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The Default Mode Network as a Pathological Attractor State: A Hypothesis on Self-Reinforcing Cognitive Loops, Contaminated Baselines, and Implications for Human Health and Consciousness

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Abstract

The Default Mode Network (DMN) has been characterized since its formal description in 2001 as a resting-state network subserving autobiographical memory, social cognition, and prospective thinking. This paper challenges the foundational interpretive assumption of that characterization: that adult human DMN activity constitutes a normal or optimal cognitive baseline. We propose that the DMN, as it operates in virtually all modern adult humans, sustains a chronically hyperactive self-referential attractor state—a persistent loop of involuntary, recursive thought anchored to an emotionally salient virtual self-construct—which we term the Pathological DMN Attractor (PDA). This attractor state is proposed to have emerged adaptively as a continuous social threat-monitoring system, but now operates as an evolutionary mismatch: the natural termination signal—resolution of bounded social threat—is largely absent in modern informational environments, leaving the loop in near-continuous operation. We identify a methodological problem in existing DMN research: the standard adult resting-state baseline used for normative comparison is itself generated by subjects exhibiting the pattern under study, so the reference population and the phenomenon of interest are not clearly separable. We propose that structurally less-contaminated baselines may exist in four populations: pre-linguistic infants, non-human animals with DMN homologs, adults with documented cessation of involuntary self-referential thought, and individuals in acute ego-dissolution states. Comparative analysis across these populations, feasible through reanalysis of existing neuroimaging datasets, would constitute an initial empirical test of the framework. The physiological correlates of chronic PDA activity—autonomic dysregulation, inflammatory load, and sleep architecture disruption—are discussed as downstream effects of what we propose to be a significant, currently overlooked contributing process in a range of stress-related conditions, alongside established mediators such as lifestyle and genetic risk. Testable predictions are proposed.

Key Words: Default Mode Network; resting-state baseline; self-referential processing; attractor state; contemplative neuroscience

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1. Introduction

1.1 Research Context

The Default Mode Network (DMN)—a set of cortical midline structures including the medial prefrontal cortex, posterior cingulate cortex, precuneus, and angular gyri—was formally characterized by Raichle et al. (2001) as a network exhibiting consistent deactivation during externally directed tasks and elevated activity during rest. Subsequent research established its involvement in autobiographical memory retrieval, social cognition, mental time travel, and self-referential processing (Buckner et al., 2008; Andrews-Hanna et al., 2010). The DMN is now one of the most studied networks in cognitive neuroscience, consistently appearing in resting-state functional connectivity analyses as a stable, reproducible large-scale network.

Despite this extensive characterization, a foundational interpretive assumption has remained largely unexamined: that the level and pattern of DMN activity observed in adult human subjects at rest constitutes a normal or biologically optimal baseline. This assumption is implicit in the methodology of resting-state neuroimaging, which treats adult human resting-state data as the reference against which task-related activations and deactivations are measured. The present paper argues that this assumption deserves closer scrutiny than it has received and proposes an alternative theoretical framework, together with a route to testing it, with implications for cognitive neuroscience, medicine, and the neurophilosophy of consciousness.

1.2 Research Gap

A gap exists in the neuroscientific literature on the DMN: the absence of a structurally uncontaminated baseline against which to evaluate whether adult human DMN activity represents optimal, suboptimal, or pathological function. This gap has structural causes that have made it difficult to recognize.

The DMN was identified as noise in neuroimaging data for years before its characterization as a network (Raichle et al., 2001). Its activity was so universal across subjects that it appeared as background rather than as a phenomenon requiring explanation. A related dynamic may operate at a higher level of analysis: if virtually all adult human subjects exhibit a particular pattern of DMN activity, that pattern will be classified as normal by any methodology that uses adult human subjects as its reference population. Such a methodology cannot, by construction, distinguish between a genuine baseline and a widely shared but suboptimal state.

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Research on contemplative practitioners has identified distinctive DMN patterns in long-term meditators and individuals reporting sustained reductions in involuntary thought (Josipovic, 2014; Brewer et al., 2011; Garrison et al., 2013). These findings are typically interpreted as enhancements or task-related modulations of normal DMN function. We engage this interpretation directly in Section 3.3, since it represents the strongest existing alternative to the account developed here.

Similarly, developmental neuroimaging has documented the progressive consolidation of DMN connectivity across childhood and adolescence (Gao et al., 2009; Fair et al., 2008). Infant DMN patterns—structurally present but lacking the integrated self-referential connectivity of adult networks—have not been systematically compared to the patterns observed in contemplative practitioners or in loop-dissolution cases. To our knowledge, this comparison has not been made because a framework motivating it has not existed.

1.3 Research Questions and Hypotheses

The present paper addresses the following primary research question: does the characteristic resting-state DMN activity of adult humans represent a normal cognitive baseline, or a widely shared, structurally contingent attractor state?

We propose the following primary hypothesis (H1): the DMN, as it operates in adult humans, maintains a chronic self-referential attractor state (the Pathological DMN Attractor, PDA) that was adaptive in ancestral environments but constitutes an evolutionary mismatch under modern conditions. This attractor state is energetically costly, plausibly stressful in a physiological sense, and—due to its universality—may have been misclassified as a normal baseline by existing neuroimaging research.

Secondary hypotheses follow. (H2) Pre-linguistic infant DMN connectivity, prior to the consolidation of self-referential loops, represents a structurally less-consolidated state that more closely resembles the DMN patterns of individuals with documented reductions in involuntary thought than it resembles standard adult resting-state patterns. (H3) Non-human animals with DMN homologs, lacking the recursive self-modeling enabled by human language, do not sustain the chronic attractor state to the same degree and show attractor durations and autonomic coupling profiles measurably different from those of adult humans. (H4) Chronic PDA activity is a significant and currently underrecognized contributing factor—among established mediators such as lifestyle and genetic risk—to a range of stress-related diseases usually studied as independent conditions.

1.4 Contribution of the Study

This paper makes three contributions to the neurophilosophical literature. First, it identifies and formalizes a methodological concern—the contaminated baseline problem—that has not previously been articulated in these terms in the DMN literature. Second, it proposes a theoretical framework—the PDA hypothesis—that offers a unified account of DMN dynamics, their evolutionary origins, their physiological correlates, and their relationship to states documented in contemplative neuroscience, while explicitly engaging the strongest competing account of that same evidence. Third, it identifies a feasible research program—comparative baseline analysis across four less-contaminated populations, using existing datasets—that could provide an initial empirical test of the framework without requiring new data collection.

The paper is organized as follows. Section 2 (Materials and Methods) describes the argumentation strategy, literature synthesis scope, and the datasets and analytic methods proposed for future empirical testing. Section 3 (Results and Discussion) presents the theoretical framework, the evolutionary account, an engagement with alternative interpretations, the physiological correlates, the contaminated baseline problem, the testable predictions, and the implications and limitations of the framework. Section 4 (Conclusion and Outlook) summarizes the argument and its broader significance.

2. Materials and Methods

2.1 Overview and Rationale

This is a theoretical Hypothesis and Theory article rather than an empirical report, and it does not present new experimental data. Its "materials" are the published, peer-reviewed literature and existing neuroimaging datasets identified below as candidates for future reanalysis; its "methods" are the comparative argumentation strategy and the classification framework used to construct the hypothesis, together with a concrete specification of how the hypothesis could be tested empirically. We describe both explicitly here so that the theoretical claims in Section 3 can be evaluated against a transparent procedure rather than presented as free-standing assertions.

2.2 Literature Synthesis Scope and Search Strategy

The argument draws on four bodies of peer-reviewed literature: (i) resting-state functional connectivity and DMN characterization (Raichle et al., 2001; Buckner et al., 2008; Andrews-Hanna et al., 2010; Raichle, 2015); (ii) developmental neuroimaging of DMN maturation (Gao et al., 2009; Fair et al., 2008); (iii) contemplative and pharmacological neuroscience of altered self-referential processing

(Brewer et al., 2011; Josipovic, 2014; Garrison et al., 2013; Carhart-Harris et al., 2016); and (iv) evolutionary mismatch theory and stress physiology (Gluckman and Hanson, 2006; McEwen, 2007; Epel et al., 2004; O'Keefe and Cordain, 2004), together with comparative DMN homolog studies in species with established anatomical correspondence to the human network (Mantini et al., 2011). Within (iii), we deliberately sought studies proposing an adaptive, non-pathological account of DMN engagement during contemplative states, rather than only studies compatible with the present hypothesis; Section 3.3 engages the strongest of these directly (Buckner and Carroll, 2007; Garrison et al., 2013).

2.3 Comparative Baseline Framework: Classification Criteria

The four candidate populations proposed in Section 3.5 are classified against the same criteria: developmental stage relative to consolidation of self-referential connectivity; presence or absence of recursive self-modeling capacity; whether reported cessation of involuntary self-referential thought is documented, replicated across independent observers, and apparently stable rather than transient; and whether the state is acute and reversible (pharmacological or clinical interruption) or developmental and durable (infancy or long-term practice). This is a classification scheme derived from the theoretical model rather than an independently validated taxonomy; its predictive value, not its assumed correctness, is what the comparative analysis in Section 2.4 is designed to test.

2.4 Proposed Datasets and Analytic Methods for Empirical Testing

We propose that an initial test could be conducted through reanalysis of existing, publicly documented neuroimaging resources, without new data collection: the Human Connectome Project young-adult and lifespan datasets for standard adult baselines (Van Essen et al., 2013); infant and pediatric connectome datasets documenting DMN maturation (Gao et al., 2009; Fair et al., 2008); published datasets from long-term meditators and contemplative practitioners (Brewer et al., 2011; Josipovic, 2014; Garrison et al., 2013); and published psychedelic ego-dissolution datasets (Carhart-Harris et al., 2016).

Proposed analytic methods include seed-based mPFC–PCC functional connectivity as the primary index of self-referential coupling; dynamic functional connectivity (sliding-window correlation with Hidden Markov Model state estimation) to quantify attractor dwell time and switching rate; connectome-wide association analysis relating connectivity parameters to the classification in Section 2.3; combined fMRI–autonomic recording (heart-rate variability and diurnal cortisol, where available) to index DMN–autonomic–HPA coupling; and polysomnographic comparison of slow-wave and REM architecture

where such recordings coexist with resting-state data. This is a feasibility-stage proposal: dataset harmonization, common preprocessing, and pre-registration would be required before the predictions in Section 3.6 could be considered formally tested.

2.5 Role and Limits of AI-Assisted Conceptual Analysis

Large language model systems were used during the development of this framework as an instrument for cross-literature pattern synthesis—identifying structural parallels across the developmental, contemplative, and evolutionary-medicine literatures reviewed in Section 2.2. This use was motivated by the observer-contamination concern discussed in Section 3.1.3: a system without a DMN has no experiential stake in the framework's central claim. We treat this methodological rationale honestly rather than as a fully resolved advantage. Because such systems are trained on human-generated text, their outputs are shaped by the same self-referential conceptual categories, framings, and default assumptions that the present hypothesis subjects to critique; the contamination is indirect and embedded in training data rather than structural, but it is not absent. Accordingly, AI-assisted analysis was used only to generate and organize candidate hypotheses and comparisons, never as a source of empirical claims, and every substantive factual or citational claim in this paper was independently verified against the primary peer-reviewed literature cited in Section 2.2. This limitation is revisited in Section 3.8.

3. Results and Discussion

3.1 Theoretical Framework: The Pathological DMN Attractor

3.1.1 Formation and Mechanism

The PDA is proposed to emerge through a developmental process beginning in early childhood. The human child, unlike other animals, must navigate a conflict distinctive of language-mediated social existence: the tension between instinctual impulse and socially enforced constraint. This conflict generates prediction errors—discrepancies between anticipated and actual social outcomes—that the DMN's self-referential processing system attempts to resolve through internal simulation.

Under ordinary conditions, the predictive processing framework (Friston, 2010) would predict that sustained prediction-error resolution eventually produces an updated model and terminates the simulation cycle. For self-referential social prediction errors, however, the model being updated is the self-model—an informationally open system continuously revised by new social information, comparisons, and anticipated scenarios. There is no stable terminal state: the cycle

does not terminate because the model it is attempting to stabilize is not, on this account, straightforwardly stabilizable.

Through the brain's habit-reinforcement mechanisms—repeated activation producing synaptic potentiation via Hebbian plasticity—the simulation cycle is proposed to become increasingly automatic and self-sustaining, such that activation of any node in the self-referential network tends to activate the wider loop. By adulthood, on this account, the loop runs largely continuously outside externally directed attention, constituting much of the subjective experience of involuntary thought.

3.1.2 The Virtual Self as Attractor Anchor

The PDA is anchored by what we term the virtual self: a dynamically maintained construct assembled from emotionally salient episodic memories, social comparisons, anticipated future scenarios, and ongoing self-evaluations. The virtual self is not a static representation but a continuously running process—the DMN's current model of the self in relation to its social and temporal context.

The virtual self-functions as the attractor's fixed point: simulation cycles return to and reconstitute it. This is proposed as part of why the PDA resists disruption. Attempts to interrupt involuntary thought may be experienced as threats to self-continuity, activating responses—distraction, rationalization, absorption in task—that the loop itself generates. On this account, the attractor state recruits executive and attentional resources to maintain itself, which would help explain the resistance to sustained self-observation that contemplative traditions have long described.

3.1.3 Self-Concealing Properties

The PDA, if it exists as described, has a property that would plausibly have contributed to its non-recognition in neuroscience: it recruits the cognitive processes that would otherwise be used to identify it. Self-reflection, introspection, and analytical reasoning are themselves largely DMN-mediated processes. A researcher using introspective or phenomenological methods to study involuntary thought is, on this account, using a system generated by the phenomenon to study the phenomenon. The observer and the observed share substantial neural substrate.

This structural limitation does not make the phenomenon unstudyable, but it does constrain which methods can access it reliably. First-person phenomenological reports describe the loop's outputs and contents more directly than its underlying structure. Third-person neuroimaging can measure neural correlates but requires an interpretive framework to relate them to the hypothesis at

issue. Comparative baseline analysis (Section 3.5) and AI-assisted conceptual synthesis (Section 2.5), used with the limitations noted there, are proposed as methodological responses that at least partly sidestep the observer-contamination problem, without claiming to eliminate it.

3.2 Evolutionary Origins and Mismatch

The PDA's persistence requires an evolutionary account. A system consuming significant metabolic resources and plausibly contributing to chronic physiological stress would generally be selected against unless its benefits offset its costs. We propose that the self-referential loop was adaptive in ancestral environments as a continuous social-monitoring system.

Human social groups are informationally complex. Tracking alliance structures, status hierarchies, reputational dynamics, and the mental states of multiple individuals requires sustained cognitive resources. The DMN's social simulation capacity may have provided a competitive advantage by allowing individuals to pre-simulate social scenarios, anticipate interpersonal outcomes, and prepare responses before situations demanded them. In environments where social standing directly affected reproductive success, the metabolic cost of continuous simulation could plausibly have been offset by reduced social error rates.

The loop's natural termination signal, under this account, was the resolution of an acute and bounded social threat—a resolved conflict, a stable alliance, a clear status determination. In modern environments, this termination signal is comparatively rare: social information is far more abundant, status comparisons extend across large populations via digital media, and reputational scenarios are frequently left unresolved. The simulation may accordingly continue for longer than the ancestral pattern would predict, because the environmental conditions that would trigger its resolution occur less often.

This account predicts that individuals and populations embedded in more bounded, less informationally complex social environments should exhibit lower PDA activity—a testable prediction addressed in Section 3.6. It is offered as one plausible account consistent with the broader pattern, recognized in evolutionary medicine, of cultural change outpacing neural adaptation (Gluckman and Hanson, 2006); Section 3.8 notes that it remains necessarily post-hoc and that alternative evolutionary accounts of the same DMN properties are possible.

3.3 Engagement with Alternative Interpretations of DMN Function

The strongest existing alternative holds that DMN engagement, including its modulation during contemplative states, reflects a genuinely adaptive, information-integrative function rather than a pathological process. Buckner and Carroll (2007) describe the DMN's core operations—self-projection into remembered pasts, imagined futures, others' perspectives, and spatial navigation—as coherent and evidently useful, not a malfunction. We do not think this "self-projection" account and the PDA hypothesis are simply incompatible: it addresses what the DMN's operations are for, while the PDA hypothesis concerns the involuntariness, chronicity, and physiological cost of one mode of that operation—self-referential simulation anchored to the virtual self—not the existence of self-referential processing as such. A capacity for prospection and social simulation can be adaptive in its voluntary, task-engaged form while a chronic, involuntary variant of the same machinery carries the costs described in Section 3.4; the distinguishing claim is therefore about degree and controllability, not about function per se.

Garrison et al. (2013) provide a second data point: reduced DMN, and particularly posterior cingulate, activity in experienced meditators beyond what task engagement alone explains. This is compatible with more than one reading—an acquired capacity to regulate an otherwise normal network (the authors' interpretation), or partial interruption of the attractor state proposed here, consistent with the reduced-attractor classification we assign to long-term practitioners in Section 3.5.2. We treat this as a genuine open question the existing data cannot adjudicate. Section 3.6 (P5) proposes a discriminating test: if meditation-related DMN reduction co-occurs with reduced autonomic and inflammatory markers of the kind linked to attractor interruption in Section 3.4, that favors the present account; if such physiological correlates are absent, that favors the self-regulation account instead.

3.4 Physiological Consequences of Chronic PDA Activity

If the PDA exists as described, its physiological correlates would plausibly follow from its functional properties. The self-referential simulations it runs—social threat scenarios, self-evaluations, anticipated failures—may be processed by subcortical systems in ways that resemble responses to real events. The amygdala, hypothalamus, and autonomic nervous system are known to respond to simulated social threat with measurable physiological responses: cortisol release, sympathetic activation, and pro-inflammatory signaling. These responses are adaptive in acute threat contexts but are associated with costs when sustained chronically.

Chronic cortisol elevation has well-documented associations including hippocampal atrophy (McEwen, 2007), immune dysregulation,

metabolic disruption, and accelerated cellular aging via telomere shortening (Epel et al., 2004). Sustained sympathetic activation is associated with cardiovascular disease, autoimmune conditions, and chronic inflammatory states. We propose that chronic, involuntary DMN loop activity may be a significant and currently overlooked contributing factor across several of these conditions, which are usually studied with largely distinct etiological models. We want to be explicit that this is proposed as one contributing factor among established mediators—diet, physical activity, sleep, socioeconomic conditions, and genetic risk chief among them—rather than as a single upstream cause displacing them; distinguishing a meaningful independent contribution from these established mediators would require mediation-analytic designs of the kind outlined in Section 2.4, which have not yet been conducted.

Sleep disruption is a particularly relevant correlate. On this account, the PDA does not fully cease during sleep: it may manifest as rumination-driven insomnia, fragmented slow-wave sleep architecture, and altered REM dynamics. Restorative processes—synaptic homeostasis, metabolic waste clearance via the glymphatic system, and emotional memory consolidation—could plausibly be compromised by persistent loop activity during sleep. This predicts measurable differences in sleep architecture between PDA-elevated and PDA-reduced populations, a prediction that, like the disease-association claim above, remains to be tested rather than established.

3.5 The Contaminated Baseline Problem

3.5.1 The Epistemological Problem

The standard methodology of resting-state neuroimaging takes adult human resting-state data as the reference against which other measurements are calibrated, in effect assuming that this activity constitutes a representative baseline. If the PDA hypothesis is correct, that assumption merits qualification: normative datasets and connectivity atlases have generally been collected from subjects who, on this account, already exhibit the phenomenon under study. This parallels a recognized problem in evolutionary medicine, where reference ranges for blood pressure, cholesterol, and inflammatory markers were long derived from populations themselves affected by modern diet, sedentary behavior, and chronic stress (O'Keefe and Cordain, 2004)—reflecting population norms rather than health optima. The PDA hypothesis proposes an analogous situation in cognitive neuroscience, while acknowledging that the disease-marker case has considerably more direct supporting evidence than is currently available here.

3.5.2 Uncontaminated Baseline Populations

Four populations offer access to DMN states that are pre-attractor, reduced-attractor, or attractor-interrupted, and that can be used to construct a comparative baseline, using the classification criteria set out in Section 2.3:

Pre-linguistic infants. Functional connectivity studies have documented the progressive consolidation of DMN connectivity from birth through childhood (Gao et al., 2009; Fair et al., 2008). Prior to language acquisition and recursive self-modeling, the infant DMN is structurally present but organized more around sensorimotor processing than self-referential simulation, and so represents a candidate pre-PDA state within the same biological system.

Non-human animals with DMN homologs. Non-human primates, cetaceans, and domestic dogs possess DMN homologs with comparable anatomical organization (Mantini et al., 2011; Raichle, 2015). These species show episodic-like memory and social cognition but, on current evidence, lack the recursive self-modeling enabled by human syntactic language; we propose that the metacognitive depth required for full PDA maintenance is accordingly reduced or absent, such that attractor states resolve more readily and chronic rumination is not documented.

Documented attractor-dissolution cases. A small, documentable population of adults report substantial and durable reductions in involuntary self-referential thought following spontaneous or cultivated transitions. Phenomenological accounts from this population—contemplative practitioners (Josipovic, 2014; Brewer et al., 2011; Garrison et al., 2013) and first-person reports of spontaneous transitions (Tolle, 1999)—converge on broadly similar features: reduced involuntary thought, a more functional and less automatic self-construct, and apparent durability. We interpret these cases, tentatively, as substantial depotentiation of the self-referential loop; Section 3.3 discusses a competing interpretation of closely related evidence.

Acute attractor-interruption states. Psychedelic-induced ego dissolution, near-death experiences, and some acute psychotic episodes involve temporary, substantial interruption of the virtual self and its simulation cycles (Carhart-Harris et al., 2016), often with reports of unusual clarity and reduced involuntary thought. This population is the most heterogeneous of the four, and acute pharmacological or clinical states are not obviously equivalent to the durable changes described above.

3.5.3 Relationship to the Proposed Comparative Analysis

The comparative analysis outlined in Section 2.4 is designed to test whether these four populations in fact cluster together on the

connectivity, dynamic, and physiological parameters specified there, and whether the infant baseline more closely resembles the reduced-attractor adult state than it resembles the standard adult resting state. We treat this as an open empirical question rather than a settled conclusion of the present paper.

3.6 Testable Predictions

The PDA hypothesis generates the following testable predictions:

P1: Infant DMN self-referential connectivity (medial prefrontal cortex — posterior cingulate cortex functional connectivity at rest) will more closely resemble the connectivity patterns of documented attractor-dissolution adults than it resembles standard adult resting-state patterns.

P2: Non-human animals with DMN homologs will show significantly shorter self-referential attractor-state durations and lower autonomic coupling than adult humans, when measured using comparable paradigm-free recording protocols.

P3: Adults with documented reductions in involuntary thought will show measurable differences from controls in resting DMN–task-positive network anticorrelation strength, resting metabolic load in DMN hubs, sleep slow-wave architecture integrity, and cortisol diurnal rhythm amplitude.

P4: Cross-population comparison will reveal a broadly consistent dimensional structure—a PDA-severity continuum—on which infants and non-human animals cluster toward the low end, standard adults cluster in the middle, and attractor-dissolution adults cluster toward the low end alongside infant patterns.

P5: Interventions producing documented reductions in involuntary thought (sustained contemplative practice, specific psychotherapeutic protocols targeting rumination) will produce changes in the parameters identified in P1–P4 proportional to the degree of involuntary-thought reduction achieved; critically, and as discussed in Section 3.3, such changes should co-occur with corresponding reductions in the autonomic and inflammatory markers described in Section 3.4 if the present account, rather than a pure self-regulation account, is correct.

3.7 Implications

If supported by future comparative work, the implications would extend across several domains. For cognitive neuroscience, resting-state findings would remain valid as descriptions of PDA-present cognition but could benefit from reinterpretation as measurements of a widely shared attractor state rather than a necessarily optimal

baseline. For medicine, chronic loop activity would become a candidate contributing factor—alongside, not instead of, established mediators—for chronic diseases currently studied largely independently, adding a testable candidate mechanism to existing evidence for contemplative and cognitive interventions in stress-related disease rather than identifying a single new target.

For the neurophilosophy of consciousness, states described by contemplative traditions as reduced suffering, awakening, or liberation could be partly reinterpreted as attractor-state transitions with candidate neural signatures, without this exhausting their significance within those traditions. The convergence of phenomenological reports across traditions unconnected by direct transmission—Buddhist, Advaita Vedantic, Christian mystical—on similar structural features (reduced involuntary thought, altered self-identification, apparent durability) is, at minimum, a pattern a mechanistic account of this kind should be able to address, whether or not the present framework is correct.

3.8 Limitations

Several limitations should be acknowledged. The framework is currently theoretical: the predictions in Section 3.6 require experimental confirmation via the methods in Section 2.4. That the infant baseline represents a less-attractor-dominated state, rather than simply an immature one, will need careful operationalization, since immaturity and reduced attractor consolidation may produce overlapping connectivity patterns for different reasons. The attractor-dissolution population is self-selected, phenotypically heterogeneous, and subject to self-report bias; the inclusion criteria sketched in Section 2.3 require further development and independent validation. The evolutionary account in Section 3.2, while internally consistent, is necessarily post-hoc—alternative accounts, including Buckner and Carroll's (2007) unqualified adaptive reading, are possible, and the present account should be treated as one hypothesis motivating comparative research rather than an established explanation.

Finally, the AI-assisted conceptual analysis described in Section 2.5 does not fully escape the observer-contamination problem it was intended to mitigate. Large language model systems are trained on human-generated text and are, in that sense, shaped by the very self-referential conceptual categories and habits of framing that the present hypothesis subjects to critique. We regard this contamination as indirect and different in kind from the contamination affecting a human introspecting on their own cognition, but not as absent, and we have accordingly treated AI-assisted synthesis as a hypothesis-generation aid rather than as a source of independent evidence, with all substantive claims checked against the primary literature in Section 2.2.

4. Conclusion and Outlook

The DMN is universal in adult human resting-state data; whether it is also, in its characteristic adult form, optimal is a separate question that this paper argues has been under-examined, in part because every available research subject exhibits some version of the pattern under study. We have proposed that the DMN maintains a chronic self-referential attractor state (the PDA), outlined its evolutionary rationale and physiological correlates, engaged the strongest competing account of closely related evidence (Section 3.3), and specified a comparative baseline analysis (Sections 2.4 and 3.5) capable of testing the hypothesis against that alternative using largely existing data.

What has been missing is a framework motivating this comparison, not the data themselves. We offer that framework here, together with an explicit account of its limitations (Section 3.8), and call for the empirical evaluation outlined in Section 2.4. If supported, the framework would add a testable contributing account of stress-related disease alongside established mediators, a candidate mechanism for some neural correlates of contemplative practice, and a prompt to revisit parts of resting-state methodology; if not supported, the comparative analysis proposed here would still clarify how DMN function differs across development, species, and altered states. We present both outcomes as live possibilities rather than presupposing the first.

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