BCT Glossary (Canonical Terms)

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Scope. This glossary stabilizes Phase-2 usage across the flagship paper, manifesto, Born note, comparison note, objections appendix, falsification package, and supplementary notes. Definitions are intentionally operational and do not presume new microdynamics.

Canonical notation (Phase 2)

The following symbols are used consistently across the Phase-2 set.

A	Agent or controller under consideration.
$AA(\tau)$	Physically accessible algebra of observables for agent A within the integration window τ.
τ	Integration window of the agent.
τ_p	Measured persistence / retention time of a record channel.
τ_{loss}	Characteristic loss or decay timescale of a record buffer or trace.
τ^*	Minimal persistence threshold required for a record to count as event-like for the relevant agent.
I_{WW}	Effective which-way information carried by the relevant record channel.
I_c	Conservative threshold for the which-way / record channel, with default $I_c = 1$ effective bit unless otherwise specified.
R	Record-writing or effective refresh rate into the downstream record channel.
$s := R\tau_{\text{loss}}$	Stability proxy organizing the retention-driven test wedge.
F_A	Frozen operational regime for a given campaign, including thresholds, tolerances, and calibration discipline fixed in advance.
$\|\Psi\rangle$	Global quantum state of the total system.

Core ontology and observer-relative structure

Agent A
A finite physical system with bounded access and finite integration. In BCT, an agent is treated operationally, not psychologically.

Accessible algebra $AA(\tau)$
The set (or algebra) of observables physically accessible to A within the finite integration window τ, given actual constraints such as locality, bandwidth, coupling, and readout.

Integration window τ
The finite timescale over which A integrates and updates accessible information. It sets the relevant horizon for record contribution to experienced definiteness.

Global quantum state $|\Psi\rangle$
The state of the overall system, including system, apparatus, agent, and environment. BCT does not require modified global dynamics.

Indistinguishability for A over τ
The operational relation under which two global states count as indistinguishable for agent A when they agree, within the declared tolerances, on accessible statistics and on the values of stable-for-A records.

Equivalence relation $\sim_A$
The agent-relative equivalence relation generated by indistinguishability under $AA(\tau)$ and stable-for-A records.

Experienced state / experienced label $[\Psi]_A$
The equivalence-class label of global states that are indistinguishable for A. This is the Phase-2 notion of experienced definiteness.

Bit-collapse
The discrete update of $[\Psi]_A$ when stable accessible record structure changes. It is not a non-unitary jump of the global state.

Definiteness
Agent-relative event-like determinacy grounded in stable accessible records rather than in microscopic coherence alone.

Records, stability, and outcome structure

Record variable R
A finite-valued observable, or finite jointly readable set of observables, whose value encodes a physical correlation that A can in principle read within $AA(\tau)$.

Redundancy proxy $r(R)$
A count of how many disjoint fragments redundantly encode the same classical information about R above a fixed threshold.

Robustness proxy A stability condition stating that typical local perturbations over the relevant interval do not flip the readout of the record beyond the declared tolerance.

Stable-for-A record A record that satisfies the declared accessibility, redundancy, and robustness requirements for agent A over the relevant window τ.

Stable record Shorthand for a physically instantiated record that remains robust enough, long enough, to count in the experienced-state description for the relevant agent and regime.

Record-bit A record degree of freedom that functions operationally as a binary or finite-valued discriminant between alternatives.

Record formation The physical process by which correlations become stable enough to count as records for the relevant agent.

Record-defined macro-condition R_i
A coarse-grained outcome condition represented by stable accessible record structure. In Phase 2, outcomes are treated at this level rather than as primitive measurement labels.

Event-like record A record condition that satisfies the relevant accessibility and stability requirements and persists long enough to cross the threshold $\tau_p \geq \tau^*$ in the operative regime.

Event-like definiteness Definiteness associated with a record-defined macro-condition that is

accessible, stable, and persistent enough to refine $[\Psi]_A$.

Time scales and thresholds

Persistence time τ_p
Measured persistence or retention time of a record channel. It quantifies how long the relevant distinction remains operationally available.

Loss time τ_{loss}
Characteristic timescale over which record support decays, is overwritten, or becomes inaccessible in the relevant channel.

Threshold τ^*
Minimal persistence threshold required for a record to count as event-like for the relevant agent. In Phase 2, τ^* is an operational threshold, not a universal metaphysical constant.

τ^* **is not decoherence time** τ^* should not be confused with an environmental decoherence timescale. Decoherence may suppress interference in a reduced description, but τ^* concerns accessible record persistence for the agent.

Which-way information I_{WW}
Effective outcome-distinguishing information carried by the relevant record channel, measured or bounded independently at the operating point.

Threshold I_c
Conservative information threshold for the which-way / record channel. In the minimal Phase-2 wedge, the default is one effective bit.

Record-writing rate R
Effective rate at which outcome-distinguishing support is written into the downstream record channel.

Stability proxy $s = R\tau_{\text{loss}}$
Composite organizing variable used in the retention-driven falsification program. It summarizes the competition between write and loss in the calibrated record channel.

Operational regime and empirical discipline

Frozen operational regime F_A
The tuple of thresholds, tolerances, and protocol commitments fixed before the scan. Its role is to block point-by-point retuning used to rescue conclusions after the fact.

Independent calibration principle The requirement that key organizing variables such as I_{WW}, R, and τ_{loss} be measured or bounded independently of the main visibility scan.

Marker-off control A control condition in which the which-way marker is disabled while retention parameters are varied. If visibility shifts materially here, the platform has not isolated the downstream record channel from ordinary dephasing.

Arm isolation The requirement that manipulations of the downstream record channel not materially alter ordinary arm dephasing, path noise, or equivalent baseline interference controls.

Defeat condition A preregistered empirical outcome that, if observed under the declared controls, falsifies the specific BCT bridge under test in that domain.

Killable wedge A deliberately narrow empirical sector in which BCT makes a disciplined,

rejectable claim rather than an elastic interpretive suggestion.

Probability and outcome representation

Macro-subspace $\mathcal{H}_{R_i}$
The coarse-grained subspace corresponding to the record-defined macro-condition R_i.

Record projector Π_i
The projector onto $\mathcal{H}_{R_i}$. In Phase 2, these projectors represent record-defined macro-conditions rather than abstract branch labels.

Support assignment $\mu(\Pi \mid \Psi)$
The non-negative, normalized assignment of support to a record-defined macro-condition Π given global state $|\Psi\rangle$.

Additivity on orthogonal alternatives The requirement that support over mutually exclusive record projectors add in the standard way.

Non-contextuality at fixed record condition The requirement that the support assigned to a given record projector not depend on which other compatible projectors appear beside it in a particular decomposition.

Unitary covariance Representation-independence of the support assignment under simultaneous unitary transformation of state and projector.

Born form The standard support assignment obtained when the above operational constraints are imposed on record-defined projectors.

Embedding policy for the qubit caveat The Phase-2 policy that the relevant outcome projectors live at the enlarged system–apparatus–environment level, where record-defined macro-projectors are generically not limited to bare two-dimensional cases.

Interpretation and comparison vocabulary

Many microstates, one experienced label A Phase-2 slogan for the claim that microphysical multiplicity does not automatically imply multiplicity of experienced states for a given agent.

MWI (Many-Worlds Interpretation)
A family of interpretations that retain global unitarity and typically treat branching structure as central.

Branch / branching Decomposition of the global state into effectively autonomous components under a chosen coarse-graining. In BCT, branch structure alone is not yet sufficient for experienced definiteness.

Wigner-type scenario A situation in which different agents may not yet induce the same equivalence relation because they do not share the same stable record channels or physical access at the same stage.

Cross-agent agreement Agreement obtained through record propagation and access alignment, not assumed in advance as a single omniscient narrative.

Decoherence and related frameworks

Decoherence Suppression of interference in reduced descriptions due to entanglement with an environment. In BCT, decoherence is compatible with global unitarity but does not by itself settle experienced definiteness.

Quantum Darwinism A framework in which classical objectivity emerges from redundant environmental encoding. BCT is compatible with Darwinist redundancy logic but adds an explicit identity / definiteness rule.

Spectrum Broadcast Structures (SBS)
A record-objectivity framework often discussed alongside Quantum Darwinism. In BCT, such frameworks motivate stability proxies but do not replace the non-elastic observer-definiteness rule.

Notes on usage

- Prefer *agent*, *accessible algebra*, *stable record*, *record-defined macro-condition*, and *experienced label* to loose consciousness language.
- Keep I_{WW} and I_c distinct: the first is a measured or bounded quantity; the second is the threshold.
- Keep τ_p, τ_{loss}, and τ^* distinct: persistence, loss, and event-threshold are not interchangeable.
- Use "collapse" only in the agent-relative Phase-2 sense unless explicitly stating otherwise.
- Avoid semantic shortcuts such as "the information is there" unless physical accessibility and regime are specified.

AI-use note. This document benefited from AI-assisted editorial and structural drafting support. The author remains solely responsible for all claims, definitions, and errors.