

Emotional Intelligence in Cows

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“The absence of a neocortex does not appear to preclude an organism from experiencing affective states. Convergent evidence indicates that non-human animals have the neuroanatomical, neurochemical, and neurophysiological substrates of conscious states along with the capacity to exhibit intentional behaviors. Consequently, the weight of evidence indicates that **humans are not unique in possessing the neurological substrates that generate consciousness**. Non-human animals, including all mammals and birds, and many other creatures, including octopuses† , also possess these neurological substrates.”

Vedanta: Degrees of consciousness in Biological Organisms

- *Acchadita Chetan*: Covered consciousness
 - Trees, creepers, grass, and other stonelike organisms. They have practically no explicit self-consciousness. Although they have rudimentary levels of cognizant activities due sixfold transformations.
- *Sankuchita Chetan*: Contracted consciousness
 - Birds, insects, fishes, reptiles, animals. Self – consciousness is still practically very little. But still they have some sense of self-identity and they react of hostility and engage in fights, display anger etc. But they cannot think about higher existence and religion. Monkeys display a very premitive scientific temper e.g. in their behaviour. They have a sense of consequence, gratefulness etc.
- Human stage:
 - *Mukulita Chetana, bikachita, and Purna-bikachita*
 - immoral, also moral atheists
 - Theists and practicing religion
 - Those full of realizations of spiritual concepts.

Vedantic views of Cows

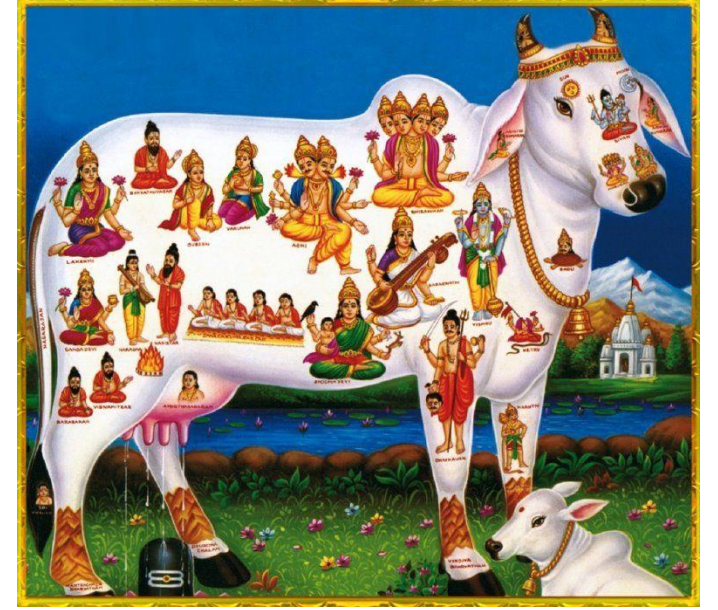
सा विश्वायूः सा विश्वकर्मा सा विश्वधायाः। (Shulka Yajurveda 1-4)

That **cow would augment the life span of the sages** involved in the sacrifices and the doer of the sacrifices. **Cow coordinates all the rituals of the sacrifices.** By providing offerings like milk, cow nourishes all the Gods of the sacrifices.

वशां देवा उपजीवन्ति वशां मनुष्या उप ।

वशेदं सर्वं भवतु यावतु सूर्यो विपश्यति ॥ (Atharvana Veda 10-10-34)

The Gods and men live on cow products. Till the Sun shines, the universe will have Cows. The whole universe depends on the support of cow.



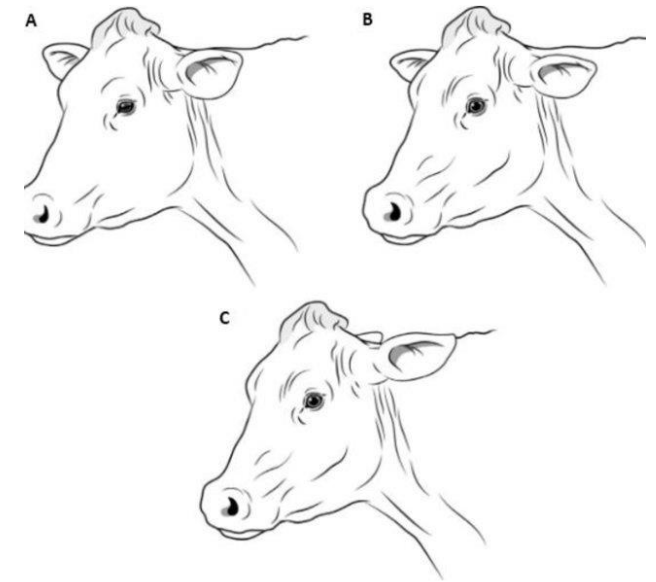
गावो बंधुर्मनुष्याणां मनुष्याबांधवा गवाम् ।

गौः यस्मिन् गृहेनास्ति तद्बंधुरहितं गृहम् ॥ (Padmapurana)

Cows are the abode of the Goddess of wealth. Sins don't touch them. There exists a fine relationship between man and cow. A home without a cow is like one without dear ones.

Sensory-Perceptual System in Cows

- Rely upon all five sense modalities. Vision is the most dominant sense.
- Good acuity in hearing superior to horses. **(Adamczyk et al., 2015).**
- Well-developed gustatory sense- Capability for the four primary taste. They are microsmatic: they have a keen sense of smell. **(Ginane, Baumont, & Favreau-Peigne, 2011).** Cows also have a complex complement of odiferous glands, including interdigital, infraorbital, inguinal and sebaceous glands. Olfaction plays a major role in their social life.
- Cows are also very sensitive to touch and have mechani-coreceptors, thermoreceptors, and nociceptors in the skin and muzzle.
- Interestingly, while cows are often fearful of touch by human, they are also calmed by some forms of tactile contact such as scratching behind the ears. (Boissy, 1998, Moran, 1993).



Changes in Facial Expressions in Cows

Learning and Cognition

- **Object discrimination**, discriminate more complex stimuli than just static geometric stimuli.
 - For instance, they are able to discriminate among individual humans on the basis of a number of dimensions such as handling.
 - Adult cows have the ability to learn to differentiate handlers who wear the same clothes. The cows learned to approach the handler conferring a reward more often than the non-rewarding handler.
- **Discriminating conspecifics**. The ability to discriminate among individuals forms the basis for social relationships, hierarchies, and reactions to familiar versus unfamiliar individuals.
 - Heifers can also learn to recognize individual cows even if, at the beginning of the testing, the individuals differed in familiarity. They can also discriminate members of their own species from members of other species. In just a few sessions, the cows are able to discriminate photographs of different kinds of cow faces from faces of other species.
 - Cows could categorize the “sameness” of all the other cow faces despite phenotypic variability as a separate group from the faces of other species.
 - Cows categorized the stimuli into familiar versus unfamiliar categories very early in the testing process and that the images were treated as mental representations of real individuals. Pictorially naïve heifers chose pictures of a familiar conspecific immediately upon entering the arena. This suggested to the authors that the heifers used previously stored mental images from actual social interactions as representations of real individuals. Additionally, the use of only photographs in the experiment suggests cows have a sophisticated visual discrimination capacity that is independent of chemosensory mechanisms.

Emotions

- Emotions comprise behavioral, neurophysiological, cognitive and conscious subjective processes and can shape attention, decision-making, and memory. (Mendl et. Al., 2004, 2005).



- Emotions, themselves, are influenced by such factors as situational awareness and sensitivities to the experience of others. Emotions and cognition are often intimately tied together in a complex interplay
 - (e.g., recollection of memories can generate strong emotions and, in turn, modulate one's response to various stimuli;
- The idea that many nonhuman animals experience basic emotions is currently well accepted. Many studies of emotions in other animals (non-mammals) refer instead to “affective state” or “core affect,” that is, terminology that differs from the human emotion literature. (Fraser, Weary, Pajor, & Milligan, 1997).

- Studies of emotions in cows, as in other animals, tend to focus on just two easily-identifiable dimensions, namely valence (positive/negative or pleasant/unpleasant) and intensity (weak/strong), which vary independently of each other.
- emotions have cognitive, behavioral, autonomic, and subjective components that correlate with each other
- The literature on emotions in cows and other farmed animals is substantial and confirms that they experience a wide range of emotions and that some of those responses are quite complex.
- Basic emotions are the building blocks of more complex and sophisticated abilities. They suggest the capacity for more sophisticated mental phenomena, such as empathy.

Some measures in studies on Cow Emotions

- Positive and negative emotional states.
 - fear responses, such as increased latency to enter, defecation, vocalizations, and escape attempts.
- Eye white percentage.
 - Indicators of emotional valence. When they can get food the % increases vs when they can't.



- Other measures: nasal temperatures, ear posture, heart rate.
- Play
 - Indicate positive and negative emotional states.

Play is related to curiosity and innovation and, therefore, forms the basis for complex object-related and social abilities (Bateson et. Al.,) It is also an expression of positive engagement with the environment and others. Cows engage in all forms of play found in mammals, including playing with objects such as balls, gamboling and running, and also social play with members of other species.

Complex emotions

- 1) emotional reactions to learning,
- 2) cognitive bias,
- 3) emotional contagion, and
- 4) social buffering.

These more complex emotional experiences suggest the possibility of sophisticated levels of psychological capacities in cows, such as self-awareness and empathy

Emotional reactions to learning

- cows express their internal subjective states. It has been argued that this kind of complex emotional experience rests upon some level of self-awareness such as self-referral or self-agency. (Hagen & Broom, 2004).
 - The authors speculated that the increased arousal in the experimental group was a direct result of the experimental animals' reaching a point of realizing their performance on the task improved, suggesting that they were emotionally reacting to a sense of self-efficacy in this situation. These findings have provocative implications for the question of self-awareness in cows

Cognitive bias,

- Negative judgment biases involve responding negatively to ambiguous stimuli after a negative emotional experience and positive judgment biases, likewise, involve the effects of positive emotional experiences on cognition.
- Very young Holstein calves exhibited a negative judgment bias for at least 22 hrs after hot-iron disbudding; the calves were less likely to approach ambiguous screen colors in two sessions after the procedure.
- In a study, calves were given rewards for approaching a white screen and were placed in a time-out for approaching a red screen. The results suggested that, much like humans, when cows are distressed, they exhibit a relatively more negative response bias towards ambiguous stimuli (Daros et al., 2014).



Emotional Contagion

Emotions tend to influence more than one individual in a group. Moreover, they can be shared through a process known as emotional contagion, the arousal of emotion in one individual upon witnessing the same emotion in another individual (Hatfield, Cacioppo, & Rapson, 1993).



It provides a way for social animals to communicate about important circumstances that may affect the whole group and respond accordingly. A series of studies on a form of emotional contagion mediated by olfactory cues has shown that when cows are exposed to stressed conspecifics they too show pronounced stress responses, such as decreased feeding and increased cortisol release. These responses were partly mediated by olfactory cues in the urine (Boissy et al., 1998).

Social Buffering

Social buffering refers to the fact that many social animals tend to react less intensively to negative stresses when they are in the presence of conspecifics. Social mammals, likewise, find it very stressful to be socially isolated.

Sato (1994) found that weaned calves that were licked more by other cows gained more weight and hypothesized that social licking leads to psychological stability in cows. Paired housing, as opposed to single housing, enhanced the ability of pregnant heifers to deal with the stress of being switched to a novel diet. None of these findings are unexpected given the highly social nature of cows.

Mother-calf emotional bonds

- A large body of research has confirmed that mother cows and calves experience strong emotional bonds that form rapidly following birth and that the natural weaning process may take many months (von Keyserlingk & Weary, 2007). Mother-calf bonding is partly dependent upon the ability of the mother to be able to lick the calf for several hours after birth (Hudson, et. Al. D'Hour, et. Al., 1989).
- Mothers produced contact calls with a higher frequency and significantly more often for their calf when separated after four days than in the other two groups (Weary & Chua, 2000). mothers and calves respond behaviorally to each other's calls and that calves respond preferentially to calls from their own mother over other adult cows.

Personality

Personality refers to “those characteristics of individuals that describe and account for temporally stable patterns of affect, cognition, and behavior” (Gosling, 2008, p. 986).

The concept of personality is based on the acceptance of individuality and, thus, has critical implications for how we regard other animals.

Instead of viewing other animals as one-dimensional, interchangeable units within a group, population, or species, recognition of personality in other animals emphasizes their individuality.

Personality

- Stability of behavioral characteristics in cows
 - Lanier et al. (2000) found evidence that individual reactivity to stress was predictable in cows.
- Nervousness, fearfulness, and reactivity.
 - Cows who stepped the most during milking and who spent more time facing the herd during social isolation produced less milk. Cows who were less fearful of humans also had fewer daily observed lying down behaviors. They also presented to the mechanical milker more frequently. Age was also a factor, with older cows also showing more fearfulness.
- Sociability and gregariousness
 - Individual differences in cows with regard to cross-species sociality is a subject of study. But there is some evidence for acclimation to human handlers who provide positive handling experiences and interactions.

Social Complexity

- Group size and structure
 - Once a herd is established, the relevance of agonistic interactions as descriptors of the cows' relationships and for their spatial structuring is weak because such interactions are rare and of low intensity
- Hierarchies
 - Cows, like many other ungulates, maintain a matrilineal social structure
- Bonding and alliances
 - Cows form lasting social bonds, both with their offspring and their herd members. Calves on pasture often form sub-groups based on familiarity and kinship. Mother cows also have demonstrated an ability to adapt their maternal behaviors to the needs of their calves. For instance, calves with low birth weights are provided more maternal protection and increased time nursing.
- Social learning
 - For instance, cows who that have never grazed before begin to show normal grazing behaviors more quickly when they are grouped with experienced grazers than when grouped with inexperienced grazers

Philosophical Consideration about Animal Organism

It is a simple feeling of the self. It differentiates into multiple sensory qualities of inorganic nature.

In its outward process the organism inwardly preserves the unity of the self. This is the nature of the animal which, in the reality and externality of individuality, is equally, by contrast, immediately and inwardly self-reflected individuality, inwardly existing subjective generality.

According to Hegel, three moments of the concept have their reality in three systems, namely, the nervous system, the circulatory system, and the digestive system. The digestive system ... but as part of the actual system of the intestines it is the mediating reproduction.

The extremities used for mechanical movement and grasping constitute the moment of the individuality outwardly positing and differentiating itself.

The idea of the living organism is the manifested unity of the concept with its reality; as the antithesis of that subjectivity and objectivity, however, this unity exists essentially only as process ... Each of these moments is itself a process, however as a concrete moment of the living, and the whole is the unity of the three processes.

It is only as this self-reproducing entity, not as an existing one, that the animal organism is living.

The abstract process of living individuality is the process of inner formation in which the organism converts its own members into a inorganic nature, into means, and feeds on itself. Thus it produces precisely this totality of its self-organisation, so that each member is reciprocally the end and the means, and maintains itself through the others and in opposition to them. It is the process which has the simple feeling of self as a result.