Bit-Collapse Theory (BCT) vs Many-Worlds (MWI)
A Phase-2 comparison in canonical language

Rewritten comparison note

Federico Batori
April 2026

Abstract

This note compares Bit-Collapse Theory (BCT) and Many-Worlds style interpretations (MWI) using the canonical Phase-2 language of agent-relative accessibility, stable records, equivalence classes, and record-defined outcomes. The aim is not rhetorical victory. It is to state clearly what each framework treats as primary, what each framework leaves implicit, and where the real disagreement lies. BCT is presented in its declared scope: global quantum dynamics may remain unitary; "collapse" is reinterpreted as an agent-relative update of an experienced-state label [Psi]_A when stable accessible records split what had previously counted as one record-defined macro-condition.

1. What is being compared

MWI is a family of views inspired by Everett's relative-state program. In broad modern form, it treats universal unitary evolution as fundamental and understands apparent collapse through entanglement, decoherence, and emergent branch structure. What exactly counts as a branch or world is itself often approximate and interpretation-dependent.

BCT, in Phase 2 form, is also compatible with global unitarity. The difference is not at the level of Schrödinger dynamics. The difference is at the level of definiteness-for-an-agent. BCT defines an experienced state for agent A as an equivalence-class label [Psi]_A over global states that are indistinguishable to A relative to AA(tau) and the values of A-accessible stable records. In that framework, "collapse" is not a new physical jump but a discrete update of [Psi]_A when stable record structure changes.

2. Ontology: what is fundamental?

MWI typically treats the universal quantum state as fundamental. Branching is then an emergent structure associated with decoherence and coarse-graining. The ontology is physical-first: the theory explains why quasi-classical components become effectively autonomous and then asks how self-location and probability should be understood inside that structure.

BCT accepts the global state |Psi> as part of the physical description, but adds a second primitive at the interpretive level: agent-relative experienced definiteness is represented by equivalence classes induced by finite access and stable records. This does not add a new force or new microdynamics. It adds an explicit identity criterion. The central BCT claim is therefore not "many worlds are false," but "microphysical multiplicity does not automatically imply multiplicity of experienced states for a given agent."

3. The observer

In MWI, observers are ordinary physical subsystems. This is a virtue of parsimony, but it also means that first-person definiteness is often handled indirectly through branch-relative self-location or related tools.

In Phase 2 BCT, the observer is treated operationally as Agent A: a physical system with a bounded accessible algebra AA(tau), a finite integration window tau, and a record structure that can stabilize outcome-relevant differences. The experienced state is then [Psi]_A, not a primitive Cartesian ego and not a raw microstate. This makes the role of the observer less intuitive but more disciplined.

4. Superposition and multiplicity

MWI describes a measurement-like interaction as producing an entangled global state whose effectively decohered components can be treated as separate branches for practical purposes. The multiplicity story lives at the branch level.

BCT asks a different question first: do the alternatives already define different stable record conditions for A? If they do not, then distinct micro-realizations may still belong to the same experienced-state label [Psi]_A. This is the sense in which BCT allows “many microstates, one experienced label.” Multiplicity of physical realization is not yet multiplicity of event-like definiteness for the agent.

5. Collapse: no physical jump, but no free branch-to-experience step either

MWI denies physical collapse. Apparent collapse is effective and branch-relative.

BCT likewise introduces no objective collapse dynamics. But it also refuses the silent inference from “the global state contains multiple decohered structures” to “the agent already occupies multiple equally definite experienced states.” In Phase 2 language, a bit-collapse for A occurs when the stable-for-A record structure changes and the equivalence class [Psi]_A is refined into distinct record-defined possibilities. The physical evolution may remain unitary throughout.

6. Probability and the Born rule

MWI contains several well-known Born-rule programs: decision-theoretic, typicality-based, envariance-related, and others. Debate persists over which assumptions are minimal or most persuasive.

Phase-2 BCT adopts a more modest route. Once outcomes are represented as record-stable macro-conditions with associated projectors Pi_i, the probability assignment mu(Pi_i | Psi) is constrained by normalization, additivity on orthogonal alternatives, non-contextuality at fixed record condition, and unitary covariance. Gleason-style uniqueness then yields the Born form. BCT’s distinctive claim is not that it has discovered brand-new mathematics, but that the relevant projectors are record-defined macro-conditions tied to experienced definiteness rather than abstract branch labels.

7. Decoherence and Quantum Darwinism

MWI relies heavily on decoherence to explain why quasi-classical branching structure emerges. Quantum Darwinism and related record-objectivity programs further explain how records become robust and redundant.

BCT agrees that decoherence and record proliferation are physically central. Where it differs is in the interpretive step. Decoherence explains stability and practical autonomy. BCT then says: event-like definiteness for A appears when stable accessible records refine the equivalence class [Psi]_A. In that sense, decoherence is a stabilizer of record structure, but definiteness is still an equivalence-class fact.

8. Wigner-type scenarios

MWI typically accepts that different observers may describe the same global situation at different effective levels until interaction aligns their records.

BCT makes this structural relativity explicit. Agent F inside a laboratory and agent W outside it need not induce the same equivalence relation at the same stage, because AA_F(tau) and AA_W(tau) need not contain the same stable record channels. A definite record for F need not yet be a definite record for W. BCT therefore treats cross-agent agreement as a problem of record propagation and access, not as an a priori requirement of a single globally shared experienced narrative.

9. Arrow of time

MWI usually explains temporal asymmetry through low-entropy boundary conditions, decoherence, and thermodynamic arguments.

BCT ties the experiential arrow more directly to persistent records. Stable record accumulation refines the experienced-state history of an agent. In broader BCT materials, this line is then connected to redundancy, entanglement spreading, and subsystem entropy growth. The point is not that BCT replaces thermodynamics, but that it gives a tighter conceptual package linking definiteness, records, and temporal direction.

10. Empirical status

In their purely interpretive forms, both MWI and BCT can remain empirically equivalent to standard quantum mechanics. BCT becomes potentially distinct only when its record-threshold bridge is sharpened into discriminating quantitative predictions. That is why the Phase-2 program emphasizes killable wedges and retention-based defeat conditions rather than rhetorical claims of new physics.

11. The actual disagreement, stated plainly

The deepest disagreement is not “unitarity or collapse,” since Phase-2 BCT also keeps unitarity. The disagreement is this: MWI can remain satisfied with branch structure plus self-location, whereas BCT insists that experienced definiteness needs an explicit non-elastic identity rule. In BCT, the question is always: which stable record conditions refine [Psi]_A for this agent? If that question is left implicit, BCT regards the interpretation as underdescribed at the level of definiteness.

12. Conclusion

MWI and BCT answer different missing pieces. MWI prioritizes dynamical economy and lets much of observer-definiteness ride on decohered structure and self-location. Phase-2 BCT accepts the same broad physical background but adds a stricter identity criterion: the agent-relative experienced state is an equivalence-class label induced by accessible stable records. The productive way to compare the two is therefore not rhetoric about “more worlds” or “more consciousness,” but a narrower question: is branch structure by itself enough to account for experienced definiteness, or does one need an explicit record-based identity rule? BCT answers yes to the second option.

AI assistance note: *This document was developed with AI-assisted editorial support. The author remains solely responsible for all claims, definitions, and errors.*