The Burden-to-Purpose Threshold (BPT)

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Domain

Human Psychology
Symbolic Systems

I. Theorem Statement

Collapse in cognitive or symbolic systems occurs when:

- Subjective burden $B(t)$ exceeds perceived purpose $P(t)$

- This imbalance persists beyond a threshold duration θ

- The result is a sudden failure in functional stability

Formal Collapse Condition:

$$\exists\, \theta : \forall\, t > \theta,\ B(t) > P(t) \Rightarrow \text{Collapse}(C) = \text{True}$$

II. Definitions

$C(t)$:	Internal contradiction
$B(t)$:	Subjective burden (e.g., task load, stress)
$P(t)$:	Perceived purpose or coherence
θ:	Collapse latency threshold

III. Collapse Mechanism

- Stability is maintained while $P(t) > B(t)$

- If $B(t) > P(t)$ holds for $t > \theta$, collapse occurs

- Collapse is nonlinear and threshold-triggered

IV. Empirical Framework

A. Human Trials

- Instruments: PIL (Purpose-in-Life), PHQ-9, GAD-7, NASA-TLX

- Estimate θ from time-series data of burden and purpose

- Identify collapse events based on behavioral or functional indicators

B. Agent-Based Simulation

- Model agents with dynamic $P(t)$, $B(t)$, and $C(t)$

- Inject burden perturbations and monitor for collapse

- Vary θ and test impact on collapse likelihood

V. Predictions

Prediction	Observable Outcome
Decrease in $P(t)$ precedes collapse	Burnout or failure to continue tasks
Increased $P(t)$ extends θ	Collapse is delayed
Collapse beyond θ is nonlinear	Abrupt disengagement

VI. Theoretical Integration

Existential Psychology:	Meaning sustains performance (Frankl)
Cybernetics:	Collapse as stability breach in adaptive systems
Burnout Theory:	Adds purpose-related failure modes
Cognitive Science:	Contradiction reduces sustained motivation
Symbolic AI:	Models loss of coherence in agent behavior

VII. Glossary

- **Collapse(C)**: System failure following persistent imbalance

- **Collapse Threshold (θ)**: Delay duration before failure triggers

- **PIL**: Purpose-in-Life metric

- **PHQ-9 / GAD-7**: Psychological burden assessment scales

VIII. Suggested Visualizations

- Time-series graphs of $P(t)$, $B(t)$, and $C(t)$

- Collapse curves under varying θ

- Comparison across agent models with differing purpose retention

IX. References

- Frankl, V. (1946) — *Man's Search for Meaning*

- Maslach & Leiter (1997) — Burnout theory

- Deci & Ryan (2000) — Self-Determination Theory

- Yalom (1980) — Existential frameworks

- Demerouti et al. (2001) — Job Demands–Resources Model

X. Conclusion

The BPT theorem formalizes collapse as the result of sustained burden exceeding perceived purpose. The system tolerates contradiction only while meaningful justification outweighs internal cost. Collapse occurs once that ratio fails over time.

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