रससाङ्ख्य

Rasa- Sāṅkhya -

Connecting Rasa to Neuroscience

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1. **Introduction**

This paper attempts to develop a conceptual model of the cosmology of emotion using the findings from the Sanskrit literature, and supports it with the latest findings from modern neuroscience. Our analysis of emotion is founded on the literature on *rasa,* in Sanskrit supplemented with the ideas from the Sāṅkhya philosophical system. We examine the origin and continuity of emotion in the human body based on scientific findings, and compare them with the phenomenology of *rasa* as described in Bharata's Nāṭyaśāstra. We agree with the Sāṅkhya theory of diversity and conclude that emotion is a custom state for an individual affected by an external stimulus, or triggered through memory recall.

As used in literature, *rasa* as a concept has two aspects in its use in literature: it is a custom signature for each object in the universe, akin to an "essence", and it is also a classifier of our sense perceptions denoting a mental state. We propose that both these aspects merge in a phenomenological sense, since the signature of an object is only a perception by an observer. We argue that in the universe, *rasa* is a product that is perceived via the interaction between two objects. Such interactions can have infinite variations, because of the unique nature of the objects as hypothesized through Sāṅkhya cosmology. We accept the distinctiveness of the objects as observed in nature. Interactions between the objects can cause an infinite variety of perceptions in the event space. These perceptions can affect the physical body through a memory recall, which leads to a manifestation of emotion. We refer to this cosmological model as Rasa-Sāṅkhya.

Note that there is a fundamental difference between the ways in which human emotion has been treated in the Sāṅkhya literature and in Western analysis. In the West, emotion is a reaction of an individual to a stimulus (which may be external, mental or physical), propelled

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by an instinct for self-preservation. In Sāṅkhya, emotion is a built-in biological condition that manifests as *duḥkha* "दुःख" (grief) (1: Ishvarakrishna). Because of the instinct of self-preservation, Western analysis of emotion associates a physiological effect in the brain as a manifestation of emotion. But from this point of view, the Sāṅkhya *duḥkha* is not equivalent to "emotion". In Sāṅkhya, *duḥkha* is a mental condition that, if not healed, may affect the body. We propose that the manifestation of this *duḥkha* in the body is perceived as *rasa*.

rasa (as presented in Sanskrit literature) can be compared to the "attributes" or properties of objects, as advocated by Spinoza in creating a cosmology of life in the universe (2: Spinoza). Taking the Sāṅkhya point of view, we claim that a property is only a local perception by an observer, a manifestation rather than the nature of the object. The same object can be viewed differently by different observers, who make different inferences. We refer to the resulting configuration as *rasa*. A *rasa* is manifest in an object by virtue of its interaction with another object, but may reside and be maintained in the receiver even after the interaction is switched off. A *rasa* manifestation can also arise through memory recall.

Note that the aesthetics in Nāṭyaśāstra (3: Bharata), and the analysis of visual aesthetics by Kant (4: Kukla, R.) and others, categorize human emotions into distinct classes such as happiness, sorrow, fear, anger etc. Nature has objects and scenes which evoke emotions in the human psyche, and emotional stimuli can also be created by art, music, speech and drama. We argue here that the quantitative effect of these stimuli in us is not generic, but rather is a function of our Sāṅkhya personality. The effect is a transient partnership. Below, we draw on the neurological reports that such effects create "imprints" in the brain that make us vulnerable to the influence of an etched-in recall emotion.

2. *rasa* in Sanskrit Literature

2.1 *rasa* as a Chemical Concept

In Sanskrit literature, the concept of *rasa* is used in at least in four distinct ways. Perhaps the oldest use of *rasa* is to connote *"*taste"*,* an intense sensory mediated via the tongue and mouth and has an absorbing effect on the body रसनेन्द्रियग्राह्यवस्तु (5: śabdakalpadrumaḥ). Unlike other senses, the sense of "taste" is invasive, it is internal in production. The resultant biochemical product spreads rapidly in the body. The sensory reception is rapid and the sensation affects our mental state immediately. In the *Ayurveda* literature (5: Rath, Panja, Nagar, Shinde, 2014), the perception of *taste* perception is categorized in six types: sweet, sour, salty, pungent, bitter and astringent. In contrast, modern neuroscience separates five pure *taste* receptors, from the somatosensory receptors that sense spiciness, temperature, fattiness

etc. Astringency is considered a somatosensory perception. *rasa* in this context is the detection of the contents of a substance before we ingest it through the mouth.

As taste, *rasa*, is the local detection of the biochemical constituent of the substance, determined by the receptors scattered over the surface of the tongue. This is accomplished by a reaction between the substance and the proteins in the saliva and is detected by the taste receptors. Taste reception can be distinguished from other types of sensory receptions on the basis of its quality. While tastes are detected as distinct (like sweet, sour etc.), through immediate local processing, object categorization is evaluated through memory functions. The taste attributes are human body functions and are most likely universal. We may reject a substance after tasting it, depending on our own psychophysical and cultural constitution.

2.2 *rasa* as a Substance

The second use of the word *rasa* refers to "juice". We get "juice" by squeezing or deep pressing an organic substance like the fruits and flowers of trees. The "juice" thus obtained carries the signature of the substance. In order to obtain "juice" we separate the pulp. The "juice" is the substance of the fruit. Such *rasa* carries the color, potency and taste of the substance. The "substance" itself is determined when we examine the "juice" through receptors in the mouth. The proper detection of the substance is achieved through freshly squeezed juice. The health benefits of consuming a fruit are linked with the intake of its freshly squeezed juice. This leads to the *Ayurveda* use of *rasa* as a medicinal use, in which *rasa* refers to particular chemical component that, when ingested, has therapeutic effect. रसायत्त आहार इति तस्मिंश्च प्राणाः (7: Sushruta quoted from śabdakalpadrumaḥ).

2.3 *rasa* in *the Upaniṣad* Literature

Hemachandra in Nirukti declared सदैव सकलं देहं रसतीति रसः स्मृतः (8: Hemachandra quoted from śabdakalpadrumaḥ). The physician Suśruta used the word *rasa* as a composite body aura that can be used for diagnoses and for the treatment of illnesses. Defining body chemistry on the basis of the empirical formulation of *guṇa*, Suśruta enunciated that a healthy body has *rasa* in balance. He examined various external features and, created techniques to determine a patient's body composition in terms of *rasa*. He proposed that the body can be healed by balancing its *rasa*. While elaborate body chemistry was developed based on *rasa*, it was understood that healing is achieved by balancing the composite active ingredient. In this sense, *rasa* became a concept. It meant that the patient had a disorder presented by a symptom of *rasa,* which had a treatment plan through a *rasa*, obtained from Nature. Sunlight and water can also act as *rasa* to help build *rasa* in the body.

In the context of the *Upaniṣad, rasa* is a word used to signify the active ingredient in any substance. It creates the signature of the substance (9: Parasuraman, Thing, Dhanaraj, 2014). This is where we connect *rasa* to Spinoza's attributes. Since objects are infinite, the dimension of *rasa* is also infinite. Though a conceptual quantity, it is existential because it helps us experience an object. We can go further from Spinoza to the Vedic literature to state that all actions have their own *rasa* (10: Taittiriya Upanishad), रसो वै सः, where *rasa* qualifies an action. The *rasa* would be in the effect of the action on an object as experienced by the object through its *guṇa*. Such *rasa* can be classified into groups as perceptually understood, but that could be a human limitation. Each person might find different reception from similar action. Such is the play of *rasa*. SriKrishna declared in the *Bhagavadgita*: रसोऽहमप्सु "I am the *rasa* in water!" (11: Bhagavadgita)

2.4 *Rasa* in Nāṭyaśāstra

In analyzing the dramatic arts in his Nāṭyaśāstra, Bharata used *rasa* as a psychological condition. He theorized that the human body is endowed with *bhāva*, which connects the mind through *rasa*. He defines *rasa* as a latent condition that prevails in the body, and is supported by *bhāva*. Through audiovisual effects, *rasa* can be triggered as a sensory stimulus which can activate the *bhāva*. Depending on the nature and duration of the stimulus, a single *bhāva* or a combination of *bhāva'*s can be activated. Our *bhāva* is rooted in the latent *rasa* in us, such that activation of *bhāva* manifests the *rasa,* which in turn can reinforce *bhāva* in the body making us immersed in *rasa.* For technical purposes, Bharata recognized eight types of *rasa* and suggested that the physical manifestation of *bhāva* can be classified in ten types (which he labeled as *sthāyī bhāva).* From the empirical reasoning of drama, he proceeded to suggest various settings that act as stimuli for *rasa* and can be used in a drama experience. (12: NāṭŚ)

By observing and possibly experimenting with human objects, Bharata enunciated that besides the *sthāyī bhāva* (longer duration mood state) as stated above, there could be many transients which manifest and decay in the process of the influence of the stimulus. He called these as *byabhicārī bhāva*. *sthāyī bhāva* varieties are detectible in all living objects in different degrees. We can intensely simulate them in drama through concentration and voice control. The important point to note is that the *bhāva* is a memory event while *rasa* is a mental event. *bhāva* is rooted in the body and is triggered by the *rasa* which is externally stimulated or created through recollection causing memory events योऽर्थो हृदयसंबादी तस्य भावो रसोद्भवः (13: NāṭŚ)

3. Spinoza's *Attributes* and Rasa

While Spinoza would consider (14: Spinoza) that the attributes are due to an infinite God, we postulate that the "essence" *rasa* is a local manifestation and is subjective in nature. Attributes are perceived through interaction and hence are not independent. We agree with the Sāṅkhya speculation that the mind and body are interdependent. As we empirically assess, mind is a synthesizer of the physical sensory inputs and also acts as a sensor of memory recollection. We agree with Spinoza's analysis that the "true" attribute of an object is "divine" in nature, and not fully comprehensible by human sense perception. Sāṅkhya enunciates that all perception is necessarily biased because of individual nature गुणपरिणामभेदान्नानात्वमवस्थावत् (15: sā. kā). The causes of bias in human sensing have to be searched in gene mapping and hereditary evolution, which is beyond the scope of the present paper.

The important point to note is that Spinoza accepts the infinite attributes required to create a cosmology of the universe. We wish to present that all such attributes are indeed *rasa* and are transient in nature. It is possible that a class of flowers may appear to have the similar smell to a human sensor, but we assert that there exist conceptual variations that we are unable to measure through our gross sensing tools. We would need the purity of "God" where the sensing mechanism can detect the absolute attribute. That leads to the incomprehensible "God" and the incomprehensibility of the attributes in the universe.

4. Model Set up

4.1 Sāṅkhya Cosmology

Sāṅkhya makes the important observation that although all beings are bound by life and death, they display different personalities while they living. Such differences might not be perceptible in infancy, but different aptitudes, interests and hobbies develop gradually. Sāṅkhya theorizes that such diversity is a part of our constitution, which is assumed to be composed of *guṇa,* a term that refers to qualitative measurement of personality. Sāṅkhya comprises three *guṇa'*s: *sattva*, *rajas* and *tamas.* These are assumed parameters with arbitrary magnitudes that can combine to create a personality. The scale is discrete, and but it can map all. *sattva* characterizes our wisdom, *rajas* characterizes our aggressiveness, and *tamas* characterizes our ignorance. Although there is no quantitative reason why these three attributes are selected, we can consider them to be the most discernible of the attributes displayed by the humans. Sāṅkhya is a pure scheme of classification where our personalities can be understood. We will use it as a basis for building a theory of *rasa* as a psychological manifestation.

Sāṅkhya is built as a theory of *duḥkha*, or human grief. Logically constructed, Sāṅkhya hypothesizes that the human condition comprise of two elements – (i) an inert but intelligent *puruṣa* and (ii) an active but ignorant *prakṛti*. *puruṣa* is an inner cognitive element that is ever awake and creates desires for activities in humans. *prakṛti* makes the activities happen, but in a biased manner. A basic thesis of Sāṅkhya is that human attitude is built on individual bias, which resides in us both physiologically and psychologically.

While Sāṅkhya's enunciation of the *guṇa* triad might appear to be arbitrary, it nonetheless allows for an infinite variety of attributes, as conceived by Spinoza. However unlike Spinoza, Sāṅkhya declares that the attributes are local and subjective. In Sāṅkhya theory, attributes disappear when we become utterly objective. In our set up, each attribute can create *rasa* by interacting with the attribute of another object. The attribute itself is inert, but its interaction by another object animates it, thereby creating *rasa*. *rasa* is local. Unlike Spinoza's God, the Sāṅkhya God has no attribute, neither does it experience an attribute. Absolute neutrality is experienced as joy, which is a realization than an experience. Every object in its own form is inert and joyful.

4.2 Classification of Emotion

Unlike the perceptual identification of *rasa* as an internal manifestation, the western observers detect emotion reading the facial impressions. The following set of six principal emotions based on facial muscle distortions are reported to be universal: anger, disgust, fear, happiness, sadness and wonder (16: Turner, 2000). Bharata had two more: valor and love. Bharata goes into the detail about how each emotion would manifest itself in physical features and how the emotion can be displayed in a dramatic production. We do not know the research on which Bharata's observations are based; the prescription is declarative. For the purposes of this discussion, we equate the terminology of Bharata's *rasa* to the western notion of "emotion."

Bharata created the system of Indian visual arts based on emotional impact due to *rasa.* He observed that emotional impact on a person acts like a trance affecting the entire body. He declared that all parts in the body from the head to toe participate in the manifestation of *rasa* शिरोहस्तकटीवक्षः पार्श्वपादसमन्वितः। अङ्गप्रत्यङ्गसंयुक्तः षडङ्गो नाट्यसंग्रहः॥ (17: NāṭŚ). For dramatic presentation he documented the effect of each *rasa* on the body parts like the eyes, neck, hands, fingers, torso, waist, legs, ankles and toes. The important part to note is that the emotional impact of *rasa* has an internal neurological effect that is expressed externally through the muscles in the face and in the body. The impact of emotion on the whole body has not yet been studied in the laboratory.

4.3 The Problem

In the discussion above, we do not have an understanding how and why an emotion develops in an individual. Bharata's work deals with the simulation of dramatic presentation, and facial expression is driven by external stimuli, the problem is to understand how emotion develops in the human body. We have a two-prong problem:

(i) Agreeing with Sāṅkhya –like cosmology, we observe that the response to a stimulus cannot be generalized as being universal. People have different tastes; they exhibit different likes and dislikes, and have varying response to a stimulus. A stimulus has a custom reception in each individual. The theory should be able to explain this.
(ii) Individuals possess different thresholds to emotion excitation, when triggered by a stimulus. The process is subjective and personal, suggesting that the body's response to emotion stimuli is uneven; different emotions need different thresholds for body excitation. We have to find an explanation.

5. Our Model

5.1 The Basics: *bhāva* and *rasa*

Bharata enunciated that *bhāva* and *rasa* are inter-related. *bhāva* is a bodily function and *rasa* is a psychological function. *bhāva* is built-in, and remains latent. It comes into life through *rasa*. यथा बीजाद्भवेद्वृक्षो वृक्षात्पुष्पं फलं यथा। तथा मूलं रसाः सर्वे तेभ्यो भावा व्यवस्थिताः॥ Like the tree results from a seed, and the flower and fruit from a tree, similarly *rasa* is at the root of everything, creating the foundation for *bhāva.* (18: NāṭŚ, 6.38, ibid) The example of blossoms on the tree in the Spring is given as a metaphorical notation how *rasa* activates *bhāva*. *rasa* is the Spring, *bhāva* is the sap in the tree. *Rasa* itself has a psychological trigger, through an external stimulus, which can be orchestrated. In Bharata's terminology, *bhāva* helps to enhance *rasa* by reinforcing it. *Rasa* and *bhāva* form a duet, with *bhāva* immersed in *rasa*. The entire environment can augment *bhāva* to help enhance a *rasa*. Once created, *rasa* affects the individual by interacting with *bhāva*.

bhāva creates the base for the *rasa* to manifest. The question is how such a base comes in to existence in the first place. *bhāva* by definition is organic and biological, but how is it customized in individuals to create different bases? We speculate that *bhāva* in us through our memories as we accumulate experiences. We do deduce from our experience that an external stimulus can affect us through memory, by letting us recall a past experience. The effect of the stimulus on us is strong if such earlier experiences have made a deep impression in our

memory. Recent research shows that the memory gets partitioned into different experience structures in creating neural imprints; we speculate that these structures act as the basis of *bhāva*.

5.2 **Our Hypothesis**

5.2.1 We propose that *bhāva* in humans resides in the brain and is accessible to recall memory promptly. *bhāva* can be thought of as channels, many of which could be resident in the brain. In principle, the number of channels can be infinite since the brain capacity to accept stimuli can be infinite. This would mean that each visible emotion could be based on myriads of auxiliary emotions that might be elicited by a stimulus. A report on the infiniteness of the brain's capacity has been recently published (19: Alme, Miao, Jezek, Treves, Moser, Moser, 2014)

5.2.2 Certain of these infinite channels get reinforced because of our genetic aptitude for being influenced by certain types of experiences. We agree with Sāṅkhya, that each individual is predisposed to a set of interests and records a custom set of experiences in memory.

5.2.3 All external events are stimuli that lead to our experiences. A stimulus may be a single object or a group of objects in the environment. The environment itself including space, air or/and water can also act as a stimulus. We propose that all objects are "possessed" with and "emit" infinite channels of *rasa*-stimulus, the spectrum of these channels is dominated by pre-disposed characteristic channels. The chemistry and physics of pre-disposition is a matter of evolutionary development, which we need not analyze.

5.2.4 Each individual is a receptor for *rasa*-stimulus. *rasa* manifests when the individual is affected by it through sensory immersion. *rasa* that would affect the individual depends on the dominant *bhāva* that the individual might have cultivated, which in turn is a function of predisposition (mentioned in 5.2.3) and the associated memory.

The hypothesis is schematized in the sketch below (Figure 1).

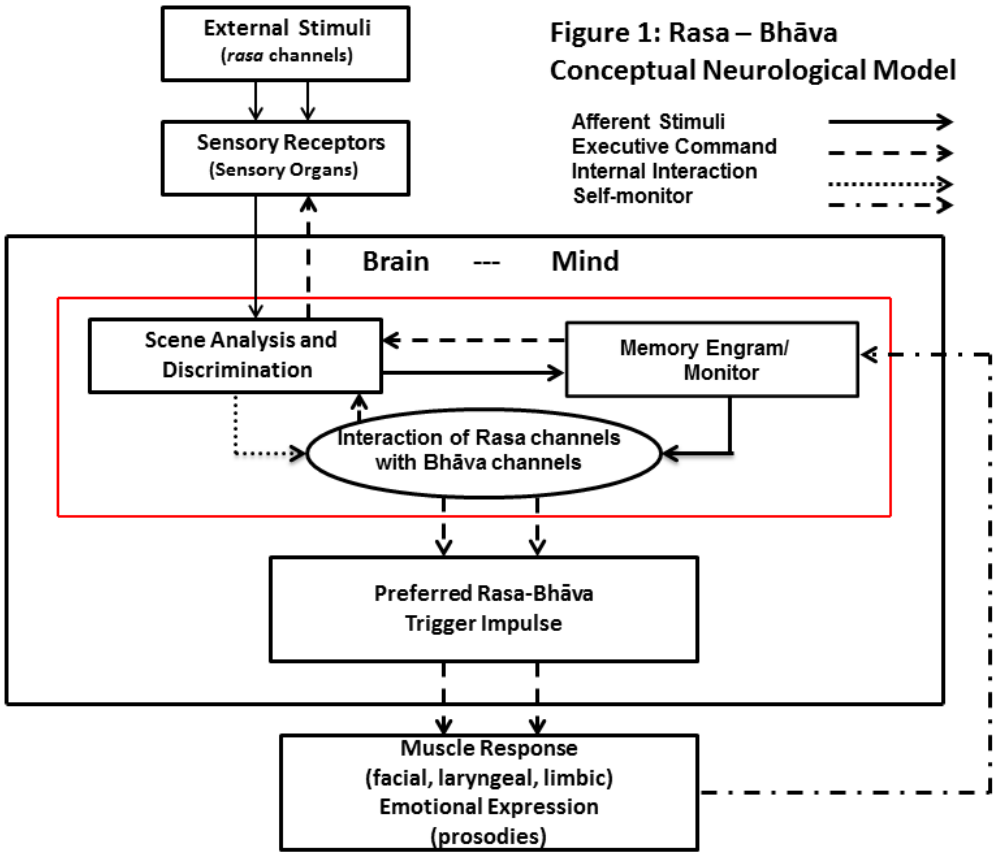


Figure 1: Rasa – Bhāva Conceptual Neurological Model

6. Bhāva and Memory

6.1 Neural Imprints in Memory

The psychological impact of emotion on memory has been studied in the context of memory "engrams", or traces in memory that correspond to the emotion. Such memory traces have lately been identified in the amygdala of mice (20: Reijmers, Perkins, Matsuo, Mayford, 2007). A memory trace of an emotion such as fear involves a set of neurons in the lateral amygdala that express high level of the transmission factor CREB (21: Kim, TaeKwon, Kim and Jin-HeeHan, 2013).

Activation of these neurons leads to a recall of the fear memory. However, it is not known whether similar activation of other groups of neurons is involved in memory traces for additional emotions. Experiments have not yet been conducted to check if similar neuronal excitation occurs on the impact of other emotions. But since fMRI studies indicate that specific sites in the brain are activated in response to emotion, we suggest that distinct set of neurons may mediate the expression of particular emotions. This would need to be confirmed with further experimental work.

We consider the memory trace as the imprint of *bhāva* as speculated in classical Indian literature. *bhāva* develops through emotional impact and becomes a characteristic of the individual by the teen age years. It is possible that the development is through the impact of different stimuli to the brain as the individual memory might respond. In principle, the brain constantly interacts with stimuli all the time, but the responses to some selective stimuli manifest themselves as traces for the individuals. Taking the cue from Sāṅkhya, we suggest that not all memory traces have the same quantitative effect; but the reverse effect of creating psychological impact by the reactivation of the memory need not be associated with the intensity of the trace**.** Figure 2 shows a sketch of the memory imprint as described in the experimental literature.

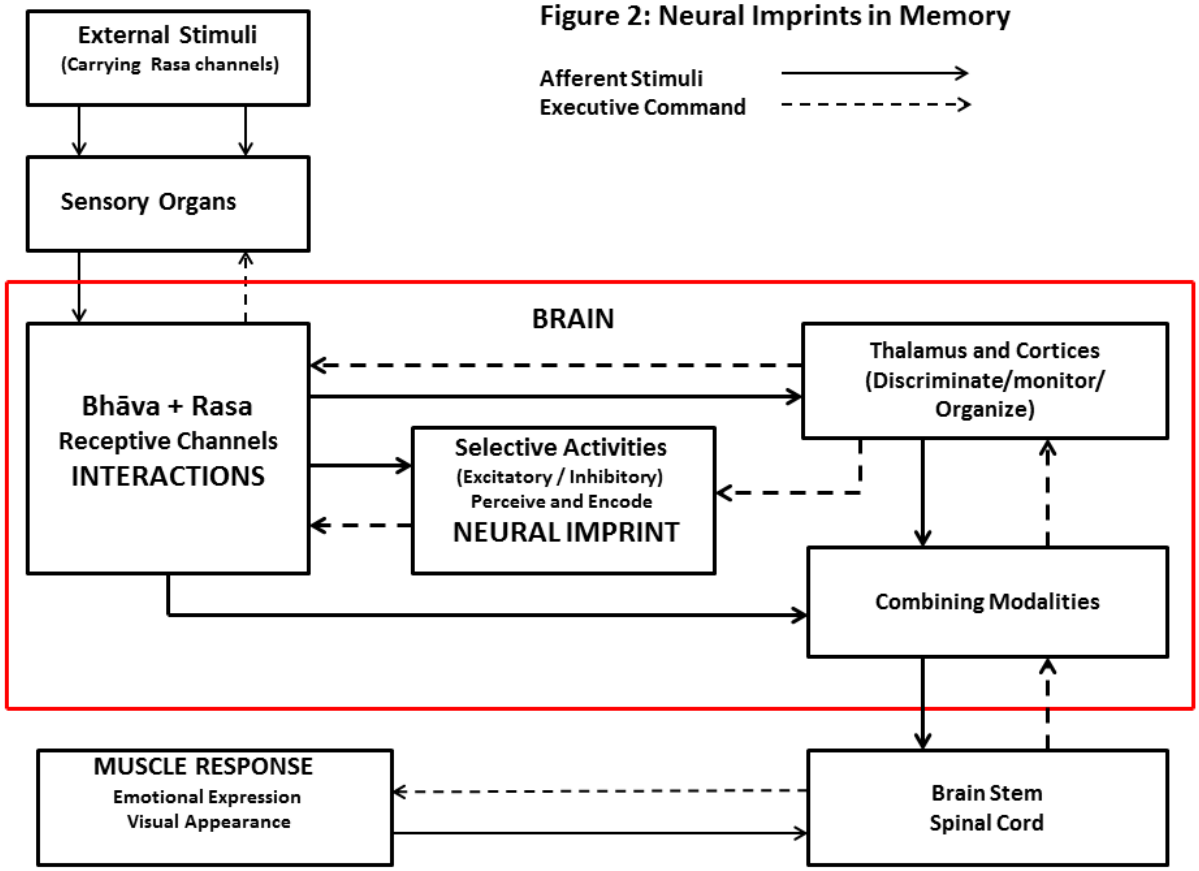


Figure 2: Neural Imprints in Memory

6.2 Recall and Activation of the Imprints

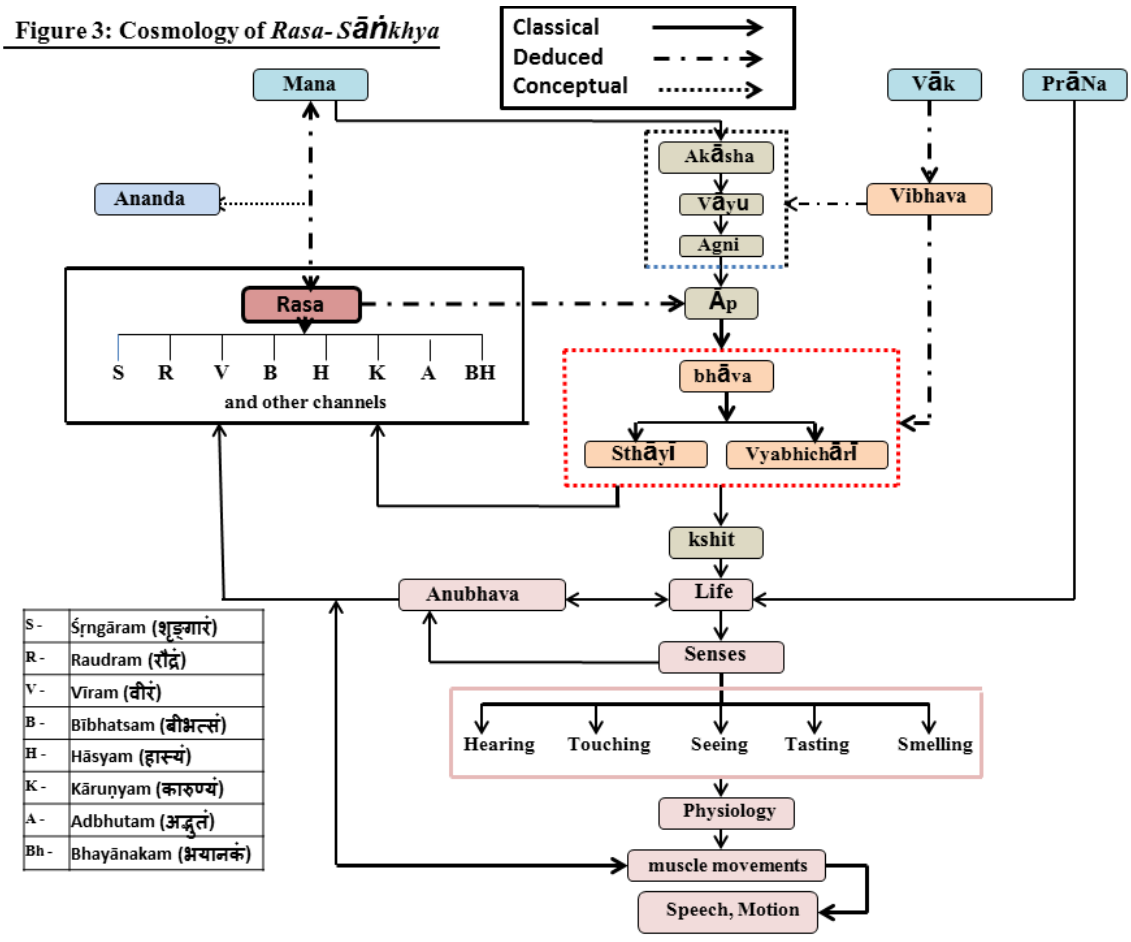
An interesting observation has been made in experiments on memory recall. For example, within the context of fear elicited by a sound, Zhou et al. report that recalling a memory does not require that the same sound intensity that created the original imprint (22: Zhou, Won,

Karlsson, Zhou, Rogerson, Balaji, 2009). This leads to the conclusion that once a trace is created, it has a permanent effect in the brain. The amplitude threshold during recall is much lower than that during the initial trace. Further studies were done to check the effect of the stimulus after the ablation of CREB neurons. The interesting result was that the ablation did not impede the impact of the stimulus. This would mean the trace has a deeper impact on the amygdala that the neurons may indicate. CREB neurons simply act as a marker to the change. (23: Kim, Jeong-TaeKwon, Kim and Jin-HeeHan, 2013)

7. Cosmology of Rasa

7.1 Rasa- Sāṅkhya

Figure 3: Cosmology of *Rasa- Sāṅkhya*



The above discussion shows that properties, essence, attributes or *prakṛti* of a being, thing or phenomenon are revealed in interactions with an object or a being. Heidegger calls it revealing an aspect of Being, while concealing many aspects due to our "facticity" (24: Heidegger), which can only have a limited unconcealment of Being. A thing in itself becomes a thing for us in this interaction, and gives rise to *ānanda*; it is present in an inert and potential state in us at all times and is a condition of facticity of "being". According to Gadamer, it is our

effected consciousness that becomes animated and an actuality due to interaction (25: Gadamer, 1975). Neuroscientists have found out that Anandamide, or the bliss molecule, may be responsible for this state (26: Anandamide).

Figure 3 shows a composite sketch of our view of the cosmology of *rasa.* Rasa sits latent in the mind, and is activated through sensory stimuli. It helps to create *bhāva,* which in turn creates the objects in the universe. *Bhāva* reinforces *rasa* and manifests as speech.

7.2 Metaphysical Extensions

We have described in some detail the ideas of Spinoza and Sāṅkhya, however this interaction has also been described in many ways in different traditions: for example, as a state in which all attributes disappear; in which subject-object-duality disappears; or which transcends all things including language and shows the limits of language. One becomes one with everything. It is a singularity. It is No-Thing; It just is. Buddhists describe it as *tathatā* or *śūnyatā*-such ness or emptiness (27: Buddha-Tathata or Suchness). It is also called absolute purity of heart leading to union with the Absolute in which all qualities, time and space vanish. Gnostics, Christian Mystics and Kabala describe it as the union with God. Kierkegaard refers to it as 'to will one thing' and that one thing is actually No Thing but God, the Absolute or Being (28: Kierkegaard, 2009). It has also been referred to as being engulfed in being.

Once this state has been triggered, one can live in it without an additional trigger or stimulus by recollection, or one experiences it and becomes enlightened:-as Buddha claimed "*saṁsāra* is *nirvāṇa"* (29: Nagarjuna). Nanak refers to this union as सबदि अनंद करे सद केला ॥ Sabaḏi anand kare saḏ kelā. (Punjabi) (30: Guru Granth Sahib). The Sufis call it state of *fanā* (Arabic) (31: Ṣūfism - Fana), in which the drop of water merges with ocean, which can be recalled and reproduced with intentionality of the subject.

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References:

1. Ishvarakrishna, 7th century AD, **साङ्ख्यकारिका**, commentary by Gaudapada, compiled by Ashutosh Vidyabhusan and Nityavodh Vidyaratna, Calcutta, 1926.

2. Alan Donagan, 1973, “Essence and the Distinction of Attributes in Spinoza's Metaphysics,” in Spinoza, a Collection of Critical Essays, ed. Marjorie Glicksman Grene, Anchor Books, Garden City, N.Y. Spinoza, Baruch, 1955 Works of Spinoza, unabridged Elwes translation, trans. R.H.M. Elwes, Dover Publications, NY

3. Nāṭyaśāstra by Bharata Muni (uncertain date), translated into English by a board of scholars, A Sataguru Publication, a division of India Book Centre. 1986

4. Kukla, R. (Ed.). (2006). Aesthetics and cognition in Kant’s critical philosophy. Cambridge: Cambridge University Press.

5. śabdakalpadrumaḥ, part IV, page 99

6. Rath, S. K., Panja, A. K., Nagar, L., & Shinde, A. (2014). the scientific basis of rasa (taste) of a substance as a tool to explore its pharmacological behavior. Ancient Science of Life, 33(4), 198–202. doi:10.4103/0257-7941.147419

7. śabdakalpadrumaḥ, part IV, page 100

8. śabdakalpadrumaḥ, Part IV, page 100

9. Subramani Parasuraman, Gan Siaw Thing, and Sokkalingam Arumugam Dhanaraj (2014, Units of Pharmacology, Faculty of Pharmacy, AIMST University, Bedong 08100, Kedah, Malaysia) Polyherbal formulation: Concept of ayurveda (Pharmacogn Rev. 2014 Jul-Dec; 8(16): 73–80.doi: 10.4103/0973-7847.134229;

10. Taittiriya Upanishad (TU 2.7.1),

11. Bhagavad-Gita (BhG. 7.8)

12. NāṭŚ 6.32; ibid.

13. NāṭŚ 7.7; ibid.

14. Spinoza; ibid.

15. Sāṅkhyakārikā, ibid., II.27

16. Turner, J. H., 2000, On the origins of human emotions: A sociological inquiry into the evolution of human affect. Stanford, CA: Stanford University Press.

17. NāṭŚ, 8.12, ibid.

18. NāṭŚ, 6.38, ibid

19. Alme Charlotte B., Chenglin Miao, Karel Jezek, Alessandro Treves, Edvard I. Moser, May-Britt Moser, 2014, Place cells in the hippocampus: Eleven maps for eleven rooms. Proceedings of the National Academy of Sciences, 8 December 2014

20. Leon G. Reijmers, Brian L. Perkins, Naoki Matsuo, Mark Mayford, 2007: Localization of a Stable Neural Correlate of Associative Memory, Science (317), 1230-1233

21. Jieun Kim, Jeong-TaeKwon, Hyung-Su Kim and Jin-HeeHan, 2013 - CREB and neuronal selection for memory trace, Laboratory of Neural Circuit and Behavior, Frontiers in Neural Circuits, 2013, Vol 7, Pages 1-7.

22. Yu Zhou, Jaejoon Won, Mikael Guzman Karlsson, Miou Zhou, Thomas Rogerson, Jayaprakash Balaji, 2009; CREB regulates excitability and the allocation of memory to subsets of neurons in the amygdale, Nature Neuroscience 12, 1438 – 1443.

23. Kim Jieun, Jeong-TaeKwon, Hyung-Su Kim and Jin-HeeHan, 2013 – ibid.

24. Heidegger Martin,1927 publication, Sein und Zeit (translated as Being and Time, Joan Stambaugh, State University of New York Press, 1996.

25. Gadamer, 1975: Truth and Method, Hans- Georg Gadamer,Bloomsbury, 1975

26. http://antoine.frostburg.edu/chem/senese/101/features/anandamide.shtml

27. http://buddhismnow.com/2014/11/21/tathata-or-suchness/

28. Kierkegaard, 2009: Purity of Heart is to Will One Thing, Soren Kierkegaard,Feather Trail Press, 2009

29. Mulamadhyamakakarika, Nagarjuna

30. Guru Granth Sahib, Mahala 1

31. http://www.britannica.com/EBchecked/topic/201463/fana