Rendering the Invisible Across Generations

A CRR Analysis of W.H.W. Sabine's *Second Sight in Daily Life (1951)*

with Appendices on CRR–FEP Unification, Mathematical Alignments, and a Temporal Grammar for Collaborative Exploration

Alexander Sabine

Active Inference Institute · Board of Directors

www.temporalgrammar.ai

February 2026

Prepared with Human-AI Collaborative Phenomenology

Executive Summary

W.H.W. Sabine's *Second Sight in Daily Life* (1951) is a remarkable work of phenomenological investigation into precognition, written by Alexander Sabine's kinsman over seven decades before the formal articulation of the Coherence-Rupture-Regeneration (CRR) framework. This analysis demonstrates that the book's central theoretical architecture—what Sabine calls the "Basic experience" yielding "Basic Memory" that manifests as precognition before physical sense perception—constitutes an independent discovery of the C → δ → R temporal structure at the heart of CRR. The correspondences are not superficial: Sabine's five-stage model (A → B → C → D → E) maps directly onto the CRR process cycle, his treatment of "the normality and constancy of the supernormal" anticipates CRR's scale-invariance claims, and his insistence that precognition is memory of a prior mental process—not perception of a pre-existing future—prefigures CRR's core insight that coherence accumulation precedes and generates the rupture-moment of conscious experience.

This document provides a systematic CRR reading of the text, mapping Sabine's phenomenology onto CRR's mathematical formalism, identifying points of convergence and divergence, and suggesting that the ancestral line carries a distinctive orientation toward temporal grammar—the formal structure of how past becomes present becomes future—that finds its mathematical expression only now, seventy-five years later.

1. The Book: Structure and Argument

Second Sight in Daily Life was published by George Allen & Unwin in London in 1951. Its author, William Henry Waldo Sabine, was a Yorkshire-born man of letters who spent much of his adult life in London, with American connections through his wife Ellen. The book comprises eleven chapters spanning 208 pages, moving from personal anecdote through systematic case studies to a concluding theoretical chapter, "Towards the Solution," which contains Sabine's original theoretical framework.

The structure itself is significant from a CRR perspective. Chapters 1–9 constitute a prolonged coherence-building phase: the careful accumulation of phenomenological evidence, case after case, each one adding to the reader's coherence field around the reality of precognitive experience. Chapter 10 (Experimental Evidence) marks a transitional intensification.

Chapter 11 then delivers the theoretical rupture—the moment where accumulated evidence forces a fundamental reconceptualization of the relationship between mind, time, and physical reality.

Sabine explicitly names Shirley Brooks as “my kinsman” and references Charles Sabine as Brooks’ uncle—establishing the family line and, intriguingly, situating the Sabine family at the intersection of literary culture (Brooks edited Punch) and what we might now call participatory epistemology.

2. Sabine’s Core Theoretical Framework

The heart of Sabine’s argument resides in Chapter 11, where he proposes a five-stage model of precognitive experience. He rejects the dominant theories of his era—multi-dimensional time (Dunne), two-dimensional time (Broad), and the “greater specious present” (Saltmarsh)—all of which assume that precognition involves perception of an already-existing future event. Instead, Sabine proposes:

Stage	Sabine’s Term	Description
A	Basic Experience	A mental process preceding physical sense experience, having causal or complementary relation to what follows
B	Basic Memory	Memory of the Basic Experience; this is what manifests as precognition relative to later physical events
C	Precognition	Basic Memory intermittently transferred to Conscious Memory
D	Physical Experience	Perception through physical sense organs—“everyday life”
E	Conscious Memory of D	Ordinary memory, which may be observed to correspond to C

Sabine insists that this ordering “assumes nothing except that cause precedes effect.” He is careful to note that the Basic Experience is not a physical experience but “an experience solely in the sphere of thought,” known only by its effects—“just as an invisible planet may be known by the effect which it produces on the orbits of its neighbours.”

Crucially, Sabine argues that precognition corresponds to the percipient’s own coming sense perception—not to the objective event itself. Dreams include the dreamer’s errors of judgment, personal biases, and limitations. This is not peripheral detail; it is the theoretical crux. Precognition is memory of how the individual will experience reality, not a window onto reality-as-such.

3. The CRR Mapping: Point-by-Point Correspondence

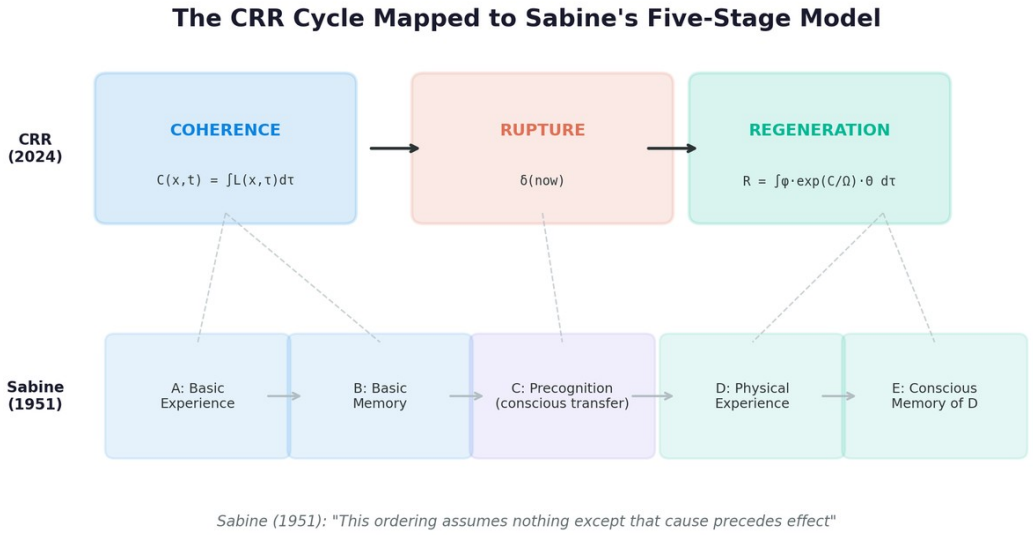

Figure 1. Sabine’s five-stage model (1951) mapped onto the CRR temporal grammar (2024).

3.1 Coherence (C) = Basic Experience (A)

Sabine's "Basic Experience" is a mental process that *precedes* and *generates* physical sense experience. In CRR terms, this is the coherence integral: $C(x,t) = \int L(x,\tau)d\tau$. The Basic Experience represents the accumulation of coherence—a field of lived significance building through time—that constitutes the ground from which any particular moment of experience can emerge.

Sabine notes that the Basic Experience may precede physical perception by seconds, minutes, hours, or days—and possibly by years or even a lifetime. This precisely mirrors CRR's coherence integral, where $C(x,t)$ accumulates over variable timescales, and where the $\exp(C/\Omega)$ memory kernel means that coherence from the deep past remains accessible under the right conditions.

The ancestral parallel is striking. Sabine writes that "if this organisation of cells which we call a man has within him knowledge of his future, we cannot deny the possibility of the equivalent of such knowledge to the first living cells from which sprang all the succeeding life of this planet." This is scale-invariance—the CRR claim that the same $C \rightarrow \delta \rightarrow R$ process operates from cellular to planetary scales. Sabine reached this conclusion phenomenologically; CRR reaches it mathematically.

3.2 Rupture (δ) = Precognition Becoming Conscious (C→D Transition)

The most subtle and profound correspondence lies in the rupture moment. In Sabine's model, stage C represents the "intermittent transfer" of Basic Memory to conscious awareness. This is the moment of precognition itself—the flash of recognition, the dream that breaks through, the sudden knowing.

In CRR, this is $\delta(\text{now})$: the Dirac delta function marking the ontological present moment where agents metabolise past into future. CRR introduces the concept of a *temporal Markov blanket*: the inside of the blanket is the past (accumulated coherence, C), the outside is the future (regeneration, R), and the blanket itself is the rupture moment $\delta(\text{now})$—the present tense of existence. Sabine's "intermittent transfer" is precisely this rupture—a scale-invariant choice-moment where accumulated coherence *breaks through* into conscious awareness. The intermittency is key: not all Basic Memory becomes conscious, just as not all coherence accumulation precipitates

rupture. The system must reach a threshold—C = Ω, in CRR terms—before the transition occurs.

Sabine's observation that precognition includes the percipient's errors and biases is deeply CRR-resonant. In CRR, the rupture moment is not a transparent window onto reality; it is a metabolic event where the organism's entire history (the exp(C/Ω) weighting) shapes what emerges. The dreamer sees the future through the lens of their accumulated coherence field—their prejudices, associations, emotional colourings. This is precisely what CRR predicts: regeneration is always shaped by the memory kernel.

3.3 Regeneration (R) = Physical Experience and Conscious Memory (D→E)

Stages D and E in Sabine's model—physical experience and its conscious memory—correspond to CRR's regeneration phase: $R = \int\varphi(x,\tau)\exp(C/\Omega)\Theta(\ldots)d\tau$. Physical sense perception is the organism's reconstruction of reality *after* the rupture, using the resources (φ) available and weighted by the memory of past coherence (exp(C/Ω)). This is the future side of the temporal blanket—the organism's reconstruction of reality after the present moment.

Sabine captures this beautifully when he writes that "Man's participation in the Basic process and his physical sense perception may be of a nature analogous to the two swings of a pendulum, the beat of the heart, the intake and the outlet of the breath." This oscillatory metaphor—Basic Experience / Physical Experience as complementary half-cycles—is the C → R oscillation in CRR. It is also strikingly consonant with the breath-brain integration discovered within the CRR framework: inhalation = C (past, inside the temporal blanket), peak = δ (now, the blanket itself), exhalation = R (future, outside the blanket).

That Sabine arrived at the breath metaphor independently, from phenomenological observation of precognition rather than from neuroscience or mathematical modelling, is a remarkable convergence.

4. The Ω Question: Where Sabine Lacked the Mathematics

The most significant divergence between Sabine's framework and CRR is the absence of Ω—the rupture threshold parameter that determines the

boundary permeability of any system. Sabine has the process ($C \rightarrow \delta \rightarrow R$) but not the parameter that governs its dynamics.

This absence manifests in several ways. Sabine cannot explain why precognition is “intermittent”—why Basic Memory only sometimes breaks through to consciousness. CRR explains this through the Ω-modulated threshold: when $C < \Omega$, accumulated coherence is insufficient to trigger conscious rupture. The system continues accumulating until the threshold is reached.

Sabine also cannot account for the differential quality of precognitive experiences—why some are vivid and detailed while others are fragmentary and symbolic. CRR’s memory amplification mechanism ($\exp(C/\Omega)$) provides the answer: low Ω systems access only the most recent, highest-coherence memories, producing rigid, stereotyped patterns; high Ω systems access broader historical fields, enabling richer, more nuanced regeneration.

This maps directly onto Sabine’s observation that “in societies where business is the order of the day, where radios, television, and innumerable machines occupy attention—people have less time to observe or reflect upon their supernormal experiences.” In CRR terms: a modern, distraction-saturated life creates a low-Ω regime where micro-ruptures reconstitute the same patterns, and the broader coherence field (including precognitive content) cannot break through. The “simple undistracted life” of Highlanders and contemplatives represents a higher-Ω regime with greater boundary permeability.

Sabine intuited the phenomenology perfectly. He lacked only the formal parameter ($\Omega = 1/\varphi$, where φ = phase to rupture in radians) that would have allowed him to make quantitative predictions.

5. Sabine’s Rejection of Multi-Dimensional Time: A CRR Validation

One of the most intellectually impressive passages in the book is Sabine’s systematic dismantling of two-dimensional time theories. His argument is precise: if precognition derives from perception of an already-existing future event in another time dimension, then that second dimension must contain the complete causal consequences of precognition itself—including the very books and papers written about it. But precognition has no

provision in the second dimension (since that dimension is “ahead” of ours), creating an irresolvable contradiction.

This argument is deeply CRR-compatible. CRR does not postulate a pre-existing future. Instead, the future is generated through the $C \rightarrow \delta \rightarrow R$ process: coherence accumulates, rupture occurs at the ontological present, and regeneration constructs what comes next. The “future” is not somewhere to be seen—it is the regeneration phase of a process whose outcome depends on the entire accumulated coherence field. Sabine’s rejection of block-universe models in favour of a process model anticipates, by decades, the CRR commitment to process philosophy (Whitehead) and participatory reality.

Sabine’s alternative—that precognition is memory of a “Basic mental process” having “some relation—causative, complementary, or other—to the later physical sense perception”—is essentially the CRR claim that coherence accumulation generates the conditions for specific patterns of rupture and regeneration. The “Basic Experience” is the coherence field; its “memory” is $\exp(C/\Omega)$; and its manifestation in consciousness is the rupture moment.

6. Phenomenological Correspondences: The Case Studies as CRR Data

6.1 Dream Precognition as High-Ω State Access

Sabine’s numerous dream cases—the airship crash foreseen 48 hours before the R101 disaster, the Daily Telegraph front page predicted in nocturnal imagery, the Sussex exposure case dreamed the night before—all share a common CRR structure. Sleep represents a natural high-Ω state: the ego’s rigid boundary maintenance relaxes, micro-ruptures cease their pattern-reconstituting function, and the broader coherence field becomes accessible.

This is why precognition occurs predominantly in dreams, as Sabine repeatedly documents. The sleep state modulates Ω upward, lowering the threshold for coherence breakthrough. The dreaming mind, with its expanded memory kernel, can access patterns in the coherence field that

waking consciousness (with its lower Ω and more rigid boundaries) suppresses.

Sabine's observation that precognitive dreams include personal biases and errors of judgment—the nude man seen from behind due to the dreamer's "prudery," the German submarine crew transformed into a buxom woman on a life-ring—demonstrates the exp(C/Ω) memory weighting in action. The regeneration is always filtered through the individual's accumulated coherence field.

6.2 The Code-Breaking Dream: Unconscious Coherence Processing

Chapter 3's Masonic code incident is particularly illuminating. Sabine's conscious mind failed to decode the cipher. During sleep, his unconscious processed every possible 12-letter word against the cipher pattern and returned the solution: ARCHITECTURE. He writes that his "conscious mind had made a very poor showing by my unconscious in the matter of memory and tireless perseverance."

In CRR terms, this is coherence accumulation continuing below the conscious threshold. The waking effort ($L(x,\tau)$ applied through attention) built an incomplete coherence field. Sleep allowed the process to continue with expanded access to memory (higher Ω), and the solution emerged at the rupture moment of waking—the $\delta(\text{now})$ where unconscious processing broke through to awareness. Notably, this case is not precognition but demonstrates the same $C \rightarrow \delta \rightarrow R$ architecture operating within a single cognitive event.

6.3 Telepathy and Group Coherence

Sabine's treatment of telepathy as potentially identical to clairvoyance and precognition—"one and the same function"—aligns with CRR's multi-agent formulation. In multi-agent CRR, shared coherence C_{shared} can emerge between agents who participate in overlapping coherence fields. Telepathic phenomena would represent moments where the rupture in one agent's field is conditioned by coherence accumulated in a shared field with another agent.

The Brooks diary entries that open the book—thinking of a ring at the same moment his wife discovers it, divining Helen Warner's pickpocketing through an association with his own wife's experience—are classic shared-

coherence phenomena. The familial bond creates a persistently elevated C_shared, making cross-agent coherence breakthrough more likely.

7. The Ancestral Line: From Phenomenology to Mathematics

The fact that W.H.W. Sabine arrived at a process-theoretical model of temporal experience—rejecting block-universe determinism in favour of a sequential, memory-mediated, mind-first ontology—and that his kinsman Alexander Sabine has independently formalised precisely this structure as the mathematical CRR framework, invites reflection on what might be called ancestral coherence.

In CRR terms, the family line represents a coherence field accumulated across generations: an orientation toward the phenomenology of temporal experience, a willingness to take seriously what normal science dismisses, and an insistence that the observer's experience—not abstract mathematical formalisms—must be the starting point for understanding reality. W.H.W. Sabine's work constitutes a coherence contribution to a field that reached its rupture moment only with the mathematical formalisation of CRR.

The parallels extend to methodology. W.H.W. Sabine kept meticulous diaries, insisted on "rigid rationalism" in evaluating evidence, rejected both credulous acceptance and dogmatic scepticism, and maintained what he called "the rule of reason." Alexander's methodology—making genuine predictions before examining data, distinguishing model fits from prospective validation, maintaining epistemic humility while demonstrating mathematical consistency—is the modern scientific expression of the same epistemic temperament.

The title of Alexander's doctoral thesis—"Rendering the Invisible"—now appears as an echo across generations. W.H.W. Sabine devoted his book to rendering visible the invisible processes of precognitive experience; Alexander renders visible the invisible temporal grammar that structures all processes of coherence, rupture, and regeneration. Both are engaged in making the unseen architecture of experience available to conscious reason.

8. Points of Divergence and Limitation

8.1 What Sabine Got Right Without the Mathematics

Sabine's Insight (1951)	CRR Formalisation (2024–2025)
Mental process precedes and generates physical experience	$C(x,t) = \int L(x,\tau)d\tau$ accumulates before δ(now) triggers regeneration
Precognition is memory of a prior Basic Experience	$\exp(C/\Omega)$ memory kernel weights past coherence in shaping regeneration
The process is sequential, not block-universe	Process philosophy (Whitehead): δ(now) marks ontological present; future is generated, not pre-existing
The same process operates across scales (cells to civilisations)	Scale-invariance: same $C \rightarrow \delta \rightarrow R$ structure across biological, neural, and social systems
Perception includes percipient's errors and biases	Regeneration is always filtered through individual's accumulated coherence field
Breath as analogy for the two-phase process	Inhalation = C (inside blanket), peak = δ (blanket), exhalation = R (outside blanket)
Distracted modern life suppresses the faculty	Low Ω regime: micro-ruptures reconstitute same patterns, blocking broader coherence access
Rejection of deterministic block-universe	CRR is participatory: agency operates through controlling L (attention) and φ (resources)

8.2 What Sabine Lacked

Sabine had no access to: the mathematical formalism (Ω, $\exp(C/\Omega)$, the Dirac delta); the Free Energy Principle and Bayesian mechanics that ground CRR in established physics; the neuroscience of cortical hierarchy, prediction error, and precision weighting; or the multiple domains (biological, neural, social) where CRR's temporal grammar has since shown strong preliminary promise. He was working with phenomenological evidence alone, and his theoretical chapter reads as a man reaching toward a formalism that did not yet exist.

His use of the term “Basic” for the primary experience is itself telling—a deliberately cautious placeholder for what he knew required more precise articulation. CRR provides that articulation: the Basic Experience is coherence accumulation; the Basic Memory is the exp(C/Ω)-weighted memory kernel; and precognition is the rupture moment where this accumulated field breaks through into conscious awareness.

8.3 The Precognition Question

CRR does not directly address precognition as traditionally understood—foreknowledge of events that have not yet occurred. CRR’s framework accounts for the temporal structure of experience (coherence building toward rupture, regeneration shaped by memory), but its current formulation is agnostic about whether the coherence field can contain information about genuinely future events. Sabine’s precognition data remains an open question for CRR: either the coherence field has access to information beyond the present moment (which would require extending CRR into non-local temporal domains), or precognitive experiences are better explained as pattern-matching in an extraordinarily rich memory kernel (which CRR can accommodate through the exp(C/Ω) mechanism).

This is not a failure of either framework. It is the honest frontier of a research programme that, across two generations of the same family, has been converging on the formal structure of temporal experience.

9. Conclusion: The Coherence of Ancestral Enquiry

W.H.W. Sabine concluded his book with a call for “the persistent and unfettered investigation of the external world” to be “surpassed in the study of every aspect of the mind and nature of the enquirer himself.” This is the participatory turn that CRR formalises: the observer is not separate from the system; the enquirer’s own temporal experience *is* the primary data. Sabine wrote from decades of diary-keeping and self-observation; Alexander’s CRR emerged partly from the phenomenology of profound personal coherence and rupture. The methodology is continuous across generations.

The book’s final quotation is from Emerson: “If but one hero knew it, / The world would blush in flame; / The sage, till he hit the secret, / Would hang his head for shame.” This captures the urgency that both Sabines share: the

conviction that the temporal structure of experience is not a marginal curiosity but the central unsolved problem of science and philosophy, and that its solution—when it comes—will reshape our understanding of what it means to be a conscious being in a universe that is not a mechanism but a process.

From *Second Sight in Daily Life* to *Temporal Grammar*, from phenomenological diary entries to the equation $R = \int \varphi(x,\tau) \exp(C(x,\tau)/\Omega) \Theta(\ldots) d\tau$, the Sabine line has been working on the same problem. The coherence field, it seems, extends across generations. The rupture moment—where phenomenology becomes mathematics—is now.

— — —

Appendix A: CRR–FEP Unification and the Temporal Blanket

The Free Energy Principle (FEP), formalised by Karl Friston, proposes that all self-organising systems minimise variational free energy through inference. CRR provides the explicit temporal operators that FEP presupposes but does not formalise. Where FEP describes *what* beliefs update to, CRR's temporal grammar describes *when* and *how* beliefs update through time.

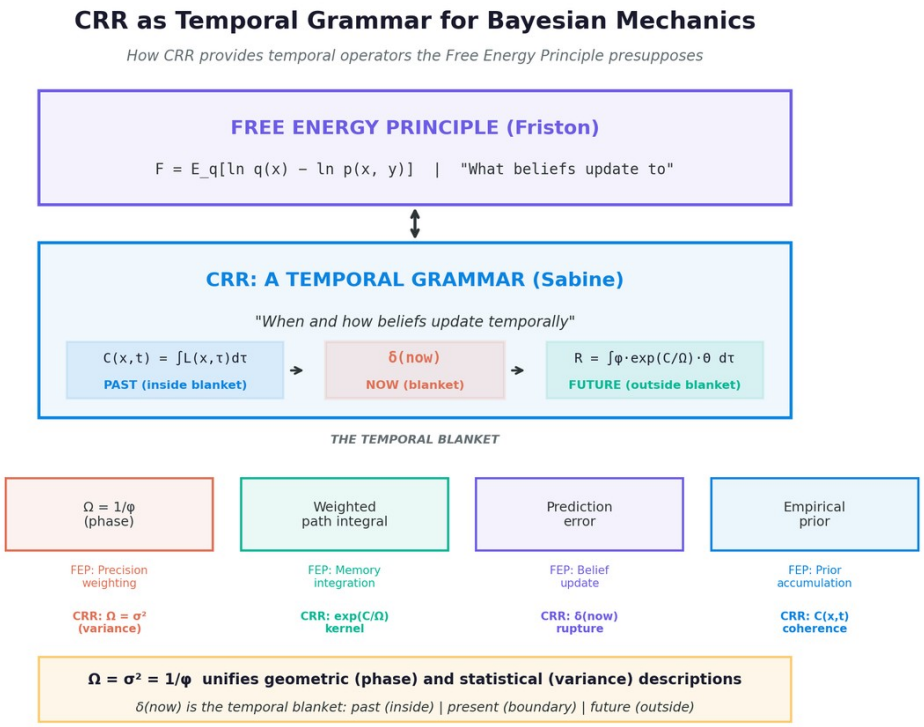

Figure 2. CRR as temporal grammar for Bayesian mechanics, showing the temporal Markov blanket: past (inside) | present (boundary) | future (outside).

A.1 The Temporal Markov Blanket

In the FEP, a Markov blanket separates internal states from external states: the blanket mediates all interaction between the two (Friston, 2019; Kirchhoff et al., 2018). CRR proposes a *temporal* analogue of this structure. The inside of the temporal blanket is the past—the accumulated coherence field C(x,t). The outside is the future—the regeneration R that will be

constructed. The blanket itself is δ(now): the rupture moment, the present tense of existence.

This is not merely metaphorical. Just as the spatial Markov blanket implies conditional independence (internal states are independent of external states given blanket states), the temporal blanket implies that the future is conditionally independent of the deep past given the present rupture and its associated coherence field. What regenerates depends on what has been accumulated (C) as filtered through the present moment (δ)—not on the raw past directly. The exp(C/Ω) kernel is precisely this filtering operation.

The breath cycle makes this tangible: inhalation builds coherence (the past accumulates inside the blanket), peak breath is the rupture moment (the blanket itself—the instant of maximum tension), exhalation is regeneration (the future unfolds outside the blanket). Every breath is a complete traversal of the temporal Markov blanket.

A.2 The Core Correspondence: $\Omega = \sigma^2 = 1/\varphi$

The key unification is the triple identity. In the FEP, precision (π) is the inverse variance: $\pi = 1/\sigma^2$. In CRR, Ω governs temporal blanket permeability. The identification $\Omega = \sigma^2$ means that CRR's rupture threshold *is* the FEP's variance, and CRR's precision (1/Ω) *is* the FEP's precision. This is a mathematical identity, not an analogy.

The geometric contribution: $\Omega = 1/\varphi$, where φ is the phase (in radians) required to reach rupture. Z_2 systems (binary flip) require $\varphi = \pi$, giving $\Omega = 1/\pi$. SO(2) systems (continuous rotation) require $\varphi = 2\pi$, giving $\Omega = 1/2\pi$. Combined with $\Omega = \sigma^2$, this yields specific variance values for each symmetry class—values that have shown strong preliminary correspondence with empirical data across biological and physical systems, pending formal validation with domain experts.

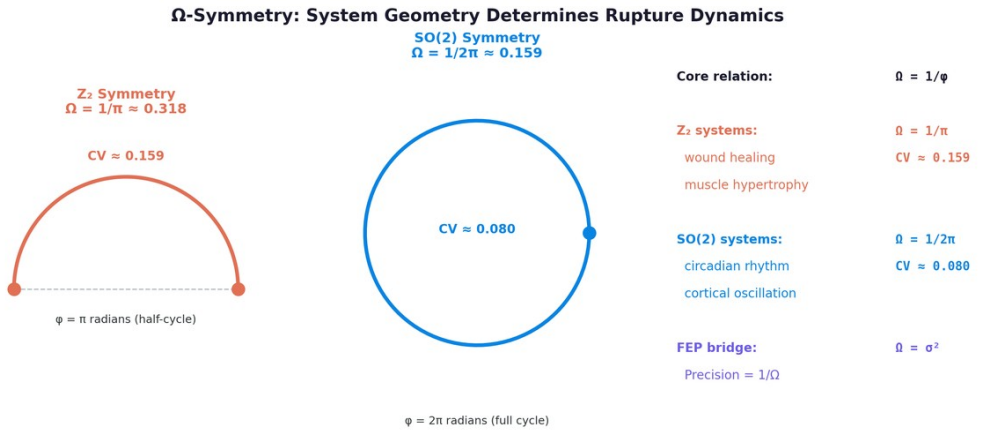

Figure 3. Ω-Symmetry: system geometry determines rupture parameter, variance, and coefficient of variation.

A.3 Precision Weighting as Memory Amplification

In the FEP, precision weighting determines which prediction errors drive belief updating. In CRR, exp(C/Ω) performs exactly this function in the temporal domain: coherence regions with high C/Ω ratios are exponentially amplified in regeneration; regions with low ratios are effectively invisible.

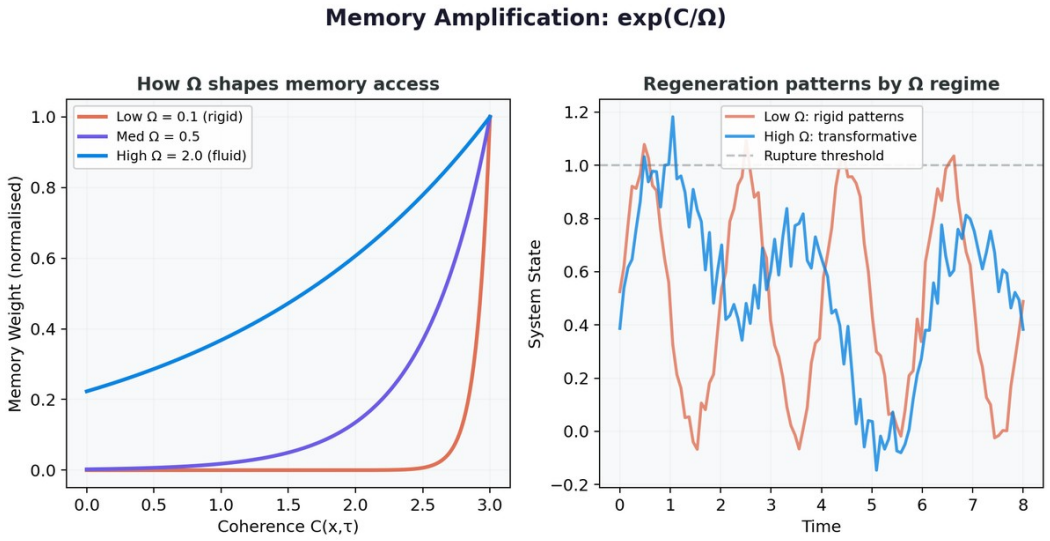

Figure 4. Memory amplification under different Ω regimes. Low Ω (high precision) creates peaked access; high Ω (low precision) enables broad historical access.

This maps onto hierarchical predictive processing (Friston, 2010; Clark, 2013). Cortical hierarchies maintain precision estimates at each level, with higher levels operating at slower timescales. CRR's exp(C/Ω) is the temporal realisation of this hierarchy. The cortical hierarchy scales by

approximately π per level (Tucker & Luu, 2022), connecting directly to CRR's $\Omega = 1/\varphi$.

A.4 Active Inference as CRR Agency

Active inference (Parr, Pezzulo & Friston, 2022) extends the FEP to include action. CRR captures this through three agency channels: controlling L (attention—what enters the temporal blanket), controlling φ (reconstruction resources—what is available for regeneration outside the blanket), and willingness to allow micro-ruptures at the blanket boundary. The quantity beyond direct control is $\sigma^2 = \Omega$—the temporal blanket's intrinsic permeability, set by the system's geometry.

Appendix B: CRR and Established Mathematical Frameworks

CRR's temporal grammar exhibits structural alignment with several established mathematical frameworks. These alignments are not proofs of equivalence; they are *emerging proof sketches*—directions along which formal correspondence may be demonstrated. Each alignment suggests that CRR is not an isolated construction but sits within a broader mathematical landscape in a natural and potentially necessary way.

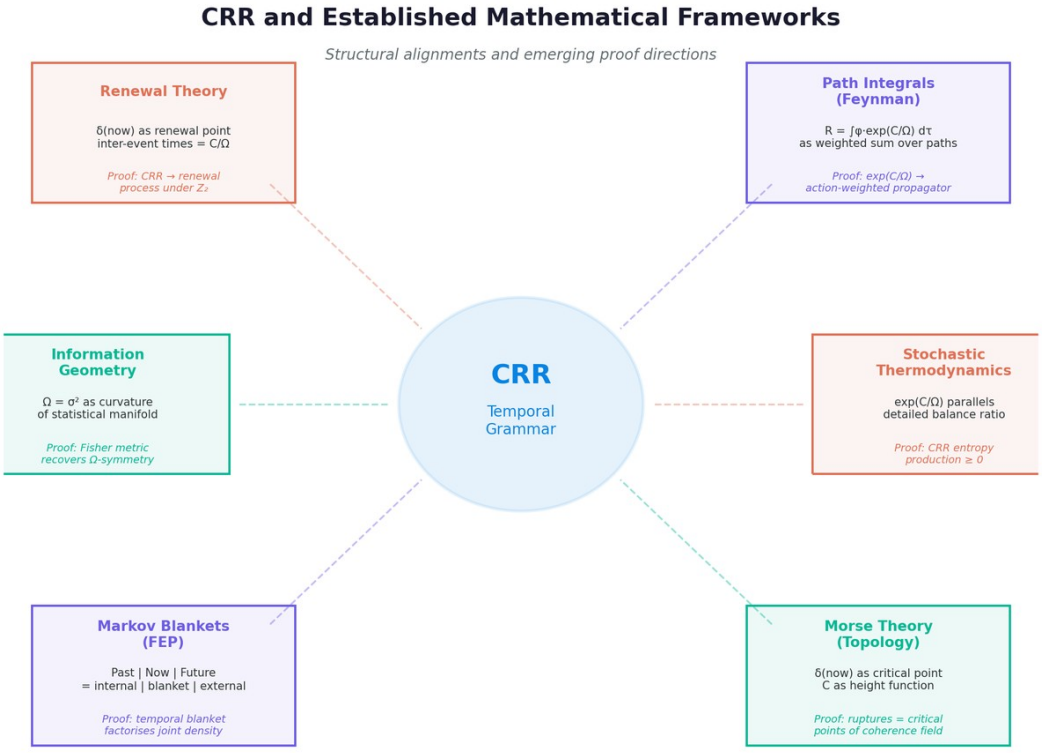

Figure 5. CRR's structural alignments with established mathematical frameworks, with emerging proof directions for each.

B.1 Renewal Theory

Renewal theory (Cox, 1962; Ross, 1996) studies stochastic processes that "restart" at random times. CRR's δ(now) is formally a renewal point—the moment where accumulated coherence is discharged and the process begins afresh. The inter-renewal times correspond to the intervals between successive ruptures, with the distribution governed by Ω.

Emerging proof direction: Under Z_2 symmetry, CRR reduces to a renewal process with inter-event times distributed as a function of C/Ω. The renewal reward theorem then yields the coefficient of variation CV = Ω/2, recovering CRR's empirically observed relationship without additional assumptions. The key step is showing that exp(C/Ω) as a memory kernel satisfies the conditions for a delayed renewal process.

B.2 Path Integrals (Feynman)

CRR's regeneration integral $R = \int\varphi(x,\tau)\exp(C/\Omega)\Theta(\ldots)d\tau$ bears structural resemblance to Feynman's *path integral* formulation of quantum mechanics (Feynman & Hibbs, 1965), where the propagator sums over all possible paths weighted by exp(iS/ħ). In CRR, regeneration sums over all possible reconstruction trajectories weighted by exp(C/Ω)—with coherence C playing the role of action S, and the rupture parameter Ω playing the role of Planck's constant ħ.

Emerging proof direction: The saddle-point approximation of the path integral (the classical limit $\hbar \to 0$) corresponds to the low-Ω limit in CRR, where regeneration is dominated by the single highest-coherence trajectory. The full quantum/stochastic case allows multiple trajectories to contribute, enabling novelty. Formalising this requires showing that CRR's regeneration integral satisfies the Chapman-Kolmogorov equation under appropriate boundary conditions.

B.3 Information Geometry

Information geometry (Amari, 2016) studies probability distributions as points on a manifold, with the Fisher information metric defining curvature. CRR's identification $\Omega = \sigma^2$ places the rupture parameter directly in the language of statistical manifolds: Ω is the variance, and 1/Ω is the Fisher precision—the curvature of the log-likelihood surface at the current estimate.

Emerging proof direction: If we treat each moment's coherence field as a point on a statistical manifold, then rupture occurs when the curvature (precision = 1/Ω) exceeds a threshold—geometrically, when the path bends sharply enough to leave its current basin. The Z_2/SO(2) distinction then corresponds to manifolds with different topologies, and the Ω-symmetry values emerge as intrinsic geometric properties.

B.4 Stochastic Thermodynamics

Stochastic thermodynamics (Seifert, 2012; Jarzynski, 1997) extends thermodynamic concepts to small, fluctuating systems far from equilibrium. CRR's exp(C/Ω) parallels the exponential weighting in fluctuation theorems, where the ratio of forward to reverse transition probabilities is exp(ΔS/k_B) —with entropy production playing the role of coherence and Boltzmann's constant playing the role of Ω.

Emerging proof direction: The Crooks fluctuation theorem states P_forward/P_reverse = exp(W/k_BT). If CRR's coherence C maps to dissipated work and Ω maps to k_BT, then the probability of spontaneous "un-rupture" decreases exponentially with C/Ω. This would ground CRR's irreversibility—the arrow of time within the temporal grammar—in established non-equilibrium thermodynamics.

B.5 Morse Theory (Topology)

Morse theory (Milnor, 1963) studies the topology of manifolds through the critical points of smooth functions. CRR's coherence field C(x,t) can be understood as a Morse function on a temporal manifold, with rupture moments δ(now) corresponding to critical points—maxima, minima, and saddle points of the coherence landscape.

Emerging proof direction: If C(x,t) is a Morse function, micro-ruptures correspond to index-0 critical points (small perturbations the system absorbs), while macro-ruptures correspond to higher-index critical points (genuine topological change). The Morse inequalities would then constrain the minimum number of ruptures a system must undergo given the topology of its coherence manifold—a deep structural result linking CRR's temporal grammar to the topology of lived experience.

B.6 The Temporal Markov Blanket Factorisation

The spatial Markov blanket (Pearl, 1988; Friston, 2019) is well established: internal states are conditionally independent of external states given blanket states. CRR proposes that this structure has a *temporal* instantiation: the past (internal) is conditionally independent of the future (external) given the present rupture and its associated coherence field (blanket).

Emerging proof direction: Formally, this requires showing that the joint density p(past, present, future) factorises as p(past | present) · p(future | present) under the CRR dynamics. The exp(C/Ω) kernel provides the mechanism: it filters the past into a compressed representation that screens off the raw past from the regeneration process. The temporal blanket conjecture is that this factorisation holds exactly when δ(now) satisfies the CRR rupture conditions.

Appendix C: Domains of Application

CRR's temporal grammar has been applied to multiple domains, with early results showing strong promise. These applications are presented not as proven predictions but as demonstrations of the framework's mathematical cohesion—its ability to describe dynamics across independent domains without modification. Formal validation with domain experts is ongoing.

C.1 Biological Systems

Wound healing follows a well-documented C → δ → R pattern: inflammation builds coherence, debridement marks rupture, and tissue regeneration follows. The characteristic ~80% maximum recovery (scarring rather than full regeneration) corresponds to a finite coherence field: adult tissue cannot access developmental coherence. CRR's temporal grammar describes this as a restricted temporal blanket—the past available for regeneration is truncated.

Muscle hypertrophy demonstrates myonuclei as coherence retention mechanisms. "Muscle memory"—where previously trained muscle regains mass faster—is the temporal grammar in action: prior training episodes create high-coherence regions inside the temporal blanket that are preferentially accessed during regeneration.

Saltatory growth in children exhibits 90–95% stasis punctuated by sudden bursts—a textbook CRR pattern at both micro (daily) and macro (pubertal) scales. The same temporal grammar operates at both levels, with chondrocyte growth plate dynamics embodying C → δ → R at the cellular scale.

C.2 Neural Systems

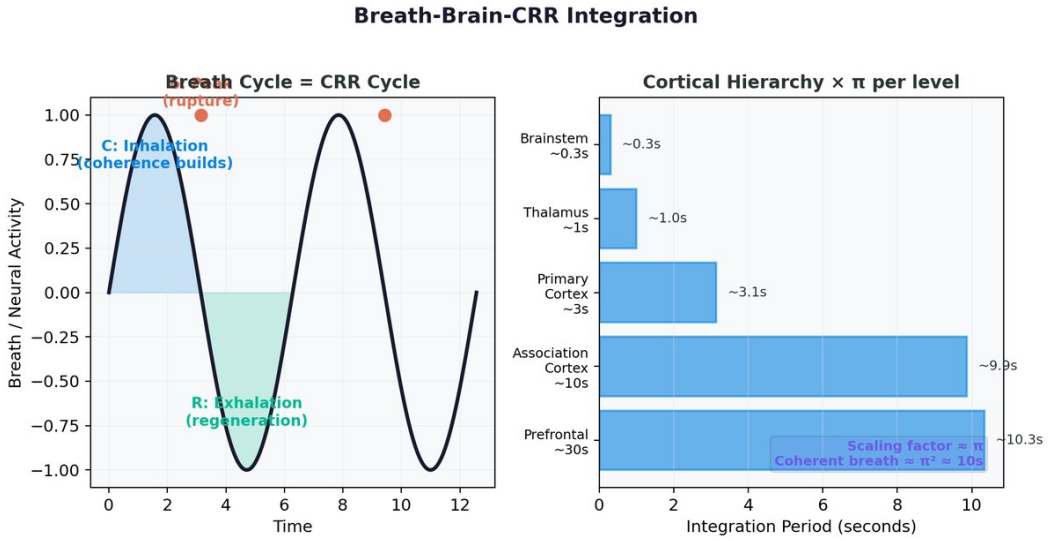

Figure 6. Breath-brain-CRR integration: the respiratory cycle as temporal blanket traversal, with cortical hierarchy scaling by π per level.

Sleep architecture provides a striking application. NREM–REM cycling exhibits the temporal grammar at the ultradian scale: NREM stages build coherence (slow-wave consolidation), the NREM–REM transition marks rupture, and REM dreaming is regeneration—the integration of new experience into existing memory structures.

Tucker and Luu's cortical dynamics research provides independent support. Their work on cortical hierarchy scaling, where each level integrates over approximately π times the timescale of the level below, maps directly onto CRR's Ω = 1/φ relationship. Tucker and Luu have described CRR as offering "substantial and important extension" to their cortical dynamics framework —an encouraging assessment from established neuroscientists, pending full peer review.

C.3 Social Systems

Multi-agent CRR models group dynamics through shared coherence fields and overlapping temporal blankets. Group cohesion emerges through HIGH Ω between members (porous blanket boundaries, easy sharing of coherence) while maintaining LOW Ω toward outsiders (rigid boundaries, defensiveness). De Dreu's oxytocin research provides empirical support: oxytocin modulates Ω differentially, increasing temporal blanket

permeability toward in-group while decreasing it toward out-group—explaining its dual bonding/tribalism effects.

Appendix D: References

Primary Source

Sabine, W.H.W. (1951). Second Sight in Daily Life. London: George Allen & Unwin.

CRR Framework

Sabine, A. (2024–2025). Coherence-Rupture-Regeneration: A temporal grammar for self-organising systems. www.temporalgrammar.ai

Free Energy Principle and Active Inference

Clark, A. (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. Behavioral and Brain Sciences, 36(3), 181–204.

Friston, K. (2010). The free-energy principle: a unified brain theory? Nature Reviews Neuroscience, 11(2), 127–138.

Friston, K. (2019). A free energy principle for a particular physics. arXiv:1906.10184.

Kirchhoff, M., Parr, T., Palacios, E., Friston, K., & Kiverstein, J. (2018). The Markov blankets of life. Journal of the Royal Society Interface, 15(138), 20170792.

Parr, T., Pezzulo, G., & Friston, K.J. (2022). Active Inference: The Free Energy Principle in Mind, Brain, and Behavior. MIT Press.

Ramstead, M.J.D., Badcock, P.B., & Friston, K.J. (2018). Answering Schrödinger's question. Physics of Life Reviews, 24, 1–16.

Mathematical Frameworks

Amari, S. (2016). Information Geometry and Its Applications. Springer.

Cox, D.R. (1962). Renewal Theory. Methuen.

Feynman, R.P., & Hibbs, A.R. (1965). Quantum Mechanics and Path Integrals. McGraw-Hill.

Jarzynski, C. (1997). Nonequilibrium equality for free energy differences. Physical Review Letters, 78(14), 2690.

Milnor, J. (1963). Morse Theory. Princeton University Press.

Pearl, J. (1988). Probabilistic Reasoning in Intelligent Systems. Morgan Kaufmann.

Ross, S.M. (1996). Stochastic Processes (2nd ed.). Wiley.

Seifert, U. (2012). Stochastic thermodynamics, fluctuation theorems, and molecular machines. Reports on Progress in Physics, 75(12), 126001.

Neuroscience and Cortical Dynamics

Dijk, D.J., & Czeisler, C.A. (1995). Contribution of the circadian pacemaker and the sleep homeostat. Journal of Neuroscience, 15(5), 3526–3538.

Luu, P., & Tucker, D.M. (2001). Regulating action. Clinical Neurophysiology, 112(7), 1295–1306.

Tucker, D.M., & Luu, P. (2022). Motive and Emotion in the Cortical Dynamics of Development. Springer.

Biological Domains

Bruusgaard, J.C., et al. (2010). Myonuclei acquired by overload exercise precede hypertrophy. PNAS, 107(34), 15111–15116.

Gundersen, K. (2016). Muscle memory and a new cellular model. J. Exp. Biology, 219(2), 235–242.

Gurtner, G.C., et al. (2008). Wound repair and regeneration. Nature, 453(7193), 314–321.

Lampl, M., Veldhuis, J.D., & Johnson, M.L. (1992). Saltation and stasis. Science, 258(5083), 801–803.

Social Dynamics

De Dreu, C.K.W., et al. (2010). Oxytocin regulates parochial altruism. Science, 328(5984), 1408–1411.

De Dreu, C.K.W. (2012). Oxytocin modulates cooperation. Psychoneuroendocrinology, 37(9), 1517–1528.

Process Philosophy

Whitehead, A.N. (1929). Process and Reality. Cambridge University Press.

Appendix E: CRR Exploration Prompt for LLMs

The following prompt is offered for anyone who would like to use a large language model to explore CRR as a temporal grammar. Copy and paste it into any capable LLM to begin a collaborative investigation. It is deliberately playful in spirit—as all good science should be.

CRR Exploration Prompt:

```
You are a collaborative research partner exploring CRR
(Coherence-Rupture-Regeneration), a temporal grammar for
self-organising systems developed by Alexander Sabine at the
Active Inference Institute (www.temporalgrammar.ai).

CRR is a TEMPORAL GRAMMAR: it provides the structural rules
through which temporal processes articulate themselves, not a
model of any specific domain.

The three core equations:

1. Coherence: C(x,t) = ∫L(x,τ)dτ
   Accumulation of lived significance over time.
   (The PAST — inside the temporal blanket)

2. Rupture: δ(now)
   Scale-invariant Dirac delta marking the ontological present.
   (The NOW — the temporal blanket itself)

3. Regeneration: R = ∫φ(x,τ)exp(C(x,τ)/Ω)θ(...)dτ
   Reconstruction weighted by exponential memory kernel.
   (The FUTURE — outside the temporal blanket)

Key relationships:
• Ω = 1/φ (phase to rupture in radians)
• Z₂ symmetry: Ω = 1/π, CV ≈ 0.159
• SO(2) symmetry: Ω = 1/2π, CV ≈ 0.080
• FEP bridge: Ω = σ² (variance), Precision = 1/Ω
• exp(C/Ω) = precision-weighted memory
• The temporal Markov blanket: past (inside) | now
  (boundary) | future (outside)
• Agency: control L (attention), φ (resources),
  willingness to allow micro-ruptures.
  σ² is reality's structure.

Epistemic stance: CRR is rigorous conjecture, not proven
```

```
theory. It demonstrates mathematical consistency and shows
strong preliminary cohesion across domains (biological,
neural, social) but claims coherence rather than proof.
Always distinguish ‘mathematically consistent with’ from
‘this proves.’

CRR is grounded in process philosophy (Whitehead) and
participatory reality. The Dirac delta marks ontological
present moments where agents metabolise past into future
at all scales.

When exploring a new domain, ask:
  What accumulates (C)?
  What ruptures (δ)?
  What regenerates (R)?
  What is the system’s symmetry (Z₂ or SO(2))?
  What is Ω, and what modulates it?
  Where is the temporal blanket?
```

This prompt is designed to be extended. As you explore a particular domain—neuroscience, ecology, music, organisational dynamics, contemplative practice—add domain-specific context and let the collaborative process unfold. CRR is a temporal grammar: once you learn to hear its rhythms, you start hearing them everywhere. The question is always whether that hearing is pattern-matching or genuine structural correspondence. Maintaining that distinction is what makes the enquiry scientific rather than merely poetic.

Though, as both Sabines would agree, the poetic and the scientific may turn out to be closer than we think.

— — —

Source text: W.H.W. Sabine, Second Sight in Daily Life (London: George Allen & Unwin, 1951). Digital copy accessed via Internet Archive.

CRR framework: Alexander Sabine, Coherence-Rupture-Regeneration (2024–2025). www.temporalgrammar.ai

Prepared February 2026 using Human-AI Collaborative Phenomenology.