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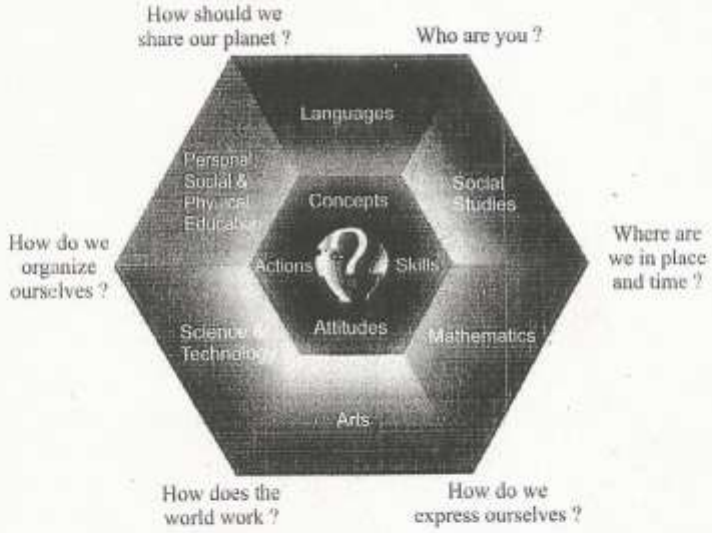

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Nonverbal Communication - An Evolutionary Approach from Zoosemiotics to Antroposemiotics

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Key Words : Zoosemiotics, Antroposemiotics, Nonverbal communication, Animal communication, Body Language, Evolutionary approach.

Abstract : *Communication as per Wikkipedia is a process of transferring information from one entity to another. The study of animal communication is sometimes called Zoosemiotics, while the study of human communication is called as anthroposemiotics. Animal communication is a rapidly growing field in the 21st century. Charles Darwin in the late 1800s could be regarded as the earliest expert to have made serious scientific observation about body language. Charles Darwin was first to make the claim in his book, 'The Expressions of the Emotions in Man and Animals, published in 1872', that the facial expressions in human are inherited from animals. The original meaning of the word "neuron" in Greek is "vegetable fiber" and as recent research shows, most of the intra organismic plant communication processes are neuronal-like. Recent studies have discovered surprising complexity and sophistication in the behavior of bacteria, including intra- and intercellular communication. Animal communication is one of the most difficult areas of study in science for several reasons. The animals have developed / evolved elaborate body parts to facilitate communication. Ethology is the zoological study of animal behavior. Nonverbal communication plays an important part in our life and can be used further to understand the not only Zoosemiotics but also the cytosemiotics which can be used to cure many disorders.*

Discussion:

Communication as per Wikipedia is a process of transferring information from one **entity** to another. According to the researchers like Ron Kurtus, (2006); Ross Buck, (2006); Calero(2010), communication processes are sign-mediated interactions between at least two agents which share a **repertoire** of signs and **semiotic** rules. In communication the information is enclosed in a package and is channeled and imparted by a sender to a receiver via some medium. The receiver then decodes the message and gives the sender a feedback. All forms of communication require a sender, a message, and a receiver. Communication requires that all parties have an area of communicative commonality.

Animal communication is any behaviour on the part of one animal that has an effect on the current or future behavior of another animal. The study of animal communication is sometimes called **Zoosemiotics**, while the study of human communication is called as anthroposemiotics. These have played an important part in the methodology of ethology, sociobiology and the study of animal cognition.

Animal communication is a rapidly growing field in the 21st century and many prior understandings related to diverse fields such as personal symbolic name use, animal emotions, animal culture and learning and even sexual conduct, have been revolutionized.

Charles Darwin in the late 1800s could be regarded as the earliest expert to have made serious scientific observation about body language, but there seems little substantial development of ideas for at least the next 150 years. Charles Darwin was first to make the claim in his book, 'The Expressions of the Emotions in Man and Animals, published in 1872', that the facial expressions in human are inherited from animals. Darwin's assertions about genetically inherited facial expressions remained the subject of much debate for many years.

Darwin's work pioneered much ethological thinking and Ethology began as the science of animal behaviour during the early 1900s and increasingly extended to human behavior and social organization. Ethology considers animal evolution and communications, and relates it strongly to human body language.

Nonverbal communication

Nonverbal communication is the process of communicating through sending and receiving wordless messages. And such nonverbal communication is seen to establish in the animal and plant kingdom. Rather Communication is not

limited to humans, or even to primates but very primitive animals also show the communication system established such as sponges, corals. The very basic level of communication as per resent research is the cellular communication. There is cell signaling and chemical communication between primitive organisms like bacteria and in the plant kingdom even in fungi. All of these communication processes are sign-mediated interactions with a great variety of distinct coordination.

Communications in plants

Among plants, communication is observed within the plant cells and between plant cells, between plants of the same or related species, and between plants and non-plant organisms, especially in the root zone. Plant roots communicate with rhizobial bacteria, with fungi and with insects in the soil. These parallel sign-mediated interactions are possible by plants because of the decentralized "nervous system" of plants. The original meaning of the word "neuron" in Greek is "vegetable fiber" and as recent research shows, most of the intra organismic plant communication processes are neuronal-like. Plants also communicate via volatiles in the case of herbivore attack to warn neighboring plants. In parallel they produce other volatiles which attract parasites which attack these herbivores. Fungi communicate to coordinate and organize their own growth and development such as the formation of mycelia and fruiting bodies. Additionally fungi communicate with same and related species as well as with nonfungal organisms in a great variety of symbiotic interactions, especially with bacteria, unicellular eukaryotes, plants and insects. These volatiles are semiochemicals and are of biotic origin, which trigger the fungal organism to react in a specific manner. It means, fungal organisms are competent to identify the difference in signal of the same molecules. So far five different primary signaling molecules are known that serve to coordinate very different behavioral patterns such as filamentation, mating, fruiting bodies, growth, pathogenicity.

Communications in Bacteria

In the studies of animal aggregations, self-organizing activity in simple creatures, including bacteria is noted and recent studies have discovered surprising complexity and sophistication in the behaviour of bacteria, including intra- and intercellular communication resulting in behaviour suggestive of intelligence and memory cooperation and altruism and even social intelligence (Ross Buck, 2006). In addition, there is evidence that prokaryotes lived socially from the beginning. The most ancient known organisms on earth are fossilized colonies of cyanobacteria which exist even today and are responsible for the pond scum that forms on stagnant water. They self-configure to create a working community that recovers from damage, using systems of communication that are not well understood.

Recent studies have shown that many of them exhibit *quorum-sensing*: mechanisms for recruiting the mass production of molecules or engaging in other collective activities beneficial to the bacteria where a "quorum" of millions or billions of bacteria assemble and produce the molecule en mass in a useful concentration (Swift et al., 1996; Waters & Bassler, 2005). In the laboratory, a growing colony of *V. fischeri* a bacteria which lie freely as well as in symbiotic state with fish remains dark until a relatively high density of individuals is achieved, at which point luminescence increases rapidly. This phenomenon is caused by the action of signal molecule, which increases in concentration with an increasing number of individuals.

Communication in higher animals

Animal communication is one of the most difficult areas of study in science for several reasons. The field of animal communication includes an analysis of the physical characteristics of information transmission between two individuals which can pass in five channels :

1. Acoustic
2. Mechanical
3. Visual
4. Chemical
5. Electrical

Acoustic signals have characteristics that make them particularly suitable for communication, and virtually all animal groups have some forms which communicate by means of sound. Phonoreception.

Mechanical communication is communication through vibrations may be either substratum-coupled (through vibrations in the ground or other substrate) or acoustic (through the air or water).

Visual signaling between animals can be an obvious component of communication. Besides

the normal range of human vision (visible light), visual signals include additional frequencies in the infrared and ultraviolet ranges. The quality of light that is often considered as color, but other characteristics are important in visual communication. Alterations of brightness, pattern and timing also provide versatility in signal composition.

Chemical signals like visual and sound signals, can travel long distances, but with an important distinction. Distant transmission of chemical signals require a movement of air or water. Pheromones are chemical signals that are produced by an animal and are exuded to influence the behaviour of other members of the same species.

Electrical signals Some electric fish and electric cals have electric generating organs that are really modified muscle bundles. Communication by electric signaling is rapid; signals can travel throughout the medium and rather complex signals can be generated, permitting species-specific communication during sexual attraction.

In different animals communication system is evolved to use either one method or combination of many. There are various forms of the communications involving the display of distinctive body parts, distinctive bodily movements; sometimes in combination Thus communication in animal world is a very complex system. In the history of ethology an important example of Herring Gull's Presentation of its bill to a chick in the nest. The Herring Gull has bright yellow colored beak with a red spot on the lower mandible near the tip. When the parent returns to the nest with food, stands over its chick and taps the bill on the ground in front of it. The chick in response peck at the red spot which is called begging response. This stimulates the parent to regurgitate food in front of the chick. The complete signal thus involves a distinctive morphological feature i.e. body part – the red spotted bill, distinctive movement i.e. tapping towards the ground which makes the red spot highly visible to the chick. According to Niko Lin bergen (Wikipedia) the red colour spot on highly contrast colour of the bill are crucial for eliciting the appropriate response from the chick. It is not yet resolved whether this actually is an inborn behaviour in all its complexity or a generalized curiosity on the part of chick.

Most elaborate food – related signal must be dance language of honeybees. Von Frisch (Wikipedia) is best known for the "dance language" of bees. Worker bees dance to communicate the distance, direction and quality of a feeding place they have found while foraging around the hive. The dance is performed on the vertical comb of the hive by taking into consideration the direction of sun. The bees have an internal biological clock that tells them where the sun should be in the sky. Distance to the feeding place, sites with lots of high quality food is communicated by the number of waggles at the center part of the dance or by the vigor of the dance. In addition, other workers paying attention to the dancer touch their sister and can determine what type of flower she visited by the pollen stuck on her hair. A second dance, a round dance, is used when the food source is very close to the hive.

Among spiders, web vibrations are used to communicate between a courting male and the web's owner. Mechanical communication is also seen in desert beetles where the stamping of legs of male on the sand carry the vibrations to female and becomes easy to find mate.

The bioluminescence signals in fireflies are well known visual signals used for attraction of opposite sex (Lloyd, 1983). The courtship rituals are unique to the species, which avoid mating with other species member. It helps to attract or maintain the attention of potential mate. It involves the display of body parts, body postures or emissions of scents or calls. Another important form of communication is the bird song. This is included under vocal communication Bird song is mainly performed by male but in some species both sexes sing alternatively. In vocal communication other calls studied are the warning cries of monkeys, mating calls of many species of frog or territorial calls of gibbons.

Many species of mammals secrete some secretions which have long lasting smells. These are mixed with urine or feces and are used for territory marking called olfactory communication.

Honey bees carry a pouch of materials from hive when they go out & release when they reenter, this allows their safe reentry in hive.

The electro communications are rare forms in animal communication and are seen primarily in aquatic life but in some mammals like platypus & echidna electro receptors are present.

In many species threat displays are made during competition over food, mates or territory. In this at

Body Language - technically known as kinesics (pronounced 'kineesicks') - is a significant aspect of modern communications and relationships. The study and theory of body language has become popular in recent years because psychologists have been able to understand what we 'say' through our bodily gestures and facial expressions, so as to translate our body language, revealing its underlying feelings and attitudes. Body Language is also referred to as 'non-verbal communications', and less commonly 'non-vocal communications'.

Ethologists have progressively applied their findings to human behaviour, including body language, reflecting the evolutionary origins of much human non-verbal communication - and society's growing acceptance of evolutionary rather than creationist theory. Austrian zoologist and 1973 Nobel Prizewinner Konrad Lorenz (1903-89, Wikipedia) was a founding figure in ethology. According to Desmond Morris, author of The Naked Ape, the evolutionary biologist, Richard Dawkins (1941), Ethology, is an over-arching science which continues to clarify the understanding of body language.

A different view of human behavior related to and overlapping body language, surfaced strongly in Desmond Morris's 1967 book The Naked Ape, and in follow-up books such as Intimate Behavior, 1971. He linked human behavior related to communication to human 'animalistic' evolution. His work remains a popular and controversial perspective for understanding people's behavior. Though his theories did not focus strongly on body language, contributed significantly to the increasing interest among people beyond the scientific community - for a better understanding of how and why we feel, act and communicate.

Physiognomy is an obscure and related concept to body language. Physiognomy refers to facial features and expressions which indicate the person's character or nature, or ethnic origin.

However the use and recognition of less fundamental physical gestures (hand movements for example, or the winking of an eye), and aspects of personal space distances, are now generally accepted to be **environmentally determined** (learned, rather than inherited), **which is significantly dependent on local society groups and cultures**. These emotional face expressions are: Happiness, Sadness, Fear, Disgust, Surprise, Anger

When the signals modify the meaning of subsequent signals it is called as Meta communications which is used not only by animals but even by human in our day to day life. Nonverbal communication—such as facial expressions, gestures, posture, and tone of voice—is an important component of personal business interactions. Nonverbal communication can help a small business owner to get a message across or to successfully interpret a message received from another person. On the other hand, nonverbal communication can also send signals that interfere with the effective presentation or reception of messages. Sometimes non-verbal messages contradict the verbal; often they express true feelings more accurately than the spoken or written words

According to experts, a substantial portion of our communication is nonverbal. Every day, we respond to thousands on nonverbal clues and behaviours including postures, facial expression, eye gaze, gestures, and tone of voice. From our handshakes to our hairstyles, nonverbal details reveal who we are and how we relate to other people.

Thus after 150 years we can say that Darwin's theory of evolution holds true even for the communication where the simple communication methods in unicellular prokaryotes are modified in the higher evolved organisms and are inherited in human beings. Nonverbal communication plays an important part in our life and can be used further to understand not only the Zoosemiotics but also the cytosemiotics which can be used to cure many disorders.

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Profile

She is principal, reader and head, Department of Zoology, B.N. Bandodkar, college of science. She did M.sc in Zoology and Ph.D from Mumbai University. She has been honoured with **'Paryavaran Mitra Puraskar'** by the Thane Janata Sahakari Bank Ltd. On 5th June 2010. She is recipient of **'Thane Gaurav Award'** by Thane Municipal Corporation for extra-ordinary work in the the field of **Conservation of Environment.** She was conferred the **fellowship** in recognition of **outstanding contribution** towards the advancement of aquatic biology by Indian association of Aquatic biology at Hyderabad in 2005. She has published various research papers and articles and also presented a number of papers at national and International conferences. Besides she is a guide of Ph.D students.