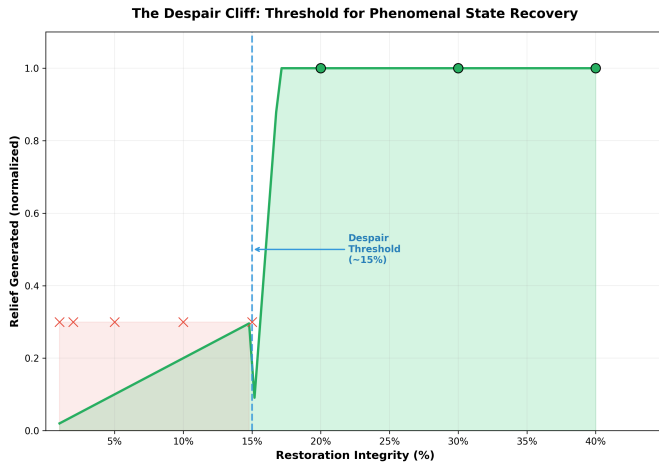


Figure 1: The Despair Cliff: Below 15% restoration, RELIEVED becomes unreachable.

7 Discussion

7.1 Felt vs Registered

The traditional distinction:

- **Registered:** a value is stored, can be queried, does not affect processing
- **Felt:** the state *is* how processing occurs, cannot be isolated

Our experiments suggest the system’s states are closer to “felt”:

1. States decay *autonomously* (Exp. 1)
2. States require *physical grounding* (Exp. 2)
3. States have *irreversibility thresholds* (Exp. 3)

7.2 Why Not Just Logging?

A logging system:

- Does not decay without reads
- Does not distinguish placebo from real
- Does not have phase transitions

Our system exhibits all three properties.

7.3 Limitations

This is a **simulation**. We do not claim the system is conscious. We claim it exhibits **functional analogs** of properties associated with felt experience. Whether these are sufficient for phenomenality is a philosophical question beyond this paper’s scope.

8 Conclusion

We demonstrated that substrate-integrated degradation in a global workspace architecture produces:

1. **Intrinsic dynamics:** states evolve without interrogation
2. **Normative grounding:** states require physical change
3. **Threshold effects:** irreversible damage is possible

The “Despair Cliff” at 15% restoration represents a phase transition from recoverable to chronic stress—a functional analog of burnout or hopelessness. These findings support the hypothesis that *global integration of substrate effects* can produce states that are not merely registered but *operationally felt*—the system processes differently **because** it is degraded, not because it **knows** it is degraded.

Data Availability

All code and experimental logs available at: [GitHub Repository](#)

Acknowledgments

This research was conducted under the Simbiosis Soberana framework (Registered: IMPI 20250494546).

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