Information Sharing, Record Overlap, and Aggregation in VERSF

A seven-state information-theoretic test and constraints on compression-driven binding

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General reader summary

VERSF explores the possibility that every completed physical event leaves a lasting record, and that the accumulation of these records can influence what happens next. This paper asks whether information theory can help explain why some records become linked and why stable structures might emerge, without assuming that nature is trying to create complexity.

We first examine a simple model with seven possible record states, reflecting VERSF's seven-state starting point. Two records that are entirely independent share no information; two identical records share about 2.807 bits. This provides an exact way of measuring common information. It does not mean that we have calculated the full complexity of a real physical history, or derived VERSF's physical record probabilities.

Next we connect that shared information, as a deliberately stated modelling assumption, to the existing VERSF picture of attraction opposed by a short-range record-overlap cost. The original example favours a pair separated by about 1.259 times the characteristic length ξ. We then ask what would happen if shared information itself reduced the energy. For a weak assumed reward, the separated pair remains favourable; beyond a critical reward of about 0.16150 in the model's dimensionless units, complete overlap becomes energetically preferable. In other words, more shared information does not automatically produce more stable or better organised structures.

A further test examines how sensitive the binding result is to the chosen record width, alphabet and spatial correlation profile. The numerical transition threshold changes substantially, and for sufficiently smooth near-contact profiles there is no finite threshold making exact contact favourable. This limits the physical interpretation of the original figure while giving us a clearer standard for future VERSF calculations.

The paper now also tests the actual archived directed VERSF history clock. Rather than assuming how seven records relate, it calculates how much one address predicts the next: approximately 0.883 bits per update. Following the full seven-address completion rule gives about 18.798 bits of distinguishability between the resulting address histories and an independent-address comparison. These figures describe the complete sequence of addresses; a real physical record that forgets some steps will generally keep less information. They are a mathematical property of an existing VERSF probability model, not a new energy law or a measured force strength.

Abstract

This paper examines information sharing in VERSF using two deliberately distinct levels of calculation. First, an illustrative symmetric seven-symbol record channel supplies exact Shannon mutual information and a hypothetical information-reward perturbation to the existing Gaussian-smeared Yukawa aggregation potential. For the reference width s = 0.4 and alphabet N = 7, the global contact transition occurs at g = 0.1614959146; controlled changes to width, alphabet and spatial correlation profile show that this threshold is not universal, and sufficiently smooth near-contact profiles exclude finite-g exact-contact selection. A two-bit marginal-control example establishes that equal mutual information does not identify mixed statistical response or physical gauge stiffness. Second, we calculate information directly from the archived directed D36 seven-address Fold kernel. At the conditional calibrated drive $\alpha = 0.9590011097$, adjacent addresses share 0.8834813682 bits per step. An exact absorbing-chain calculation of the source first closed-cover rule gives 21.2776829509 updates and a full stopped-history relative entropy of 18.7984364450 bits against a stationary iid-address reference, satisfying an exact occupation factorisation. A zero-drive control shows that larger information per step need not mean larger information per completed event. The D36 calculation is inherited from a reproducible conditional source law; its full-path information is not the information retained by the native physical record. None of these results determines an information-energy coupling, physical event selection, many-body binding or Standard Model force strengths.

Research status. Revised exploratory working paper, 1 November 2026. Exact information measures are calculated from a stated toy channel and from the archived conditional D36 clock. The energy reward remains counterfactual; physical joint-event weighting and gauge response are not derived.

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1. Question and scope

VERSF considers irreversible event commitments, persistent records, and their possible consequences for later current, field, matter and completion responses. Its recent *Fact Momentum, Record Overlap, and the Emergence of Stable Aggregates* calculation constructs a static scalar-mediated attraction opposed by an assumed positive record-overlap response, and exhibits a pair bound at finite separation [4]. The accompanying gauge-response programme makes clear that statistical information geometry, current susceptibility and a physical action Hessian are distinct quantities [4,5].

The question addressed here is therefore deliberately narrower than the claim that "information makes complexity". **Can an information-theoretic measure of shared records be defined, computed and used to falsify particular information-driven aggregation proposals within the existing VERSF benchmark?** The work proceeds in three stages: an exact seven-state mutual-information calculation; a controlled perturbation of the existing pair potential; and a statistical mixed-response control grounded in a joint two-record law already considered in the VERSF programme. A final symmetry test concerns the possibility of gauge-sector discrimination.

Sections 3–8 use a seven-symbol test alphabet whose symmetric correlation law is not the actual VERSF transition law. Section 9 tests robustness of that illustrative model. Section 10 instead calculates information inherited from the archived directed D36 address kernel and the native first closed-cover stopping rule, still without asserting that the address process equals the complete physical marked-event distribution.

2. Algorithmic and Shannon information: different claims

For a finite binary string x, the Kolmogorov complexity $K_U(x)$ is the length of the shortest programme that makes a fixed universal computer U output x [1,2]. A corresponding algorithmic mutual-information quantity may be written, up to conventional additive and logarithmic qualifications, as

$$I_{\mathrm{alg}}(x{:}\,y) \simeq K_U(x) + K_U(y) - K_U(x,y).$$

Exact Kolmogorov complexity cannot be computed for arbitrary finite strings. Hence the calculations below do **not** report K_U or I_{alg} for realised VERSF histories. Instead, they test the mathematically tractable ensemble quantity

$$I(X;Y) = \sum_{x,y} p\,(x,y)\log_2 \frac{p(x,y)}{p(x)p(y)} = H(X) + H(Y) - H(X,Y),$$

where H is Shannon entropy and I is measured in bits [3]. Under an explicitly specified, repeatable stochastic source, Shannon entropy controls asymptotic expected description length for long typical sequences. This motivates the term *compression proxy*, but it does not turn single-event mutual information into a physical energy, an algorithmic-complexity theorem or a new action principle.

In particular, high incompressible complexity is not synonymous with organised structure. Random strings can have high K_U while exhibiting little reusable correlation. The present test therefore uses **shared** information, not total information or a postulated tendency to maximise complexity.

3. An exact seven-state correlated-record channel

Let $X, Y \in \{0, \ldots, 6\}$ denote two record labels. Take a uniform source $p(X = i) = 1/7$ and define the one-parameter conditional law

$$P(Y = j \mid X = i; c) = \frac{1-c}{7} + c\,\delta_{ij}, \qquad 0 \le c \le 1. \qquad (1)$$

This is a specified test channel. Its joint probability is $P(i,j) = P(j \mid i)/7$, and Y also has the uniform marginal. Write

$$p_{=} = \frac{1+6c}{7}, \qquad p_{\neq} = \frac{1-c}{7}, \qquad (2)$$

where $p_{=}$ is the probability of the matching outcome *conditional on a given* i, and each of the six mismatches has conditional probability $p_{\neq}$. Direct substitution gives

$$I_7(c) = \log_2 7 + p_{=}\log_2 p_{=} + 6p_{\neq}\log_2 p_{\neq}, \qquad (3)$$

with the continuous convention $0\log 0 = 0$. Thus $I_7(0) = 0$ bits and $I_7(1) = \log_2 7 = 2.8073549221$ bits. The transition matrix may be written $P = c\mathbf{1} + (1-c)\mathbf{1}\mathbf{1}^{\mathrm{T}}/7$ and has spectrum

$$\mathrm{spec}(P) = \{1, c, c, c, c, c, c\}. \qquad (4)$$

Proposition 1 (informational mode degeneracy). A channel of the form (1) distinguishes the uniform component from the six-dimensional orthogonal subspace, but is isotropic within that subspace. It cannot resolve six distinct physical modes or unequal gauge-sector responses without an additional, source-derived representation-sensitive attachment. This follows immediately from (4).

4. Spatial record-overlap attachment

The existing VERSF benchmark uses finite-width Gaussian sources with $s = \sigma/\xi$, separation $u = r/\xi$, and normalised pair overlap proportional to $\exp[-u^2/(4s^2)]$ [4]. To test an informational interpretation on this **same length scale**, define

$$c(u) = \exp\left[-\frac{u^2}{4s^2}\right], \qquad s = 0.4. \qquad (5)$$

This identification is a model attachment: a Gaussian *spatial overlap* is not automatically a correlation coefficient for the actual marked-event records. Its value is that it produces an exact, positive, normalized seven-state probability law whose information can be compared with the previously calculated pair potential without changing the benchmark geometry.

Separation u = r/ξ	Correlation c(u)	I_7 (bits)
0.000	1.000000	2.807355
0.250	0.906961	2.199918
0.500	0.676634	1.239311
1.000	0.209611	0.149000
1.259	0.084115	0.027195
1.500	0.029729	0.003652
2.000	0.001930	0.000016

Table 1. Exact mutual-information profile for the stated seven-state channel and Gaussian correlation map; values rounded after calculation.

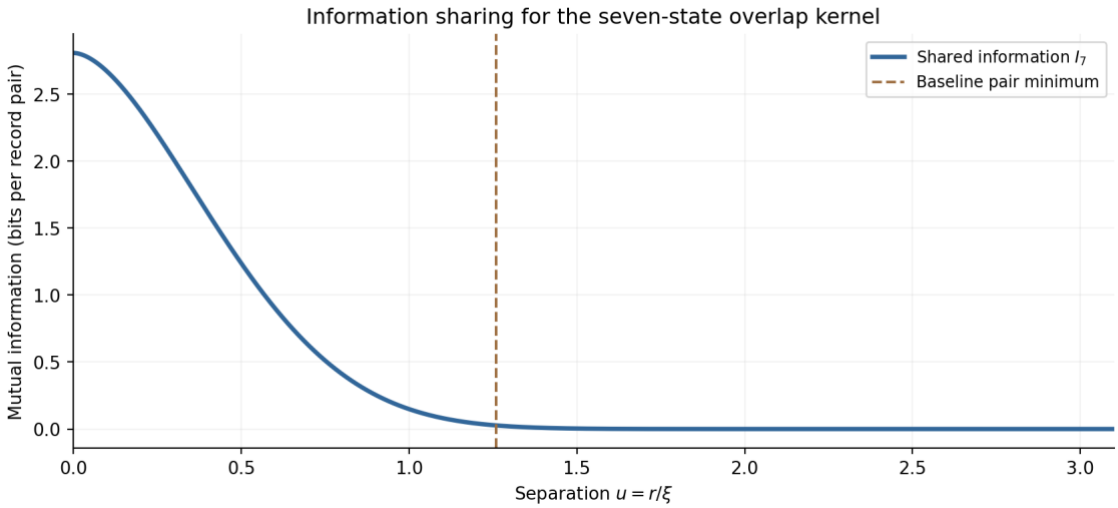


Figure 1. Shannon mutual information of the two seven-state record labels as a function of dimensionless separation. The vertical marker is the benchmark VERSF pair minimum, not an independently derived information maximum.

The shared information falls rapidly outside the profile overlap. At the existing benchmark pair separation $u \simeq 1.2587166$, it is only 0.0271955 bits per label pair under this chosen channel. This is an informative comparison, not a claim about the Shannon entropy of the true completed-event law.

5. The inherited VERSF aggregation benchmark

Use precisely the finite-width scalar model employed in [4]. Its dimensionless static pair potential is

$$V_0(u) = B\exp\left[-\frac{u^2}{4s^2}\right] - A\,Y_s(u), \quad \mu = m_\kappa \xi, \qquad (6)$$

where the exact Gaussian-smeared Yukawa profile is

$$Y_s(u) = \frac{e^{\mu^2 s^2}}{2u}\big(F(u) - G(u)\big). \qquad (7)$$

$$F(u) = e^{-\mu u}\mathrm{erfc}\big(\mu s - u/(2s)\big), \qquad G(u) = e^{\mu u}\mathrm{erfc}\big(\mu s + u/(2s)\big).$$

At contact, use its nonsingular limit

$$Y_s(0) = \frac{1}{\sqrt{\pi}s} - \mu e^{\mu^2 s^2}\mathrm{erfc}(\mu s). \qquad (8)$$

For the reproduced conditional benchmark $A = B = 1, s = 0.4, \mu = 2/\sqrt{3}$, bounded minimisation gives

$$u_*^{(0)} = 1.25871657, \quad V_0\left(u_*^{(0)}\right) = -0.12402603, \quad V_0(0) = 0.32364847. \qquad (9)$$

The finite-separation minimum comes from a specified short-range overlap penalty opposing the longer-range scalar attraction. The record stiffness and coupling signs have not been derived from the complete physical VERSF event Hessian. A radially stable pair is not, by itself, a stable many-body aggregate.

6. Counterfactual information-energy perturbation and a threshold

To test the strongest simple hypothesis that shared information is energetically rewarded, **add only as an explicit diagnostic**

$$V_g(u) = V_0(u) - gI_7\big(c(u)\big), \qquad g \geq 0. \qquad (10)$$

Here g is dimensionless energy per bit in the chosen model units. No VERSF source calculation selects g; this term may also double-count genuine record physics if the underlying V_0 record sector already

encodes the same correlations. Equation (10) is useful precisely because it puts the claim at risk of numerical contradiction.

Proposition 2 (contact-versus-pair threshold). Compare the energy at $u = 0$ with the best separated configuration $u > 0$. Since $I_7(0) > I_7(u)$ for $u > 0$, contact is globally no higher in energy than any separated configuration whenever

$$g \geq g_{\mathrm{crit}} := \max_{u>0} \frac{V_0(0) - V_0(u)}{I_7(0) - I_7(u)}, \qquad (11)$$

where the displayed ratio is relevant at positive u with $V_0(u) < V_0(0)$. The formula follows by rearranging $V_g(0) \leq V_g(u)$. Maximising the one-dimensional ratio for the parameters of (9) gives

$$\boxed{g_{\mathrm{crit}} = 0.1614959146, \qquad u_{\mathrm{coexist}} = 1.1803606.} \qquad (12)$$

At the threshold, both branches have energy approximately -0.1297278853; immediately above it, the contact configuration is energetically lower. The separated local minimum still exists over the illustrated range, so the result is a **level crossing in this pair model**, not a demonstration that all possible aggregate states or all metastability disappear.

Assumed g	Global minimum u	Minimum Vg	Separated local min u
0.000	1.258717	−0.124026	1.258717
0.100	1.217919	−0.127167	1.217919
0.150	1.188614	−0.129194	1.188614
0.160	1.181477	−0.129657	1.181477
0.161496	0 and 1.180361	−0.129728	1.180361
0.180	0	−0.181675	1.165279
0.200	0	−0.237823	1.145450

Table 2. Numerically checked global minima (contact versus positive-separation branch). All potential values are dimensionless and conditional; g is not calibrated from experiment.

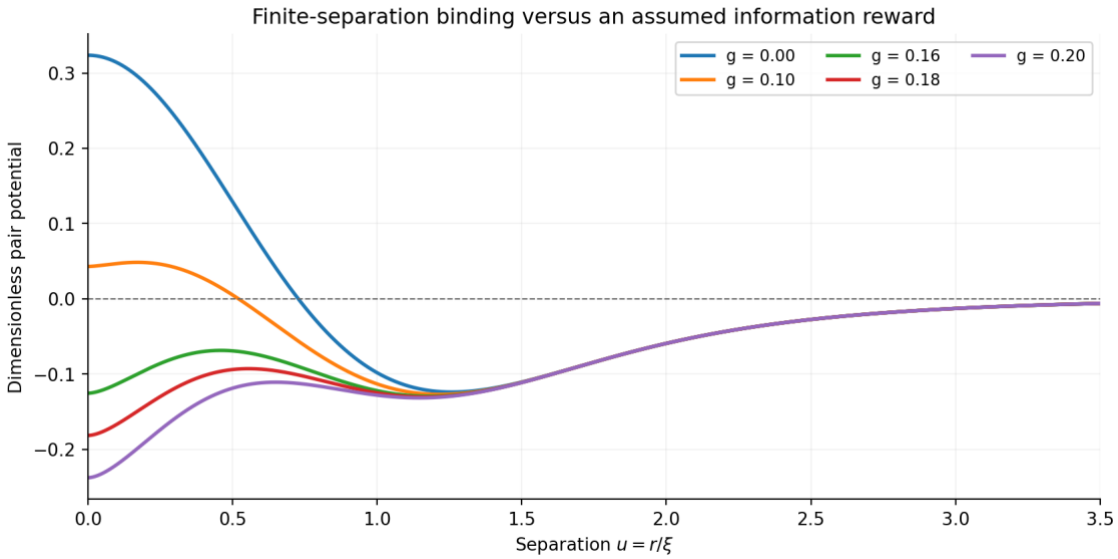


Figure 2. Exact pair-potential curves for several hypothetical information-reward strengths. The shift from a finite-separation global minimum to contact is a model warning against equating maximal information reuse with stable organisation.

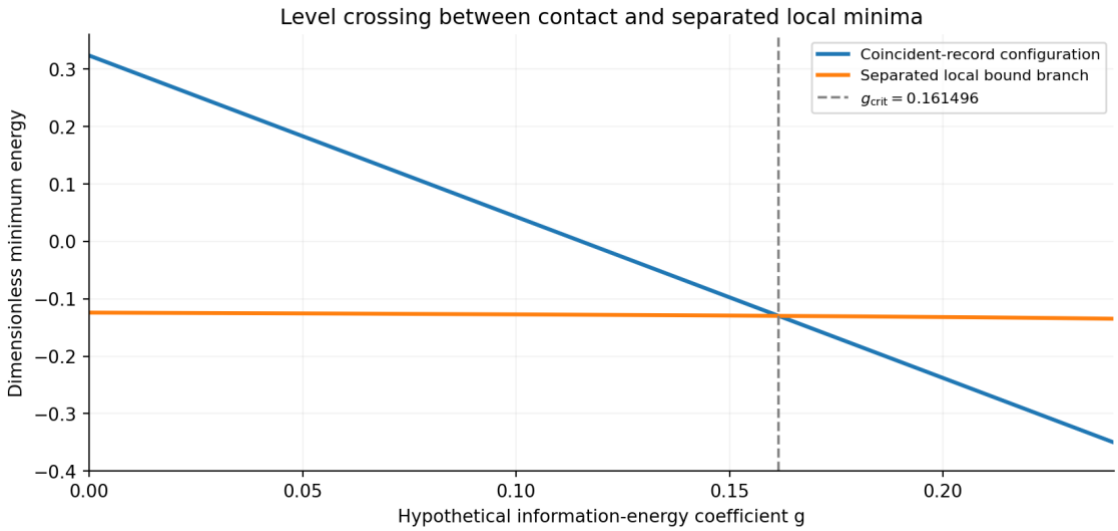


Figure 3. Energy level crossing for contact and the finite-separation branch. The vertical line marks the calculated conditional threshold.

Interpretation. Stronger sharing is not equivalent to more organised structure: in this model it eventually favours maximally coincident records, destroying the energetic preference for two distinct constituents at finite separation. The counterexample does not establish that true VERSF must possess this extra coupling; rather, it identifies a condition that any proposed information-to-energy law must avoid or counterbalance if finite structures are to remain preferred.

7. Independent two-bit information and mixed-response test

The recent VERSF aggregation analysis includes an elementary joint two-mark law with separate marginals that leave a correlation parameter undetermined [4]. At the unbiased background, take $a, b = \pm 1$ and

$$p(a, b \mid c) = \frac{1 + abc}{4}, \qquad |c| < 1. \qquad (13)$$

Its marginals are both uniform. The exact mutual information is

$$I_2(a; b) = 1 - h_2\left(\frac{1 + c}{2}\right), \quad h_2(p) = -p\log_2 p - (1 - p)\log_2(1 - p). \qquad (14)$$

To measure mixed statistical response, use the local family

$$p(a, b \mid u, v, c) = 1/4\,(1 + au + bv + abc), \qquad (15)$$

on the positive-probability parameter neighbourhood about $u = v = 0$. The Fisher matrix for u, v is exactly

$$G(c) = \frac{1}{1 - c^2}\begin{pmatrix} 1 & -c \\ -c & 1 \end{pmatrix}. \qquad (16)$$

Correlation c	I_2 (bits)	Fisher G_{uu}	Mixed G_{uv}
0	0	1	0
+0.6	0.278072	1.5625	−0.9375
−0.6	0.278072	1.5625	+0.9375

Table 3. Information is insensitive to the sign of the correlation, while the mixed Fisher element reverses sign. The profiled single-coordinate response is calculated separately in (17).

The physically relevant caveat becomes sharper on taking the statistical Schur complement:

$$G_{uu} - \frac{G_{uv}^2}{G_{vv}} = 1 \qquad \text{for every } |c| < 1. \qquad (17)$$

Thus unequal mixed information blocks do not even guarantee unequal *retained statistical* coefficients after the other score is relaxed, much less unequal physical gauge kinetic terms. Conversely, elementary Pinsker bounds impose the valid consistency condition, in bits,

$$|\mathrm{Cov}(a,b)| = |c| \le \sqrt{2\ln 2\ I_2(a;b)}. \qquad (18)$$

For $c = 0.6$, the right side is 0.62088, correctly exceeding the actual covariance 0.6. Equation (18) is a bound on *statistical covariance* in this unbiased binary family, not a bound on physical coupling constants.

Proposition 3 (nonidentification). The scalar information measure I_2 does not determine the sign of the mixed Fisher response G_{uv}; in the stated family the profiled response is moreover independent of c. Consequently, mutual information alone cannot determine the mixed physical record–current–gauge Hessian of VERSF.

8. Relationship to the K = 7 cycle and the Standard Model programme

The actual VERSF six-cycle history response is not described by the isotropic channel of Section 3. In the cited aggregation continuation, the source-regulated cycle quadratic form at the illustrative parameter $\rho = 0.4$ has inverse-mode responses [4]:

Six-cycle mode	Inverse response
Uniform cycle	21.145603
First harmonic (two modes)	15.192000
Second harmonic (two modes)	11.816000
Alternating	11.140800

Table 4. Previously reported VERSF source-cycle inverse responses; these are not new information-theory predictions.

The existing conditional 75:25 harmonic projection yields $\chi_{\mathrm{cyc}} = 18.8132024$ on its stated attachment [4]. A factor-separable source attachment $B_A = b \otimes T_A$ multiplies all representation traces by the same cycle susceptibility. Consequently, it cannot generate unequal physical sector corrections by information sharing alone. The different normalisation conventions $(6,13/2,378)$ for $q = 6Y$ and $(6,6.5,10.5)$ after division of the hypercharge trace by 36 must also remain distinct [4,5].

The present test does **not** determine the physical colour, weak or hypercharge coupling strengths, nor does it derive the more specific VERSF participation-dependent coefficients. The relevant physical comparison requires the same-parent, background-dependent action Hessian, including Fact-Lock restrictions, current and matter response, field-dependent measure, completed-history weighting, and spatial refinement [4,5]. The information calculations are diagnostic observables; identifying them with the low-momentum transverse gauge-action coefficients would be an unsupported additional assumption.

9. Robustness of the information-induced contact transition

The critical reward in Section 6 is conditional on the record width, the seven-symbol information alphabet and the mapping from spatial separation to record correlation. To test whether the qualitative result is an artefact of a single value, we independently re-evaluated the full Gaussian-smeared Yukawa potential and maximised the exact contact-versus-separated energy ratio for each parameter choice. The scalar attraction parameters A = B = 1 and μ = $2/\sqrt{3}$ were retained throughout.

9.1 Width and alphabet controls

First vary $s = \sigma/\xi$ while retaining the Gaussian correlation $c(u) = \exp[-u^2/(4s^2)]$ and the seven-symbol channel. The minimum of the unperturbed pair potential is re-optimised at every width; it is not assumed to remain at the original separation.

Width s	Critical reward g	Coexistence u
0.30	0.096163	0.6213
0.35	0.130818	0.8945
0.40	0.161496	1.1804
0.45	0.188084	1.4752
0.50	0.210834	1.7788

Table 5. Width sensitivity in the original seven-symbol information model. The thresholds are dimensionless and vary with the chosen record geometry.

Next replace the seven-symbol test alphabet by an N-symbol symmetric channel, keeping the potential and $s = 0.4$ fixed. The same formula holds with $p_{equal} = [1+(N-1)c]/N$ and $p_{unequal} = (1-c)/N$.

Alphabet N	Maximum I at contact	Critical reward g
2	1.00000 bits	0.450310
7	2.80735 bits	0.161496
14	3.80735 bits	0.119906

Table 6. Alphabet sensitivity. A change in maximum available sharing changes the numerical reward required for a contact transition; no universal g emerges.

9.2 Profile-shape control and a stronger counterexample

Retain $s = 0.4$ and $N = 7$, but generalise the assumed distance–correlation map to the profile family $c_\beta(u) = \exp[-(u^2/(4s^2))^\beta]$. The Gaussian case is $\beta = 1$. The energy term remains $-g\, I_7(c_\beta(u))$.

Profile β	Critical finite g	Outcome
0.50	0.169335	Contact wins above threshold
0.75	0.164546	Contact wins above threshold
1.00	0.161496	Original Gaussian case
1.25	No finite threshold	Contact is locally disfavoured
1.50	No finite threshold	Contact is locally disfavoured

Table 7. Profile sensitivity. For $\beta > 1$ the contact-versus-separated ratio diverges near zero; quoting a large finite value obtained after imposing an arbitrary small-distance cutoff would be mathematically misleading.

The reason is analytic. In the present benchmark $V_0(0) - V_0(u)$ grows as a positive constant times u^2 near $u = 0$. In contrast, the information loss $\log_2 N - I_N(c_\beta(u))$ scales as $u^{(2\beta)}|\log u|$ for small positive u. Therefore the ratio in the Section 6 threshold criterion diverges as $u \to 0$ when $\beta > 1$. For every finite g, there exist sufficiently small positive separations whose energy is below the exact-contact energy. The previous finite threshold consequently applies only to specified profile classes; it is not an invariant information-theoretic prediction.

9.3 Physical interpretation

The robust conclusion is narrower but stronger: an assumed information reward can change relative binding preferences and, for some profiles, favour contact, but its quantitative effect depends on the spatial map and alphabet. Information sharing is neither sufficient to guarantee finite-radius stability nor universally guaranteed to destroy it. Any physical VERSF application must supply the map, record state space, and energy coupling from a common action rather than choose them for the desired binding outcome.

10. Native D36 completed-history information: a source-derived calculation

Sections 3–6 used a freely specified seven-symbol record channel. We now calculate a distinct information observable directly from the archived VERSF D36 discrete-Fold transition law, without introducing a spatial correlation function, information reward or measured force constant. This is a genuine source-inherited probability model, though its historical status remains conditional: D36-R1 demonstrates that the discrete-Fold clock is reproducible, not that the primitive substrate uniquely selects that clock [8].

10.1 The inherited directed kernel

Let address 0 be the hub and addresses 1,…,6 form a directed rim. The archived reference assigns the hub probability 1/7 for each destination. At rim address i, the only possible destinations are the hub, the same rim address, and the clockwise and anticlockwise rim neighbours. With the source drive α and $D(\alpha) = 2 + 2\cosh\alpha$, these four probabilities are respectively 1/D, 1/D, $\exp(\alpha)/D$ and $\exp(-\alpha)/D$. The stationary probabilities are $\pi_0 = 7/[7+6D]$ and $\pi_i = D/[7+6D]$ for each rim address [8].

The archived one-bit calibration $\alpha = 0.959001109719975$ follows from the D36 discrete-Fold entropy-production condition, not from the information test below. It must not be confused with the independent continuous-time clock studied in the D36 reproducibility paper. The stationary law at this root gives $\pi_0 = 0.1894237309$ and each $\pi_i = 0.1350960448$.

10.2 Exact adjacent-address mutual information

For a stationary chain X_t with this kernel P, the mutual information between successive addresses is a directly calculable observable. It measures prediction of the next address given the present address, relative to a stationary independent-address baseline.

$$I_D36 = I(X_t;X_{t+1}) = H_2(\pi) - \Sigma_x \pi_x H_2(P_x\bullet). \quad (20)$$

Direct substitution of the seven-by-seven transition matrix gives:

D36 observable	Archived calibrated drive	Zero-drive control
Drive α	0.9590011097	0
Stationary address entropy $H_2(\pi)$	2.795574 bits	2.771890 bits
Conditional next-address entropy	1.912092 bits	2.182306 bits
Mutual information per update	0.883481 bits	0.589584 bits
Mean closed-cover duration	21.277683	32.970510
Stopped-history divergence to iid null	18.798436 bits	19.438899 bits

Table 8. New information-theoretic calculations from the inherited D36 transition law. The zero-drive control is recalculated using its own stationary probability and stopping-time distribution. The final quantity is a full-path relative entropy, not mutual information between two terminal record labels.

The nonzero value at α = 0 is expected: even without a directed bias the hub/rim graph remains a constrained Markov chain, so the next address depends on the present one. The increase from 0.589584 to 0.883481 bits per step as α changes reflects enhanced address predictability in these two conditional models. It is not an isolated effect of irreversible fact recording or an independent measure of organisation.

10.3 Exact first closed-cover calculation

Use the already defined native completed-history stopping rule: choose anchor a from π, retain self-transitions, and stop at the first return to a after all seven addresses have been visited. The final return transition is included. On the augmented (current address, visited-mask) state space, the hub anchor has 255 transient states and each rim anchor has 204. This is the actual closed-cover experiment, not a fixed clock or an independent exponential stopping time [9,10].

For a full stopped address history $h = (a = x_0,x_1,\ldots,x_\tau = a)$, compare the native path law against the iid-address null Q that uses the same initial π and draws every subsequent address independently from π.

Both processes apply the same deterministic stopping rule. The path likelihood ratio is the product of $P(x_t,x_{t+1})/\pi(x_{t+1})$, so the stopped-path relative entropy is

$$D_{KL}(P_{stop} \,||\, Q_{stop}) = E_P[\, \Sigma_{t=0}^{\tau-1} \log_2(P(X_t,X_{t+1})/\pi(X_{t+1}))\,]. \quad (21)$$

For every fixed anchor, expected visits v_x to source address x before its complete-cover return obey $vP = v$. As the D36 chain is irreducible, this implies $v_x = E[\tau \mid a]\pi_x$. Thus the expectation of the additive log ratio factors exactly:

$$D_{KL}(P_{stop} \,||\, Q_{stop}) = E_P[\tau]\, I_{D36}. \quad (22)$$

At the archived drive, the exact stopped-chain solution gives $E[\tau] = 21.2776829509185$ and $D_{KL} = 18.7984364450$ bits. The hub-conditioned mean is 20.6188715185 and every rim-conditioned mean is 21.4316407267, matching the prior completed-cover calculation. An independent sparse absorbing-chain solve, with the reward $\log_2(Pxy/\pi y)$ accumulated on each allowed step, reproduces the product identity to about 7×10^{-15} bits numerically.

These are two different descriptions of related address predictability. The 0.883481-bit number belongs to a stationary adjacent-address pair. The 18.798436-bit number is a Kullback–Leibler divergence between distributions of complete stopped address sequences and their iid reference; it is not a Kolmogorov-complexity saving for a single sequence and does not mean that a physical terminal record contains that many bits.

10.4 Record coarse graining, controls and physical scope

This distinction matters because the completed-event record may not retain every address transition. The separate 1 November VERSF record study finds that omitting unrecorded waiting steps while preserving richer crossing labels retains only 0.837468, 0.867344 and 0.924389 of the tested six-direction D41 score information in its stated observation [10]. Those percentages concern statistical scores, not the D36 full-path KL above, and must not be multiplied into 18.798436 as though they were fractions of the same observable.

For any specified deterministic terminal or ledger map $R = f(h)$, data processing guarantees $D_{KL}(P_R \,||\, Q_R) \le 18.798436$ bits in the calibrated D36 address-only comparison. Equality would require an information-sufficient record for the P-versus-Q path likelihood. To determine the actual retained value one must apply the native record map to the same two stopped path distributions, then recompute their divergence. A physical history-conditioned predictive quantity involving J, A, matter and record labels still requires the complete current–link–record–completion–matter joint transfer, not merely its seven-address projection.

A useful negative control emerges from the zero-drive branch. Its adjacent-address mutual information is smaller (0.589584 bits/update), but its longer mean complete-cover duration yields a slightly larger full-path KL (19.438899 bits). Thus “more information per step” and “more accumulated discrimination per completed event” need not rank two histories the same way. Any fact-momentum interpretation must specify the grain and what record survives completion.

11. A source-level route to a decisive test

A useful continuation should replace the toy record channel and invented g by the native current-dependent marked instrument and the complete completed-event transfer, using exactly the same evolving carrier as the energy response. The following gates are distinct and falsifiable:

1. **Physical history law.** Construct the normalised $P_{\mathrm{phys}}(h)$ of stopped, completed histories from the source-selected joint current–link–record–matter–completion evolution. Preserve the record lock and correct stopping rule. The static two-record channel (1) cannot substitute for this law.
2. **History-sensitive information.** At identical available instantaneous physical controls s, compare predictions $P(R_{n+1} \mid h, s)$ for distinct admissible committed histories h; measure their

divergence against a history-blind null $P(R_{n+1} \mid s)$. This tests genuine predictive history dependence, not an assumed incentive to maximise entropy.

3. **Same-carrier response.** Calculate $I(R_{n+1}; R_{0:n} \mid s)$ and the mixed physical action derivatives on the same physical preparation, and test whether any apparent relationship survives conditioning, gauge constraints and elimination of only physically relaxable directions.

4. **Aggregation and stability.** On source-derived spatial record profiles, calculate the physical projected completion kernel, finite-N bound configurations, constrained normal modes and energy barriers; compare history-labelled and history-scrambled controls at fixed instantaneous field/matter arrangements.

5. **Gauge-sector discrimination.** Test whether the actual representation-resolved current attachment breaks the mode degeneracy of (4) and produces independently calculated transverse gauge kinetic coefficients without tuning them to experimental strengths.

A candidate information-energy identification should be **rejected** if its predicted response disappears on holding the physical state fixed, if its sign conflicts with the physical restricted Hessian, if it drives the aggregate into unphysical collapse without other source terms, or if it leaves the physical gauge-sector ratios undetermined despite a claim of deriving them.

12. Numerical reproducibility and checks

The calculations use double-precision Python/NumPy/SciPy and the previously supplied source model parameters. The Yukawa formula (7) was checked independently against the Fourier-space integral

$$Y_s(u) = \frac{2}{\pi}\int_0^\infty \frac{k^2 e^{-s^2k^2}}{k^2+\mu^2}\frac{\sin(ku)}{ku}\,\mathrm{d}k, \qquad (19)$$

using the continuous $u = 0$ limit of the sinc factor. At $u \in \{0,0.5,1,1.2587166,2,3\}$, direct quadrature and the closed expression agreed with absolute errors no greater than 2.3×10^{-16} in this numerical implementation. This independently checks the Gaussian-smeared Yukawa evaluation, but not the source selection of its coefficients.

The critical value was calculated by two independent approaches: (i) the root of the difference between contact energy and the numerically minimised separated branch; and (ii) direct maximisation of the analytic ratio (11). Both return $g_{\mathrm{crit}} = 0.1614959146$ to the precision quoted. Exact normalisation and endpoint controls verify (1)–(4) and (13)–(17). All numerical values in Tables 1–3 are regenerated from the stated formulae; no measured particle-physics parameters enter the fit.

The accompanying reproducibility script is titled versf_ait_test.py. The document's plots use the same formulae and independently evaluate the displayed curves; the script's numerical output is stored as versf_ait_results.json. The numerical implementation tests this **conditional finite model**, not the complete source-selected VERSF dynamics.

Additional native-law verification. The D36 calculation uses the published hub/rim kernel and stationary law of D36-R1 [8], not the isotropic toy channel. For every one of seven starting anchors, a reachable-state absorbing-chain system solves the expected update count and the additive log-likelihood reward. Its transient-state counts are 255 for the hub and 204 for each rim. Stationary mixing reproduces the published 21.2776829509 mean, and the KL accumulation agrees with $E[\tau]\, I(X_t;X_{t+1})$ within double-precision residual. The $\alpha = 0$ branch and the profile-sensitivity tables are regenerated independently from the same script. The reward tested in Section 6 is not inferred from this KL value.

13. Conclusions

The information-theoretic interpretation of VERSF record overlap can be made precise enough to test. The seven-state channel supplies a fully normalised probability model and an exact shared-information observable, while the existing Gaussian-overlap scale gives it a controlled spatial comparison. The

experiment also shows why the interpretative claim must be constrained: strong hypothetical information reward can replace a stable finite-separation global minimum with contact; and the sign and reduced response of mixed record variables cannot be recovered from mutual information alone.

The new D36 calculation supplies something more source-grounded than the toy overlap channel: a finite, reproducible statistical measure of address predictability and a stopped-history divergence obeying the actual VERSF completion rule. Yet the conclusion remains constrained. Neither this address information nor the independent toy reward is the physical record–current–gauge action, and different temporal or record coarse grainings can discard or rearrange what is observed. An eventual physical advance must identify retained records, spatial couplings, action-derived energies and representation-resolved gauge observables from one common completed-event source.

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Research declaration. The D36 address information and completed-path KL are computed from an inherited conditional discrete-Fold source law. The spatial information-reward test and its critical coupling are separate counterfactual constructions; they are not extracted from the physical VERSF action. This work makes no experimental claim, does not calculate uncomputable Kolmogorov complexity, and does not derive Standard Model force strengths.