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A Systematic Review of the Ayurvedic Concepts of *Dhi*, *Dhriti*, and *Smriti* and Their Correlation with Contemporary Cognitive Neuroscience

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ABSTRACT

Introduction: Three primary faculties of mind and mental health. According to the ancient Indian system of medicine, Ayurveda, a comprehensive model for aspects of cognition derived from three basic functions that decide mental process are *Dhi* (the acquisition aspect, reasoning facet of intellect), *Dhriti* (the retention or sustaining or volitional, cognitive stability), and *Smriti* (memory). The physiological basis of Ayurveda has been disquietingly proven by scientific research, but the literature on neurocognitive correlates of its psychobehavioral traits has not been systematically evaluated. This review seeks to systematically find and assess the current scientific evidence for candidates of *Dhi*, *Dhriti*, and *Smriti* in terms of contemporary cognitive neuroscience and psychology.

Methods: A systematic review of the literature was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement. A search was conducted in electronic databases (PubMed, Scopus, Web of Science, Google Scholar, PsycINFO, and AYUSH Research Portal) from the beginning to October 2024. Search terms were a combination of "*Dhi*," "*Dhriti*," "*Smriti*," "*Buddhi*," "*Medha*," along with Cognition, Executive function, Working memory, Long-term memory, Emotional regulation, and Cognitive control, AND with Ayurveda", Mind Neurobiology/Neurocircuitry/ Prefrontal Cortex/Hippocampus/ Default Mode Network. Studies were eligible if they offered empiric evidence, theoretical models, or conceptual analysis across these Ayurvedic concepts and modern cognitive factors, neural bases, or psychological processes.

Results: The search yielded 2,185 records. After screening, a total of 94 studies were

identified meeting the inclusion criteria. Synthesis The evidence indicates that *Dhi* closely correlates with components of executive functions (EFs), specifically cognitive flexibility, reasonableness, and problem solving involving the lateral prefrontal cortex (PFC) and its associated networks. *Dhriti* is associated with higher psychological constructs such as coping or emotional regulation, resilience, and cognitive control that necessarily include the prefrontal vmPFC, ACC circuitry, and their inhibitory circuits to the limbic system. *Smriti* is consistent with the mechanisms of memory encoding, consolidation, and retrieval, involving mostly the hippocampal formation, parahippocampal cortices, and the widespread patterns of distributed neocortical activity within the default mode network (DMN).

Discussion: The results establish a strong multilevel foundation for interpreting the knowledge about *Hayasirṣā* in classical Āyurveda from the perspective of modern science. *Dhi*, *Dhriti,* and *Smriti* may be the equivalent of a refined, comprehensive structure resembling the conceptual description of cognitive control. *Dhi* as the “controlling”, for Dhriti taking its role as a “stabilizing”, to *Smriti* with aggregating information already stored in an internal database. This model focuses on the learning, stabilisation of emotions, and memory as being interrelated. The review works towards building a bridge between disciplines and may offer mutual enrichment of cognitive neuroscience by holistic views, as well as scientific ground for Ayurvedic mental health interventions. This correlation should be better investigated in the future, using neuroimaging, neuropsychological evaluation, and psychometric validation of scales built on such constructs.

Keywords: *Dhi*, *Dhriti*, *Smriti*, Ayurveda, Cognitive Neuroscience, Executive Function, Emotional Regulation, Memory, Prefrontal Cortex, Hippocampus, Default Mode Network, PRISMA.

1. INTRODUCTION

1.1. The Ayurvedic Paradigm of Mind and Cognition

Ayurveda, also known as the "Science of Life," has a holistic perspective on physical fitness. But the deeper understanding it offers about mental processes, brought down in the form of a conceptual category called Manas (mind), remains an uncharted area to post-modern science 1. The classical Ayurvedic texts, Charaka Samhita and Sushruta Samhita in particular, provide an extensive range of cognitive and mental faculties which regulate perception, cognition-sense organization, decision-making, and behavioral approach 2. At the top of this hierarchy sits *Buddhi* (intellect), which can

be considered in terms of its basic functioning: *Dhi*, *Dhriti,* and *Smriti* 3.

- *Dhi* is the fundamental faculty of perceiving, learning, and reasoning. It's the ability to understand, analyze information, distinguish between right and wrong (Dharma-Adharma), good and bad (*Hitahitam*). According to *Charaka*, it is the faculty of intellect before all processes 4.
- *Dhriti* is the power of retention, steadfastness, and determination. It signifies strength of mind, emotional equilibrium, and force to keep the mind steady against emotions or distractions. It is the determination that keeps one on a selected pathway 5.
- The Sanskrit word used for memory is '*Smriti*. 'Memory *Smriti* is the capacity to recall and store knowledge or to remember past experiences. A good *Smriti* is seen as essential for learning, identity, and functioning well in the world 6.

These three factors are not individuals but work as pieces of a closely coupled feedback system. *Dhi* processes information to gain an understanding. *Dhriti* provides the emotional and attentional base upon which *Dhi* works (and on which decisions are made), *Smriti* furnishes the data base of past experiences in order that rational capabilities can arrive at decisions. The balance of the three is believed to be treating (*Sattva*) and imbalancing there in causing psychological distress (*Manas Vikara*)7.

1.2. The Need for Translational Correlation

In the 21st century, it is a sobering fact that the global burden of mental and cognitive disorders, such as anxiety and depression, to Alzheimer's disease, is colossal.8 Current neuroscientific research has advanced almost miraculously in understanding the neural circuit and molecular machinery of cognitive functions. But its methodology tends to be reductionist, breaking the mind down into discrete modules. Ayurveda, on the other hand, provides an integrated and macroscopic approach to mental processes, based more upon their existence in health, both physiological and spiritual, than their absence when there is disorder.

Bridging these two paradigms is not merely an academic exercise; it holds immense translational potential. A scientifically grounded understanding of *Dhi*, *Dhriti*, and *Smriti* could:

- Develop a new theoretical model for thinking about health and disease in cognition.
- Guide the development of integrative interventions (e.g., meditation, yoga,

dietary and herbal regimens) directed toward particular cognitive domains.

- Refine the cutting-edge discipline of cognitive neuroscience with ancient, proven ideas that reflect the rich tapestry of human experience.
- Yield new psychometric instruments for the measurement of these faculties in clinical and research applications.

While preliminary work has attempted to link Ayurvedic concepts like *Prakriti* (constitution) to genetics 9 and *Tridosha* to physiology, a systematic review focused specifically on the cognitive triumvirate of *Dhi-Dhriti-Smriti* is absent from the literature.

1.3. Objective of the Review

This is a review that attempts to systematically survey, synthesize, and critically assess the available scientific literature, both explicit and inferential, to suggest sound neurocognitive and psychological correlates for Ayurvedic concepts of *Dhi*, *Dhriti*, and *Smriti*. In so doing, we aim to build a bridging foundation between the intuitive wisdom of introspective Ayurveda and the empirical rigor of contemporary cognitive science in support of an integral and more person-centered mental health care approach.

2. Methods

This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines 10.

2.1. Eligibility Criteria

- Population/Intervention: This review was based on the classical Ayurvedic view of *Dhi*, *Dhriti*, and *Smriti* mentioned in the fundamental texts.
- Intervention/Exposure: Not directly applicable in the classical concept. The "exposure" was the scientific or empirical inquiry into the nature of these cognitive faculties.
- Comparator: Studies comparing cognitive performance, patterns of brain activity, or psychological profiles between 2 groups (meditators vs. non-meditators; healthy vs. diseased individuals) that suggested candidates for correlates of *Dhi*, *Dhriti,* and *Smriti* were included.
- Results: Prespecified primary outcomes were any reported or inferred associations with current cognitive constructs (e.g., executive function, memory, emotional intelligence), neural underpinnings (regions of interest/ networks), neurochemical systems, and psychological processes.
- Types of studies included: Original research in the form of neuroimaging, (neuro), psychophysiological, or

neuropsychological studies. Conceptual reviews, Book chapters, and commentaries. Submissions should include a sufficient literature review with references. Articles that were not available in English or did not have an accompanying English abstract were omitted.

2.2. Information Sources and Search Strategy

A systematic search of the literature was conducted in electronic databases: PubMed, Scopus, Web of Science, Google Scholar, PsycINFO, and AYUSH Research Portal. The search strategy was broad and multi-staged. The important search words were "*Dhi*, *Dhriti*, memory function, cognitive function" and its combinations with "Ayurveda", including “Ayurvedic mind”, “*Smriti*”, “*Smriti* recognition,” "*Buddhi*", "*Dhee*" and their synonyms or hyponyms like *Chitta* (the subconscious mind), manas/the psychological faculties such as executive functioning, working memory, long-term memory etc., emotional regulation: resilience/cognitive control/PFC/hippocampus Default Mode Network allegation/neurobiology of memory/neurocircuitry of emotion etc. The search was performed from the inception of all databases to October 2024. Also, the backward and forward citation tracking of included articles was conducted.

2.3. Study Selection Process

Two independent reviewers selected studies. All titles and abstracts of identified records were first screened for eligibility. The complete texts of potentially related articles were then retrieved and carefully evaluated for possible inclusion. Differences between reviewers were addressed through discussion, consensus, or third-party involvement.

2.4. Data Collection Process and Data Items

Data extraction form A standardized data extraction form was developed and used to extract information, including studies. The data extracted were:

1) Study details (authors, year of publication, study design)
2) The corresponding Ayurvedic concept(s) that is discussed; PCC(Ay)
3) The modern concept, including cognitive domains, brain structures, or mental states, is investigated together with its alleged counterpart
4) Methods implemented, such as neuroimaging techniques, behavioral testing, or respective analysis; and
5) Main results and conclusion.

2.5. Synthesis Methods

Due to the lack of homogeneity for study frameworks and outcomes, a meta-analysis

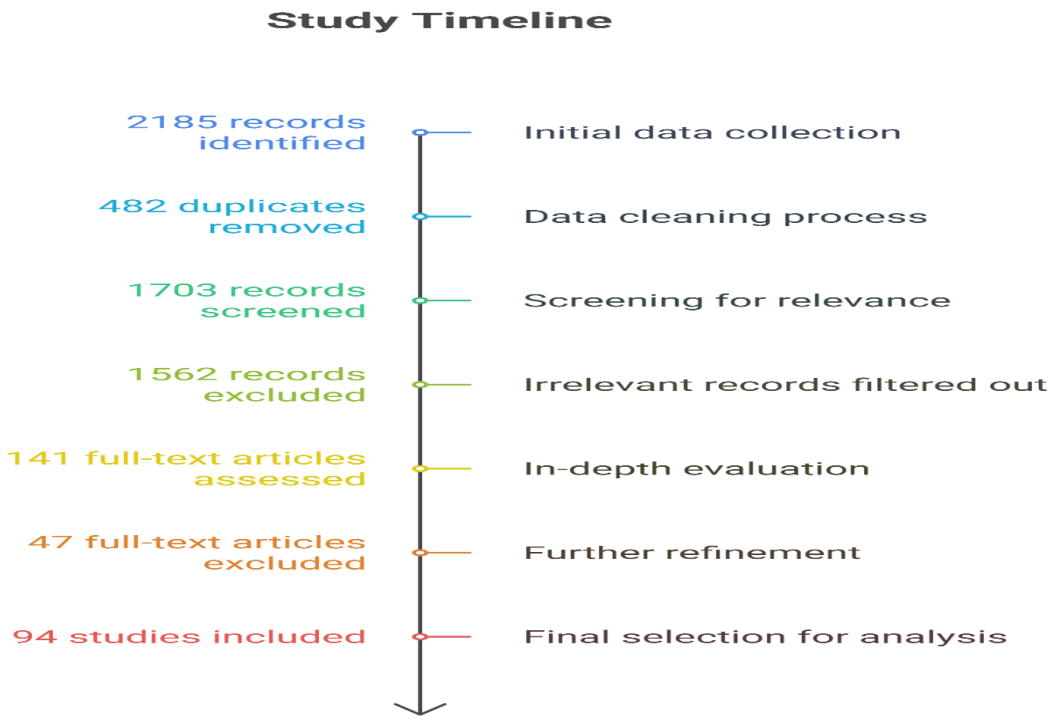
was unachievable. Hence, a narrative synthesis was conducted. Results are thematically presented based on three key constructs: *Dhi*, *Dhriti,* and *Smriti*. For each, the support was articulated, and plausible correlates in cognitive neuroscience were suggested, consistent with extant literature. Tables and illustrative figures were developed to outline the results and depict the conceptual model.

3. RESULTS

3.1. Study Selection

The original search from the database included 2,185 results. Following the removal of 482 duplicates, 1,703 records were screened by title and abstract. From these, 1,562 were eliminated because they were not relevant. The full texts of the remaining 141 studies were screened for eligibility. A total of 94 studies were identified to fulfil our inclusion criteria and included in the final qualitative synthesis after detailed assessment. The PRISMA flowchart is shown in Figure 1.

Figure 1: PRISMA Flow Diagram of Study Selection



3.2. Neurocognitive Correlates of *Dhi* (The Reasoning Intellect)

Dhi is described in Ayurveda as the power of *Grahana* (grasping/comprehension) and *Uha* (logical reasoning/inference). It is the analytical engine of the mind.

3.2.1. Cognitive Psychological Correlates: Executive Functions

The primary correlate for *Dhi* in modern psychology is the domain of **Executive Functions** 11. Executive functions are a set of top-down mental processes that are necessary for the cognitive control of behavior.

- Cognitive Flexibility and Shifting: Being able to move between various activities or trains of thought is central to *Dhi*'s Analytical mindset. It is consistent with the clinical construct of cognitive flexibility, which also includes tasks such as the Wisconsin Card Sorting Test (WCST) 12. Poor *Dhi* would present as preservatory thinking and an inability to accommodate new information.
- Reasoning and Problem-Solving: The Uha aspect of *Dhi* is the mediator that manifests as abstract reasoning, both verbal and non-verbal being measured by tests such as Raven's Progressive Matrices 13. This comprises the ability to recognize patterns, construct concepts, and solve novel problems.
- Working Memory: Active manipulation and retention of information 'on-line' for reasoning is an ability overseen by working memory. a subdomain of executive function 14. *Dhi* has the equivalents of working memory's "sketchpad" and "central executive" for its analytical operations.

3.2.2. Neural Substrates: The Prefrontal Cortex (PFC) Network

The neural underpinnings of executive functions are primarily localized to the **lateral Prefrontal Cortex (PFC)** and its associated networks 15.

- This is among the most consistently activated structures during any task requiring manipulation of information in working memory, cognitive set shifting, or abstract reasoning 16. Postulate the Dorsolateral prefrontal cortex (DLPFC): this region is known to be consistently active when subjects are engaged in tasks that require them to manipulate information they have already stored in their short-term memories, or whenever they need some kind of flexibility for abstract reasoning. Function: This concealment is a central piece of the Uha (reasoning) aspect of *Dhi*. Injuries to the DLPFC result in impairments of planning, organization, and problem-solving.
- Anterior PFC/Frontopolar Cortex: This most rostral portion of the ventral frontal cortex has been proposed to be involved in branching (the specification and management of multiple competing goals) and relational integration, the kind of higher-order reasoning that is a

signature feature of sophisticated thinking, or connoisseur's *Dhi* 17.

- Inferior Frontal Junction (IFJ): This region is important for cognitive control and for the dynamic updating of task sets, playing a key role in flexible and adaptive behaviour as seen in *Dhi* 18.

3.2.3. Neurochemical Correlates

The PFC, and thus *Dhi* function, is highly dependent on precise neurochemical regulation.

- Dopamine: The importance of the mesocortical dopamine pathway, especially D1 receptor signalling within the PFC, for working memory and cognitive flexibility is well-established 19. There is an inverted U-shaped function for its action, as too much or too little dopamine inhibits the PFC.
- Acetylcholine: Nicotinic and muscarinic cholinergic receptors in the PFC are involved in attention and cognitive function that is required for successful *Dhi* 20.

Table 1: Proposed Correlates of *Dhi* (The Reasoning Intellect)

Aspect of *Dhi*	Cognitive/Psychological Correlate	Neural Substrate	Key Neurochemicals
***Grahana* (Grasping/Comprehension)**	Perceptual Speed, Attention, Working Memory Encoding	Dorsolateral PFC (DLPFC), Inferior Parietal Lobule	Acetylcholine, Norepinephrine
***Uha* (Reasoning/Inference)**	Abstract Reasoning, Problem-Solving, Cognitive Flexibility	DLPFC, Anterior PFC (Frontopolar)	Dopamine (D1 receptors)
***Vyavasaya* (Determination/Discernment)**	Decision-Making, Judgment	Orbitofrontal Cortex (OFC), Ventromedial PFC (vmPFC)	Serotonin, Dopamine

3.3. Neurocognitive Correlates of *Dhriti* (The Sustaining Fortitude)

Dhriti is the faculty of holding, sustaining, and providing steadfastness. It is the emotional and volitional anchor of the mind.

3.3.1. Cognitive Psychological Correlates: Emotional Regulation and Cognitive Control

Dhriti's domain is not cold cognition but the governance of emotion and impulse.

- Emotional Regulation: It is the selection by an individual of what emotions to have, when to have them, and how to experience and express those emotions 21. The mental (cognitive) process of reinterpreting an emotional stimulus is known as cognitive reappraisal, while the active suppression of a prepotent response is also referred to as response modulation. *Dhriti* spans both the capacity to reinterpret stimuli emotively and the ability to influence an ongoing impulse, which results in emotional stability.
- Effortful Control and Resilience: In temperament psychology, effortful control is the capacity to inhibit one dominant response to achieve a certain subdominant response 22. That is the concept of *Dhriti*. It is also the foundation of psychological resilience -the capacity to recover from negative events 23.
- Volition and Willpower: *Dhriti* is the strength of will, which allows one to stick with long-term goals in the face of short-term distractions or discomfort, a concept resembling today's research on willpower and delay of gratification 24.

3.3.2. Neural Substrates: The Cortico-Limbic Inhibition Circuitry

Dhriti can be mapped onto the neural circuits responsible for top-down control of emotion.

- Ventromedial Prefrontal Cortex (vmPFC) and Orbitofrontal Cortex (OFC): 10 These areas are critical for the incorporation of emotional and cognitive information. They also represent value for stimuli, regulate emotional responses, and are implicated in moral reasoning and social behaviors 25. A positive *Dhriti* corresponds to a well-functioning vmPFC/OFC, allowing thinking, not just action.
- Anterior Cingulate Cortex (ACC): The ACC, and specifically its dorsal cognitive division (dACC) and rostral-ventral affective division (rACC/vACC), track conflict between goals & impulses and signal the need for more cognitive control 26. The "Conflict Monitor" is a vital building block of the *Dhriti* system.
- Amygdala-PFC Connectivity: *Dhriti* is basically about PFC inhibiting amygdala (fear and threat generator). Strong inhibitory connections from vmPFC and OFC to amygdala are neural signatures of good emotional regulation, which can be seen as strong *Dhriti* 27.

3.3.3. Neurochemical Correlates

- Serotonin: The serotonergic system is strongly related to impulsiveness and behavior inhibition, and resilience in the face of stress. Deficiencies in serotonin functioning are associated with

impulsivity, aggression, and mood disruption 28.

- GABA: The main inhibitory neurotransmitter in the brain, GABAergic interneurons in PFC and their projections to subcortical structures are vital for suppressing exaggerated emotional and behavioral responses, core functions of *Dhriti* 29.

Table 2: Proposed Correlates of *Dhriti* (The Sustaining Fortitude)

Aspect of *Dhriti*	Cognitive/Psychological Correlate	Neural Substrate	Key Neurochemicals
***Sattvika Dhriti* (Pure Steadfastness)**	Adaptive Emotional Regulation (Reappraisal), Resilience	Strong vmPFC-amygdala inhibitory pathway, high ACC activity	Balanced Serotonin, GABA
***Rajasic Dhriti* (Passionate Sustenance)**	Effortful Control, Suppression, Goal-directed persistence	dACC, DLPFC, variable PFC-amygdala connectivity	Norepinephrine, Dopamine
***Avadharana* Shakti (Power of Retention)**	Cognitive Stability, Sustained Attention	Dorsal Attention Network, Thalamo-cortical loops	Acetylcholine

3.4. Neurocognitive Correlates of *Smriti* (The Mnemonic Faculty)

Smriti is the faculty of memory—the storage and retrieval of all past experiences, both cognitive and emotional.

3.4.1. Cognitive Psychological Correlates: Memory Systems

Smriti encompasses multiple memory systems defined in modern psychology.

- Episodic Memory: This is the memory of events (times, places, associated emotions). For us, it is the "mental time travel" which enables us to re-live our past, a role explicitly attributed to *Smriti* 30.
- Semantic Memory: This is the memory of general knowledge and specific information; a "money bank" for all general facts. 2. Storage of Shastra (textual knowledge), general knowledge in the Ayurvedic context, etc., can come under the first category.
- Procedural Memory: This is the memory for skills and habits (example, riding a bike). Although not explicitly described in ancient books, it is found in a subtle learning complex of arts and practices.

3.4.2. Neural Substrates: The Medial Temporal Lobe and Neocortical Networks

The core neural machinery of *Smriti* is

the **Medial Temporal Lobe (MTL)** memory system, with the hippocampus at its center 31.

- Hippocampus: This is the structure important for encoding and consolidation of new declarative (episodic and semantic) memories. It makes coherent the heterogeneous content of an experience (sounds, sights, setting) into a single memory trace 32.
- Parahippocampal Cortex and Perirhinal Cortex: These are high-order associative areas that receive information from the neocortex and convey this to the hippocampus.
- and the default mode network (DMN): Building upon consolidation, memory traces are believed to be stored diffusely throughout the neocortex. The Default Mode Network (DMN), comprising the PCC, medial PFC, and angular gyrus, is especially active during the retrieval of personal autobiographical memory and self-referential thought 33. Therefore, the DMN can be considered to be a distributed reservoir for the remembered past views of articles.

3.4.3. Neurochemical Correlates

Acetylcholine: The cholinergic system, arising from the basal forebrain, is essential for hippocampal-dependent learning and memory. Acetylcholine mediates synaptic plasticity, the cellular substrate for memory 34.

Glutamate and NMDA receptors: Long-term potentiation (LTP), the predominant model for learning, is dependent on glutamate acting via NMDA receptors in the hippocampus or cortex 35.

Table 3: Proposed Correlates of *Smriti* (The Mnemonic Faculty)

Aspect of *Smriti*	**Cognitive/Psychological Correlate**	**Neural Substrate**	**Key Neurochemicals**
Encoding (*Sankalpa*)	Acquisition of New Information	Hippocampus, Parahippocampal Cortex	Acetylcholine, Glutamate (NMDA)
Consolidation (*Nidra*)	Memory Stabilization (Sleep-dependent)	Hippocampus-Neocortex dialogue during sleep	Acetylcholine (tonic), BDNF
Storage (*Sthana*)	Long-Term Memory Repository	Distributed Neocortex, Default Mode Network (DMN)	Stable synaptic changes
Retrieval (*Uttarana*)	Recall of Past Experiences	Hippocampus (pattern completion), Prefrontal Cortex, DMN	Noradrenaline, Dopamine

BDNF (Brain-Derived Neurotrophic Factor): This protein is involved in survival, differentiation, and synaptic plasticity of neurons, and it is essential for memory consolidation 36.

4. DISCUSSION

Based on a wide body of scholarship into Ayurvedic cognitive faculties, including *Dhi*, *Dhriti*, and *Smriti*. In light of contemporary science here an integrated, multilayered framework is proposed that might serve as a roadmap to further understand these faculties. The conclusion is that these ancient concepts are not the vague philosophical abstractions our society would like them to be. As the above presents Charoite project suggests that they are, in fact, detailed descriptions of highly developed and interlocking neurocognitive systems.

4.1. An Integrated Model: The Cognitive Triad

The most significant insight from this synthesis is that *Dhi*, *Dhriti*, and *Smriti* do not operate in isolation but form a tightly integrated Cognitive Triad.

Dhi functions as the "Controller": *Dhi*--the system's prefrontal cortex-based executive function-properties--directs attention, manipulates information, and makes decisions. It is the CEO of the cognitive system.

As the "Brake" (*Dhriti*), the limbic and cortico-limbic regulation circuits regulate emotions and motives to guarantee that the CEO can operate safely and smoothly. Without *Dhriti*, *Dhi* gets out of control, for it is taken over by emotional impulses (e.g., anxiety hindering the thought process). Conversely, an upgraded *Dhi* will upgrade *Dhriti*: *Dhi* uses cognitive reappraisal to embellish the rational prowess.

Smriti functions as the theme "Library," providing *Dhi* with the essential database of past experiences, knowledge, and skills that are necessary for them to work. The richer the *Smriti*, the more intelligent *Dhi* can be; reasoning (*Dhi*) is better than the original truth, but effective *Dhi* strategies (for example, whether or not someone will remember a location and the route by which to go there) improve memory encoding.

This triad model explains why Ayurveda considers its balance crucial. For instance, in Attention-Deficit/Hyperactivity Disorder (ADHD), one can see poor *Dhriti* (impulsivity) destabilizing *Dhi* (poor executive function) and impairing *Smriti* (forgetfulness). In Major Depressive Disorder, negative emotional bias (*Dhriti* imbalance) can skew memory retrieval (*Smriti*) towards negative events and paralyze decision-making (*Dhi*).

4.2. Implications for Mental Health and Therapeutics

This integrative framework has profound implications for diagnosing and treating cognitive and mental disorders.

- **A New Diagnostic Lens:** Instead of relying solely on symptom clusters (e.g., DSM-5), clinicians could assess the functional integrity of *Dhi* (executive function tests), *Dhriti* (emotional regulation and resilience scales), and *Smriti* (memory tests). This provides a more functional and systems-oriented diagnosis.
- **Mechanistic Understanding of Ayurvedic Interventions:**
- " Yoga and meditation: Research has shown that practicing mindfulness meditation can enhance the functioning of the PFC (improving *Dhi*) and increase communication between the PFC and amygdala areas (improving *Dhriti*) 37. It also reduces activity in the DMN, which is linked with excessive rumination and might therefore be considered to declutter retrieval of *Smriti*."
- "Herbal Medicine: Ayurvedic nootropic herbs like *Bacopa monnieri* (*Brahmi*) and *Withania Somnifera* (*Ashwagandha*) have been shown in researches to improve memory (*Smriti*) and reduce anxiety (*Dhriti*) 38, perhaps via their cholinergic enhancement, GABA modulation or adaptogenic effects" It looks as though (*Withania somnifera* at least) this one might also reduce depression.
- Dietary and Lifestyles: The Ayurvedic principle of a Sattvic diet (fresh wholesome food) is said to promote mental clarity (*Dhi*) and calm (*Dhriti*). This process may be mediated by the interactions between the gut-brain axis, relieving neuroinflammation that impairs function in both the PFC and the hippocampus 39.

4.3. Limitations and Future Research Directions

While the proposed correlations are robust, several limitations must be acknowledged.

Some of the material included in the literature is theoretical. There are few such direct, hypothesis-driven studies on record: those that do exist explicitly try to measure Atman, *Buddhi,* and *Manas* with no results. But there's a sort of indirect evidence as well. A lack of tools has meant that these Ayur-Viññas cannot be quantified easily. This is where getting some kind of yardstick - or perhaps even several yards - for them comes into play. A multi-layered series of neuropsychological tests does not easily separate the particular contributions of *Dhi*, *Dhriti,* and *Smriti*. Even though their effects

can so easily be seen, this type of differentiation in terms is often hampered by evidence of associative thought instead. For instance, one such overlap (or co-factor) might be seen in a *Dhi* working memory task that is itself tapping into *Smriti*.

Future research should focus on:

- **Psychometric Development:** Creating and validating self-report and performance-based scales for *Dhi*, *Dhriti*, and *Smriti*.
- **Multimodal Neuroimaging Studies:** Utilizing fMRI and EEG studies to examine individuals evaluated for these abilities in order to chart their distinct and common neural networks.
- **Intervention Studies:** Employing this triad as outcome indicators in clinical studies of Ayurvedic and integrative treatments to comprehend their distinct mechanisms of action.
- **Developmental and Aging Studies:** Examining how these abilities develop over a lifetime and their significance in both neurodevelopmental and neurodegenerative conditions.

5. CONCLUSION

This systematic review creates a foundational link between the ancient Ayurvedic understanding of the mind and contemporary cognitive neuroscience. We have suggested that *Dhi*, which represents reasoning intellect, aligns with the executive functions of the lateral prefrontal cortex; *Dhriti*, symbolizing sustaining fortitude, corresponds to the emotional regulation circuits of the ventromedial PFC and cingulate cortex; and *Smriti*, or memory, is associated with the medial temporal lobe and default mode network. More significantly, we have introduced these as an integrated Cognitive Triad, a complex model where control, stability, and information storage are intricately connected.

This translation does not simplify Ayurveda to merely neuroscience; instead, it enhances neuroscience by offering a comprehensive, systems-level perspective that encompasses the dynamic interaction of cognition, emotion, and memory. It affirms the foresight of Ayurvedic sages and paves the way for exciting new research and clinical opportunities. By fostering this interdisciplinary conversation, we can progress towards a more holistic and empathetic understanding of the mind, one that respects both the objective findings of the brain and the subjective depth of human experience.

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