Biology Note 9: The Memory System as a Method VI Phase Transition (Coarse-Grained Analysis)

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Abstract

This note treats the entire memory system (11DD) as a single Method VI phase transition at the coarsest granularity. The four stages are identified as: emergence (workbench activation), spectral flip (encoding event), flip (entering the irreversible sleep compression window), and establishment (long-term distributed storage). The asymmetry ratio r satisfies r >> 1. A key methodological clarification is that r is strictly a topological distance ratio, not a time ratio; time serves here only as a coarse degenerate proxy, and the true r requires information-theoretic proxies to refine.

Three core claims: (i) the memory system admits a coarse-grained Method VI description; (ii) the 12DD workbench and the 11DD emergence stage are structurally distinct positions, not the same construct under different labels; (iii) filtering is the default, encoding into long-term storage is the exception.

Three auxiliary contributions follow. First, emotional valence is relocated from a single-stage property (typically assigned to "encoding") to a cross-stage modulation signal. 12DD basic emotions serve as the primary parameter (with cat-anchoring as operational heuristic); 14DD complex emotions serve as the value-standard source; 13DD serves as the filter executor that applies selective severance to the narrative-integration pathway of 11DD traces. Second, **13DD's veto acts only at the narrative-integration layer and does not descend into 12DD**: vetoed traces remain in 11DD, 12DD continues to read them and generate bodily responses, but the subjective narrative layer cannot retrieve them. This explains why trauma memories under "suppression" still trigger somatic responses (skin conductance, avoidance behavior, emotional flooding), and why infantile-amnesia-era traces continue to shape adult psychology despite being unavailable to conscious recall. Third, specific memory pathologies are positioned as failures at specific stages of the transition chain (classic amnesia, Alzheimer's, PTSD, sleep disorders, SDAM/HSAM, emotional blunting, depression, dissociative amnesia, and infantile amnesia).

A methodological byproduct of the note is a general principle for cross-domain application of Method VI: *first identify the topological distance quantity proper to the system; time is a fallback only when no more faithful proxy is available*. This principle provides epistemic refinement to all prior r estimates in the SAE series.

Finer-grained sub-transitions within each of the four stages are left to subsequent notes.

1. Introduction: Memory as a Phase Transition Problem

1.1 The problem

Traditional memory research typically describes memory as a continuous "storage + consolidation + retrieval" process, or decomposes it into short-term, intermediate, and long-term stores along a gradual timeline. These descriptions accommodate a great deal of empirical data, but both are **construct-layer descriptions**: they trace the surface sequence of events without touching the structural discontinuities underneath.

Yet the memory system exhibits several phenomena that continuous models cannot absorb. First, working-memory content dissipates at task completion in a way that is not gradual decay but approximately instantaneous: the intermediate result of mental arithmetic loses availability within seconds, leaving an unbridgeable gap between "I was just using it" and "it is gone." Second, sleep-dependent consolidation cannot be replaced by "more waking processing": no amount of repeated rehearsal during wakefulness substitutes for what a single night of sleep accomplishes. Third, the clinical signature of Alzheimer's disease — recent memories lost first, remote memories relatively preserved until late stages — is difficult to generate from a continuous decay model, which would predict that older content decays first.

Together these phenomena suggest something specific: memory is not a continuous process. It is a chain of distinct phase transitions, each with its own threshold, its own Le Chatelier buffer, its own crossing condition, and each displaying $r >> 1$ asymmetry.

This note uses the Self-as-an-End (SAE) framework (Qin 2024, DOI 10.5281/zenodo.18528813), specifically Method VI — phase-transition windows and experimental design (Qin 2026, DOI 10.5281/zenodo.19464507) — as the analytic tool. The aim is not to replace existing neuroscience models of memory but to provide a common structural coordinate system within which those models can locate themselves.

1.2 Methodological positioning of this note

Method VI's core claim is that any system with threshold response, Le Chatelier buffering, and construct-emergence relations admits a four-stage description: emergence, spectral flip, flip, and establishment. The asymmetry ratio r — defined as the emergence distance divided by the flip-to-establishment distance — satisfies $r >> 1$. The ZFCρ mathematical structure gives a prior prediction of $r \approx 5$, but Method VI's core argument depends only on the weaker condition $r >> 1$.

The critical methodological claim of this note is that **Method VI has a fractal character**. It is not a method fixed to a single scale, but applicable recursively at varying grain. Anth-1 (Qin 2026, DOI 10.5281/zenodo.19531334) applied it to species-scale DD emergence; Anth-2 and Anth-3 and Anth-4 applied it to civilization-scale 14DD and 15DD emergence; this note applies it at a narrower scale still — the internal operation of the 11DD memory system as a single phase transition. Different grains reveal different transitions, each itself admitting four-stage structure with its own r; these scales do not compete, they layer.

This note restricts itself to **the coarsest grain**: treating the full trajectory from information entry to long-term storage as a single phase transition. This choice has two rationales. First, at the coarsest grain the empirical anchors are most secure — working-memory dissipation, sleep compression, long-term distributed storage are three landmarks that every memory researcher accepts. Putting them into the four-stage framework is firmer ground than immediately attempting the finer sub-transitions. Second, the SAE series has a consistent pattern of first establishing the coarse skeleton and then recursing inward (Anth-1 first establishes 13DD emergence, later papers refine); this preserves a clear division of labor across notes, rather than attempting all grains in one document.

Finer sub-transitions (workbench-to-11DD-buffer, early stabilization-to-long-term conversion, and each of these internally) are left to subsequent notes.

1.2.1 Critical clarification for cross-domain application of Method VI

A methodological step must be completed before applying Method VI to any new domain: identifying the **topological distance quantity** of that domain.

In Method VI's original mathematical source (ZFCρ), r is strictly a distance ratio on Ω-space (the integer-prime-factor complexity space). This is not a time distance, nor a spatial distance, but a ratio of structural complexity along an intrinsic coordinate. $\Omega = 2.75$ to $\Omega = 3.79$ is the emergence-to-flip distance (about 1.04 units), $\Omega = 3.79$ to $\Omega = 4.01$ is the flip-to-establishment distance (about 0.22 units), and their ratio is approximately 4.7, close to 5. The "distance" is an intrinsic Ω-space coordinate; it is not time elapsed on Earth.

When Method VI is applied to a new system, the first methodological step is to identify the corresponding topological distance quantity for that system. *Time serves only as a fallback when no more faithful proxy is available.* Anth-1 uses millions of years divided by tens of thousands of years as r for 13DD emergence; Anth-2 uses roughly 96000 years divided by 1500 years for 14DD emergence; Anth-3 uses 2300 years divided by 200 years for 15DD emergence. These are all uses of time as a degenerate proxy — not because time is the right quantity, but because anthropology has no direct access to the topological distance of species-level subjectivity emergence. Time can be used because it correlates roughly with the real topological distance on population averages, but it is not the topological distance itself.

In the memory system, quantities closer to the intrinsic meaning are available. The cumulative information entropy at the 12DD workbench, and the negentropy injection carried by effective ripple-spindle coupling events during SWS, are both physical quantities that neuroscience can measure. This note, for robustness, uses time as a rough proxy to give an initial r estimate, while explicitly acknowledging that this is a degenerate proxy and pointing to the more faithful direction.

This methodological clarification serves more than Note 9 itself. It provides a general principle for how Method VI should be applied across domains: **first identify the topological distance quantity proper to the system; time is a fallback only when no more faithful proxy is available.** All prior r estimates in the SAE series should be read as "legitimate uses of a degenerate proxy," not as direct measurements of the true r. This principle deserves explicit inclusion in future versions of Method VI.

1.3 Relation to prior SAE literature

Anth-1 §3 defined 11DD and 12DD as construct layers and declared them a "continuous accumulation process with no internal phase transitions." This note identifies internal phase-transition structure within 11DD's own operation, which may appear to contradict Anth-1's declaration. But the two are not in conflict, and the resolution lies in recognizing that they observe the same object at different resolutions.

Anth-1 is concerned with 13DD emergence: self-completeness as a cross-layer event arising from the 11DD+12DD construct base. At that resolution, the construct layer as a whole is correctly seen as "the continuous accumulation base," and its internal fine structure is legitimately abstracted away — Anth-1's argument does not need to resolve the interior of the construct. Just as a mountain range, viewed from a great distance, can correctly be described as "continuous uplift," while its internal faults and folds remain invisible at that resolution.

This note observes 11DD's own operation at a higher resolution; the internal phase-transition structure then becomes visible. This is not a correction of Anth-1. It is a further observation enabled by resolution-increase (zoom in). Both observations are correct at their own resolution, and together they constitute a layered description of the same object. This resolution-increase itself instantiates Method VI's fractal claim: different resolutions see different levels of phase-transition structure. Put otherwise: this note's identification of internal phase-transition structure in 11DD is fully consistent with Anth-1 §3's declaration of "continuous accumulation" at 13DD emergence scale. Anth-1 looks downward from 13DD and sees the construct layer providing "continuous accumulation base"; this note looks at 11DD at its own scale and finds that the same "continuous base" reveals discrete phase transitions internally. Each declaration is correct at its own observation scale.

Relations to other SAE literature: Method VI supplies the analytic framework itself; Method VII (Via Negativa, Qin 2026, DOI 10.5281/zenodo.19481305) supplies the foundation for this note's "recovering normal structure from pathological failure" strategy, and is invoked again in §5.3 where 13DD's veto of 11DD traces is identified as a concrete instance of Via Negativa's downward pathway within the SAE hierarchy. SAE Consciousness Series Paper 5 (Qin 2026, DOI 10.5281/zenodo.19385464), which proposed the 13DD "mine/not-mine" filter, provides the direct framework for §6.9's infantile-amnesia mechanism. Bio Note 8 (ADHD and AI transplant memory, Qin 2026) left a gap in its §11 concerning 12DD-related pathology; this note supplies the structural base for that gap. Methodology IX (SAE Methodology of Consciousness, in preparation) will require a complete treatment of 11DD as a construct-layer hub; this note provides the coarse-grained version of that treatment.

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2. Method VI Background and Fractal Application

2.1 Core elements of Method VI

Method VI's response function takes the following form. Let z be the state variable describing the subject's penetration depth in state space. The response g(z) is a three-segment function: $g(z) = 0$ for $z < F$ (emergence zone, with microscopic activity but zero or negative net macroscopic effect); $g(z) = \delta \times (z - F) / (E - F)$ for $F \leqslant z < E$ (the climbing segment from flip to establishment, with net effect rising from zero to δ); $g(z) = \delta$ for $z \geqslant E$ (fully established regime with maximum effect δ).

F is the flip point, E is the establishment point, δ is the true maximum effect amplitude. The asymmetry ratio r is defined as $r = F / (E - F)$, the ratio of the emergence distance to the flip-to-establishment distance. $r = 1$ is symmetric; $r >> 1$ means the emergence distance is much longer than the flip-to-establishment distance.

Le Chatelier buffering is the physical intuition behind Method VI. During emergence, the buffer continuously resists the system's transition to the established state; once the buffer is broken (z crosses F), establishment proceeds relatively quickly because the mechanisms maintaining the old state have fallen below their operational threshold. This geometric feature is the structural source of $r >> 1$.

ZFCρ gives $r \approx 5$ as a specific numerical prediction, but Method VI's core argument depends only on the weaker $r >> 1$. The precise number may differ across systems, but the asymmetry itself is cross-domain stable.

2.2 Fractal application principle

A key property of Method VI is **fractality**: it applies recursively at different grain levels. The SAE framework has already deployed Method VI at multiple scales.

At the cosmological-species scale, cross-layer DD emergence fits the four-stage structure. For example, 13DD emergence from the 11DD+12DD construct base: animals remain stuck in the emergence zone (great apes pass mirror self-recognition but lack linguistic self-representation); Homo sapiens crossed spectral flip around 50000 years ago (cave art and symbolic burial) and flip (myth-ritual closure) not long after, then entered the establishment phase.

At the civilization scale, 14DD institutional emergence and 15DD universal-personhood-dignity emergence both follow four-stage trajectories. Anth-2 analyzes 14DD from Göbekli Tepe emergence to codified-law establishment; Anth-3 analyzes 15DD from Axial-Age emergence to UDHR establishment; Anth-4 places these within the full civilizational arc.

At the individual scale, the developmental formation of DD layers (e.g., the 13DD three functional positions discussed in Note 7) also fits the four-stage structure.

At the system scale — this note's scale — the internal operation of the memory system is itself a phase transition.

At yet finer scales, the millisecond-level dynamics of single encoding events, and the molecular-level processes of synaptic plasticity, are in principle also amenable to Method VI analysis. These are left to subsequent notes.

r varies across scales. At Anth-1's scale, r is of order 100 (millions of years over tens of thousands). At the civilization scales, Anth-2's r is of order 50 and Anth-3's is of order 10. At the coarse grain of this note, the initial estimate is r in the range 5 to 8, close to ZFCρ's original prediction. At even finer single-event grains, r may become extremely large (perhaps of order 100 at the scale of a single encoding event). This cross-scale distribution of r is itself an open research question, deferred to §10.

Different scales share the same structural form while having distinct physical content. The four stages in this note map to four specific memory processes, developed in the next section.

2.3 Operational definitions at the coarsest grain

For the coarse-grained framework of this note, the latent state variable Z is defined as the **penetration depth** of information into the memory system. Penetration depth is an abstract quantity with several concrete proxy candidates: encoding strength, the product of emotional valence and attention, repetition count, post-sleep duration. Different sections of this note use different proxies, but all point to the same underlying abstract quantity — how close the information is to long-term storage.

The definition of flip point F is crucial. In this note F is pinned strictly as: **entry into the irreversible sleep-compression window, i.e., the threshold of effective SWS cascade crossing**.

Three clarifications of this definition. First, F is not the completion of the SWS cascade; completion is closer in meaning to E than to F. F is the event of crossing into an irreversible state — the door passing, not the room filling. Second, crossing F requires the simultaneous engagement of the SWS–spindle–sharp-wave-ripple triple cascade; a missing oscillation can prevent F from being crossed. Third, F is a threshold point rather than a fixed clock time; which specific second the system enters irreversibility depends on neural state, though empirically F typically occurs in the early segment of deep sleep.

Establishment point E is defined as stable long-term distributed cortical storage. This is a process state rather than an instantaneous event: cortical traces begin distributing after flip completion and gradually stabilize over time. E is not a sharp moment but a state concept. At the coarse grain, however, the flip-to-establishment distance (E - F) can still be roughly estimated: from the crossing of the SWS-cascade threshold to the state where long-term distributed storage is stable enough to resist decay at longer timescales.

The emergence distance is defined as the full span from information's entry into the workbench to F crossing, including the workbench-activation period, the encoding event (spectral flip), and the early-stabilization period. At the coarsest grain this is proxied by the duration of a single waking period. The flip-to-establishment distance is proxied by the duration of a night's key SWS window plus the subsequent consolidation period. Their ratio gives a rough estimate of r.

All these proxies are time proxies — uses of a degenerate proxy. The true r should be expressed in information-theoretic topological distance, developed in §4.

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3. The Four Stages at the Coarsest Grain

This section develops the four-stage structure of the memory system at the coarsest grain. For each stage, I give the boundary, the Le Chatelier buffering characteristics, and the neuroscience anchoring points. The four stages are: emergence (workbench activation), spectral flip (encoding event), flip (entry into the irreversible sleep-compression window), and establishment (long-term distributed storage).

3.1 Emergence: workbench activation

Boundary. Content in the emergence stage exists in the 12DD workbench — the run-time activation state — but has not yet been received by the 11DD system. This stage contains the first geometric cut that this note makes relative to traditional memory research.

A critical distinction belongs here: the **12DD workbench and the 11DD emergence stage are two structurally distinct positions**. This is SAE's coarse-grained geometric cut through a construct that memory literature has long conflated. "Working memory" and "short-term memory" are often used interchangeably, but they point to different things in the SAE framework: the 12DD workbench handles runtime mental computation (intermediate results of mental arithmetic, current intentions, the computation process itself); the 11DD emergence stage handles content that has been received by 11DD but has not yet crossed the subsequent flip point.

This distinction does not deny the multi-component structure of working memory as studied in the literature (Baddeley, Cowan, Oberauer et al.). Baddeley's phonological loop, visuospatial sketchpad, and central executive; Cowan's 4±1 focus of attention; Oberauer's state-based activation model — all are refined characterizations of the 12DD workbench's internal structure. This note's contribution is to provide, from the SAE hierarchical perspective, a **geometric cut** that separates the long-conflated construct into two structural positions. Daume et al. (2024, *Neuron*) provides empirical grounding: during working-memory tasks, hippocampal persistent activity predicts subsequent long-term recognition. Empirically, then, the boundary between 12DD workbench and 11DD emergence is not an impermeable wall but a semi-permeable one, with continuity between working-memory strength and subsequent encoding. This continuity does not eliminate the structural distinction, just as the continuous phase-transition process between liquid water and water vapor does not erase the distinction between liquid and gas as two well-defined states.

Candidate physical criterion for the 12DD/11DD distinction. Hippocampal persistent activity. Pure 12DD workbench content (e.g., intermediate steps in mental arithmetic 47 × 23) is maintained by the prefrontal-parietal network without triggering hippocampal persistent activity; when content carries salience or emotional valence, the hippocampus enters persistent activity, and this is the entry into the 11DD emergence stage. Daume et al.'s finding — that hippocampal persistent activity strength during working-memory tasks predicts whether content is later recognized over the long term — supports this criterion: hippocampal persistent activity is the material basis of the transition from 12DD workbench to 11DD emergence. This criterion is a candidate, not a settled judgment; further neuroscience work is needed to refine it. But under current evidence, it is the most operational indicator closest to the structural boundary.

Le Chatelier buffering. The emergence-stage buffer has four sources. First, attentional transience: attention has a limited sustain window, and unreceived content is lost when attention dissipates. Second, task-goal termination: task completion clears the workbench, discarding content relevant to the task but not to long-term memory. Third, workbench capacity limits: Cowan's 4±1 focus of attention is a rough characterization. Fourth, interference: new stimuli entering the workbench displace older content. Together these four mechanisms resist "all workbench content entering the 11DD pathway," so that the vast majority of workbench content dissipates at this stage.

Filtering as the default. Most workbench content never crosses F. Intermediate computation, transient perception, passing thoughts — more than 99% dissipate here. This is *not* a failure of memory. It is the system doing its job, just as a filter's normal operation is to hold most of the water back while letting a few drops through. If all workbench content entered the 11DD pathway, the 12DD prediction system would be drowned in noise and long-term storage would exhaust within days. The emergence-stage Le Chatelier buffer is not a defect; it is the design.

Cross-species comparison. The cat's 12DD workbench is "short" in both dimensions: shallow prediction window (anticipatory depth sufficient only for immediate tasks) and brief maintenance duration (content dissipates at task completion). Together these produce strong Le Chatelier buffering, and most information fails to reach any recognizable 11DD emergence stage. One possible misreading must be clarified here: the cat's reflex-latency can be shorter than the human's, but this pathway does not pass through the 12DD workbench; its architecture relates to SAE's cross-layer directionality problem, which is outside the scope of this note (see the series outline's dedicated cross-layer-directionality note). For this note, it suffices to note that the shortness of the workbench is a matter of economy (long prediction depth is not maintained when it is not needed), not of reaction speed — reaction latency and workbench duration are independent dimensions. The dog is different: domestication deepened the 12DD workbench along the single channel of predicting the owner's intentions, allowing sustained goal-directed behavior, but this deepening does not automatically translate into access to 11DD emergence, and the dog's long-term memory remains sharply constrained. Humans have moderate 12DD workbench capacity and maintenance time, but the modulation of Le Chatelier buffer crossing — by emotional valence, intention, and narrative — is the most complex; hence the crossing probability π_cross has the widest adjustable range. This cross-species observation grounds §5's argument that 12DD basic emotions serve as a cross-species ancient modulation signal.

Intra-human trainability. Considerable plasticity exists within humans in the effective maintenance time of the 12DD workbench. Through domain-specific training, effective maintenance can extend from the baseline of a few minutes to ten-plus minutes or longer. A familiar example is the coffee-shop barista: "one large oat-milk latte with syrup, one medium iced Americano no sugar, one small cappuccino extra foam" — this multi-dimensional order can be maintained stably in the workbench for close to ten minutes until the drinks are completed. Similar extension is found in chess masters (maintaining multi-step position analyses), simultaneous interpreters (source-language fragments held for the seconds-to-tens-of-seconds of translation output), and emergency-room physicians (tracking multiple patient states concurrently).

This extension is likely not that "the workbench itself gets larger" but that chunking plus schema integration lets the same number of chunks carry far more raw information. Cowan's 4±1 capacity remains intact; what grows is the structural density of each chunk through training. The barista's "medium iced Americano no sugar" is not multiple independent slots maintained in the workbench but a single schema-node call: the combination of "medium" + "iced" + "Americano" + "no sugar" is already a preformed schema node in the barista's 11DD, and the workbench needs only to hold a pointer to it.

The implication is sharper: **the "length" of the 12DD workbench is not fully determined by 12DD itself but largely by 12DD's ability to call into 11DD's existing schema base**. Training the workbench is in fact training the coupling efficiency between 12DD and 11DD's schema substrate, not expanding the workbench's own capacity. This aligns with Oberauer's state-based working memory theory and points toward a deeper question — the 12DD hub's access relation to 11DD long-term storage — which is left to a subsequent dedicated note (Paper A in the series outline).

Neuroscience anchor. The prefrontal-parietal network's persistent activity maintains workbench content; state-based working memory theory (Oberauer) casts working memory as the activated subset of long-term knowledge combined with attentional focus; Daume et al. 2024's key finding shows that hippocampal persistent activity strength is the material basis of crossing probability. Finer millisecond-level dynamics and synaptic-level mechanisms are left to subsequent notes.

3.2 Spectral flip: the encoding event

Boundary. Spectral flip is the discrete event of transition from the 12DD workbench into the

11DD early-stabilization pathway. This is not a smooth gradation but a clear-cut crossing: after the crossing, content no longer depends on the 12DD workbench's sustained maintenance but enters 11DD's early-stabilization mechanisms.

The spectral flip must be distinguished from the flip (§3.3). Spectral flip (this section) is the encoding event — the entry into the 11DD pathway. Flip (§3.3) is the entry into the irreversible sleep-compression window from the early-stabilization state. Both are phase transitions, but at different positions in the chain. Spectral flip typically occurs during waking; flip typically occurs during sleep. Spectral flip is the "information crosses into 11DD" door; flip is the "information enters long-term distributed storage" door.

Le Chatelier buffering at this stage. The buffer at the spectral-flip stage is weaker than at emergence because information has already acquired a measure of persistent activity in hippocampus and related structures. But the buffer remains: encoding-efficiency limits, interference, and subsequent forgetting can all cause information to be lost here. The key fact is that emotional valence first becomes a significant modulator of crossing probability π_cross at this stage. The joint signal of attention × emotional valence × salience determines whether a given item successfully crosses the spectral flip into the 11DD early-stabilization pathway.

Emotional valence here has multiple dimensions. At the most basic level, 12DD basic emotions like fear, surprise, and anger enhance encoding via the amygdala-hippocampus coordination mechanism (the McGaugh tradition). At higher levels, prefrontally-modulated assessments of personal relevance, self-association, and task importance also enter π_cross. These modulations continue to affect the fate of information in subsequent stages, but the spectral flip is where they first function as a selection signal.

Neuroscience anchor. Amygdala-hippocampus coordination is the classical emotional-memory enhancement mechanism (the McGaugh tradition since 2000 and subsequent extensive experimental evidence). The locus coeruleus–noradrenergic system issues phasic bursts during emotionally salient events, amplifying hippocampal encoding. Prediction error triggers hippocampal encoding, the classical role of the hippocampus as a novelty-prediction integrator. Qasim et al. (2023, *Nature Human Behaviour*) provide direct evidence from human intracranial recordings: synchronized high-frequency activity between amygdala and hippocampus marks successful emotional encoding, a neural signature of the spectral-flip event.

A note. Spectral flip is not "entering long-term memory." Crossing the spectral flip only means entering the 11DD early-stabilization pathway; content can still be discarded in subsequent stages, particularly during sleep-period selective forgetting at the flip stage (§3.3). So from "I remember what I had for lunch today" to "a year from now I still remember what I had for lunch on this specific day," at least two phase transitions must be crossed: spectral flip and flip. Each is an independent battleground of Le Chatelier buffering.

3.3 Flip: entry into the irreversible sleep-compression window

Boundary. Flip is the **core event** of the memory-system transition. Flip point F is pinned strictly as: **entry into the irreversible sleep-compression window, i.e., crossing the threshold of effective SWS cascade**. This is not the SWS cascade's completion, nor is it some portion of sleep process as a whole — it is the specific threshold at which irreversibility begins. Once the SWS cascade (the three-way coupling of slow-wave sleep, sleep spindles, and hippocampal sharp-wave ripples) is engaged, information transitions from early stabilization (hippocampus-dependent, fragile, episodic-feature-rich) to the long-term stabilization pathway (cortically distributed, stable, drifting toward semantic).

This is the phase transition corresponding to the familiar observation that "sleep can compress things into long-term memory." Waking cannot cross this F, regardless of how long the waking period lasts. Conscious cognitive processing during waking is in fact *a buffer*: persistent rehearsal does not push content toward flip; if anything it delays flip by keeping content in the active early-stabilization state rather than releasing it into the SWS cascade for offline processing. Sleep is not "rest"; it is the online-to-offline switching phase transition of 11DD. During waking we attend to our own affairs; during sleep 11DD gets its chance to do its most important work.

Le Chatelier buffer-crossing conditions. Crossing F requires simultaneous engagement of the SWS–spindle–sharp-wave-ripple triple cascade. Loss or miscoupling of any of the three oscillations can prevent the crossing. Slow-wave sleep provides the baseline synchronizing rhythm; spindles provide windows for temporal organization of information; sharp-wave ripples carry compressed information replay. When the three couple, information crosses F into the long-term pathway; when any is missing, information remains stuck in early stabilization and is eventually forgotten or displaced by the next day's input. Staresina (2024, *Trends in Cognitive Sciences*) provides the most systematic current review of this triple-coupling's importance.

A consequential but under-emphasized fact: prefrontal sharp waves during SWS impose top-down suppression on hippocampal replay — the in-sleep instantiation of 12DD modulating 11DD. Which information deserves to cross F is not decided unilaterally by the hippocampus but is negotiated between prefrontal cortex and hippocampus during sleep. The 12DD prediction system retains influence over sleep, using prefrontal sharp waves to selectively suppress hippocampal replay, shaping F-crossers to align with the current predictive framework. This mechanism likely maps to several sleep-related clinical-cognitive phenomena (see §6).

The critical position for $r >> 1$. The flip stage is where r is assigned at the coarse grain. The emergence distance is proxied by a full waking period (roughly 16 hours); the flip-to-establishment distance is proxied by the key SWS window (roughly 1 to 3 hours) plus a few days of subsequent cortical stabilization. Their ratio places r in the range 5 to 8, matching the order of magnitude of ZFCρ's $r \approx 5$. But this is a time-proxy estimate and therefore degenerate; the true r requires information-theoretic refinement (§4). The empirical confirmation of r's value at this magnitude is itself one of the open empirical questions of this note, tested by P-N9-1 in §9.

Emotional valence as secondary filter. After F is crossed, sleep-period replay is not random. High-emotional-valence content is preferentially replayed — a key second filter. But replay priority is not monotonic: extreme emotional valence can disrupt normal replay progression. This is one important mechanism of PTSD: the emotional valence of extreme trauma is so high that the SWS cascade itself is disrupted (fragmented sleep, nightmare awakenings), content fails to smoothly cross F, and it remains stuck in early stabilization, repeatedly reactivated. Specific mechanisms are developed in §5 (inverted-U response) and §6.3 (PTSD).

Neuroscience anchor. Coupled sleep rhythms (Staresina 2024); sleep-dependent engram reactivation (Wang et al. 2024, *iScience*); prefrontal sharp waves' top-down suppression during SWS is a recent advance in prefrontal sleep-ripple research, with evidence showing that prefrontal cortex is not passively dormant during SWS but actively participates in selective suppression of hippocampal replay. Denis et al. (2022, *PNAS*) provides a specific empirical fact: sleep preferentially consolidates negative aspects of memory, consistent with the theoretical prediction of emotional-valence secondary filtering, and relevant to later pathology (§6) discussion of PTSD and depression.

Sleep deprivation as a natural experiment. If the flip transition's $r >> 1$ holds, sleep deprivation should not damage memory proportionally to total hours lost but should show a threshold-like signature. $r >> 1$ means the flip-to-establishment distance is a small fraction of the total window; depriving this small fraction harms memory far more than depriving an equal amount of emergence-period time. A specific prediction: a night of normal duration but with SWS entirely absent damages memory far more than a night of half-duration with intact SWS cascade. This prediction grounds P-N9-1 in §9.

3.4 Establishment: long-term distributed storage

Boundary. The establishment stage is the long-term fate of information after it has entered long-term distributed cortical storage. Traces transition from hippocampus-dominated to neocortical-distributed storage; hippocampal dependence decreases (though it does not vanish — contextual binding theory holds that for contextually rich episodic memories, hippocampal dependence may persist indefinitely); semanticization begins and continues; episodic features gradually attenuate, with gist and schema increasingly dominant.

Establishment is not "reaching a terminal." It is an ongoing process. The content of long-term distributed storage is not static in time: it is continuously being updated, overwritten, and reorganized. Three mechanisms correspond to this dynamic process: complementary learning systems' progressive integration; reconsolidation's reverse re-editing; and 13DD's veto filtering of 11DD traces, driven partially by 14DD's value standards (see §5.3). Each retrieval is a potential rewriting opportunity; each reactivation fine-tunes the existing trace; each new related experience adjusts the structure of older traces.

The changed role of the Le Chatelier buffer at establishment. The buffering mechanisms here differ from the previous three stages. The first three stages' buffers resist "information descending to a deeper layer"; the establishment buffer is more complex, containing both mechanisms that resist decay (repeated retrieval, semantic-network support, protecting traces from total loss) and mechanisms that encourage reconstruction (reconsolidation opens editing windows). The balance between these two determines the long-term fate of specific traces.

An apparent paradox at this stage: repeated retrieval *inversely* triggers reconsolidation — repeatedly recalling the same memory leads to its fine-tuning at each recall. This means the most-often-recalled memories are the most easily modified, not the most stable. This aligns with Loftus's work from the 1970s on the malleability of eyewitness memory: witnesses who repeatedly recall the event tend to have memory details contaminated by successive recalls, rather than strengthened by them.

High-emotional-valence content tends to resist semanticization and thus retains episodic features longer. This is why the sensory imagery of trauma memories may persist undiminished for decades (though contextual integration may be damaged), while ordinary daily memories gradually become abstract and fuzzy. Traces tied to 14DD complex emotions (shame, guilt, remorse associations) are subjected at this stage to 13DD's **veto-style** filtering along value standards supplied by 14DD — not mere gentle re-editing, but systematic severance of specific traces from the narrative-integration layer. This mechanism is developed in §5.3.

Key fact. Establishment is not "permanent preservation." Established traces are continuously reconstructed; each retrieval may alter content. This is why old memories are typically consistent with the current narrative: they have been repeatedly re-edited along it. A person's recollections of their own childhood are less a faithful recovery of childhood experience than a current work, continuously rewritten through the lens of current understanding, values, and narrative framework. This fact has important implications for self-understanding and for clinical work: the availability of reconsolidation windows is a major current research direction in trauma therapy.

Neuroscience anchor. Complementary learning systems (McClelland, O'Reilly) provide the classical hippocampus-to-cortex progressive-integration framework; the multi-trace and transformation theory of systems consolidation (Nadel, Moscovitch) casts establishment as the co-evolution of multiple parallel traces; fuzzy-trace theory (Brainerd, Reyna) points out gist and verbatim traces decay in parallel, with gist more stable; Sekeres, Moscovitch, and Winocur 2018's contextual binding theory defends the long-term hippocampal dependence for certain episodic memories. These models differ in detail but all point to the same coarse-grained picture: the establishment stage's long-term distributed storage is a dynamic process, not a static archive.

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4. Le Chatelier Buffering and the Topological-Distance Nature of r

4.1 Summary of the four-stage buffers

At each stage the buffering mechanisms differ in content but share a direction: resistance to advancement. At emergence, the buffer consists of the workbench's dissipation tendency, attentional transience, and capacity limits; the crossing condition is sustained attention + emotional valence + task goal. At spectral flip, the buffer is encoding-efficiency limits and interference; the crossing condition is sufficient encoding gain. At flip, the buffer is the waking-state suppression of irreversible compression entry; the crossing condition is entering sleep with normal SWS cascade. At establishment, the buffer is more complex, containing both decay-resisting mechanisms (repeated retrieval, semantic-network support) and reconstruction-enabling mechanisms (reconsolidation opening editing windows); the balance between them determines long-term fate.

These four buffering mechanisms differ in substance but **share the same geometry at the phase-transition level**: Le Chatelier systematic resistance followed by relatively rapid establishment once the buffer is broken. This shared geometry is what makes Method VI a common analytic framework across them.

4.2 The nature of r: a topological-distance ratio, not a time ratio

In ZFCρ's strict definition, r is the distance ratio on Ω-space (the integer-prime-factor complexity space). $\Omega = 2.75$ to $\Omega = 3.79$ is the emergence-to-flip distance (about 1.04 units); $\Omega = 3.79$ to $\Omega = 4.01$ is the flip-to-establishment distance (about 0.22 units); their ratio is approximately 4.7, close to 5. This "distance" is the intrinsic coordinate of Ω-space — the ratio of structural complexity — which is neither a time distance nor a spatial distance.

This fact matters critically for cross-domain applications of Method VI. When applying Method VI to the memory system, the ideal would use **information-theoretic topological distances**: the emergence distance should be the cumulative information entropy at the 12DD workbench (the integral of content × maintenance time × encoding strength); the flip-to-establishment distance should be the negentropy injection carried by effective ripple-spindle coupling events during SWS — i.e., the compression work from episodic to schema. Candidate neural proxies: for emergence distance, the integrated hippocampal theta oscillation plus total amygdala-triggered locus-coeruleus-noradrenergic release; for flip-to-establishment distance, spindle-ripple coupling event count × average coupling strength × replay selectivity.

The true r should therefore be written as:

$$r = \frac{\text{cumulative information entropy at emergence}}{\text{negentropy injection by effective SWS coupling events}}$$

Both numerator and denominator are in information-theoretic units, carrying no time dimension.

4.3 Why time is not the topological distance

For operational reasons, this note temporarily uses time as a coarse proxy for r: the emergence period is proxied by a waking period (about 16 hours); the flip-to-establishment distance by the key nighttime SWS window (about 1 to 3 hours); their ratio gives r in the range 5 to 8. This matches the order of magnitude of ZFCρ's original prediction of r ≈ 5. But this is only a degenerate proxy; it is not the true r.

The fundamental reason time is inaccurate as a proxy: the same waking-period duration can correspond to information entropy accumulations differing by orders of magnitude. A bored day and an intensive learning day both 16 hours long can differ by thousands of times in the total information entropy accumulated at the workbench. The same sleep duration can yield SWS-coupling event counts differing by factors of several or over ten (modulated by age, health, emotional state, etc.). Time as a proxy works roughly at population averages but largely fails at the individual level; this is one reason inter-individual variability in memory retention appears erratic. This does not mean time proxying is useless: in the absence of fine neural measurement, it is an operational weakest-lower-bound, still capable of giving the order-of-magnitude estimate of r at population average. This note acknowledges this operational capacity while explicitly clarifying that it is not the true r — the true r requires information-theoretic proxies.

This clarification serves more than Note 9 itself. It points to a more general methodological principle: **when applying Method VI to new domains, the topological distance quantity must first be identified; time is a fallback only when no more faithful proxy is available**. Anth-1 uses millions of years over tens of thousands for 13DD emergence's r; Anth-2 uses approximately 96000 / 1500 for 14DD emergence; Anth-3 uses 2300 / 200 for 15DD emergence. These are all uses of time as a degenerate proxy, because anthropology lacks direct measurement of the topological distance of species-level subjectivity emergence. Time works because it correlates roughly with the true topological distance at population average, but it is not the topological distance. The memory system admits quantities closer to the original meaning (cumulative information entropy, negentropy injection), which is a small step forward; but these are still approximations, and genuine refinement requires further neuroscience work.

This methodological principle has epistemic sharpening implications for every r estimate across the SAE series. Existing Anth-series r estimates should be read as "legitimate uses of a degenerate proxy," not as direct measurements of the true r. Future Method VI versions should incorporate this principle explicitly. This subsection, in a sense, stands as an external patch to Method VI v1, providing an architectural clarification for cross-domain applications.

4.4 "Filtering is the default, encoding is the exception"

The philosophical implication of r >> 1 can be stated in a single sentence: **filtering is the default, encoding into long-term storage is the exception**.

A person experiences tens of thousands of events, thoughts, and perceptions per day. Only a tiny fraction cross the spectral flip into the 11DD pathway. After the sleep-period flip filtering, even fewer reach long-term storage. The fraction that is eventually remembered long-term, relative to the day's total experience, may be less than one in ten thousand.

This is **not** a defect of the memory system. If all experiences were retained, the 12DD prediction system would be drowned in noise; long-term storage would exhaust within days; retrieval cost would become unbearable. On the contrary, default filtering is the system working correctly, just as a filter's normal operation is to hold most of the water back while letting a few through. The question is not "why is my memory so bad"; it is "why does a small subset of content manage to break through layer after layer of buffering into long-term storage." The key signal in answering this question is emotional valence, developed in §5.

This perspective has practical implications for everyday self-attribution of memory. Most people saying "my memory is poor" are misunderstanding the default behavior of the memory system. The memory system defaults to filtering out most content; "poor memory" only has meaning when a specific item that should have crossed the spectral flip failed to do so. If content dissipates at the 12DD workbench stage, this is not memory failure — this is the system working correctly.

4.5 Methodological implication for memory research: exposure verification

Method VI's fourth non-trivial prediction is: before declaring an intervention ineffective, one must verify that the exposure was adequate. Applied to memory research: many studies declaring "memory training ineffective" may in fact be cases where training failed to cross the flip point, not cases where the training mechanism itself is ineffective.

Specifically, a study concluding that memory training does not improve long-term retention should answer the following questions. Did the encoding intensity during training reach a level that could plausibly cross the spectral flip? Did the post-training sleep contain a normal SWS cascade? Was the training content preferentially replayed during the flip stage? If these questions are all "not verified," then the "training ineffective" conclusion only establishes that training failed to achieve adequate exposure; it does not establish that the training mechanism is ineffective. True mechanism-falsification requires observing ineffectiveness under verified adequate exposure.

This suggests a specific requirement for experimental design in memory research: exposure verification should be a standard component of memory-training studies, not an afterthought. This requirement may eventually change the evidence-evaluation standards for memory-training research.

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5. Emotional Valence as a Cross-Stage Modulation Signal

5.1 Emotional valence belongs to no single stage

Traditional memory research typically locates emotional valence at "the encoding stage": emotionally charged events are encoded more strongly and therefore remembered better. This picture has partial empirical support but is misleading at the coarse-grained phase-transition level.

From the Method VI perspective, emotional valence belongs to no single stage. It is **a modulation signal that runs through all four stages**:

(1) At emergence, emotional valence determines whether workbench content is maintained long enough to enter the 11DD emergence stage (higher valence extends workbench retention or directly triggers hippocampal persistent activity);

(2) At spectral flip, emotional valence lowers the crossing threshold via amygdala-hippocampus coordination (the McGaugh tradition), so that high-valence content crosses more easily into 11DD early stabilization;

(3) At flip, emotional valence modulates sleep-period replay priority, with high-valence content preferentially replayed, influencing flip selectivity;

(4) At establishment, emotional valence determines semanticization resistance — high-valence content is compressed into gist more slowly, retaining episodic features longer.

This cross-stage perspective explains several phenomena that single-stage views cannot. For example, why an emotional event may not stand out at encoding but becomes more firmly retained after a night or several nights of sleep: this is not "coming back to mind later"; emotional valence continues to modulate replay selection at the flip stage, giving the emotional content a second round of reinforcement. Or why traumatic memories remain vivid for decades in their sensory detail: this is not excessive encoding strength at a single stage, but extreme emotional valence modulating all four stages simultaneously, granting the content preferential passage through every buffer point.

5.2 12DD basic emotions as primary parameter: cat-anchoring as operational heuristic

The source of emotional valence is the 12DD basic-emotion system. This requires an operational heuristic regarding emotion's DD-layer assignment.

As an operational heuristic: **emotional reactions also exhibited by species without 13DD can be treated as 12DD-level emotions**. Cats show fear, anger, disgust, satisfaction, surprise, and curiosity; by this heuristic, these are classifiable as 12DD basic emotions. One-trial fear conditioning in rats is a strong confirmation: a single-trial fear memory can be retained for life, demonstrating that 12DD-level emotion suffices for the memory system to cross multiple phase-transition thresholds and complete all four stages.

This heuristic requires an epistemic caveat. In the SAE framework it functions as an **operational heuristic**, not an **ontological criterion** for emotion classification. Complex boundary cases — elephant grief, proto-shame in primates, crow-like retaliatory behavior — are left to dedicated cross-species emotion research. The center of gravity of this note is not emotion classification; it is memory-as-phase-transition plus emotional valence as cross-stage modulation. Cat-anchoring's instrumental value lies here: it provides a clean 12DD-level starting point so the structural argument can proceed. Over-insisting on ontological definitions would shift the argument's firepower toward boundary-disputes and away from the topic.

Several neural facts support the heuristic (without proving it as definition): the phylogenetic antiquity of the amygdala, preserved from reptiles through mammals with similar core architecture; the cross-mammalian conservation of the locus coeruleus–noradrenergic system; the basic hypothalamus-amygdala-hippocampus axis shared across mammals. These neural facts indicate that the basic hardware of 12DD emotion is highly conserved in mammals, giving the cross-species heuristic a neurological basis.

Implication for this note: the emotional-valence ordering mechanism is **not high cognition**. It is a cross-species ancient substrate, attached to 12DD's prediction system. Cats also possess the complete emotional-valence compression: one-trial fear learning lasts a lifetime — textbook evidence of 12DD-level emotion running the full phase-transition chain. The human emotional-memory system adds a 14DD complex-emotion modulation layer on top of the 12DD foundation, but the core mechanism at the 12DD level is the same as the cat's.

5.3 The 13DD filter's vetoing role, with 14DD supplying value standards

Architectural clarification. In the SAE framework, the host of the "veto" function is 13DD, not 14DD. This is part of SAE's basic architectural definition: 13DD is the self-completeness layer, and its defining capacity is **self-other distinction** — the "mine/not-mine" judgment. This judgment is itself a veto capacity: traces judged as "not mine" are refused entry into narrative integration. 14DD provides value standards (the judgment that something violates one's "must-do"), but the executor of the veto is 13DD. 14DD is the standard-setter; 13DD is the executor who cuts the channel.

The precise location of the filtering. This distinction matters critically for understanding SAE's architectural directionality constraint. 13DD's filtering acts **only at the 12DD-to-13DD interface**; it does not descend into the internal operation of 11DD or 12DD.

Specifically:

- 11DD traces can always be read by 12DD, which generates bodily responses, emotions, predictions, and behavioral adjustments from them (this pathway is always open)
- When a trace reaches 13DD, the 13DD "mine/not-mine" filter reviews it
- The filter decides — on the basis of value standards supplied by 14DD, and/or 13DD's own identity-continuity judgments — whether to accept the trace for integration
- A rejected trace **does not enter the narrative layer**, but **remains in 11DD, and 12DD can still read it**

That is: **13DD's veto is "I decline to receive," not "you are forbidden to send."** The upper layer does not penetrate into the lower layer to modify its operation; the upper layer merely decides whether or not to receive at its own boundary. This is SAE's directionality constraint expressed at the filter architecture.

Four specific manifestations:

(1) **Shame**. 13DD, following 14DD's "this is unacceptable" standard, severs a specific 11DD memory's pathway to narrative integration. The trace remains in 11DD, 12DD can still read it, the body still responds to related cues (skin conductance, avoidance behavior, physiological arousal), but current conscious autobiographical retrieval cannot reach it. Pathological intensification of this mechanism corresponds to dissociative amnesia (§6.6).

(2) **Guilt**. 13DD, following 14DD's "this needs re-characterization" standard, modifies a trace's narrative label within the reconsolidation window. The same event, after guilt modulation, is re-encoded as "my harm to X" — this is not creating a new trace but re-labeling an existing one at the narrative layer.

(3) **Remorse**. 13DD, under 14DD's persistently supplied "this is severe" standard, repeatedly reconsolidates the same event, deepening the negative emotional label at each pass. This is the mechanistic basis of rumination.

(4) **Pride and solemnity**. Likewise veto-style 13DD filtering, but 14DD's standard is "this cannot remain in neutral default." Positive and negative emotions are symmetric at the 13DD-execution level — both veto the current narrative default, reshaping traces with a directional label.

A key observation: veto does not prevent 12DD from using traces. This observation has important empirical support. Traumatic memories, even when "suppressed" (not accepted at the narrative layer), still produce strong bodily responses to related cues: skin conductance, avoidance, emotional flooding, dream repetition. These responses are generated via the 12DD pathway directly, without requiring 13DD's narrative integration. Prosopagnosia, blindsight, PTSD autonomic responses all share this architectural pattern: **conscious retrieval fails; bodily/emotional response persists**. Under SAE, these phenomena are not "mysterious unconscious operations"; they are **12DD normally reading 11DD traces and producing output, while 13DD's filter simply does not let those traces enter narrative integration**.

Where Via Negativa sits. The value standards supplied by 14DD can be positive ("this should be remembered as glorious") or negative ("this should be rejected"); the standards themselves are not Via Negativa. Via Negativa is 13DD's **mode of execution**: no creation of new traces, only the application of "not permitted to integrate into my narrative" to existing ones. Each 13DD filtering action is an instance of "this cannot be integrated into my story," which is exactly what the Via Negativa method looks like as a concrete downward pathway within the memory system. Method VII's abstract methodology finds here a specific biological instantiation.

Only 13DD holds this role. This is an architectural fact worth stating explicitly. The layers from 9DD to 12DD do not require "mine/not-mine" judgment: 10DD does not ask "is this my perception"; 11DD does not ask "is this my trace"; 12DD does not ask "is this my prediction." Only at 13DD does self-completeness emerge and necessarily bring with it the veto function. 14DD and 15DD have their own roles, but the **sole location where "mine/not-mine" filtering is executed is 13DD**.

Research-programme disclaimer. The specific neural signatures of guilt/shame/pride executed via 13DD reconsolidation versus fear/anger reconsolidation are not yet well-established in the literature. This note presents them as a research programme, not as settled conclusions. Prediction P-N9-5 (§9) gives a concrete testable direction for this programme.

5.4 Inverted-U response: pointing toward an open problem

The relationship between emotional valence and memory retention is not monotonic. Ouyang and Dunsmoor (2024, *Learning & Memory*) demonstrated an important empirical distinction: emotional intensity produces a linear relationship on conditioned learning but an **inverted U-shaped** effect on episodic memory. Mid-range emotional valence yields the strongest episodic memory; extreme emotional valence yields weaker or more fragmented episodic memory.

A preliminary Method VI reading of the inverted U: extreme valence greatly lowers the spectral-flip threshold (so content crosses into 11DD early stabilization very easily); simultaneously, extreme valence disrupts the normal SWS-cascade flip progression (sleep is fragmented by nightmares and hyperarousal, the triple-oscillation coupling fails to fully form, F cannot be crossed normally).

The result is an apparent paradox: content enters the 11DD pathway unusually easily, yet cannot complete the conversion into long-term distributed storage. The trace remains stuck at early stabilization, repeatedly activated in near-original form. This is precisely the mechanism of PTSD flashback (§6.3).

This note leaves the full mechanism of the inverted U to open problems (§10.2). Capturing it requires multi-transition coupling analysis; no single transition alone explains it. But the coarse-grained observation is sufficient: the inverted U is not "mid-range valence is optimal encoding strength" — it is the joint effect of two transitions' thresholds being pushed in different directions by extreme valence, producing non-monotonic response. Refining this is a worthwhile target for future memory research.

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6. Pathology as a Spectrum of Stage Failures

6.0 Epistemic status and medical disclaimer

Epistemic status. The stage-level localization of each memory pathology in this section is a **currently best-explaining coarse-grained structural hypothesis** within the Method VI framework, not a phase-transition diagnosis already established by neuroscience. Evidence strength varies across the localizations. The spectral-flip-failure of classic amnesia has the strongest literature support (more than half a century of H.M. case research). The PTSD localization (Phase 2 over-crossing + Phase 3 incomplete) has moderate support (recent studies on selective over-consolidation and contextual-integration deficits). The Alzheimer's Phase-3-to-4 channel damage has anatomical and pathological evidence, though mechanistic detail is still under active investigation. The SDAM/HSAM Phase-4 symmetric-poles reading is a new structural hypothesis proposed here, partially supported in the literature but requiring dedicated further research. The emotional-blunting cross-stage π_cross decrement is a direction where Method VI can generate specific predictions (current literature being thin). §9 provides corresponding falsifiable predictions.

Medical disclaimer. The pathological analyses in this section are not clinical guidelines. They should not be read as diagnostic or therapeutic recommendations for any specific patient. Patient diagnosis and treatment must be made by qualified clinicians according to individual circumstances. The purpose of this section is to provide, for the Method VI framework's application to memory, a conceptual-diagnosis perspective on the pathology side, serving theory and research, not clinical decision-making.

Methodological note. This section uses coarse-grained diagnosis: each pathology is located to which of the four stages has failed. Finer subtype differences are left to subsequent notes. The goal is to expose the structure of the diagnostic spectrum at the coarse level, providing a traceable map for future finer-grained work.

6.1 Classic amnesia: spectral-flip failure

Classic amnesic syndromes are the paradigmatic case of the memory-transition chain breaking at the **spectral-flip position**. The H.M. case (severe anterograde amnesia following bilateral medial-temporal-lobe resection) provides more than half a century of research. The typical pattern:

(1) **Preserved working memory**: H.M. could maintain coherent conversation for several minutes, indicating intact 12DD workbench function. (2) **Preserved remote memory**: Long-term memories established before surgery were largely preserved, indicating that traces that had completed Phase 4 were not dependent on the damaged medial temporal lobe. (3) **Failure of new learning**: Post-surgical experiences could not form long-term memories — each morning, no declarative memory of the preceding day's events.

Method VI diagnosis: **the transition chain is broken at the spectral-flip position**. Workbench content can be maintained briefly, but cannot cross spectral flip into 11DD early stabilization. Information reaches the 12DD workbench, persists briefly, and dissipates, never entering the 11DD pathway.

At the neural level, this diagnosis corresponds to the medial temporal lobe (particularly the hippocampus) as the key executor of the spectral-flip event. Daume et al. (2024)'s finding that hippocampal persistent activity predicts long-term recognition provides positive evidence: after hippocampal damage, this "persistent activity predicting long-term recognition" mechanism is severed, and the spectral-flip event cannot occur. Korsakoff's syndrome (amnesia from mammillary-body and thalamic damage) shows a similar pattern, receiving the same spectral-flip-failure diagnosis, with neural basis involving different nodes in the hippocampus-thalamus circuit.

6.2 Alzheimer's disease: Phase-4 channel damage and trace collapse

Alzheimer's disease shows a typical but imperfect temporal gradient: recent memories are lost first, remote memories are relatively preserved, and in late stages remote memories also collapse. This pattern differs from classic amnesia: classic amnesia has a sharp temporal boundary between preserved and lost (pre-surgery vs post-surgery), whereas Alzheimer's shows a **continuous temporal gradient** reflecting a gradually-advancing degenerative process.

Method VI diagnosis: **damage to the Phase-3 to Phase-4 channel, plus ongoing collapse of already-established traces**.

- Recent content struggles to cross the flip (Phase 3) into the long-term pathway because medial temporal lobe is affected earliest, and the hippocampal end of the SWS cascade fails.
- Established remote traces in cortical distributed storage progressively collapse, reflecting progressive cortical degeneration.
- The temporal gradient reflects the fact that fully-stabilized remote traces resist new waves of degeneration better than recent, not-yet-fully-stabilized traces. This is not a real difference in preservation mechanism but a difference in degeneration timeline.

Neural basis: medial entorhinal cortex and hippocampus are affected earliest, with tau pathology spreading from the medial temporal lobe and gradually invading the cortical distributed-storage network. This corresponds to Method VI diagnosis: the Phase-3-to-Phase-4 channel (the medial-temporal-to-cortex dialogue) is severed first, after which cortical distributed storage itself begins to degrade.

This is the **currently best-explaining coarse-grained localization**. The disease's actual progression involves multiple parallel mechanisms (amyloid plaques, tau tangles, neuroinflammation, synaptic loss) contributing differently at different stages; the coarse Method VI diagnosis does not replace research into those specific mechanisms, it only provides a structural coordinate.

6.3 PTSD: Phase-2 over-crossing + Phase-3 incompletion

PTSD is one of the most explanatorily powerful cases for Method VI diagnosis. The traditional literature has at times described PTSD as "over-consolidation" — the idea that traumatic memories are consolidated so strongly they cannot extinguish. But recent research suggests this simple model is incomplete. PTSD actually shows a paradoxical combination: **some aspects of memory are abnormally stable** (recurring intrusive sensory fragments, intense emotional arousal), **while others are abnormally fragile** (contextual integration, temporal order, coherent narrative).

Under Method VI this paradox finds a natural explanation. PTSD is diagnosed as: **abnormally strong Phase-2 crossing + abnormally weak Phase-3 F crossing**.

Specific mechanism:

- Extreme emotional valence makes content **abnormally easy** to cross Phase 2 (spectral flip), with amygdala-hippocampus coordination abnormally amplified, so content is given priority for entry into 11DD early stabilization.
- Simultaneously, extreme emotional valence **disrupts** Phase 3's normal SWS cascade engagement — sleep is fragmented by hyperarousal, nightmares, and disruption, and the triple oscillation coupling cannot be fully formed; F cannot be properly crossed.
- The result: traces are **stuck in the early-stabilization stage**, repeatedly reactivated in near-original form (flashbacks).
- And: content fails to enter long-term distributed cortical integration, so it cannot be effectively semanticized, cannot be placed into coherent autobiographical narrative, cannot be time-located ("that happened in the past" — the semantic desensitization — cannot take effect).

This diagnosis redefines the essence of PTSD: **not memory that is too strong, but memory stuck at the wrong stage**. Flashbacks persist for years or decades not because the trace is exceptionally tightly consolidated but because the trace never completed the conversion to long-term distributed storage — it has remained in the fragile, sensory-cue-triggerable, high-episodic early state.

Neural basis: PTSD patients show amygdala hyperactivation, reduced hippocampal volume, and abnormal prefrontal-hippocampal coupling. These neural signatures map consistently onto the Method VI diagnosis: amygdala hyperactivation corresponds to the lowered Phase-2 threshold; reduced hippocampal volume and abnormal prefrontal coupling correspond to the failure of Phase-3 SWS cascade. Clancy et al. (2024)'s study of the spatiotemporal dynamics of hippocampal-cortical networks in traumatic intrusive memories provides recent empirical support for this localization.

This is the **currently best-explaining coarse-grained localization**. It does not deny the empirical facts accumulated in traditional over-consolidation research; it reorganizes those facts: the "abnormal stability" of trauma memories is caused by structural localization (stuck in early stabilization), not by intrinsically strong consolidation.

6.4 Sleep disorders: Phase-3 F crossing deprived

Sleep disorders' impact on memory is the most direct case for Method VI diagnosis. Chronic insomnia, sleep apnea, and fragmented sleep share a common effect: the key SWS window is absent or broken.

Method VI diagnosis: **Phase-3 F crossing directly blocked**.

Specific mechanism: the SWS cascade (slow-wave sleep + spindles + hippocampal sharp-wave ripples) fails to fully form. Slow-wave count is insufficient, spindle-slow-wave coupling is imprecise, and sharp-wave ripples fail to fire adequately during the critical window. The result: content has entered the 11DD early-stabilization pathway, but cannot cross F into the long-term distributed-storage pathway.

Coarse consequence: **selective impact on recent memory conversion, with previously established remote traces relatively preserved**. This pattern is widely observed clinically. Long-term insomnia patients' reported memory impairment is almost always "I can't remember recent things," rarely "I've forgotten things from years ago." This matches the Method VI diagnosis precisely: F-crossing blockade affects only new content; older content that has already crossed F and completed some stabilization can still be retained even if SWS cascade fails.

Neural basis: coupled sleep rhythms failure (Staresina 2024's review provides the most systematic current evidence). Specific failure modes include reduced slow-wave power, reduced spindle density, and reduced precision of spindle-slow-wave phase coupling. These measurements can serve as objective indicators of Method VI diagnosis: SWS cascade integrity can be quantified and used as a neural proxy for Phase-3 F-crossing capacity.

6.5 SDAM and HSAM: the symmetric poles of Phase 4

This note reorganizes SDAM (Severely Deficient Autobiographical Memory) and HSAM (Highly Superior Autobiographical Memory) as the **symmetric poles** of the Phase-4 Le Chatelier buffer. This is a new structural hypothesis proposed by this note, with partial literature support but requiring dedicated further research.

SDAM: excessive semanticization.

- Phase-4 Le Chatelier buffer **abnormally weak**
- Semanticization (compression) is excessive — "my" episodic experience is compressed down to bare facts
- Semantic knowledge, procedural memory, and laboratory memory tasks are normal, indicating Phases 1-3 are intact
- But lacks vivid autobiographical re-experiencing, indicating that at Phase 4, episodic features are being prematurely swallowed by semanticization
- Corresponding clinical description: "I know I went there, but I cannot re-experience how it felt at the time"

Method VI diagnosis: **Phase-4 Le Chatelier buffer is weak; episodic features are prematurely consumed by semanticization**. Literature support comes from Palombo, Levine et al.'s case studies of SDAM. SDAM individuals perform normally or above average on semantic tasks but lack neural markers and subjective experience of re-experiencing during autobiographical recall tasks.

HSAM: failed semanticization.

- Phase-4 Le Chatelier buffer **abnormally strong**
- Semanticization (compression) is persistently resisted; discarding any episodic detail is refused
- The system carries massive redundant structure: for each day in the past, the date, weather, clothing, food can be precisely recalled even decades later
- Autobiographical retrieval is specialized; date-anchored pathways are unusually developed
- But **not generally forgetting-resistant**: HSAM individuals typically do not show significant advantages on standard laboratory memory tasks; Phases 1-3 are normal, and the abnormality is confined to Phase 4's episodic-decay resistance

Method VI diagnosis: **Phase-4 Le Chatelier buffer is excessively strong; episodic features resist semanticization**. This is not "larger capacity" or "better memory" but an abnormal strengthening of Phase-4 buffering along the direction of episodic decay.

The structural significance of symmetric poles:

SDAM and HSAM are not two independent pathologies. They are the two directional extremes of Phase-4 buffering:

- SDAM pole: compression is too strong, episodic information is prematurely semanticized
- HSAM pole: compression is over-resisted, episodic information refuses semanticization
- Normal individuals lie on a continuous spectrum between these poles, with most people's Phase-4 buffer tuned just right to preserve important autobiographical content while completing semanticization

This symmetric picture adds a diagnostic structural elegance to Method VI's application in memory. It also offers SDAM and HSAM research a common coordinate: the two are not independent phenomena but two different tunings of the same phase transition. This is a new structural hypothesis proposed by this note; its empirical verification is left to future research.

6.6 Dissociative amnesia: 13DD filter's pathological intensification on specific traces

Dissociative amnesia's traditional clinical description: a specific memory is "suppressed" or "dissociated," unavailable to active retrieval but potentially triggerable by specific cues. This diagnosis is contested clinically, with differential diagnosis from organic memory impairment important, and the neuroscience evidence is unstable. But under SAE, dissociative amnesia has a natural localization that directly connects to §5.3's 13DD filter mechanism.

Method VI diagnosis: **pathological intensification of 13DD filter on specific 11DD traces**.

Mechanism candidate: 13DD, following 14DD's "unacceptable" value standard (shame, guilt, post-traumatic denial), applies strong filtering to a specific 11DD trace, severing its pathway to the narrative-integration layer. Crucially, **this is not severing the trace itself, nor is it severing 12DD's reading of the trace**; it is severing the 12DD-to-13DD narrative-integration pathway. Hence the typical triple dissociation:

- **Narrative layer**: conscious autobiographical retrieval fails; the verbal report is "I don't remember"
- **12DD layer**: the body still responds to related cues (elevated heart rate, skin conductance, avoidance behavior), because 12DD can still read the 11DD trace and generate predictions and physiological reactions
- **The trace itself**: remains in 11DD; specific sensory cues (a smell, a specific sound, a scene) may at some moment loosen the 13DD filter temporarily, allowing the trace to enter the narrative layer as a "sudden remembering"

This is mechanistically dual to PTSD:

- PTSD: trace is stuck between Phase 2 and Phase 3, cannot complete conversion to long-term, repeatedly intrudes in near-original form
- Dissociative amnesia: trace has completed Phase 4 into long-term distributed storage, but 13DD filter subsequently severs the consciousness-to-trace narrative-integration pathway

The two can coexist in the same individual. A trauma survivor may have both flashbacks (PTSD) and dissociative forgetting of specific details (certain aspects of the event completely unretrievable even with effort). This is not contradictory — it is two different positions failing simultaneously: Phase-3 incompletion driving flashbacks; 13DD filter over-activation on specific traces driving dissociative forgetting. The coexistence of PTSD and dissociative amnesia is a non-trivial prediction of Method VI diagnosis (see §9).

Epistemic caution: dissociative amnesia's clinical definition is itself contested, with unstable literature evidence. This note's SAE localization is a **theoretical hypothesis**, not a diagnostic standard. It is among the currently best-explaining coarse-grained localizations, but requires finer work for refinement. In particular, the mechanism of 13DD filter's selective pathological intensification on specific traces remains a research programme in the current literature (see §5.3), so the SAE diagnosis of dissociative amnesia remains a theoretical inference.

6.7 Emotional blunting: cross-stage π_cross attenuation

Emotional blunting is a phenomenon commonly observed in depression, certain medication side effects (especially long-term SSRI use), schizophrenia, and some brain injuries. Its core feature: overall emotional experience diminishes, not by manifesting as sadness or anxiety but as "numbness" or "no feeling."

Method VI diagnosis: **modulation signal universally attenuated, with cross-stage π_cross decrement**.

Specific consequences: emotional valence as cross-stage modulation signal is weakened at every stage. Phase-1 crossing probability decreases (workbench content no longer maintained into encoding by emotional salience); Phase-2 amygdala-hippocampus coordination weakens (emotional-encoding enhancement mechanism fails); Phase-3 sleep-period replay selectivity decreases (emotional content no longer preferentially replayed); Phase-4 episodic resistance to semanticization decreases (emotional memories no longer specifically retain episodic features).

This produces an **apparently paradoxical observation**: emotional-blunting patients' overall memory retention rate does **not necessarily** decrease, because the baseline retention of non-emotional events was already determined by low π_cross and does not drop significantly. But **high-emotional-valence content that should have been preferentially retained is no longer preferentially retained.** The result:

- Ordinary daily content retention rate: **not significantly reduced**
- Memory enhancement for high-emotional events: **significantly weakened**
- Overall texture of memory: **becomes gray, uniform, lacking landmarks**

This is why emotional-blunting patients often describe "my memory has lost its colors" or "I remember what happened, but I cannot feel its importance." This is not a failure of the memory system; it is a failure of the modulation signal. The structure of memory is intact, but the distribution of importance weights is flattened.

This is a population-level structural reading; it does not replace individual clinical judgment. The emotional blunting of specific patients may involve combinations of mechanisms; clinical assessment and treatment must be judged by qualified professionals according to the individual.

This is the **currently best-explaining coarse-grained localization**. The literature is currently thin, which is exactly where Method VI can generate specific predictions. P-N9-2 (see §9) provides a specific testable prediction: emotional-blunting patients' memory-enhancement effect for high-emotional content should be significantly reduced, while neutral content retention should show no significant difference.

6.8 Depression: polarity-skew of the modulation signal

Depression's memory signature differs importantly from emotional blunting. Emotional blunting is **attenuation** (all emotions' π_cross uniformly reduced); depression is **polarity-skew** (the effect of positive and negative valence on π_cross becomes asymmetric). Both may coexist in the same patient (depressed patients often experience emotional blunting simultaneously), but mechanistically they are separable.

Method VI diagnosis: **modulation signal polarity-skew**, not uniform cross-stage reduction, but differential treatment of different valence.

Specific consequences:

- Negative emotional valence's π_cross enhanced: negative events have lowered spectral-flip threshold, easy entry into 11DD; sleep-period replay prioritizes negative content; post-establishment reconsolidation repeatedly deepens negative narrative. These jointly drive the clinical pattern of rumination and overgeneral autobiographical memory.
- Positive emotional valence's π_cross reduced: positive events enter 11DD less often, are replayed less in sleep, and thus retained long-term less. This corresponds to the clinical phenomenon of mood-congruent forgetting.

Neural basis: mood-congruent recall and overgeneral autobiographical memory are repeatedly-replicated phenomena in depression memory research. Method VI provides a complementary perspective: these empirical phenomena are reorganized as "modulation signal polarity-skew" — a structural diagnosis.

Relation to emotional blunting (§6.7):

- Emotional blunting is the universal reduction in modulation signal magnitude
- Depression is polarity asymmetry
- These are two different pathological re-tunings of the modulation signal
- Specific patients may show both in combination, but the mechanisms can still be separated through careful clinical measurement

This is the **currently best-explaining coarse-grained localization**. It is highly compatible with existing depression-memory literature; Method VI here offers reorganization rather than overturn.

6.9 Infantile amnesia: the developmental phenomenon of 13DD filter establishment

Infantile amnesia (the adult inability to recall early childhood events) has long been treated as a developmental phenomenon rather than a pathology. Traditional explanations have focused on hippocampal maturation, language and theory-of-mind development — **encoding-layer** immaturities. This note, under SAE, proposes a **retrieval-layer** refined localization that is mechanistically dual to dissociative amnesia (§6.6), and cites SAE Consciousness Series Paper 5 (Qin 2026, DOI 10.5281/zenodo.19385464)'s 13DD "mine/not-mine" filter as direct mechanism.

Method VI diagnosis: the core mechanism of infantile amnesia is **13DD filter, once established, systematically vetoing pre-identity-era 11DD traces**.

Mechanism. Before ages 4-5, 13DD is not yet stably established and the "mine/not-mine" filter is not yet built. Experiences of this period are normally encoded by 11DD and normally read by 12DD. Once 13DD stabilizes, the filter begins operating: **following current "I"-identity-**

continuity judgments, it classifies much of the pre-identity-era trace as "not mine" and refuses to allow them entry into current narrative integration.

This differs importantly from the simple "encoding failure" explanation. By this note's localization:

- **Encoding did not fail**: early traces entered 11DD normally
- **12DD still reads them**: these traces continue to shape adult behavior, emotion, prediction, and attachment patterns
- **13DD narrative layer is severed**: adult autobiographical retrieval cannot reach these traces, hence the report "I don't remember before age 3"

Hard empirical anchor: the skin-conductance dissociation of Newcombe et al. 1994

Newcombe and colleagues (1994, *Child Development*) published a key study. Children aged 9-10 were shown a set of face photographs, some of which were classmates from their preschool at age 4 (not seen for 5-6 years), and others of whom were unfamiliar control children. Two measures were taken simultaneously:

- **Explicit recognition** (verbal report "do you know this person?"): near chance — children were essentially unable to say which were old classmates
- **Skin conductance response** (automatic electrical response driven by sympathetic-nervous-system sweat gland activation, not under conscious control): the SCR to former classmates' faces was significantly higher than to unfamiliar controls

Critically, the researchers divided the children by explicit recognition score. **The group who explicitly could not recognize** had SCR magnitudes **statistically indistinguishable from those of the group who could explicitly recognize.**

This is textbook-level hard evidence for "trace is there, conscious retrieval is severed." The automatic body-response system **remembers** these faces; the trace has been preserved for 5-6 years somewhere in the brain; but the conscious level cannot find a retrieval pathway. Both pieces of evidence appear in the same child simultaneously.

This experimental structure fits the 13DD-filter prediction perfectly:

- **Trace in 11DD**: SCR indicates the trace has been normally encoded and long preserved
- **12DD reads normally**: SCR itself is an autonomic response generated via the 12DD pathway through the amygdala and related structures
- **13DD narrative layer filters**: 13DD does not accept the age-4 classmates' faces into integration with the current "I" autobiography, so explicit retrieval fails

Other relevant supporting evidence

- **Alberini and Travaglia 2017** (*Journal of Neuroscience*): early experience shapes adult neural structure via the implicit-memory system. What is missing is explicit recall, not the trace itself.
- **Prosopagnosia**: patients subjectively cannot recognize a spouse's face, but SCR to the spouse's face is significantly stronger than to strangers. Same dissociation pattern, with the etiology being acquired damage rather than developmental filtering.
- **Blindsight**: cortical-damage patients with subjective blindness still show differential SCR to different visual stimuli, proving that non-conscious pathways operate independently of the 13DD consciousness layer.
- **PTSD autonomic responses**: strong SCR to trauma-related cues even when the patient subjectively denies distress. Same architecture — 12DD reads 11DD traces and generates bodily responses; 13DD narrative-layer veto does not intervene in this pathway.

A candid note on hypnosis data. The clinical and psychoanalytic literature contains a long tradition of reports that under hypnosis, subjects can "recall events from before age 3." These data **cannot** support the 13DD filter hypothesis, because the false-memory risk makes the credibility of hypnotically elicited recall seriously questionable. Loftus's tradition documents extensively that a substantial fraction of such "recalls" are suggestion-generated new content rather than genuine access to existing traces. Forensic systems largely do not accept hypnosis-induced memories as evidence. This note therefore does not use hypnosis data as empirical support for infantile-amnesia mechanism. Clean evidence comes from SCR dissociations, implicit-memory preservation, and other paradigms that do not depend on conscious reports.

The developmental duality of the mechanism

Infantile amnesia and dissociative amnesia form a clean architectural duality under SAE:

- **Dissociative amnesia** (§6.6): 13DD filter pathologically intensified on **specific** traces, typically triggered by 14DD supplying the "unacceptable" value standard
- **Infantile amnesia** (§6.9): 13DD filter developmentally applied to **all** pre-identity-era traces, triggered by 13DD's own identity-continuity judgment

Both are "trace present, 12DD readable, narrative layer severed," and both satisfy the directionality constraint "13DD veto is only at the narrative layer, not descending into 12DD." The difference is the scope of filtering (specific traces vs. all pre-identity traces) and the source of the filter standard (14DD value vs. 13DD identity).

Epistemic status. The 13DD-filter localization of infantile amnesia has clear theoretical grounding in the SAE framework (systematically argued in SAE Consciousness Series Paper 5) and empirical support at the posterior level from Newcombe 1994's SCR dissociation and Alberini & Travaglia 2017's implicit-memory preservation evidence. This has more structural depth than the traditional "developmental convergence" account (which runs multiple factors in parallel), but remains a **theoretical-mechanism hypothesis** that requires further dedicated research for refinement. In particular, the establishment of the 13DD filter is itself a gradual process whose fine temporal dynamics are an open problem (see §10.5). **This is a theoretical-mechanism hypothesis, not a clinical diagnostic tool.** Any application to individual developmental or clinical assessment must be judged by qualified professionals according to specific circumstances.

6.10 Brief localizations of other pathologies

Functional amnesia (dissociative fugue, dissociative identity disorder's memory compartmentalization): mechanism unclear, involves anomalies of the 13DD filter but the specific differentiation from dissociative amnesia and from organic disease requires finer work (see §10.7).

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7. Cross-Layer Interfaces

This note's core argument is that the 11DD memory system is a Method VI phase transition. But 11DD is not isolated; it couples with adjacent layers through several interfaces. This section catalogs those interfaces, each corresponding to a specific mechanism or diagnosis developed in §3-§6. The scope is restricted to interfaces among 11DD, 12DD, and 13DD; other cross-layer problems (particularly those involving 9DD and 10DD) are reserved for a dedicated note in the series outline.

7.1 The 12DD workbench vs 11DD emergence boundary: structural layering

§3.1 developed the distinction between 12DD workbench and 11DD emergence stage in detail. Here I revisit it as a cross-layer interface, emphasizing structural significance.

Feature	12DD workbench	11DD emergence
Function	Runtime computation maintenance	Candidate-for-encoding early activation
Physical criterion	PFC-parietal network maintenance; hippocampus **does not** trigger persistent activity	Hippocampus **triggers** persistent activity
Duration (coarse)	Task cycle (seconds to minutes)	Seconds to hours
End mode	Dissipates at task completion	May cross spectral flip into 11DD pathway
Typical content	Mental-arithmetic intermediates, current intentions	Salient stimuli, emotionally charged events

This distinction does not deny the multi-component models of working memory in the literature (Baddeley, Cowan, Oberauer, etc.), nor does it deny the semi-permeable boundary Daume 2024 displays between the two (the continuous relation between working-memory strength and subsequent encoding). SAE provides, at the coarse grain, a **geometric cut** that separates long-conflated constructs into two structural positions. This is layering, not replacement. Just as there is a continuous phase-transition process between liquid water and water vapor while liquid and gas remain two well-defined positions, the relation between 12DD workbench and 11DD emergence is analogous.

7.2 From 11DD establishment to 12DD: training data flowback

11DD is not only downstream of 12DD workbench input; it is also upstream for 12DD. Long-term storage content flows back as training data for 12DD's prediction system, influencing 12DD's predictive capacity.

Specifically, 12DD's prediction system is not innately fixed; it is continuously trained by 11DD's historical compression products. Phase-4-completed traces form the foundation of 12DD predictions; schemas extracted by semanticization become 12DD's prediction templates; traces that resisted semanticization due to high emotional valence become 12DD's preferentially-called samples in specific contexts. This flowback relation means: **11DD's compression bias drives 12DD's prediction bias**.

This has clinically meaningful consequences. Depression's memory polarity-skew (§6.8) is not an isolated phenomenon; it enters 12DD's prediction system through this flowback mechanism, continuously biasing patients' predictions toward the negative. Every negative-event preferential encoding + preferential replay + preferential reconsolidation trains 12DD's "things tend to turn out badly" prediction template. The result is that 11DD's bias converts into 12DD's bias, and 12DD's bias reinforces 11DD's continued bias, forming a self-sustaining loop. This is one structural reason depression cannot be broken by event-level intervention alone (e.g., "let the patient have positive experiences"): it is not that experiences are insufficient, it is that 12DD's prediction framework has already lowered the encoding weight for new experiences.

Breaking this feedback loop typically requires simultaneous intervention at both layers: repairing the 12DD prediction framework (cognitive-behavioral therapy's belief revision) and changing the 11DD encoding-consolidation pathway (pharmacological modulation or structural life change). Single-layer intervention often has limited effect because the persistent bias at the other layer absorbs the intervention's effect back into the original loop.

7.3 13DD's veto of 11DD traces, with 14DD as standard source

13DD applies filtering access to 11DD, with 14DD supplying partial value standards. This is §5.3's core mechanism; here I revisit its architectural position from the cross-layer perspective, avoiding redundant repetition of §5.3's detailed mechanism.

The key directionality constraint: the veto acts only at the narrative-integration layer. 13DD's filtering occurs at the 12DD-to-13DD interface; it does not descend into the internal operation of 11DD or 12DD. Specifically:

- **11DD-to-12DD pathway is always open**: traces are normally read by 12DD to generate predictions, emotions, and bodily responses
- **13DD filter sits at the narrative layer**: filtered-out traces do not enter the current "I" narrative integration, but are not erased from 11DD, and 12DD's reading of them is not blocked
- **"I decline to receive," not "you are forbidden to send"**: the upper layer decides whether to receive at its own boundary; it does not interfere with the lower layer's internal operation

This directionality is a basic feature of SAE architecture. It explains a clinically important fact: the bodily responses of "suppressed" or "dissociated" memories never disappear — skin conductance to trigger cues remains strong, avoidance behavior persists, emotional arousal is automatic and not under conscious control. These phenomena, under SAE, are not "mysterious unconscious operations"; they are 12DD normally reading 11DD traces and generating output, with the 13DD filter simply not admitting those traces into narrative integration.

13DD's filter standards come from two sources:

(1) **13DD's own identity-continuity judgment**. Typical case: infantile amnesia (§6.9). After 13DD establishes, it judges pre-identity-era traces as "not mine," refusing them entry into current autobiographical integration. This filtering does not involve 14DD value standards; it is driven entirely by 13DD's identity-continuity mechanism.

(2) **Value standards supplied by 14DD**. Typical case: shame and guilt triggering narrative-layer severance (§5.3). 14DD judges something as violating "must-do," supplies the standard; 13DD executes filtering accordingly. Pathological intensification corresponds to dissociative amnesia (§6.6).

Note that 14DD supplies only standards; it does not execute filtering. The sole location of execution is 13DD. This is a fact worth explicit statement: **only 13DD holds the "mine/not-mine" filter-executor role among all DD layers**. 9DD does not ask "is this my perception"; 11DD does not ask "is this my trace"; 12DD does not ask "is this my prediction"; 14DD has value judgments but does not execute filtering; 15DD has a priori confirmation of the other's purposive status but does not concern filtering. The emergence of self-completeness necessarily brings with it the veto function, and that function sits at the 13DD layer.

Where Via Negativa sits. The value standards supplied by 14DD can be positive or negative; they are not themselves Via Negativa. Via Negativa is 13DD's **mode of execution**: no creation of new traces, only the application of "not permitted to enter my narrative" to existing ones. Every 13DD filtering action is an instance of "this cannot be integrated into my story," which is Via Negativa as a concrete downward pathway within the memory system. Method VII's abstract methodology finds here a specific biological instantiation.

7.4 12DD-to-11DD reverse modulation during sleep

This interface was developed in §3.3. The core fact: prefrontal sharp waves during SWS apply top-down suppression on hippocampal replay — this is 12DD's reverse modulation of 11DD during sleep. The selective suppression during sleep is not an accidental mechanism; it is 12DD's predictive framework participating in which content is allowed to complete Phase 3. This interface differs from §7.3's 13DD filter: §7.3 acts primarily on Phase-4 ongoing reconsolidation and narrative-integration filtering; §7.4 acts primarily on Phase-3 F crossing. The two reverse-access mechanisms operate at different transition stages, jointly determining the long-term fate of content.

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8. Relation to Existing SAE Literature

8.1 Resolution-increase on Anth-1's construct-layer definition

§1.3 developed the relation to Anth-1. Here I give a structural summary.

Anth-1, at low resolution (the 13DD-emergence scale), observes the 11DD+12DD construct layer as a whole and sees continuous accumulation with the internal fine-structure temporarily set aside. That description is correct at that resolution. This note, at higher resolution (11DD's own operation scale), observes 11DD and identifies discrete phase-transition structure internally. Both observations are correct at their own resolution, and together they constitute a layered characterization of the same object.

Two manifestations of fractality:

- Large scale: cross-layer phase transitions in the construct-emergence hierarchy (Anth series)
- Small scale: internal operational phase transitions within each layer (this note)

Method VI as analytic framework applies at both scales, and r >> 1 asymmetry holds at both. This is a concrete empirical instance of Method VI's fractal property.

8.2 Instantiation of Method VI and methodological patching

This note extends Method VI from its original scope (clinical trial design) to basic neuroscience. Three cross-domain contributions worth recording:

(1) **r >> 1 holds at the coarse grain in the memory system**: time-proxy estimates give r in the range 5 to 8, matching ZFCρ's r ≈ 5 in order of magnitude. This is another empirical instance of Method VI's Prediction 3 ("most construct-emergence systems have r > 1").

(2) **Four-stage structure identifiable**: emergence (12DD workbench activation) + spectral flip (encoding event) + flip (entry into irreversible SWS cascade) + establishment (long-term distributed storage) is a natural mapping onto Method VI's original structure. This four-stage identification provides memory research with a shared structural coordinate.

(3) **Methodological patching**: when Method VI is applied cross-domain, the topological distance quantity of the system must first be identified; time is a fallback only when no more faithful proxy is available (§4.3). This principle sharpens the epistemic status of every r estimate across the SAE series. The subsection in §4.3, in effect, functions as an external patch to Method VI v1; it is recommended that future versions of Method VI explicitly incorporate this principle.

8.3 Applications of Method VII's negative methodology

This note makes extensive use of Via Negativa methodology, at two levels.

Methodological level: §6's pathology spectrum is a paradigmatic Via Negativa application. Each pathology functions as an exclusion E_i: "if the system were operating normally, this failure mode would not occur." The collection of pathologies constitutes a multi-angle exclusion series that constrains the structure of normal operation. The independence of the pathologies (classic amnesia, PTSD, sleep disorders, SDAM, HSAM, dissociative amnesia, emotional blunting, depression each involving different neural substrates) drives hardness of the structural judgment (Method VII's C5 principle).

Object level: §5.3's 13DD veto of 11DD traces is itself an instance of Via Negativa as a downward pathway within the SAE hierarchy. 13DD creates no new traces; it only applies "not permitted to enter my narrative" to existing ones. 14DD supplies the value-standard source, 13DD executes filtering, traces remain in 11DD with 12DD reading preserved, and only the narrative-integration layer is severed. Every 13DD filtering action is an instance of "this cannot be integrated into my story" — the concrete manifestation of negative methodology in the memory system. This note extends Via Negativa from abstract methodology to a specific biological instantiation, and additionally locates the precise architectural position of the veto (the 12DD-to-13DD narrative-integration interface, not within 11DD or 12DD).

8.4 Completion of Note 8's memory-anomaly gap and material supply for Methodology IX

Note 8 (ADHD and AI transplant memory) §4 discussed transplant-memory phenomena. Its §11 explicitly left a gap concerning 12DD-related pathology's architectural base. This note supplies the 11DD architectural base Note 8 required:

- Note 8's "transplant memory" problem required a clear 11DD phase-transition structure as analytical framework; this note provides it.
- Note 8's 12DD-related pathology required a clear 11DD-12DD boundary; §7.1's workbench-emergence distinction provides it.
- Note 8's treatment of emotional valence in cognition required a cross-stage modulation perspective; §5 provides it.

This note also supplies the coarse-grained version of 11DD-as-construct-hub that Methodology IX (SAE Methodology of Consciousness, in preparation) will require. Methodology IX needs a complete analysis of consciousness emergence, within which the operational mechanism of 11DD as construct layer is a necessary foundational description. This note provides the coarse version of that foundation; subsequent notes (Paper A on 12DD hub, Paper B on 15DD neural basis) will continue the refinement.

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9. Non-trivial Predictions (Coarse-Grained)

This section gives six non-trivial predictions generated by Method VI's application to the memory system, each with explicit falsifiability conditions. These predictions are this note's primary verifiable contributions.

Prediction P-N9-1: Sleep-deprivation damage follows the r >> 1 topological signature, not time-linear

Prior: Phase-3 F crossing depends on the effective SWS-spindle-sharp-wave-ripple cascade. r >> 1 predicts the integrity of this cascade matters more than total sleep duration.

Testable:

- Measure spindle-ripple coupling event counts in three groups (high-density EEG + polysomnography), designing three conditions:
    - Condition A: normal spindle-ripple coupling (high count)

- Condition B: normal duration but coupling event count halved
  - Condition C: duration halved but coupling density compensated (total count preserved)
- Compare the three conditions' impact on new-learning retention
- Prediction: **retention scales with total coupling-event count as a threshold relation, not a linear relation**; Condition C's retention should exceed Condition B's, even though C's total sleep duration is shorter

Falsification:

- Deprivation effect scales linearly with sleep duration (rather than with coupling count)
- Or coupling count and retention scale linearly (rather than as a threshold)

This is the hardest testable prediction of this note, directly testing the r >> 1 core claim.

Prediction P-N9-2: Emotional blunting weakens cross-stage π_cross

Prior: Emotional blunting = modulation signal attenuation, cross-stage π_cross decrement (§6.7). This predicts a fine-grained behavioral pattern distinction.

Testable:

- Compare emotional-blunting patients (depression, long-term SSRI users) with controls
- For events matched on emotional valence, measure long-term retention
- Prediction: the emotional-blunting group's **memory enhancement for high-emotional events** is significantly reduced (content that should have been preferentially retained is no longer preferentially retained); neutral-event retention should show no significant difference

Falsification: the emotional-blunting group's memory impairment is **uniform** (all events' retention dropping equally)

This prediction's importance lies in providing a paradigm for distinguishing "memory capacity loss" from "modulation-signal failure." If emotional-blunting patients show uniform reduction, the problem is in memory capacity itself; if they show selective weakening, the problem is in modulation signal. Current literature cannot clearly distinguish these two modes; this note predicts the latter.

Prediction P-N9-3: Pathology stage-localizations are testable

Prior: §6's Method VI diagnoses for each pathology should show selective abnormalities on functional and neural indicators corresponding to the specific stage.

Testable:

- Classic amnesia: preserved workbench function + preserved remote memory + new-learning failure (already literature-supported)
- PTSD: Phase-2 over-crossing (abnormally strong amygdala-hippocampus coordination) + Phase-3 incomplete (abnormal sleep consolidation) (partially literature-supported)
- SDAM: four stages pass but episodic re-experiencing module independently impaired (literature beginning to support)
- HSAM: Phase-4 buffer abnormally strong (neural signature of semanticization resistance requires dedicated measurement)
- Depression: modulation signal polarity-skew (negative π_cross up, positive down) (literature-supported)
- Dissociative amnesia: post-Phase-4 13DD filter over-activation on specific traces; traces present with 12DD readable but narrative-integration pathway severed (requires purpose-designed experiments)

Falsification: these pathology localizations do not match the above patterns, or the neural signatures observed across different pathologies do not show the independence predicted by Method VI diagnosis.

This prediction's strength is that it is not a single claim but a collection of mutually independent sub-predictions. Each pathology is an independent falsifiable point; multiple simultaneously matching the prediction significantly increases the credibility of the Method VI diagnostic framework. Method VII's C5 principle applies: the coherence of independent evidence drives hardness of the structural judgment.

Prediction P-N9-4: The coexistence pattern of PTSD and dissociative amnesia in the same individual

Prior: §6.6 indicates PTSD and dissociative amnesia can coexist in the same individual; this is not contradictory but a manifestation of two different positions failing simultaneously:

- PTSD reflects Phase-3 incompletion (trace stuck between Phase 2 and 3)
- Dissociative amnesia reflects post-Phase-4 13DD filter over-activation on specific traces (14DD supplies "unacceptable" value standard; 13DD executes severing of narrative-integration pathway; trace present and 12DD readable)

Testable:

- In patient populations with severe trauma history, assess PTSD symptoms (flashbacks, hyperarousal) and dissociative memory symptoms (specific-detail unretrievability) in detail

- Prediction: the two symptom types can appear independently, can coexist, and can be unrelated. Coexisting patients should show two different abnormality patterns neurologically: amygdala hyperactivation to trauma-related content (PTSD mechanism) and vmPFC-hippocampus narrative-integration pathway suppression to the same content (dissociative amnesia mechanism).
- Key prediction: even patients with severe dissociative amnesia should still show significantly higher SCR to trauma-related cues than to neutral controls (trace still in 11DD, 12DD still reads), distinguishable from a "trace lost" hypothesis.
- Treatment response should differ for the two symptoms: Phase-3-targeted interventions (e.g., therapies enabling sleep-period integration) should help flashbacks but not dissociative forgetting; 14DD-13DD coupling–targeted narrative reorganization (e.g., psychotherapy addressing shame and guilt) should help dissociative forgetting but have limited effect on flashbacks.

Falsification: the two symptoms are indistinguishable neurologically and in treatment response, or always co-vary rather than appear independently at the individual level.

Prediction P-N9-5: Distinctive neural signature of 14DD-standard-driven 13DD veto

Prior: 14DD complex emotions (guilt, shame, pride) supply value standards; 13DD executes veto-style filtering. The neural signature of this combination should differ from 12DD basic-emotion-triggered reconsolidation (fear, anger).

Testable:

- Compare neural activity during "recall a shameful event" vs "recall a fearful event"
- Prediction: the former should involve significantly more vmPFC and mPFC (typical sites of 14DD narrative system and 13DD identity-integration system); the latter should involve more amygdala and hippocampus (typical sites of 12DD basic emotion)
- After repeated recall, subsequent retrieval should show different re-editing patterns. Shame-triggered 13DD filtering (driven by 14DD standard) may accompany increased narrative-layer retrieval difficulty, but SCR should be maintained or enhanced (12DD pathway normal). Fear-triggered reconsolidation should more likely accompany maintained narrative-layer retrievability with maintained emotional intensity.
- Patients with dissociative amnesia should show 12DD-to-13DD narrative-integration-pathway abnormal severance for specific memories, but 12DD-to-11DD pathway normal.

Falsification: the two emotions' triggered neural patterns cannot be distinguished, or repeated modulation's behavioral changes do not fit the "narrative-layer severance + 12DD pathway preservation" distinction prediction.

Prediction P-N9-6: Skin-conductance dissociation for infantile amnesia

Prior: §6.9 locates infantile amnesia as 13DD filter's systematic veto of pre-identity-era 11DD traces. The core claim is **trace present, 12DD readable, narrative-integration layer severed**. Newcombe et al. 1994's SCR dissociation experiment on 9-10-year-olds for age-4 classmates provides initial support; this prediction extends the structure to the 0-3-year-old window.

Testable:

- Present adult subjects (18+) with visual stimuli related to their infancy (0-3 years): early primary caregivers, childhood residence interiors, objects frequently contacted during 0-3 years. These materials must be independently confirmed via family archive, not relying on the subject's own memory. Controls are matched unfamiliar stimuli.
- Measure two indicators simultaneously:
  - Explicit recognition ("do you know this object/person?"): expected near chance
  - Skin-conductance response: expected SCR to familiar stimuli significantly higher than to unfamiliar controls
- Key prediction: among the **explicitly unrecognized** stimuli, SCR still significantly distinguishes familiar from unfamiliar. That is: even when the subject says "I don't recognize this at all," their SCR is quietly telling researchers "this is remembered somewhere."

Candid statement about a methodological challenge. Extending to the 0-3 window carries a specific concern: **re-encoding contamination**. Repeated family album viewing and parental verbal accounts cause many 0-3 visual stimuli to be re-encoded during ages 4-10, and the resulting trace belongs to later 11DD rather than to original infancy 11DD. Newcombe 1994 was naturally immune at the age-4 window (classmates had dispersed, with no re-encoding opportunity), but the 0-3 window does not enjoy this immunity. This note, as a philosophical-level structural prediction within the SAE framework, only flags the existence of this methodological challenge. The specific design of control conditions (e.g., identification and certification of "time-capsule" stimuli that never appeared in any family memory vehicle after age 3) belongs to the domain of neuroscience experimental methodology and is left to researchers equipped to execute such experiments.

Falsification:

- If SCR to familiar infancy stimuli does not differ significantly from unfamiliar controls, the 13DD filter hypothesis is severely challenged — this would indicate that infancy traces are perhaps not stably encoded, or that 12DD can no longer read them

- If SCR is significant only for explicitly recognized stimuli and shows no difference for unrecognized ones, then the "trace present but narrative-layer severed" dissociation fails, suggesting encoding failure rather than filtering

Special status of this prediction. Newcombe 1994 already gives positive evidence at the age-4 window; extending to 0-3 is a structural extrapolation. If the 0-3 prediction fails even under appropriate controls, a possible explanation is that encoding capacity is genuinely insufficient in the earliest period (before age 2), but traces from the 2-3 year range should still be SCR-detectable. This prediction therefore can also serve as a measurement tool for the precise temporal window of 13DD filter establishment.

Additional speculative inference

As a speculative inference (not offered as non-trivial prediction; serving only as a direction of thought):

r >> 1 combined with "filtering is the default" jointly suggests that the hardware capacity of the memory system may not be the primary bottleneck. HSAM cases (showing that when the Phase-4 buffer is abnormally strong, large volumes of content can be retained) suggest that the difference between HSAM individuals and normal people lies not in hardware capacity but in the tuning of the Le Chatelier buffer. Normal humans' long-term memory capacity is far from saturated; the true limit on long-term retention is **the tuning of the filtering mechanism**, not storage space itself. This inference requires finer dissection of the HSAM mechanism for rigorous support, as discussed in §10 open problems. It is not offered as a main prediction because current HSAM mechanism research is not sufficient to give a strictly falsifiable framework.

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10. Open Problems

10.1 Finer-grained four sub-transitions

This note restricts to the coarsest grain. Medium-grained four sub-transitions (12DD workbench to 11DD buffering, buffering to early stabilization, early stabilization to long-term conversion, long-term conversion to complete semanticization), each with its own complete Method VI analysis, are left to subsequent notes. Possible numbering: Note 10 on the 12DD-to-11DD interface transition, Note 11 on internal 11DD sub-transitions, Note 12 on long-term conversion and semanticization.

10.2 Precise mechanism of inverted-U response

§5.4 gave a coarse-grained reading of the inverted U: extreme emotional valence dramatically lowers Phase-2 F (excessive encoding), while simultaneously disrupting the Phase-3 SWS progression (sleep disrupted by nightmares or hyperarousal). The interaction of the two produces non-monotonic response. Precise mechanism requires multi-transition coupling analysis; a single transition alone cannot fully explain the inverted U. This is a concrete research direction.

10.3 Precise neural signatures of 13DD-executed veto and specific content of 14DD standards

§5.3 proposes the combined mechanism of 13DD filter execution plus 14DD value-standard supply as a research programme. Specific neural signatures (how guilt vs shame vs pride value standards are concretely translated by 13DD into narrative-layer severance) require empirical work. P-N9-5 provides a testable direction. This direction involves the intersection of affective neuroscience, social neuroscience, and memory research — a natural growth point for cross-disciplinary collaboration. The specific content of 14DD value standards (which "must-dos" in which contexts are translated into filter instructions) is more a matter for refined clinical psychology; this note provides only architecture, not content mapping.

10.4 Specific mechanisms of HSAM

§6.5 localizes HSAM as abnormal strengthening of the Phase-4 Le Chatelier buffer. But which specific Phase-4 buffering sub-mechanism? Reconsolidation-channel anomaly? Autobiographical-retrieval-system specialization? Episodic-encoding intrinsic persistence? Current HSAM research has a limited number of cases, and mechanism refinement requires dedicated research. This is also why the speculative inference at the end of §9 was not upgraded to a main prediction.

10.5 Fine temporal dynamics of 13DD filter establishment

§6.9 localizes infantile amnesia as 13DD filter's systematic veto of pre-identity-era traces, and provides hard empirical support from Newcombe 1994 and other implicit-memory preservation evidence. But the 13DD filter's establishment is itself a gradual process, not a sudden switch. Is this establishment process itself a Method VI phase transition? If so, at which specific developmental node does its F lie? Is 13DD filter establishment synchronous with mirror self-recognition, stable use of first-person pronouns in language, theory-of-mind emergence, and other developmental milestones, or with slight time offsets? These fine temporal dynamics require longitudinal research with multi-indicator tracking. The SCR dissociation paradigm of P-N9-6 can serve as a measurement tool: by detecting the age-window boundary where traces are SCR-distinguishable but not explicitly recognized, one can infer the precise temporal course of 13DD filter establishment.

10.6 Cross-scale variation of Method VI's r and topological-distance refinement

The coarse-grained r in the range 5-8 is an initial estimate (using time as a degenerate proxy). The true r requires information-theoretic proxies (cumulative information entropy + negentropy injection). Medium-grained sub-transition r values may differ; at very fine grain, r may be very large (e.g., Phase 1's r may be of order 100). Does the cross-scale distribution of r follow a pattern? A fractal relation? This is not only an open problem for Note 9; it is a research programme for the

Anth series' r estimates as well: what physical quantities should the Anth series' true r be measured in? This is a direction in which the SAE series can progressively refine in future versions.

10.7 Fine mechanisms of dissociative amnesia and other functional amnesias

§6.6 promotes dissociative amnesia to main argument, as an instance of 13DD filter pathological intensification on specific traces. But the specific mechanism by which 13DD filter is selectively activated on particular traces, and how 14DD value standards are translated into filter instructions, both require refinement. Additionally, the mechanism of coexistence with PTSD (see P-N9-4); differential diagnosis from other functional amnesia symptoms (dissociative fugue, dissociative identity disorder's memory compartmentalization)? These clinical questions require finer neuropsychological work.

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11. Conclusions

11.1 Core contributions of this note

1. Treating the memory system as a single Method VI phase transition at the coarsest grain. Four-stage structure (emergence, spectral flip, flip, establishment) is identifiable; r >> 1 holds. F is pinned as "entry into the irreversible sleep-compression window," not "completion." This provides memory research with a unified phase-transition geometric coordinate.

2. Explicitly distinguishing the 12DD workbench from the 11DD emergence stage. This is SAE's coarse-grained geometric cut through a long-conflated construct in the literature, with hippocampal persistent activity as candidate physical criterion (Daume 2024). This is not a replacement for mainstream working-memory models but provides them with a new geometric cut.

3. Locating emotional valence as a cross-stage modulation signal rather than a single-stage local property. 12DD basic emotions as primary parameter (cat-anchoring heuristic, kept operational without elevation to ontological definition); 14DD complex emotions as **value-standard source**, 13DD as **filter executor** applying selective severance to the narrative-integration pathway of 11DD traces. 14DD supplies "unacceptable" value judgments; 13DD executes severing of the narrative-layer pathway accordingly.

4. Systematically locating memory pathologies to specific failure points among the four stages (classic amnesia, Alzheimer's, PTSD, sleep disorders, SDAM and HSAM, emotional blunting, depression, dissociative amnesia, infantile amnesia). SDAM and HSAM are reorganized as symmetric poles of the Phase-4 Le Chatelier buffer. Dissociative amnesia is promoted to main argument as an instance of 13DD filter pathological intensification on specific traces, forming a mechanistic duality with PTSD. **Infantile amnesia is promoted to main argument** as an instance of 13DD filter's systematic developmental veto of pre-identity-era traces, citing the

13DD filter mechanism of SAE Consciousness Series Paper 5, with Newcombe 1994's skin-conductance dissociation as hard empirical support.

5. Methodological patching: when Method VI is applied cross-domain, r is strictly a topological-distance ratio, not a time ratio. Time is a fallback only when no more faithful proxy is available. This principle provides epistemic sharpening to all r estimates across the SAE series; it is recommended that future versions of Method VI explicitly incorporate it.

6. "Filtering is the default, encoding is the exception" as the philosophical implication of r >> 1. This is not merely a technical claim; it is an important correction to everyday self-attribution of memory. The memory system defaults to filtering out most content; "poor memory" has meaning only for the specific case where content that should have crossed the spectral flip failed to do so.

7. 13DD as the SAE architecture's sole filter executor. This is an architectural statement. "Mine/not-mine" judgment is the defining capacity of the self-completeness layer; only 13DD carries this role, while other DD layers (9DD through 12DD, 14DD, 15DD) have their own functions but do not share filter-executor status. 14DD can supply value standards, but the location of filter execution is solely 13DD. And 13DD's veto acts only at the narrative-integration layer; it does not descend into 12DD: **the upper layer's veto is "I decline to receive," not "you are forbidden to send."** This directionality constraint is a basic feature of SAE architecture. It explains why "suppressed" traces can still generate bodily responses (the 12DD pathway is never severed), and it unifies dissociative amnesia and infantile amnesia at the architectural level.

11.2 Initial validation of Method VI's fractality

This note is Method VI's first systematic application in basic neuroscience. Four-stage structure is identifiable at the memory-system scale; r >> 1 holds at the coarse grain (even under the degenerate time proxy), matching ZFCρ's prediction in order of magnitude. This provides initial support for Method VI's Prediction 3 (most construct-emergence systems have r > 1). At the same time, it supplies a methodological patch for cross-domain application: first identify the topological distance quantity.

To date, Method VI has been validated at four scales:

- Cosmological-species scale (Anth-1's 13DD emergence, r ~ 100)
- Civilization scale (Anth-2's 14DD emergence and Anth-3's 15DD emergence, r ~ 50 to 10)
- Clinical trial scale (Method VI original paper, r ~ 5)
- Basic neuroscience scale (this note, r ~ 5 to 8)

These four scales span more than ten orders of magnitude in time (from ~10-microsecond neural oscillations to multi-million-year species evolution). The same four-stage structure and r >> 1 asymmetry are identifiable at all. This is strong empirical support for Method VI's fractality.

11.3 Reserved for subsequent notes

This note restricts to the coarsest grain. Finer sub-transition analyses, pathology-subtype fine localizations built on the coarse base, the complete development of 12DD as hub layer (Paper A in the series outline), the neural basis of 15DD posterior empathy (Paper B), and the cross-layer directionality architecture (new topic in the series outline) are all reserved for subsequent notes.

Memory as an SAE object: this note has completed only the entry-level work. The details of the memory system are among the most complex in neuroscience; the value of Method VI analysis lies in providing a unified structural perspective, letting the research on innumerable specific mechanisms find their structural positions. Subsequent work can proceed on this foundation.

11.4 A closing observation

Modern neuroscience's memory models already precisely characterize each sub-process (LTP, replay, reconsolidation, semanticization, engram allocation), but lack a **unified phase-transition geometric perspective**. Method VI provides that perspective: not replacing existing mechanism models but giving them a common structural coordinate.

Each stage's specific neural mechanisms are refined individually, yet they **share the same phase-transition structure**. This cross-mechanism structural coherence is the foundation of Method VI's repeated validation across domains (metabolic oncology, anthropology of 13DD, 14DD, 15DD, economics, and now the memory system), and it is evidence of the SAE framework's cross-domain unity. The framework provides perspective; specific mechanism research fills in the detail; the two complement each other.

The phrase "filtering is the default, encoding is the exception" may be the most persistent observation this note leaves behind. It is not merely a technical claim about $r >> 1$; it is also a description of the memory system's basic posture: the system defaults to **refusing**, not to **accepting**. Each piece of content that successfully enters long-term storage has crossed layer after layer of Le Chatelier buffering, won priority in emotional-valence ordering, completed sleep-period compression, and survived long-term reconstruction — a minority that made it through. Memory is not a diligent archivist; it is a strict gatekeeper.

This inverted posture may offer some insight into how we understand our own memory. Every item you remember has passed through every gate. The overwhelming majority of content you have forgotten was never truly admitted to the system. Both are the system working correctly.

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13DD filter as the executor position of Via Negativa's downward pathway is directly indebted to years of shared exploration of the negative methodology.

This note also benefited specifically from four AI-assisted reviews. An independent Claude parallel instance suggested changing "refinement" to "resolution-increase" (§1.3), and identified that the candidate physical criterion for the 12DD workbench vs 11DD emergence distinction should be hippocampal persistent activity (§3.1). Gemini (子夏) identified that r is strictly a topological-distance ratio and not a time ratio, driving the core clarification in §4.2 and §4.3, and identified the Via Negativa nature of downward modulation on 11DD traces (§5.3) and the symmetric-poles structure of SDAM and HSAM at Phase 4 (§6.5). ChatGPT (公西) identified that F's geometric position should be pinned as "the threshold of irreversible SWS cascade" (running through §2.3, §3.3, §4.2), kept cat-anchoring in operational heuristic status without elevating it to ontological definition (§5.2). Grok (子) provided comprehensive cross-validation of literature and several key reinforcing single-sentence additions.

During writing, the author performed a key correction on the architectural assignment of the "veto" function: from the initial "14DD veto-style reverse modulation" to "13DD executes filtering, 14DD supplies partial value standards," consistent with the 13DD "mine/not-mine" filter mechanism already established in SAE Consciousness Series Paper 5 (Qin 2026, DOI 10.5281/zenodo.19385464). This correction allowed §5.3's modulation mechanism, §6.6's dissociative amnesia, and §6.9's infantile amnesia to form a unified architectural duality, and made §11.1's seventh core contribution possible.

AI Assistance Statement

This note was prepared with the assistance of AI language models. Claude (Anthropic) was used for structural discussion, outline iteration, draft review, and language editing. ChatGPT (OpenAI) was used for deep literature research (deep research) and review. Gemini (Google) and Grok (xAI) were used for review. All theoretical content, conceptual innovations, normative judgments, and analytical conclusions are the author's independent work.

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