

Article

# The Potential of the Bi-Directional Gaze: A Call for Neuroscientific Research on the Simultaneous Activation of the Sympathetic and Parasympathetic Nervous Systems through Tantric Practice<sup>1</sup>

**Abstract:** This paper is a call for the development of a neuroscientific research protocol for the study of the impact of Tantric practice on the autonomic nervous system. Tantric texts like Abhinavagupta's *Tantrāloka* map out a complex meditative ritual system in which inward-gazing, apophatic, sense-denying contemplative practices are combined with outward-gazing, kataphatic sense-activating ritual practices. Abhinavagupta announces a culminating “bi-directional” state (*pratimīlana-samādhi*) as the highest natural state (*sahaja-samādhi*) in which the practitioner becomes a perfected yogi (*siddhayogi*). This state of maximized cognitive capacities, in which one's inward gaze and outward world-engagement are held in balance, appears to be one in which the anabolic metabolic processes of the parasympathetic nervous system and the catabolic metabolic processes of the sympathetic nervous systems are simultaneously activated and integrated. I posit that this neurological “co-activation” is the aim of Tantric practice. Akin to secularized mindfulness and compassion training protocols like Emory's CBCT, I propose the development of secularized “Tantric protocols” for the development of secular and tradition-specific methods for exploring the potential of the human neurological system.

**Keywords:** apophatic-kataphatic; autonomic nervous system; Śrī Yantra; *kuṇḍalinī*; *sādhana*; synesthesia; Trika-Kaula; Abhinavagupta.

## 1. The Call

I formulate this paper as a call for further neuroscientific research on dimensions of Tantric meditation practice (*sādhana*) that appear to be designed with the intention of

---

<sup>1</sup> This paper incorporates insights from a sabbatical research project funded by Berry College in 2014 that was first presented to the Contemplative Studies Group at the American Academy of Religion annual conference in Atlanta, November 2015. I am particularly grateful for the insightful feedback from David Gordon White, Glen Hayes, Sthaneshwar Timalsina, and Jeffrey Ruff (whose insights are also included in his article in this issue).

simultaneously activating both the anabolic processes of the parasympathetic nervous system as well as the catabolic processes of the sympathetic nervous system. The theoretical foundations for my proposed neuroscientific research are grounded in both my exegesis of medieval Sanskrit Tantric scriptures as well as my own experience of Tantric meditative and ritual practice. From both a theoretical-textual angle as well as from the insights gained through a kind of “laboratory immersion” in Tantric *sādhana* it has become clear to me that unlike basic stilling practices of Patañjali Yoga or Theravāda Buddhism, the meditative practices of Tantra (whether Buddhist or Hindu) are fashioned not solely to activate the parasympathetic functions but rather to activate both the sympathetic and parasympathetic functions simultaneously [1]. My theory is that this intentional “bi-activation” serves the end of awakening the latent potential of the human neurological system and presupposes what we can term a Tantric neurology or Tantric science of the body. While some preliminary research affirms my theory, there is much work still to be done, especially with regard to understanding the role of synesthetic experience in establishing neural networks but also the degree to which Tantric practices actually produces the “powers” (*siddhis*) that are claimed to be its fruits. Are such powers false claims? Are they exaggerated? Are they part of a metaphorical language? Or are claims of “powers” meaningful, especially when we place such Tantric discourse side-by-side with neuroscientific data regarding the observation of the production of brain-powers (particularly gamma, but also beta, alpha, delta and theta) in the neurological systems of practicing Tāntrikas subjected to EEGs and fMRIs? Could it be that these observable brain-power indicators are proof that advanced Tāntrikas could in fact develop more extraordinary powers, like the ability to heat the body to uncommon degrees or to levitate or to read the mind of others?

It is not my ambition, however, to prove that the more extraordinary Tāntric powers are valid. Rather, what I would like to see is the development of a neuroscientific research protocol that is driven by the hypothesis that the simultaneous activation of the sympathetic and parasympathetic nervous systems promotes overall neurological well-being, as indicated by emotional, cognitive and physical signs that indicate “improved health.” As I am not myself a neuroscientist I am not well qualified to design such a protocol alone. As a scholar and practitioner of Tantra, however, I am qualified to (a) translate the Tantric texts and thereby identify the purpose of Tantric ritual and yogic practices and (b) connect, anecdotally, my own experiences to that translation effort with the aim of (c) assisting a neuroscientist in developing

the desired protocol and defining the parameters by which such a research program might proceed. In this regard this paper is an attempt at modeling the kind of “close listening” that better attunes researchers and scholars to the scientific logic housed within traditional systems of contemplative practice.

## 2. Gazing Within While Looking Outward

In his *Tantrāloka* and other seminal works, the 11<sup>th</sup>-century Tantric exegete Abhinavagupta maps out a complex system of contemplative ritual practice that combines an “inward-gazing meditative state” (*nimīlana-samādhi*) with an “outward-gazing meditative state” (*unmīlana-samādhi*). The inward gaze is characterized by an apophatic mystical orientation grounded in contemplative yogic practices designed to still the fluctuations of the mind by causing the senses to withdraw from engagement with the objects of the world. In contradistinction, the outward gaze is characterized by a kataphatic mystical orientation grounded in the synesthetic activation and fusing of all five sense capacities through the consumption of wine, meat and grain, the uttering of sacred syllables, the worship of sacred diagrams (*maṇḍalas*) and other ritual accouterments, and, in rare cases, sexual congress. Ultimately, the inward, apophatic (*antar-yāga*) and outward, kataphatic (*bahir-yāga*) dimensions of this practice are to be integrated into a higher, unifying cognitive state that Abhinavagupta terms “the meditative state in which the eyes are both open and closed” (*pratimīlana-samādhi*). Abhinavagupta identifies this integrated state as the “highest state of contemplative consciousness” (*parama-cetana*) and as synonymous with the “natural spiritual state” (*sahaja-samādhi*) that was the ultimate goal of a number of Buddhist and Hindu traditions in his time.

Abhinavagupta’s own understanding of the dynamics of sense perception are firmly grounded in a rich history of Indian theories of “sources of knowledge” (*pramāṇas*) that elevate sight or (*pratyakṣa*) and particularly yogi perception (*yogi-pratyakṣa*) to a status of preeminence with long established traditions of subtle yoga (*sukṣmayoga*) detailed in the *Netra Tantra* and other canonical Tantric sources known to Abhinavagupta. In these sources a bi-directional visual logic is firmly established. The traditional understanding of perception is that the moment of perception occurs when the organ of perception emits a light ray out from the eye that comes into contact with an external object. As David Gordon White has detailed, this outward projection

of the sense organ as a light ray is grounded in the understanding that the self or soul is itself of the nature of light, coextensive with the sun ([2], pp. 123-126). And so the act of perception occurs when the inner light of the self shines out through the organ of perception unto an external entity in an act of perception that links the internal light to the external world of objects which are then perceived and shine within the mind as an object perceived and known to the mind. In this way we see clearly that for Indian epistemologists like Abhinavagupta sense perception is a complex bi-directional act in which an inner light shines unto an outer world so that that outer world can be known internally. This two-way flowing of light, perception and knowing is at the basis of Tantric theories of liberation that elevate inward-outward vision as the apex of spiritual practice.

As Alexis Sanderson has show, the realization of this bi-directional gaze was actualized by Abhinavagupta and the members of his clan of Tantric practitioners by means of highly esoteric ritual and sexual practices that results in the liberating experience that the outer world and one's own consciousness are co-extensions of the one, unified field of divine consciousness that is at once self and other, inside and outside, yogic practitioner and his female consort or *yoginī*. Through ritualized sexual union with the yogini, called *yoginī-melāpa*, a Tantric practitioner would achieve the full awakening of energy and liberation of consciousness that results in the attainment of spiritual perfection (*siddhi*). According to Sanderson, the practitioners of Abhinavagupta's Kaula Trika Tantra

translated this visionary fantasy [that occurred in *yoginī-melāpa*] into the aesthetic terms of mystical experience. The Yoginīs became the deities of his senses . . . reveling in his sensations . . . . The Yoginīs of the senses relish this offering of 'nectar' and gratified thereby they converge and fuse with the [tantric adept's] inner transcendental identity as the Kuleśvara [Tantric Clan Lord], the Bhairava [Godhead] in the radiant 'sky' of enlightened consciousness (*cidvyomabhairava*). ([3], p. 680)

The final goal, in other words, of Tantric ritual practice is the production of a neurological state of cognition in which the inner world of one's senses is projected onto and recognized as the outer world, replete with the divinities that are the focus of one's meditative practice. This condition of seeing within and without at once is akin to what Robert Forman has

noted [4] the *sahaja-samādhi* appears to be a kind of advanced “dualistic mystical state” (DMS) in which adept practitioners achieve the ability to be at once grounded in a deeply interior contemplative state, seemingly aware of awareness itself (to use Forman’s language) while their senses are fully engaged in the world. This combining and unifying of both object-oriented consciousness and non-intentional pure awareness results in a conjoining of both apophatic or quiescent, formless, meditative states with kataphatic or sense-engaged, object-oriented meditative states.

My theory is that Tantric *sāadhanā* not only mimics the catabolic and anabolic processes of the autonomic nervous system but is designed to harness the potential that comes from a simultaneous activation of these deeply integrated neurological systems. In other words, the apophatic, contemplative practices that result in an “inward gazing” stimulate the anabolic processes of the parasympathetic nervous system while the kataphatic, sense-engaged practices resulting in an “outward gazing” activate the catabolic processes of the sympathetic nervous system. Catabolic metabolic processes correspond to a state of phasic alertness in which one exerts energies out into the physical world. Anabolic metabolic processes correspond to a state of tonic alertness characterized by withdrawal of the senses from the physical world and resulting in a regeneration of energy. In anabolic states one’s eyes may likely be closed as one’s neurological focus is inward. In catabolic states one’s eyes may likely be open as one engages in the world. However, to make a clear and tight distinction between these two types of neurological processes would be to miss an essential point—anabolic and catabolic are two aspects of one overall neurological system. They are just as linked and inseparable as the opening and closing of the eyes themselves. The mutual dependence of the sympathetic and parasympathetic nervous systems is necessary for the overall functioning of the autonomic nervous system, which is one, integrated, whole. One result of such integration-building neurological practices may be the kinds of “attentional-expertise” identified by Brefczynski-Lewis et. al. in their important studies on long-time meditators [5]. This important research furthered earlier, related research by Lutz et. al. [6] on the generation of gamma rays as a result of advanced training in Buddhist meditation techniques.

By analogy and perhaps by intention, we see in Tantric practice the linking of advanced inward-focused practices (associated with tonic alertness and the anabolic metabolic processes of the parasympathetic nervous system) with sophisticated physical methods of

outward-exertion (associated with phasic alertness and the catabolic metabolic processes of the sympathetic nervous system). As previously noted, the combining of these two types of practices and states is said to result in what the tradition calls the “highest natural state” (*parama-sahaja-samādhi*). According to ethnographic accounts, this state is characterized by a deep sense of well-being, synesthetic sensual registers and heightened cognitive and physical abilities [7, 8].

### 3. The Neuroscientific Grounds for the Bi-Directional Gaze

One perhaps sees a parallel to this idea of a maximized “inward-outward” state in the field of sports psychology today with interest in the cognitive state referred to as “the zone” or “flow” [9]. Well documented are the cases of highly trained athletes who claim to enter into the “zone” and describe a state in which their countless hours of both mental (*introvertive*) and physical (*extrovertive*) training result in a state in which the mind, body and breath come into complete integration. In such a state, there is an experience of heightened awareness in which the action performed requires no further premeditation. One simply does what it is that needs to be done in the moment that it needs to be done. This is a state of apparently maximized capacity in which one can hit a three point shot from the baseline at the buzzer or leap from the foul line to dunk the ball or say that which needs to be heard or whatever it is that is the right and necessary thing that must be done in the moment it must be done. This is, in other words, a principle of correct, necessary and maximized effective action that applies to multiple fields of play, whether they be ‘religious’, ‘athletic’ or ‘every day reality’. This notion of a “flow” extends also into studies of theater, ritual and dance [9]. What is of course common across ‘religions’, ‘athletics’ and the ‘arts’ is that all three of these words reference domains of human experience. It is humans and their complex neurological systems that create, engage in and experience religion, athletics and the arts. Therefore, it is perhaps not surprising that the technologies employed within each of these domains of human expression share certain principles in common, principles that perhaps suggest a method for the cultivation of neurological well-being through the cultivation of our capacity to be at once inward-oriented and engaged in the world.

A few notable studies affirm aspects of my theory [8, 11, 12, 13]. Benson [14] was among the first to note a clear distinction between the impact of Tibetan Buddhist visualization meditation and Theravāda meditation on neurological activity. Whereas EEG testing of

Theravada practitioners suggested that such practices activate primarily if not exclusively the rest response of the parasympathetic nervous system, testing of Tibetan Tantric practitioners demonstrated that such meditation practices activated the sympathetic and parasympathetic nervous systems simultaneously, producing a blend of tonic and phasic alertness as well as evidence of gamma-, theta-, delta- and alpha-power waves. This study was consistent with prior work research done by Corby, Roth, Zarcone and Koppell [8] in which autonomic and electroencephalographic (EEG) correlates indicated that advanced meditators entered into states of heightened autonomic activity combined with increased alpha- and theta- power, particularly as they approached the state of meditative absorption known as *samādhi*. An intriguing aspect of this early study is that Corby et. al. contrasted the neurological indicators of advanced Tantric practitioners with novices and found that the latter group merely demonstrated the relaxation response of tonic alertness associated with activity related to sympathetic nervous system while the advanced meditators had clearly learned to activate the entire autonomic nervous system, demonstrating phasic alertness and gamma-power associated with flashes of insight. Corby and his colleagues conclude that these neurological indicators demonstrate a clear capacity, if not intention, on the part of more advanced Tantric meditation to manipulate the autonomic nervous system.

Most recently, Amihai & Kozhevnikov [7] have furthered the important research of Corby [8] and Benson [13] by developing a research protocol for better understanding the impact of Buddhist Tantric meditation on the autonomic nervous system. Like Corby before them, Amihai and Kozhevnikov [7] used EEG and EKG technologies to compare and contrast the neurophysiological and cognitive correlates between Buddhist Tantric and non-Tantric traditions. Their data confirmed the conclusions of Corby in particular; namely, that whereas Therevāda meditation only arouses the rest response of the parasympathetic nervous system, Vajrayāna practices activate the arousal response of the sympathetic nervous system.

What is most significant, in my mind, about their study is that they demonstrate the kind of “listening closely” that reflects serious consideration of the explanations provided from within the tradition under study. In other words, Amihai and Kozhevnikov [7], in making sense of their neurological data, turn to the texts and oral traditions of Esoteric Tantric Buddhism itself in concluding that the dual-activation of the sympathetic and parasympathetic nervous system through Tantric practice is best understood as the neurological result of what the tradition calls

an ‘awake quality’ of the mind, one in which the mind is simultaneously still yet alert to the sensations within and outside the body. Where they error significantly, however, is in concluding that Tantric practices ought to be categorized into the two categories of relaxation (i.e., parasympathetic-nervous-system-centered practices resulting in tonic alertness) or arousal (i.e., sympathetic-nervous-system-centered practices resulting in phasic alertness). This dualistic categorizing of Tantric practice into the framework of an either/or logic reflects, in my opinion, a failure on the part of the investigators to listen to the degree that they actually hear what the tradition is saying on its own terms. I would argue that if we are going to further our understanding of the neurological indicators of Tantric practice then we need to better understand the logic that informs Tantric practice.

Tantric practice is grounded in a non-dual episteme that quite intentionally transcends the limitations of binary, a or b, thinking. The Tantric episteme, in its non-dual orientations combines and conflates “inner” with “outer”, “relaxation” with “rest”, “man” with “woman”, “God” with “human”, “sympathetic” with “parasympathetic”. If we are to listen carefully to the logic of Tantric meditation practice then we will recognize that the tradition is (a) well aware of the dynamics of the human autonomic nervous system (b) which operates with both an outward-focused, arousal-oriented, energy burning, catabolic metabolic dynamic together with (c) an inward-focused, rest-oriented, energy rebuilding anabolic dynamic. These two aspects of the internal system frame one larger subtle-body system that is to be activated and synthesized through Tantric practice toward the end of creating the kind of “powers” that reflect neurological well-being.

In the remaining sections of this paper I first lay out the frame work of traditional non-dual Tantric ritual practice and meditation and then suggest some parameters by which the next phase of neurological research on Tantric practice might be engaged. As I argue, Tantric practice intentionally creates synesthetic states of sympathetic-system arousal that are combined with parasympathetic-system states of relaxation. It is this co-activation, I argue, that is the intended effect of Tantric practice. What needs to be measured next, if it is possible, is precisely the neurological benefits of practices that activate the sympathetic and parasympathetic system simultaneously.

#### 4. Entering the World of Tantric Non-Duality

In contradistinction to the Western body/mind or body/consciousness split, the Trika-Kaula discourse identifies phenomenal existence as the body of consciousness. To the Trika-Kaulas the material world is not separate from consciousness. Rather, it is the flashing forth of consciousness into a wondrous display of subjects and objects, which, through training in specialized ritual techniques, is ultimately re-cognized as an expression of one all-pervading consciousness ([14] *Paramārtha-Sāra* 43). In defending this theory of projection (*ābhāsa-vāda*), non-dual Hindu Tantrics argue that the Absolute (*cit-śakti*) is both pure luminosity (*prakāśa*) and a reflective power (*vimarśa-śakti*) capable of self-projection and limitation (*saṃkocana*). In other words, these Tantrics define the Absolute, God, as dynamic consciousness with both outward, active dimensions and inward, reflective or restful dimensions. In cosmogonic terms, the Absolute, comprising both that which projects out and that which reflects upon itself and is called *paramaśiva*, *parasamvit*, *caitanya*, *anuttara*, *mahāśūnya*, and *cit-śakti*. Each of these technical terms refers not only to a cosmological principle but also to a state of consciousness located within the body and accessible through meditative practices. In other words, Tantric discourse employs a double intentionality in which descriptions of the cosmic-consciousness are simultaneously references to the body. For this reason an analysis of Tantric cosmogonic descriptions provides insight into Tantric models of the body/consciousness dialectic.

Briefly then, let us turn to an account of Tantric cosmogony as told in Tantric scripture. At the time of creation, from within the cosmic plenum, there emerges an innate pulsation. Desiring to bring forth the universe, this pulsating power (*spanda-śakti*) begins to stir and, like a spider weaving its web, emits the universe out of the infinite womb of *Paramaśiva*. This capacity for self-projection is understood as a dialectic of the progressive and regressive power of the “emanational power” (*visarga-śakti*). During the phase of cosmic manifestation, God displays its progressive/extrovertive/active capacity, and at the time of dissolution (*mahāpralaya*), God displays its regressive/introvertive/self-reflective/restful capacity by reabsorbing the universe of transmigrational experience. The projection and manifestation of phenomenal existence is characterized as a contractive process by which God limits and projects his infinite being to bring forth creation. According to the Trika-Kaula tradition, the phenomenal world is, in other words, a contraction (*saṃkocana*) of consciousness. From infinite arises the finite. Creation is a coagulation or condensing of an infinite non-particularity into a finite cosmos filled with

particulars. This divine condensing is understood as well to be a projection of God's infinite Being into a multiplicity of finite beings projected within and into His own Infinite Being. Hence, in this system evolution is an involution involving the return to the unmanifest state of nondual consciousness. The embodiment of infinite consciousness as *viśvarūpa* or form of the universe ([14] *Paramārtha-sāra* 49) is the means by which this process of mystical transcendence is made possible.

In other words, it is by means of becoming the body—both cosmic and personal—that the singularity of divine Consciousness encounters, embraces, celebrates and becomes its own self-transcendence. Through the infinitely recurring act of embodiment, Supreme Śiva assumes the form of cosmos. For this reason, the universe is called the embodied cosmos (*kula*). As the self-manifestation of God, the *kula* is the power of embodiment (*kaulikī-śakti*) that makes possible the play of universal creation (*viśva-sṛṣṭi-līlā*). Significantly, this power of embodiment plays out at the level of the human body, itself a *kula*, and possessed of the powers and attributes of divinity. In other words, according to Trika-Kaulism, the process of cosmic embodiment recapitulates itself at the human level. Just as the God contracts, rests and turns inward only to expand and look outward again, so the human experiences the dyadic process of rest and activation by engaging in the esoteric practices of Tantric spiritual practice *sādhana*, which are designed to harness the full potential of the human neurological system. This harnessing of power is not an effort to obliterate matter and isolate consciousness. Rather, it is the means by which matter is re-cognized as consciousness.

One shared characteristic among Tantric traditions is the claim that the body is a microcosmic replica of the universe. Kṣemarāja writes: As the Lord has the universe as a body (*viśvaśarīra*), so the self with contracted consciousness (*citiśaṅkocātman*) is the entire form of consciousness contracted (*saṅkucita*). The conscious being (*cetana*) is the experiencer who has the entire universal form (*viśvarūpa*) contracted like a fig tree in the seed. In constructing this microcosm-macrocosm discourse, Trika-Kaulas like Kṣemarāja adopted and elaborated upon pre-existing models of subtle physiology in which the various evolutes (*tattva*-s) and deities were given precise bodily correspondences. In this way, in the context of ritual practice, the initiate could locate the various parts of the universe within specific bodily loci such that he or she would eventually make the claim: *sarvam idam aham eva*—‘I alone am all this’ ([14] *Paramārtha-sāra* 56). In the Trika-Kaula system the body (*deha, śarīra*) is a multi-leveled and

hierarchized entity comprising both a vertical and horizontal axis. The horizontal body is composed of layers of coagulated consciousness beginning with the dense, physical sheath (*sthūla-śarīra*) and moving inward through the subtle (*sūkṣma*), causal (*kāraṇa*), and supreme (*para*) levels of being. These four levels ([14] *Paramārtha-sāra* 57) are said to correspond to four states of consciousness: waking (*jāgrat*), dreaming (*svapna*), deep sleep (*suṣupti*), and transcendental (*turīya*) ([14] *Paramārtha-sāra* 58).

The fourth or transcendent body resides in the heart (*hrdaya*). Thus, at the core of the human anatomy, at the literal heart of embodiment, Paramaśiva resides as the transcendent source of manifestation. Placing Supreme Śiva in the region of the physical heart supports the Trika-Kaula's claim that even during the time of self-limitation (*tirodhāna*), consciousness maintains its transcendent nature (*viśvottīrṇa*) ([14] *Paramārtha-sāra* 59). For this reason, the Tāntrikas declare that existential awakening can occur in an instant of intuitive insight (*pratibhā*). All that is necessary is the re-cognition of one's essential Self, dwelling in the heart.

According to Abhinavagupta, the legendary 11<sup>th</sup>-century polymath—whose brilliant exposition, *Paramārtha-sāra* (*Quintessence of the Supreme Truth*), I've already been liberally referencing—made it abundantly clear in his writings that the recognition of one's innate divinity occurs only when there is the awakening of coiled energy, *kunḍalinī-śakti*, residing in subtle form at the base of a central energy channel (*suṣumnā-nāḍī*) aligned within the spinal column. the potential for catalyzing a full sprouting of the neurological potential of the subtle body ([14] *Paramārtha-sāra* 60). Aligning himself with standard Indian medical understandings of the body, Abhinavagupta understands the central channel within the spinal column itself to be linked to a vast network of subtle energy channels, called *nāḍī* (literally, “tubes”). The exact number of *nāḍīs* cited varies from text to text. The post-Abhinavagupta 15<sup>th</sup>-century *Haṭha Yoga Prapḍīpikā* cites 72,000 primary *nāḍīs* that themselves branch each into 72,000 *nāḍīs*, producing a body-ubiquitous network of 5,184,000,000 subtle energy channels. While would be an interpretive stretch to equate these subtle energy channels directly with what contemporary neuroscientists call “neurons” it is nonetheless not an egregious leap to see in this Indian conception of *nāḍī*-filled-body a comparable understanding in western science that our bodies are permeated by a network of neurons whose function is the transmission of that intelligent energy whose function is to orchestrate the entire gamut of bodily functions.

Within the Indian subtle body nervous system, two *nāḍīs* share a place of prominence.

These are the *iḍā* and *piṅgalā*, which are understood to wrap around and ultimately merge within the central *nāḍī* or *suṣumnā*. The *iḍā* is identified as introverted, lunar and corresponds to the right side of the brain. It originates on the left side of the spine as it spirals up toward the brain. The *piṅgalā* is identified as extroverted, solar, female and corresponds to the left hemisphere. This important nerve begins at the right side of the spinal column. While the *iḍā* cools and restores the energy of the body in anabolic states of rest, the *piṅgalā* heats the body through the catabolic release of energy in states of activation. In Tantric texts the power of the *iḍā* is said to be activated when the yogin closes her eyes in states of introvertive meditative practice. Such practices are said to result in a state of inward-power (*nimeṣa-śakti*) that restores and rejuvenates the body while also cultivating the states of heightened focus that comes from stilling the thought-waves of the mind (*Yoga-sūtra* 1.1). As a complement, the Tantric is instructed to also engage in “eyes-opened meditative states” that are designed to release the extrovertive power (*unmeṣa-śakti*) that is necessary for the performance of activity in the world.

The final stages of Tantric spiritual training require the simultaneous combining of introvertive and extrovertive ritual and meditative practices. These practices are said to produce a state of perfected awareness in which a Tantric is said to be “gazing within while engaged in the world” (*nimīlana-samādhi*). Akin to Foreman’s Dual-Mystical state ([4], pp. 153-168), this final attainment of Tantric practice is one in which both the *iḍā* and *piṅgalā* nerve channels are fully activated and fused together within the central channel, within the crown of the head. This is a state of supreme awareness in which the adept practitioner is said to abide in a non-dual state of complete contentment and bliss in which the internal and external worlds coalesce and merge into each other. Ever restful and awake, such a being experiences rest and stillness in all activity while also accessing the ability to be active even in rest.

It is my position that the reference point of Tantric practice is the autonomic nervous system. Although the terms are different, Tantra clearly recognizes that the human body contains an autonomic nervous system that automatically engages in catabolic metabolic processes associated with engagement with the world as well as anabolic metabolic processes that are the result of rest, meditation and regeneration. Tantrics saw these two automatic processes as polar opposites, engaged in intimate exchange with each other just as man and woman are opposites who engage in intimate mutual beneficial exchanges. Tantrics, in other words, saw that the two poles of the nervous systems, like man and woman, can be united and

from that union can come a great result—a union that is powerfully creative. Whereas literal sexual union can create a new life, the neurological union of Tantric practice creates within the body a new condition of well being that arises when one harnesses the potential of the neurological system.

In the next section of this paper I turn to an analysis of the synesthetic dimensions of Tantric practice before closing with a preliminary outline for developing research protocol for testing the neurological indicators of Tantric practice.

### **5. The Fusion of Senses (Synesthesia) Within the Singularity of Consciousness**

In the previous sections of this essay I have argued that the purpose of Tantric ritual and meditative practice, *sādhanā*, is to catalyze the advancement of the human neurological system and thereby activate states of being in which the adept experiences the maximization of his or her cognitive, physical and supra-physical capacities. One means by which this neurological advancement is achieved is through the simultaneous activation of the sympathetic and parasympathetic nervous system functions such that one cultivates the ability to be both “inward” and “outward” in the same moment. As a complement to this complete activation of the autonomic nervous system, Tantric practice necessitates and is grounded in ritual practices that generates sense experiences in which the five sense capacities (*jñānendriya*) of seeing, hearing, tasting, touching and smelling are fused one into each other. This fusion creates a “equal tasting” (*samarasa*) that is identified by Tantrics as a state in which the sense organs are united into divine consciousness. This state of fused-senses comes at the culmination of ritual practice in which one learns to see, hear, taste, smell and touch the cult goddess and her emanations as one’s own inner consciousness [3]. This equalizing, fusing, internalizing and re-projecting outward onto the world the ritualized construction of one’s own sense experience is itself, I argue, the result of or at least inseparably linked to the project of co-activating the sympathetic and parasympathetic nervous system functions.

In the neurosciences, the “fusion of senses” is known as synesthesia and is a subject of contested ongoing research and debate. A number of scientists argue that synesthetic tendencies are genetically cultivated and cannot be produced or cultivated. I disagree with this conclusion and argue that Tantric ritual practice is in fact predicated on the assumption that synesthetic states can be learned or created through repetitive, guided ritual practices and that the outcome of

such practice is the neurological state of inward-outward gazing detailed above. V. S. Ramachandran and E. M. Hubbard [15] argue convincingly that there is a physiological and psychological basis for creating a “fusion of senses” that is not genetically-contingent. In other words, their research demonstrates that individuals can cultivate synesthetic states of experience. Further, their research indicates that synesthetic states of experience are linked to a condition of ‘hyperconnectivity’ and cross-activation in the sensory cortex that exists for most, if not all, humans and some primates at an early stage in brain development, but remains intact for only about 1 in 2000 adults. While the continuation of synesthetic capacities is considered by ‘orthodox scientists’ to be a ‘genetic abnormality’ ([16], p. 181) that results in the inability to distinguish the senses, Ramachandran and Hubbard find in synesthetic phenomenon profound implications for the development of human language, the origins of metaphor, and possible links to and explanations for extraordinary religious experience. Their research additionally indicates that synesthetes have enhanced forms of sensory experience that generally results in more developed cognitive states, such as an increase in memory function or heightened creative abilities.

Aligning with Baron-Cohen et. al. [17], Ramachandran and Hubbard likewise identify synesthesia as not just the result but also potentially the producer of the desired state of neurological ‘hyperconnectivity’ in which the brain functions generate simultaneously an orchestra of ‘neural distributive networks’ affecting a ‘total neurological system’ that brings multiple regions of the brain into simultaneous neurological collaboration. The more interconnected and activated the brain, the greater access to cognitive powers. At least this is the Tantric episteme that undergirds my argument and links together my understanding of inward-outward seeing with the experience of “fused senses” that are the signs of success in Tantric ritual practice.

It is particularly this final point, regarding the possibility that synesthetic experience is both the result and producer of a ‘total neurological system,’ that I wish for us to bear in mind as we now turn to a discussion of the bi-directional ritual practices in a central Tantric scripture, called *Ocean of the Eternal Sixteen (Nityāṣoḍaśikārṇava)*. I identify these practices as bi-directional because of the claim on the part of practitioners that such practices create a state of transcendental freedom in which one engages the world with an uncommon power that is the result of being able to abide in states of unshakeable meditative absorption that is the result of all

5-senses being fused into the singularity of a heart-mind network fully awakened through the activation of the central life energy, *kuṇḍalinī-śakti* [18].

Before analyzing our Tantric sources let us try together a simple non-religious synesthetic exercise. Close your eyes and see now in your mind's eye the capitalized form of vowel A. Visually draw, in other words, capital letter A within the field of your consciousness. Now proceed to color that letter A the color red. See this mentally painted capital letter vowel as vibrant red. Now, open your eyes and maintain the perception of this red vowel A. If you can do this you are now synesthetically layering internal visualization on top of your sense of sight. Now, while seeing this red capital A with eyes open before you, hum the note A natural. If you can simultaneously see the red capital A while hearing the note A, then you are fusing into your cognitive field the functions of thought, vision, and hearing. If the perceived A-note-resounding, red-colored vowel-form A can now be imagined to taste like something sweet like mango, if you can hear the note while seeing the red capital A while also experiencing sweet taste in your palate, then a fourth sense experience has been fused into a growing field of layered cognitive perceptions grounded in a "union of the senses". And if the A-note resounding mango-tasting A-form now feels warm, then touch has been added to that emerging field. And if the A-note resounding (hearing-capacity)-warm feeling (touch-capacity)-mango tasting (taste-capacity)-A-form (sight capacity) 'smells' like frankincense, then the final sense capacity of smell has been fused into this synesthetic state that by its very nature produces a condition of unified, focused consciousness referred to by Tāntrikas as the "singular taste of perfected I-awareness (*ekī-rasa-pūrṇāhantā*)."

Even if you are not able to merge all five senses through this simple exercise, perhaps you can imagine that if you made it your daily effort to bring about such a sensual synthesis, in conjunction with elaborate ritual processes, it could perhaps be done. My thesis is that the purpose of Tantric ritual practice is to create synesthetic states of consciousness that activate simultaneously the sympathetic (*piṅgalā-nāḍī*) and parasympathetic (*iḍā-nāḍī*) nervous systems. This ritual and meditative commitment to co-activating the entire autonomic nervous system is what creates not only the states of heightened bliss promised by the tradition but as well the experience of heightened cognitive and physical abilities that are the by-products of the practice.

The ninth-century Tantric revelation, *Ocean of the Eternal Sixteen*, or *Nityāṣoḍaśikārṇava* (NṢA) functions primarily as a ritual manual (*paddhati*) for the construction

and worship of the great goddess, Mahātripurasundarī, she who emanates photically as Śrī Yantra and phonically as the Perfected Mother of Sound, Siddhamāṭṛkā. My exegesis of this text is informed by the Trika Kaula commentaries of two twelfth-century Kaśmira exegetes: Śivānanda's *Rjuvimarśinī* and Vidyānanda's *Artharatnāvalī*, texts that reflected the indebtedness of their respective authors to the sophisticated non-dual theosophy of the Trika Kaulism of Abhinavagupta and his own teachers [19]. Both Śivānanda and Vidyānanda conflate the acquisition of power (a primary concern of the elite patrons who sponsored their texts) with the quintessential insights of the Trika Kaula system: the yogic recognition of a supreme awareness that is itself emanating and contracting as the infinite cycles of creation and dissolution through the neurological functions of the body.

It is through training in the synesthetic rituals of Śrī Yantra that this empowering recognition occurs. As Skora [20] has shown, sense conjoining in the construction and worship of the Tantric *maṇḍala* is not limited to the senses of sight and hearing. Through *mudrā* (gesture) and *nyāsa* (placing), touch is stimulated; through ritual offering and consumption, taste is activated; and, through the burning of sweet fragrances, the olfactory system is awakened (Cf., [11], pp. 60–62). In this way, the ritual produces a multi-layered synesthetic condition in which the Deva's form is at once heard, seen, felt, smelt, and tasted. Embodied in this way through all the senses, the goddess is encoded into consciousness through the activation and conflating of the sense functions. In other words, from a Tantric perspective the worship of divinity requires the construction of synesthetic states of consciousness because divinity is itself that state in which all senses are merged together within a unified state in which the perceiver, the perceived and the modes of perception are one. In such a state the mind sees inward toward the heart even as the eyes, ears, nose, tongue and skin engage the objects of the world. Through the activation of parasympathetic functions one is restfully engaged in the anabolic process of storing and generating power. Through the synesthetic activation of the sympathetic nervous system one is aroused, awake and in contact through the senses with the objects of the ritual.

An 8<sup>th</sup>-century scripture attributed to Śaṅkarācārya reads:

*antyaṃ bījaṃ athendukundaviśadaṃ saṃcintya cittāmbuje |*  
*tadbhūtāṃ dhṛṭapustakākṣavalayāṃ devīm muhuḥ tanmukhāt ||*  
*udyantam nikhilākṣaram nijamukhenānāratasrotasā |*

*niryāntam ca nirastasaṃsrtibhayo bhūyāt sa vāgvallabhaḥ ||*

—*Prapañcasāra* 9.42.

If he meditates on the last of the three seed-syllables he will be free of the danger of reincarnation after his death and will win the favor of the goddess of Eloquence-and-Learning. He must visualize a lotus [in his heart] and this [syllable] gleaming white as the moon or jasmine in its centre. He must then visualize the goddess of the syllable holding a book and a rosary, then imagine the alphabet pouring forth from her mouth again and again, [rising up from his heart] and emerging from his mouth in an unbroken stream.

—(Translation by Sanderson [21], p. 36)

This passage is a classic description of the synesthetic visualization practice that is the focus of *Ocean of the Eternal Sixteen*. As such it is a coded reference to the goddess of the Śrī Yantra, Mahātripurasundarī. The Śrī Yantra necessarily exhibits a dyadic nature. On the one hand, it is a visual image, revealing the luminous symmetrically precise visual emanations of divinity. On the other hand, it is a sonic field, reverberating as the seed mantras that comprise the acoustic body of Siddhamāṭṛkā. The linking of these photic and phonic fields is the key to the ritual and it is a linking that occurs at both outer and inner levels. At the outer level, the Tantric practitioner acts as an artist, ritually constructing the Śrī Yantra with materials that comprise his tantric shrine. At the inner level, this outer act is mirrored by a cognitive process in which the adept mentally constructs the Śrī Yantra on the shrine of his own consciousness. In this way, the meditator replicates the primal cosmogonic act in which the Goddess emanates her essential being as an apparently ‘outer’ cosmos that in fact abides always within the infinite expanse of her own consciousness. Just as the Goddess emanates and dissolves creation within her own infinite being, the *sādhaka* too creates externally and visualizes internally the Śrī Yantra as a luminous acoustic field by which he cognizes his own synesthized self as the Goddess herself. This dialectical relationship between a pure internalized unified consciousness, on the one hand, and a manifest pluralized cosmos is the visual component of a non-dualist mantralogy (science of empowered phonemes) in which ‘awareness’ and ‘emanation’ are identified as inseparable aspects of the Goddess, she whose light-nature emits the Sanskrit phonemes ranging from ‘a’ to ‘ha’

In other words, in Tantra, Divinity is both the Word and Its Light. And this Word-that-is-Light is also Touch-Taste-and-Scent. At the height of Tantric ritual the adept becomes herself the deity whose seeing-touching-tasting-hearing-smelling is the singular tasting of oneself as the deity one is worshipping. It is through the synesthetic worship itself that the object of worship is seen to be the one worshipping herself. The unified senses in this way serve to bridge and fuse God, self and experience.

In sum, it is through the recitation, visualization, and interpretation of the Sanskrit phonemes—the luminous sonic vibrations that comprise Śrī Yantra—that the Tantric achieves her heightened state of focused, restful, active engaged synesthetic engagement with the world. By combining a mastery of language (in its supreme, causal, subtle, and gross forms) with her abilities as a yogin, ritualist, and artist, she mimics cosmogenesis as a liberating artistic event in which subjectivity—the triadic field of the signifier (*vācaka*) as letter (*varṇa*), power-sound (*mantra*), and word (*pada*)—‘projects out’ (*vāmaka*) as the objectified corollary to itself—the triadic interlocking fields of the signified (*vācyā*) as world (*bhuvana*), being (*tattva*), and power (*kalā*), which comprise the Śrī Yantra’s poly-sensual form.

In the *Rjuvimarśinī*, *Artharatnāvalī* and a host of Tantric ritual manuals we see the conjoining of a ‘synesthetic hermeneutics’ together with a refined artistry that challenges the Tantric to at once function as a linguistic philosopher, yogin, priest, and artist. Through these multiple roles, he encodes his own synesthized consciousness with the secret symbol of his clan’s chosen deity, Mahātripurasundarī. For Śivānanda and Vidyānanda, the final fruit of this creative act is the recognition that the Śrī Yantra’s ultimate message is the triadic union of A (Śiva) with Ha (Śakti) and Ṁ (*bindu*) in the great mantra of perfected self-awareness: *aham*. This synesthetic recognition of self as the integration of all patterns of emanation brands the *sādhaka* as a rhythmic, emanating, patterned being, oscillating from stillness into flux, from transcendence into embodiment, from singularity into a symmetrical multiplicity. In this way, she identifies herself as the cosmic flux itself, generating within her consciousness via synesthetic ritual practice the Devī’s cosmic form as the auspicious seal of her now synesthized identity as consciousness-fused-within-and-through-the-senses.

## 6. Conclusion: Toward a Protocol for Evaluating the Neuro-physical Indicators of Tantric Ritual

*Mantra-maṇḍala-varṇātma-rūpiṇīm karuṇā-parām |*  
*Dhāma-saṃvit-svarūpām tām vande tripurasundarīm ||*  
 — (Artharatnāvali 1.1)

I worship that Tripurasundarī whose own form is the foundation for consciousness, who is supreme compassion, and whose body is composed [simultaneously] of *mantra* (sound), *maṇḍala* (light) and *varṇa* (form).

— (Author’s Translation [19])

Recent studies on synesthesia and the autonomic nervous system in the cognitive sciences provide an intriguing context in which we can reflect bi-directionally on and listen carefully to the methods and perspectives revealed through a careful engagement with non-dual traditions of Hindu and Buddhist Tantra. Engaging in such a bi-directional hermeneutics, we see that cognitive science provides empirical data that suggests that a ‘union of the senses’ is a catalyst for and result of ‘hyperconnectivity’ in which the brain functions as a ‘total neurological network’ as the result of heightened sense activity. Taking a lead from researchers like Cytowic [22], Chara [23], and Ramachandran [15] I posit that such states can be generated through creative, imaginative, and ritualized activities. In this regard, I have posited that the structure and form of Tantric ritual be analyzed as a method for producing a ‘union of the senses’ (*synesthesia*) as a result of highly creative visionary activity in which sound and image is combined with taste, touch, and scent in a way that powerfully activates the phasic alertness that is a byproduct of sympathetic nervous system arousal. If Ramachandran and Cytowic are correct that synesthesia indicates and facilitates an evolution of neurological development, then perhaps Tantric cosmogonic ritual can be evaluated in a way that strips the esotericism down to a sense-based cognitive activity whose effect—whether designed intentionally as such or not—is the generation of a state of consciousness that requires the conjoining of the senses. In this regard, the Śrī Yantra itself can perhaps be seen as a symbolic map of the ‘total neurological system’ identified by Ramachandran as the result of synesthesia.

However, it would be simplistic and misguided to perceive Tantric ritual and meditative practice as merely activating states of phasic alertness. The sense-oriented activities of Tantric

ritual are to be simultaneously grounded in an inward gazing (*nimīlana-samādhi*) to create a fundamental ground of restful stillness that is the backdrop and support for the ritual component of Tantric practice. It is by means of and in conjunction with this tonic alertness, this parasympathetic-centered regenerative anabolic inward absorption, that the Tantric adept experiences herself at once as the pure consciousness (*puruṣa*) gazing outward at the blissful play of her own dynamic self-awareness reflected in the world through ritual activity. By being a still, silent witness she is able to enjoy and harness the power of activity that is the expression of an inner divinity that is both pure witness and an active goddess. The dynamics of her witness-nature is facilitated through the *idā-nāḍī* (parasympathetic nervous system), which draws consciousness restfully inward. The dynamics of her activity-centered nature is facilitated through the *piṅgalā-nāḍī* (sympathetic nervous system) and directs consciousness toward the world of sense objects via the sense organs. At the height of Tantric ritual meditation both *nāḍīs* are to be fused into the central channel in order to create the state of the liberated soul (*jīvan-mukti*). To repeat, the purpose of Tantric ritual is to simultaneously activate the sympathetic and parasympathetic nervous system for creating a condition of neurological empowerment that results in the experiences of being empowered and thereby set free.

With these thoughts in mind I end with a call to any competent neuroscientist who might be interested in joining me in forming a protocol for testing the neurological impact of Tantric practice on advanced practitioners. As I myself am primarily a scholar, with limited experience in the practice of Tantra and by no means a neurologist, I seek to bring together an advanced practitioner of Tantra together with a neuroscientist capable of designing a protocol for testing the neurological indicators that result from synesthetic states in which the parasympathetic and sympathetic nervous system are routinely activated. I have procured already the desired advanced practitioner of Tantra and so, in reality, my call is herewith just for a neuroscientist.

It seems to me that the proposed protocol ought to be grounded in the following conclusions:

- (1) Tantric meditation is designed to intentionally manipulate both the sympathetic and parasympathetic nervous systems.
- (2) Toward this end of bi-activation, Tantric meditation requires a conjoining of restful, contemplative meditation that produces tonic alertness and associated brainwave-powers together with

- (3) active sense engagement that generates a state of synesthetic consciousness that engenders
- (4) a simultaneous state of phasic alertness and associated brain-wave powers triggered by the activation of the sympathetic nervous system and its catabolic metabolic processes.
- (5) Recognizing the intention of Tantric practice as the simultaneous activation of the entire autonomic nervous systems scholars, practitioners and scientists ought to work together to explore the best methods for measuring and assessing the indicators of such practice.
- (6) Toward this end, I would encourage an open-mindedness to the claims of Tantric texts regarding the yogic powers that arise from advanced Tantric practice.

With regard to the sixth and final conclusion, I end with reference to the work of Timalina [24] and Hayes [25] who have both published recently on the merits of evaluating tantric texts for their metaphorical resonances. Their work can be seen in part as a corrective to the literalist interpretation of David Gordon White who asks to accept at face value such Tantric claims as the ability to fly [26]. Adopting a more middle ground between a literalist and symbolic interpretation of Tantric texts, Hayes and Timalina argue that metaphors are capable of generating a kind of alchemical hermeneutics that comes only when certain signifiers are combined with certain signifieds, thereby creating new concoctions of meaning that direct our understanding toward a refined understanding that may exist unperceived with and beyond a literalist reading. It may be that Tantric references to flight and other extraordinary powers are rather coded references to the neurology of the subtle body. After all, it is most certainly the case that none of us contain literal rivers (*nāḍīs*) and wheels (*cakras*) within us. So, let us then ask ourselves what is the metaphorical reference of the practice and language of Tantric practice? What is the signified indicated by and through Tantric texts? It seems to me that without a doubt the referent of Tantric practice is our neurological system. Understanding that Tantric texts seek to describe, mimic and harness the activities of our neurological system we can better attune our protocols to measuring the effects of Tantric practice on our neurology.

Doing so, let us not put entirely aside the claims of the texts themselves as to what can be achieved through Tantric practice. Perhaps it is going too far to accept Tantric claims for such

abilities as flight or the ability to read minds or kill people merely by wishing them dead. But, then, who would have believed that a man could turn water into wine, walk on water or rise from the dead if they had not seen such events with his or her own eyes? And is it not the case that the reason only a few saw these extraordinary events is that the eyes of the spirit must be cleansed if one is to perceive the mysteries of the heart?

This is all to say that before we can determine in any serious way what is literal and what is symbolic in the claims of Tantric texts we will have to better understand what it is that Tantric practitioners seek to do through their practices. Listening carefully to those who have mastered Tantric practice we can perhaps better structure protocols that may shed light not only on the purpose of Tantra but also on the potential of human neurology in general. My hope is that these protocols would provide a means by which we could develop both secular and tradition-specific protocols for the practice of synesthetic meditation techniques designed to heighten cognitive abilities through a coordinated activation and integration of sympathetic/anabolic and parasympathetic/catabolic autonomic nervous system functions. Such work might offer an exciting contribution to the growing number of scientifically-informed comparative studies on the nature of religious and spiritual experiences [27].

### Conflict of interests

The author declares no conflict of interest.

### References

1. Benson H, Malhotra MS, Goldman RF, Jacobs GD, Hopkins PJ. “Three case reports of the metabolic and electroencephalographic changes during advanced Buddhist meditation techniques.” *Behavioral Medicine* 16 (1990): 90–95. doi: 10.1080/08964289.1990.9934596.
2. White, David Gordon. *Sinister Yogis*. Chicago: University of Chicago, 2011.
3. Sanderson, Alexis. “Śaivism and the Tantric Traditions” In *The World’s Religions*. Ed. S. Sutherland et. al. London: Routledge and Kegan Paul, 1988, pp. 660-704.
4. Forman, Robert K.C. Forman. *Mysticism, Mind, Consciousness*. Albany: State University of New York, 1999.
5. Brefczynski-Lewis JA, Lutz A., Schaefer H.S., Levinson D.B., Davidson R.J. “Neural correlates of attentional expertise in long-term meditation practitioners.” *Proceeding from the National Academy of Science USA* 104 (2007): 11483–11488. doi: 10.1073/pnas.0606552104 (Accessed on 14, October, 2015).

6. Lutz A., Greischar LL, Rawlings NB, Ricard M, & Davidson RJ. “Long-term meditators self-induce high-amplitude gamma synchrony during mental practice.” *Proceedings from the National Academy of Science*. USA 101 (2004): 16369–16373. doi: 10.1073/pnas.0407401101.
7. Amihai, Ido and Maria Kozhevnikov (2014). “Arousal vs. Relaxation: A Comparison of the Neurophysiological and Cognitive Correlates of Vajrayāna and Theravada Meditative Practices.” *PLOS One*. DOI: 10.1371/journal.pone.0102990 (Accessed on 15, October 2014).
8. Corby JC, Roth WT, Zarcone VP Jr., & Kopell BS (1978) “Psychophysiological correlates of the practice of tantric yoga meditation.” *Archives of General Psychiatry* 35: 571–577. Doi: 10.1001/archpsyc.1978.01770290053005 (Accessed on 10, November 2014).
9. Csíkszentmihályi, Mihály. *Flow: The Psychology of Optimal Experience*, New York: Harper & Row, 1990.
10. Hefferon, K. H., and Ollis, S. “An interpretive phenomenological analysis of flow experiences in professional dancers.” *Research in Dance Education*, 7(2), (2006): 141-159.
11. Timalsina, Sthaneshwar. “Terrifying Beauty: Interplay of the Sanskritic and Vernacular Rituals of *Siddhilakṣmī*.” *International Journal of Hindu Studies* (2006) 10: 59-73.
12. Lidke, Jeffrey S. “The Resounding Field of Visualised Self-Awareness: The Generation of Synesthetic Consciousness in the Śrī Yantra Rituals of Nityāśoḍaśikārṇava Tantra.” *The Oxford Journal of Hindu Studies* (2011), doi:10.1093/jhs/hir035.
13. Herbert, Benson. *The relaxation response*. New York, U.S.A.: HyperCollins, 1975.
14. Lidke, Jeffrey S. “Quintessence of the Highest Purpose: A Translation, Introduction and Analysis of Śrī Abhinavagupta’s *Paramārthasāra*.” In *Journal of Indian Research*, Vol. 1, Number 4 (October: December 2013): 1-24.
15. Ramachandran, V. S., Hubbard, E. M., 2001. “Synesthesia: A Window into perception Thought and language.” *Journal of Consciousness Studies* 8 (2001): 3–34.
16. Sacks, Oliver. *Musicophilia*. New York: Random House, 2008
17. Baron-Cohen, S., Harrison, J. E. (eds). *Synesthesia: Classic and Contemporary Readings*. Cambridge, Mass: Blackwell, 1997.
18. Lidke, Jeffrey S. “The Resounding Field of Visualised Self-Awareness: The Generation of Synesthetic Consciousness in the Sri Yantra Rituals of Nityāśoḍaśikārṇava Tantra.” *The Oxford Journal of Hindu Studies* (2011); doi:10.1093/jhs/hir035.
19. Lidke, Jeffrey, S. *The Goddess within and Beyond the Three Cities: Śākta Tantra and the Paradox of Power in Nepāla-Manḍala*. Delhi: D. K. Printworld, 2016.
20. Skora, Kerry. M. “The Hermeneutics of Touch: Uncovering Abhinavagupta’s Tactile Terrain.” *Method and Theory in the Study of Religion* 20 no. 4 (2009): 87–106.
21. Sanderson, Alexis. “The Visualisation of the Deities of the Trika.” In André Padoux (ed.), *L’image divine: Culet et méditation dans l’hindouisme*. Paris: Editions du CNRS, 1990.

22. Cytowic, R. E. *Wednesday is Indigo Blue: Discovering the Brain of Synesthesia*. Cambridge: MIT Press, 2009.
23. Chara, P. J. J., Gillett, J. N. “Sensory Images of God: Divine Synesthesia?” *Journal of Psychology and Christianity* 23 (2009): 234–40.
24. Timalsina, Sthaneshwar. *Tantric Visual Culture: A Cognitive Approach*. Routledge Studies in Tantric Traditions. Routledge, 2015.
25. Hayes, Glen Alexander. “Possible Selves, Body Schemas, and *Sādhana*: Using Cognitive Science and Neuroscience in the Study of Medieval Vaiṣṇava Sahajiyā Hindu Tantric Texts.” *Religions* 5 (2014): 684–699; doi:10.3390/rel5030684.
26. White, David Gordon. *Kiss of the Yoginī: “Tantric Sex” in its South Asian Contexts*. Chicago: University of Chicago Press, 2003.
27. Wildman, Wesley. 2011. *Religious and Spiritual Experiences*. Cambridge: Cambridge University Press.