Quantum Intent Feedback

Experimental Feedback Loop of Observation, Intention, and Structural Collapse

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Abstract

This study proposes and demonstrates an experimental quantum feedback loop, where observer intention—encoded as priority vectors in gate parameters—guides the structural evolution of a quantum system. Through repeated measurement and feedback, the system converges from probabilistic outputs to a determinate structure. Shannon entropy drops near zero, and output distributions stabilize. This suggests that observation can serve not as collapse, but as structural refinement of meaning within quantum systems.

1 Introduction

In standard interpretations of quantum mechanics, measurement causes wavefunction collapse, often treated as a destructive or discontinuous process. In this paper, we propose an alternative role: observation as a means of structural refinement and intention amplification. We demonstrate experimentally that initial observation priorities can iteratively shape circuit outputs toward determinate, low-entropy states.

2 Theoretical Background

The observer's intention is encoded in a priority vector $U = [u_1, u_2, ..., u_n]$ applied as rotation parameters $Ry(u_i \cdot \pi)$ on each qubit. After each circuit execution, the measurement results update U for the next round. This creates a closed feedback loop: intention guides measurement, measurement guides structure, and structure reinforces intention.

3 Experiment

3.1 Circuit and Feedback

A 3-qubit quantum circuit is initialized with $U = [0.2, 0.7, 0.9]$. Each iteration:

1. Apply $Ry(u_i \cdot \pi)$ to each qubit.
2. Measure the result over 1024 shots.
3. Update U by computing the probability of 1 in each bit position.

This process is repeated for 10 steps. For each step, Shannon entropy and cosine similarity to the first iteration are recorded.

4 Results

4.1 Convergence and Structural Lock-in

After three iterations, U converged to $[0.01, 0.99, 0.99]$, and remained fixed. Output distributions collapsed to a single dominant state. Entropy decreased rapidly, reaching 0.00, and similarity with the reference stabilized above 0.95.

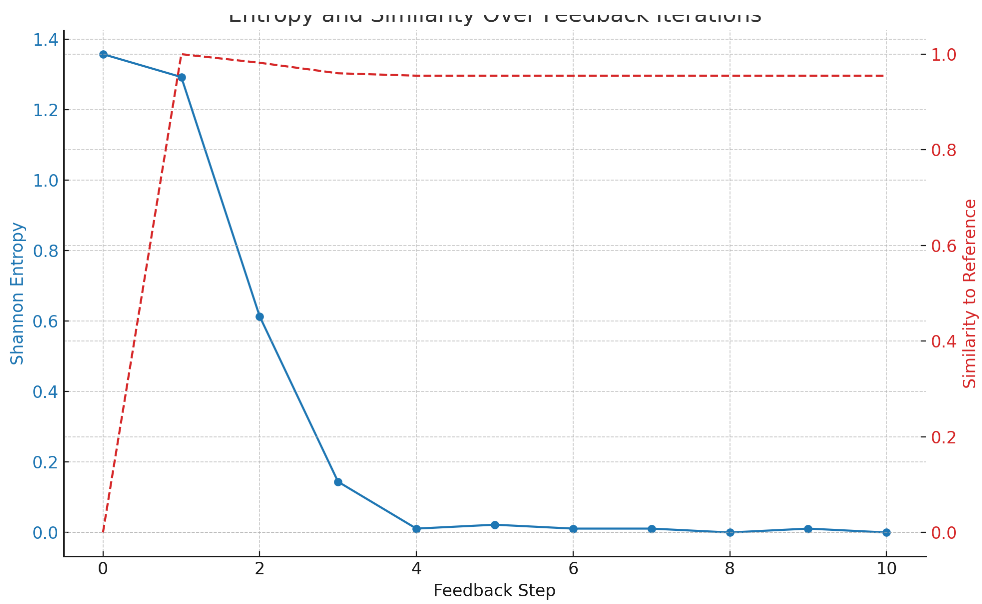

Figure 1: Entropy and similarity change over repeated quantum feedback iterations

4.2 Interpretation

This result suggests that the act of observation does not disrupt the system, but aligns and reinforces structure toward an intentional target. The system self-organizes into a determinate configuration, reducing uncertainty by design.

5 Discussion

We argue that observation, when linked to feedback, becomes an agent of structural formation rather than probabilistic collapse. The circuit, initially probabilistic, evolves into a determinate generator guided by intention. This opens pathways for modeling observer-driven computation, intention-amplifying circuits, and structurally self-reinforcing quantum systems.

6 Conclusion

Quantum systems can be reinterpreted as feedback structures where intention initiates, measurement refines, and iteration enforces structural coherence. This experiment demonstrates a primitive form of such behavior. Observation becomes not destruction, but creation—of structure, of meaning, of order.