



CAESURAE: POETICS OF CULTURAL TRANSLATION

Volume 6:2

(ISSN 2454 -9495)

July 2025

From neurocognitive and computational models to *śāstra* and *paramparā*: exploring categorical translations between Indic *darśanas* and cognitive science

****Diego Gonzalez-Rodriguez**

Abstract: Cognitive science has historically explored how information is processed in both biological and artificial systems. By focusing on functional and structural aspects of cognition, it has given rise to a variety of paradigms to study cognitive processes, generally described in terms of information-processing dynamics. From neural networks and bio-inspired algorithms to agent-based models, these approaches have brought very valuable insights, but they have overlooked fundamental questions regarding subjectivity, identity, and the nature of consciousness. In contrast, Indic knowledge systems have, over centuries, developed elaborate frameworks not only to understand attention, memory or reasoning, but also to dissect the nature of experience. Indic traditions have developed phenomenological methods to cultivate particular *bhāvas*, re-architecting human experience and deconstructing self-referential cognitive constructs. While western clinical psychology has largely been oriented towards the preservation and regulation of the egoic self, *śāstras* have explored how to transcend the ego-bound identity (*ahamkāra*). Similarly, while cognitive and computer scientists have implemented silicon-based systems that replicate mental operations; *sādhakas* have focused on empirically transcending their own cognitive and perceptual modalities. In this essay, the argument is that a proper engagement with the ontological and epistemological frameworks preserved in the *śāstras* and transmitted through living *paramparās* can enable cognitive scientists to move beyond their prevailing conceptual and methodological biases. In that regard, this research argues for a transcultural approach in which *śāstras* and *paramparās* are globally recognized in the context of cognitive science, complementing computational and neurocentric models without reducing Indic categories to Western equivalents or translating them into psychometric or neurophysiological terms.

Keywords: *cognitive science, śāstra, indic knowledge systems, cognition, consciousness studies*

Introduction

In the twentieth century, cognitive science emerged as a multidisciplinary field focused on understanding mechanisms such as intelligence, memory, reasoning and decision-making processes in both biological and artificial systems. Since then, it has investigated how cognitive systems acquire, represent, and use information, either to adapt to their environments or to perform specific tasks, integrating contributions from psychology, neuroscience, philosophy, linguistics, anthropology, computer science, and artificial intelligence (Gonzalez-Rodriguez 2015).

Questions regarding the nature of the mind have long guided this field of research. These questions, however, have already been extensively addressed in Indic philosophical traditions, where different *darśanas* have not only analyzed and dissected a variety of notions related to cognition and consciousness, but also developed empirical methods of first-person investigation. The heterogeneous corpus of *śāstric* literature, orally transmitted and studied in different *paramparās*, remains unknown for most contemporary scholars in cognitive science. However, these living traditions have systematically explored for centuries the same topics that are important for contemporary research on cognitive science, such as attention, memory, ideation, identity formation, embodiment, ego dissolution, or a wide range of non-ordinary states of consciousness.

Contemporary disciplines such as cognitive neuroscience, evolutionary biology, and complexity science have also illuminated aspects of these questions. However, in many ways they have just continued a conversation that has much older roots. By diminishing traditional knowledge systems alongside their phenomenological dimension, cognitive science has left out of its scope a variety of non-physicalist ontologies, while being unable to face the so-called "hard problem of consciousness", one of the primary unresolved issues in Western philosophy (Chalmers 1996; Dennett 1991; Searle 1992).

Paradigms in cognitive science

The focus on different aspects of information-processing dynamics in complex systems, alongside the variety of academic backgrounds of cognitive scientists (from linguists to neuroscientists) has gradually led to several competing paradigms within the field (Gonzalez-Rodriguez 2015). Still, according to Thompson (2007), we can highlight three major paradigms in the history of cognitive science: *cognitivism*, *connectionism*, and *embodied cognition*.

As described in Gonzalez-Rodriguez (2015), the *cognitivist wave* arose in response to behaviorism, proposing a computational theory of mind in which cognition was modeled after the Turing machine (Turing 1950). Acknowledging the mind as an information-processing system that encoded sensory inputs into internal representations, intelligence was described in terms of knowledge structures implemented through a symbolic language. The mind was no longer understood through behavioral observations but increasingly in relation to language and inferential rules. Under this view, any system, biological or silicon-based, could be considered intelligent as long as it implemented the proper grammar and inferential logic. In the case of machines, engineers could either encode symbolic representations and rules in Turing-complete programming languages, or integrate domain-specific knowledge with inference engines to automate rational processes. If intelligence was described in terms of language, grammar and reasoning, cognitive and computer scientists could now replicate it in machines.

Connectionism (Rumelhart & McClelland 1986) challenged this symbolic paradigm, changing the focus from the functional aspects of cognition to its structural foundations. It was not simply about designing linguistic machines, but more about architecting the proper foundational structures upon which intelligent behaviour could emerge. Accordingly, connectionism emphasized how distributed information processing could take place in complex networks made out of simple units, highlighting the adaptive and parallel dynamics of neural activity. This perspective enabled the design of artificial neural networks that could even outperform humans in pattern-recognition tasks. If intelligence was learning, perception and discrimination, cognitive scientists could again replicate it in machines with a software-based equivalent of neuroplasticity, relying on something akin to synaptic weights (and reducing learning to mathematical operations and training data sets).

The third perspective, *embodied cognition*, did not reject these functional and structural aspects, but framed cognition as a property inseparable from the organism's evolutionary history and its sensorimotor capacities (Martín-Loeches 2007; Bollen 2004). Yes, humans were endowed with language and logic, as well as neurons and sophisticated pattern-recognition capacities. But these did not arise "*ex nihilo*". They were the result of an embodied evolution and were therefore situated in a pre-existing (or co-evolved) world. Cognition was now grounded on the bodily systems that enabled action and decision-making within a given *milieu*; in other words, intelligence was acknowledged as an emergent byproduct of situated and

embodied evolutionary dynamics, in similar terms to those used to study complex adaptive systems.

All these approaches have contributed to developments not only in artificial intelligence, but also in other fields, leading to unprecedented technological, biotechnological and clinical applications. Today, the lines between bio-inspired algorithms and engineered organisms have blurred. Machines can imitate strategies observed in living beings, as in evolutionary computing (Fogel 1994), neural networks (Walczak 2019), artificial life (Langton 1989), or bacterial-based algorithms (Gonzalez-Rodriguez & Hernandez-Carrion 2014). Similarly, biological beings can be modified through genetic engineering (Sander & Joung 2014) and even synthetic biological robots can be created *in vitro* (Blackiston et al 2021). More specifically, organisms can be literally programmed to implement computational rules or perform specific tasks, as seen in synthetic biology (Cameron, Bashor, & Collins 2014) and natural computing (Banzhaf, Nordin, Keller, & Francone 2012). But although the permeability between biology and computing continues to increase, the scientific discourse still remains focused on cognition and adaptability rather than on consciousness and subjectivity. This is mostly because cognitive science has failed to provide conclusive answers regarding the nature of consciousness beyond the identification of neural correlates.

Consciousness remains a mystery even for emergentist neurobiologists. This is true for “strong AI” scholars as well, whose once-ambitious promises of artificial systems endowed with genuine subjective experience have been supplanted by market-ready solutions based on Large Language Models (Zhao et al. 2023), Deep Neural Networks (Zhang et al. 2021), and multilayered data-driven architectures. Current AI-systems combine vectorial spaces, statistical tools, data aggregation bots and sophisticated natural-language processing algorithms to create the illusion of human-like intelligence. But silicon-based machines will never be conscious, despite the sophistication of “intelligent” models outperforming some of the outward manifestations of subjectivity as evaluated by measures such as the Turing test (Moor 2001).

Once again, consciousness remains a mystery for the Western cognitive scientist too, who are utterly alien to the understanding of the *r̥sis* and the knowledge of the *śāstras*. Accordingly, both the remarkable achievements and inherent limitations of cognitive science are contingent upon its underlying ontological assumptions, which have been predominantly framed by Western intellectual traditions. And while both individual and social cognition

models are the results of multiple philosophical influences, from Darwinism to rational choice theory (Muntanyola-Saura 2014), most cognitive scientists do not read Sanskrit. Or at least not yet.

The barrier, however, is not only idiomatic; the main problem is that cultural translation is not a straightforward process. Bringing the knowledge of the *śāstras* to contemporary cognitive science requires a rigorous and critical effort, specially to prevent biased misappropriations. The contrast between Eastern and Western conceptual categories, especially with regard to the aspects of consciousness or identity, can give rise to profoundly different ontologies, as we shall see while discussing the notion of mental health (Rao 1998).

Mental health and identity: from clinical psychology to tantric categories

Academic discussions in cognitive science continue to undermine a neurological conception of the mind, reducing it to an epiphenomenon of brain activity (Gonzalez-Rodriguez 2024) and prioritizing approaches biased by the clinical categories of psychopathology, psychiatry, and neurophysiology (Greyson 1993; Gallagher 2000). One of the first concepts requiring careful cultural translation is “mental health”, traditionally framed by the dichotomy between normality and pathology (Bongiorno 2010; Crowe 2000). While the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* continues to rely on contested criteria for designating pathology under the notion of “abnormality” (Vanheule 2017), there is increasing recognition that a mental disorder is best understood as a condition involving significant distress (Vanheule & Devisch 2014). In non-Western perspectives such as Buddhist psychology (Chen 2006), the focus is on the alleviation of suffering, something that could be easily adopted globally as the fundamental goal of any therapeutic intervention (Vanheule & Devisch 2014).

Cognitive-behavioral therapy has gradually adopted certain non-Western practices, most notably mindfulness-based stress reduction programs (Gordon 2009) which have shown highly positive clinical results (Grossman et al. 2004). However, cognitive science as a whole has remained largely ignorant to the large body of Indic philosophies, overlooking their sophisticated accounts of consciousness, cognition, and identity. While Western clinical psychology’s predominant focus is on the maintenance of the egoic self, some tantric practices emphasize the transcendence of *ahaṃkāra* and the progressive elimination of *malas* (impurities), aiming to dissolve the limitations of the finite self. Tantric healing traditions, as explored by Timalina (2012), emphasize the transformation of self-awareness from a limited,

finite-bound perspective to a boundless awareness that embraces totality. This shift can be achieved through ritual practices like the visualization of mantras and deities within the body and the cultivation of particular *bhāvas*. Tantric practices may lead to the deconstruction of self-referential cognitive constructs through active imagination, but also through embodied practices like *puja* (Timalsina, 2024). And although they are fundamentally intended to reorient the individual's experience towards a more expansive, non-dual understanding of consciousness, they may indirectly lead to a reduction of suffering, as seen in Timalsina (2012).

Engaging with these perspectives offers a profound alternative to the prevailing biomedical model of psychopathology, since they focus on re-architecting experience, ultimately leading to the recognition of consciousness as the ultimate identity, instead of treating a psychiatric disorder or counteracting an “abnormality” (Vanheule 2017). Shiah (2016) proposed an alternative psychological model focused on “selflessness”, a notion that resonates with the phenomenological dimensions of non-dual awareness described in certain *darśanas*, the notion of “ego dissolution” of psychedelic research (Rankaduwa and Owen 2023; Carhart-Harris 2018; Carhart-Harris et al. 2014), and the reports of the “universal Self” associated with energy-like somatic experiences and *kunḍalinī*-like phenomena (Edwards and Woollacott 2022). Yet, there is a problem when generalizations and transcultural categories collide, which will be taken up for discussion below.

Let's take the relationship between mental distress and personal identity, understood as the self-concept of the finite subject. If suffering is considered to arise from cognitive constructs (*vikalpas*) that generate a mistaken and finite-bound sense of identity, then mental distress can be overcome through the direct realization of that ultimate “universal Self” as unbounded or infinite consciousness (Edwards and Woollacott 2022). The problem here lies in discerning *which* is the actual conceptualization of that “ultimate identity”, and *which* of the categories can be culturally translated without losing part of the semantic value in the process. If cognitive science merely relies on Western categories like Maslow's concept of the “peak experience” and vague notions like “ego dissolution” or “mystical-like” phenomena, we may actually be trapped in a reductionist understanding of non-dual experiential states. Cognitive scientists cannot assume that there is only one conceptualization of that supposed “ultimate consciousness”. How we conceptualize it, may radically differ depending on each particular *sampradaya*, due to the rich pluralism of *śāstras* and commentaries of the Indic traditions. Accordingly, what may be acknowledged as *the pratyabhijñā* (self-recognition) of *paramaśiva*

in the *Trika Śaiva* system (Singh 1982) differs from the *nirguṇa-brahman* (attribute-less absolute) of *Advaita Vedānta* (Velassery 2005) and the *sūnya* (emptiness) of *Madhyamaka* Buddhists, although all these radically different notions could fit (and therefore be conceptually simplified) when vaguely translated within the “non-dual” aforementioned Western categories.

Although this conceptual oversimplification may be ultimately misleading and philosophically inaccurate, reductionist models provide certain advantages when applied in experimental settings. Say for example, the acknowledgement of a certain degree of empirical evidence when correlating clinical improvements with the phenomenology of “mystical-like experiences”. This has led to the serious consideration of psychedelic-assisted therapy in clinical settings (Gonzalez-Rodriguez & Perez-Carmona 2023). There is even a psychometric *Mystical Experience Questionnaire (MEQ)*, based on Walter Stace’s typology of non-dual experiences, that is currently applied in clinical research. In this case the questionnaire, as Breau & Gillis-Smith (2023) explain when using the term “psychometric *brahman*”, is biased by *Advaita Vedānta* categories.

By following these categories when reviewing scientific literature, we can read that “non-dual experiences”, in which identification with the ego-bounded self is loosened, may have radical implications for reducing suffering (Gonzalez-Rodriguez & Perez-Carmona 2023). As seen in Carhart-Harris (2018), neuroscientific studies point to correlations between activity in the cortical midline structures, often grouped as the brain’s default-mode network (DMN), and “self-specific” processes associated with the “ego complex”. Those alterations in DMN connectivity are linked to the efficacy of psychedelic-assisted psychotherapy (Ruban and Kołodziej 2018), suggesting that such neurological changes are associated with the positive impact of “ego dissolution” on mental health. It is tempting to generalize these findings and acknowledge that we have found the “neurophenomenological correlates of *mokṣa*” or conclude another reductionist reading. But those statements could be profoundly misleading. A proper cultural translation goes beyond randomly borrowing exotic concepts from non-Western traditions. And this is precisely what can be fixed if cognitive scientists engage in a deep study of certain *śāstras*.

Bridging cognitive science and Indic knowledge systems

As said, there is a delicate boundary between identifying meaningful correspondences and introducing potentially misleading or reductive interpretations. Cognitive science categories are still too vague with regard to certain aspects of consciousness and cognition, but instead of misappropriating Indic terminology, we need a deeper understanding of those categories first.

However, such understanding can only come from a culturally situated dialogue. And that is possibly one of the reasons behind psychedelic research being one of the fields which is pushing further the redefinition of phenomenological categories in the West. This is precisely because of its connection to “plant medicine” and the open dialogue with non-Western communities, particularly those preserving indigenous and animistic traditions. Several studies suggest that psychedelic experiences can significantly reshape religious and philosophical worldviews (Nayak et al. 2023; Timmermann et al. 2021), which has therefore implied the reconsideration of a wide range of metaphysical categories. For instance, Nayak et al. (2023) reported in a study with 2,374 participants, that the belief in an “ultimate reality or higher power” increased from 29% to 59% with a single psychedelic experience, shifting participants toward non-physicalist understandings of consciousness, meaning, and purpose. Similarly, Timmermann et al. (2021) found that psychedelic experiences reduced the number of subjects identified with physicalism, and this change was actually accompanied by improvements in psychological well-being. This has led to the quest for a “reasonably comprehensive menu of metaphysical options” (Sjöstedt-Hughes 2023) in order to increase the number of categories used in statistical studies. Yet, such studies are biased by the particular aspects of psychedelic phenomenology, and do not necessarily correlate with the long-term transformative processes experienced through non-pharmacological practices like those found in tantric *sādhana*. So again, attributing the same categorical filters may be problematic.

In this context, despite the growing set of categories of psychedelic research, the general understanding of non-ordinary states of consciousness remains extremely reductionist when compared with the depth and granularity of Indic philosophical traditions. Abhinavagupta’s *tattva*-system, for example, offers an unparalleled dissection of the levels of reality and consciousness. Similarly, the *Mahārthamañjarī* and other *Mahārtha* texts dissect experiential states in a very meticulous manner, providing an elaborate description of cognitive and phenomenological states. Compared to the notions explored in these philosophical frameworks, the categories employed in modern psychology and neuroscience, whether “ego dissolution”,

“mystical-like experience” or “DMN downregulation”, risk oversimplifying and flattening the complexity of consciousness into neurocognitive or psychometric lenses, missing the sophisticated granularity and the philosophical nuances found in the *śāstras*.

The encounter between cognitive science and Indic knowledge systems should therefore not remain at a superficial or reductionistic level. What is required is an ontological and methodological reorientation that allows a decolonization of cognitive science, while retaining a critical mindset. There are multiple potential applications of a transcultural approach. From a clinical perspective, for example, therapeutic interventions can be reoriented considering an entirely different set of premises. One such instance is relying on non-pharmacological practices such as those described by Timalina (2012). Similarly, from a computational perspective, mathematical and conceptual models of cognition can be enriched by categories encoded in Sanskrit *śāstras*. This transcultural perspective may expand the richness of this discipline, not only as a whole, but also by contributing to each of the particular paradigms aforementioned. For example, re-visiting cognitivism, a paradigm grounded in grammar and logic, through the work of Pāṇini, Bhartṛhari, and Abhinavagupta or through the lenses of *Mīmāṃsā*, could in itself open up a rich and fascinating field of research. Similarly, embodied cognition can be problematized through ontological categories of the *Trika* system, with concepts like *icchā*, *jñāna*, and *kriyā* challenging our understanding of agency, cognition, and action within complex adaptive systems (Gonzalez-Rodriguez 2025).

Primarily however, we need a real understanding of this rich conceptual and philosophical landscape. The real change in cognitive science can only emerge from scholars who are radically situated within a living *paramparā*. By acknowledging the role of the scholar-practitioner, cognitive science can rely on first-person access to non-physicalist modes of consciousness and explore some of the Indic categories mentioned previously (Williams 2008; Gonzalez-Rodriguez 2024). The engagement with some of the philosophical frameworks and the embodied practices of *śāstras* and *paddhatis*, situated in living communities of practice, may enable the study of cognition and consciousness beyond the constraints of the biomedical framework. Integrating non-ordinary experiences while also safeguarding them from misinterpretation or premature translation into biomedical language (Grof 2017; Greyson 1993) may also enable the study of non-ordinary states of consciousness and a deeper understanding of embodied phenomena such as energy-like somatic experiences (Sovatsky

2009; Cooper et al. 2021; Edwards & Woollacott 2022; Brandão et al. 2024) from a phenomenological perspective that respects their significance from pathological lenses.

If the cognitive scientists were introduced to the study of *śāstras*, this field of research has the possibility to expand its conceptual repertoire by engaging in certain cases with more accurate categories. This does not mean abandoning neuroscientific and psychometric approaches but complementing them with categories that carry a different ontological weight and phenomenological precision. Such a transcultural methodology could provide cognitive science with tools to move beyond its current self-constraints regarding the “hard problem of consciousness”. It has the potency to widen the scope of research in consciousness studies by considering the non-physicalist accounts of subjectivity that are both philosophically rigorous and empirically grounded.

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****Diego Gonzalez-Rodriguez, Ph.D.** is a professor at Universidad Camilo José Cela (UCJC). His current research focuses on ethno-phenomenological approaches to cognitive science and consciousness studies, bridging non-Western models with contemporary perspectives such as information theory and complexity science. He teaches across several academic programs, including the Bachelor in Artificial Intelligence & Robotics, Bachelor in Computer Engineering, and Bachelor in Technology & Business. Additionally, he collaborates with the Department of Neuromedicine and Movement Science at the Norwegian University of Science & Technology (NTNU).

