

A Study on Evolutionary Perspectives of 'Emotions' and 'Mood' on Biological Evolutionary Platform

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To cite this article:

Krishanu Kumar Das. A Study on Evolutionary Perspectives of 'Emotions' and 'Mood' on Biological Evolutionary Platform. *Psychology and Behavioral Sciences*. Vol. 7, No. 5, 2018, pp. 89-96. doi: 10.11648/j.pbs.20180705.12

Received: October 12, 2018; **Accepted:** November 10, 2018; **Published:** December 20, 2018

Abstract: This study endeavours to define evolutionary perspectives of emotions and mood on biological evolutionary platform. Emotions and Mood are two separate entities of the mental apparatus. 'Mood' is the energy level of the mind at a given particular moment, whereas 'emotion' is a specific sensation or feeling in the mind that provides directional drive to the other faculties of the mind – memory, intelligence, and physical activities – for their actions to be performed to pursue a specific goal. Present study supports that every emotion has been developed individually in the course of biological evolution, and they all have been evolved to maintain the survival needs. According to 'Emotion Model' posited by Das, each emotion is distinct and different with a specific survival role and physiologically can be qualitatively and quantitatively determined on different emotion scales. So there is no such existence of as such primary and secondary emotions. Furthermore, each emotion has some certain expressing habits, which both are suited for adapting with the emotion provoking situations and are used for inter-communication purposes. This study also clarifies how evolution of emotions has been an important tool in sociobiology maintaining the bridge between Darwin's evolution theory and Hamilton's inclusive fitness theory, and has become responsible for entire social evolution.

Keywords: Emotions, Mood, Evolution, Sociobiology, Biological Evolution

1. Introduction

The concept of 'emotion' being as a trait to help the organisms in survival process in the course of biological evolution was first postulated by Charles Darwin, in the book 'The Expression of Emotions in Man and Animals' [1]. In his literature, Darwin tried to explain how some expressions of the emotion evolved into serviceable habits to man and animals, as he said, "raising of eyebrows serves to increase the field of vision". Later, the detailed study of the animal behaviour has given birth to a new branch of science known as 'Ethology'. Through the pioneering studies made by Konrad Lorenz, Nikolaas Tinbergen, and Karl von Frisch, we came to know the importance of species-typical behaviours in the adaptation of animals to their environments. Species-typical behaviours arise from the genetic heritage of the species as they have been evolved over time. They are the part of the species' nature. But environmental factors play also important role on these species-typical behaviours. In his famous experiment of 'imprinting' with goslings, Lorenz

demonstrated how in a certain period of development, animals are highly sensitive to a certain stimulus, which promotes the development of a specific behavioural pattern. Since these environmental factors are roughly similar to all the members of a species living in a common habitat, species-typical behaviours based on common genetic heritage are similar for all members of a species. For that, many species-typical behaviours are inflexible in the pattern, and triggered by a particular stimulus, known as a 'releaser', and behaviour released by such a stimulus is often called a 'fixed action pattern (FAP)'. Emotional expressions are examples of such species-typical behaviours.

Each and every emotion has been genetically transmitted among the species along with the course of biological evolution. And they all have been developed to help the species for adaptation and serve the specific goal "self-preservation and propagation of the species". Expressions of emotions have been designed either for the organisms to suit the best with the emotion-provoking environment, or to help in the inter-communication purposes in social interaction of

the species and to deliver the signals to others about the emotional state of the animal.

2. Theoretical Approaches to Explain the Evolutionary Roles of 'Emotions' and 'Mood'

2.1. Evolutionary Perspectives of Emotions

'Emotion' could be defined as "a specific sensation or feeling in the mind that provides directional drive to the other faculties of the mind – memory, intelligence, and physical activities – for their actions to be performed to pursue a specific goal" [2].

There is no existence of any distinction between primary and secondary emotions. Many of the researchers are in favour of the concept of primary and secondary emotions, like primary and secondary colours. Plutchik, Panksepp, Izard and Ekman support that there are some basic emotions from which complex or secondary emotions develop [3-7]. However the concepts of primary and secondary emotions are not supported by all [8-10]. According to present study, all emotions are distinct and different both anatomically and physiologically, though they maintain common mechanisms for action. And they all could be distinguished and determined both qualitatively and quantitatively along with their respective emotional scales. But emotions vary in their magnitudes or expanse of emotional scales in accordance with their importance as they have been developed in the course of evolution.

Every emotion can be represented on 'pleasure and pain' scale, as illustrated in 'Emotion Model' posited by Das, maintaining their adaptive range or AR on a certain location on the emotion scale, which is responsible for different emotional sensations with the similar emotional stimuli in different persons, and even in the same person when the position of adaptive range has been shifted [10, 11]. So all emotions have two ends, one 'pleasure' or 'satiety' or 'positive' end, and another 'pain' or 'non-satiety' or 'negative' end. This is true for emotions like 'fear', 'anger' also, which are commonly considered as negative emotions. 'Fear' has its opposite end 'courage' or 'valour'; 'anger' has its opposite end 'revenge satisfaction'.

The species get all the emotions as genetical heritage. But the objects or situations responsible for provoking or inducing emotions are all had to be conditioned through the learning processes during life.

No organisms upon this earth struggle to become the fittest, their only goal is to serve their instincts. 'Survival of the fittest' is an outcome of it. This instinct could be plant hormones or instinct in animals. We are restricting the term 'emotion' to a developed pattern of instinct in case of animals, regulated by neurohormones.

Emotions are again set to pursue the specific goal "self-preservation and propagation of the species". It could not be otherwise, because in those cases the species would have

been extinct. So it is self-explanatory.

According to Darwin, the fitness means reproductive success [12]. But the organisms neither struggle for existence, nor struggle for reproductive success. They only struggle to serve their instincts or emotions. We eat to satisfy our 'hunger' emotion, not to preserve the body. The preservation of the body is the result. An organism could be happy and satisfied without procreating, but only serving its emotions adequately; as it is evident in case of many domesticated pets. In insects like ants, there are a specific division which do not enjoy sexual reproduction or do not have sexual passion. Man is nothing but an animal, and no exception to that rule, if only not knowledge does bother him. But again, our cognition leads our mind to the final consequence, and by that is responsible for arousal of emotions in direct and indirect manner (consult 'emotion model'). For a simple example, 'if we do not eat, we will be sick or even may die' – thinking of that consequence arouses 'fear' emotion which compels us to eat. In case of animals, where this knowledge is absent, it may be irrelevant. Absence of 'hunger' emotion may lead to their death.

'Gene' is neither 'selfish' nor 'unselfish'. It is a mechanism or machine. It is the nature's responsibility whether it would accept or reject the machine. So, for survival and successful replication either individually or collectively, the genes have to have a 'fool-proof' mechanism.

For example, the species modulated the gene for emotion 'sex' for reproductive success. Man invented the contraceptive methods or contraceptive pills, and learned to enjoy the emotion bypassing the reproduction. What would be the ultimate effect of it? The species 'Man' would be extinct.

Of course, man is an intellectual animal to think for that, and there are other emotions, like 'love', 'fear', 'anger', which could be conveniently shared among the family members including spouse and offspring, promoting better adaptation in the life-struggle. But yet, this is the reason why in spite of outstanding medical advancement, superior management of the natural calamities and abolition of wars, in many of the developed countries which practice 'free-sex' habit with use of contraceptive methods, the population growth rate is negative, i.e., the population is decreasing, comparing the developing countries having high growth rate, which do not practice 'free-sex' habit or are not well inclined to accept contraceptive methods on various grounds including cultural and religious stands.

2.1.1. Purposes of Emotions

Now we will come to what are the emotions we do possess and what are the specific purposes they have been developed to serve for in the course of evolution.

Hunger and Sex are two basic passions. These two basic passions have both the features of a perception and of an emotion. We perceive or feel hungry by internal stimulation aroused by specific receptors in hypothalamus owing to fall in glucose and other nutrients (amino acids, fatty acids, keto acids etc.) level in blood. Again, we feel hungry by thinking

of desired food. We get sexual stimulation from different parts of the body through neural arousal. Local stimulation, massaging of glans penis in male and glans clitoris in female stimulate sensory nerve end organs, and the sexual sensations are passed through the afferent nerves to the cerebrum. And we also get sexually stimulated by thinking of sexually provoking thoughts. So these two basic passions carry the features of both receptor mediated perception (like vision, audition, etc.), and emotion. No need to say, how essential are these two passions. They help us to maintain our lives and are also needed in the process of preservation of the species. Besides hunger and sex, some other emotions may also have perceptual features; like pressing any object (even inanimate) against breast, a person will feel a sensation of 'love'.

The emotion 'fear' has been developed to protect the species from the harmful effect of something, either living or non-living, which is more powerful than it.

'Anger' prepares us to challenge our enemies, with utilizing best of our physical and mental resources – to defeat them. The emotion 'Anger' has been developed to provide killing instinct in the species against something, either living or non-living, which is less powerful than it.

The emotion 'Love' has been developed primarily to take care for our weak offspring in the initial stages of development, and thus has been essential for preservation of the species. Besides that, it also applies to protect the weaker opposite sex, and to build interpersonal bonds among the members of a group. Because, most of the higher animals including man are gregarious in nature and this gregarious quality helps for greater chance of survival as survival against powerful enemies partly depends on co-operative actions of the group members.

The emotion 'Hope' triggers to enhance our mental and physical activities in an organized manner towards specific goal or goals. Its opposite end is 'Despair'. 'Despair' temporarily stalls or slows our activities.

Our 'sense of beauty' sensitizes us for cleanliness, to adore those things that have positive effects on our health, and also helps us in selection of healthy eligible opposite sex. In its opposite end, it makes us dislike things those are unhealthy in nature. Sometimes we describe something as being 'ugly', though that particular thing does not have any harmful effect on health. But here, the sight of that, somehow, has been conditioned with some object, either living or non-living, that has deleterious effects on our health, in the earlier stages of our life.

The emotion 'Disgust' makes us stay away from things, both living organisms and non-living objects that either are creepy or sticky in nature, or produce deleterious effects on our body and mind. In its opposite extremity, we feel attracted to those things that have beneficial or sanitary effects on our body and mind; like we get lured to be in open nature or at sea side.

The emotion 'Joy' informs us that the situation or surroundings or environment is favourable for us, and encourages us to be involved in maximum activities during

that period of time. This emotion's opposite end is 'Sadness'. 'Sadness' conveys that the environment or situation is unfavourable, and discourages us to take activities, to preserve potentials.

'Laughter' makes us forget temporarily the stress situation that we often live in. It lightens our serious thinking to get us out of the stressful condition that we go through for that time, and saves us from its harmful detrimental effects on both physique and mind. In the opposite end of this emotion, we feel burdensome pedantic graveness.

'Shame' or 'Embarrassment' lets us know that the situation or the surroundings are unfriendly or non-encouraging for exposing us or doing activities. And so, it restricts our activities and prevents exposure by hiding our bodily preserve. The emotion's opposite end is 'feeling of confidence', which promotes exposure and activities.

The emotion 'Surprise' prepares us to be adapted with the sudden unexpected change in the environment. This emotion plays a vital role in adaptation in all aspects, both physical and mental, when the surroundings suddenly turn to be different. The emotion's opposite end is 'boredom', when the surroundings and environment are constantly similar, repetitive and changeless.

'Curiosity' urges us to know the unknown. This emotion is significant to keep us prepared to take challenges from unknown quarters. Also it helps us to seek prospects of benefit from unknown quarters. Curious nature is seen in many animals also, for the sake of the same reason, either in detecting danger or in searching food. At its opposite end lies 'monotony'.

'Utsaha' or 'Liking to do specific job' – This emotion encourages us to do a specific job. It can also be deciphered as 'zeal, zest, enthusiasm, or eagerness for specific work'. Some of our primitive men learned to draw realistically or produce a musical sound by voice or an inanimate object, and that amused and pleased other members of the group. They soon realized that their works are being appreciated by their groupmates, and also helping them in earning their necessities of living supplied by the appreciating members of the group. So they developed intense likings for that particular job. The human achievements in arts, literature, science, and music followed. The emotion 'Utsaha' or 'liking to do specific job' can be applied to any work. In this emotion's opposite end is lying 'Frustration'.

The emotions, 'fear', 'anger' and 'love' are not only confined to the possession of the human being, but many other animals are their possessor too. Animals exhibit a few other emotions also. Curiosity, that is curious nature of the mind, is found in many animals. Sadness and joyfulness are visible in plenty of animals. However, in human mind, there has been emergence of an array of more finer and sophisticated emotions which are usually not possessed by animals, like 'sense of beauty', 'humour', 'shame or embarrassment'. Along with the course of evolution, they have been individually developed and emotions have been most sophisticated, subtle, and refined in the most advanced and developed mind, that is human mind.

As for recognition of emotions, emotions are cross-species in nature. That means a man can understand or perceive an animal's emotion, and an animal can recognize a man's emotion. But it is very interesting that this cross-species nature of emotional recognition is only bounded to common emotions. That is, an animal can recognize those emotions of a man, which they themselves possess; like 'anger', 'fear' or 'love'. But they are completely blind to those emotions which they themselves do not possess. An animal is unable to perceive a human emotion like 'humour' or 'laugh'. You don't have to be ashamed or embarrassed before an animal, because it does not possess this emotion, and is blind to this emotion. So it is very necessary for the recognition of emotions between the organisms that organisms must have to possess common emotional centers in their brain or nervous system. It also guides to the fact that the same emotional center which is responsible for expression of the emotion, is also involved in recognizing the emotion in others in some way.

2.1.2. Significance of Emotions in Sociobiology

The above mentioned specific roles and purposes of the emotions also clarify the principles of socio-biology, the term coined by Edward O Wilson in the book 'Sociobiology: The New Synthesis' [13] on the basis of the function of evolution in shaping the human behaviour through transmission of genetically influenced behavioural traits.

Altruistic or self-sacrificing behaviours can be explained more conveniently by the understanding of basic properties, characteristics, and way of functioning of the emotions.

Altruistic behaviours, as Darwin explained, are responsible for the group selection of the species. But contradiction against group selection on the basis of altruistic behaviour was raised by the explanation that in any group the less altruistic individuals will be more likely to survive, and the group will become less self-sacrificing as a whole in the long run.

To counterbalance this contradiction Hamilton proposed 'inclusive fitness theory' [14]. This theory depends on the theory of kin selection, the fact that genes can help the replication of identical genes in others by selecting them within kin or close relatives, and forming a group where organisms will tend to live close to each other. And this way altruistic acts will benefit the others who also share the same genes for this behaviour.

Hamilton posited that whether an altruistic gene would be included in a common population is depending on

$$c < rb$$

Here 'r' is the degree of relatedness, 'b' is the reproductive benefit to the recipient of the altruistic behaviour, and 'c' is the reproductive cost of the altruist.

But the confusion aroused about the degree of relatedness. How a 'gene' can detect a similar identical gene among others! And 'kin selection' can only be applicable to some extent to humans, but it could not be applicable in support of animal's altruistic behaviour, because animals can hardly remember

their kin (genetic relatives) to direct their altruistic behaviours. Even in case of human, we often see an individual's altruistic behaviours are not always directed to his kin only, rather they depend on an individual's close association with others on various grounds.

To settle this confusion, Hamilton forwarded the idea which later was known as 'green-beard effect'.

According to this effect, the gene, through a set of linked alleles, produces a perceptible phenotype and allows the individual for recognizing the similar phenotype in others to treat preferentially for altruistic activities; as Dawkins exemplified this in his book as 'I have a green beard and I will be altruistic to anyone else with green beard' [15-16].

Green-beard effect has been seen in few species in different observational studies, as in red imported fire ant, *Solenopsis invicta* [17]; in slime mould *Dictyostelium discoideum* [18]; in side-blotched lizards [19]; and in budding yeast *Saccharomyces cerevisiae* [20].

Alternatively, another theory – 'reciprocal altruism' – was propounded to explain the altruistic behaviours in man and animals [21]. According to this theory, the altruistic activities will be reciprocated towards those only, who will also show altruistic activities in return. And by that, only those individuals will get the benefit of it who have the similar genes for this activities. There are other theories like evolutionary game theory [22-23], tit for tat theory [24], which also approach to explain altruism on the basis of the same principle.

But no theory can explain altruism singularly on the genetical base, without taking into account the understanding of the nature and characteristics of the emotions.

Our present approach to explain altruism is depended on two basic mechanisms.

(1) Subjugator will always show altruistic activities towards the subjugated person. Because removal of subjugated person from the subjugator is a painful experience to the subjugator.

(2) One emotion whose expression is specifically designed for altruistic activities besides the above mentioned principle, is 'love'.

Now we will explain the points one by one.

(1) Whenever the adaptive range (AR) on an emotional scale moves from positive to negative end of the emotional scale, 'subjugation' takes place on that particular emotion scale. When the adaptive range moves in the opposite direction on an emotion scale, 'upjugation' takes place. Once adapted, subjugation does not bring any mental distress to the subjugated person, but it reduces the quality of the life and brings down the mental status of the subjugated. On the opposite hand, 'upjugation' raises the mental status of the subjugator [to understand 'subjugation' and 'upjugation' on an emotion scale, consult 'emotion model'].

A person maintains higher mental status, when the adaptive ranges (ARs) lie towards the positive extremity on most of the emotional scales.

A subjugator when subjugates a person or an animal, then 'upjugation' occurs on subjugator's emotional scale

and 'subjugation' occurs on subjugated person or animal's emotional scale. This process can occur on single emotional scale or different emotional scales. Usually, group subjugation occurs in 'fear' or 'anger' emotional scales.

Though the subjugator is getting the higher mental status by this process, he cannot be separated from the subjugated, because in that case in the absence of the subjugated, his AR will move back to its previous position. For example, the king cannot sense the 'feel of a king' without his subjects.

This process of emotional adaptation is the groundstone of the social evolution.

Human primitive society was formed as a group, when there emerged a group leader among the members of the group. This group leader obviously was of higher mental qualities, that is with higher IQ, EQ, etc. This group survived more challenges against enemies and adversities, because under the group leader the subjugated members of the group were bonded and disciplined, and fought well organisedly against both the enemies and adversities.

On the opposite side, the group without a group leader, was indisciplined and unorganised, and succumbed easily to the former one.

In this case, even if the subjugator is getting higher mental status, he is also being bound to his subjects on the same emotional bondage. Total separation of this bondage will bring immense unpleasurable feeling to the subjugator. So the subjugator or the group leader has to take all the protective and caring activities towards his subjects, using his higher mental qualities. This is an ideal example of symbiosis, that developed in the course of social evolution carrying benefits to both the subjugator and subjugated.

Consequently, not a single group leader but hierarchy of group leaders emerged in society according to the competency; and full-blown monarchic society developed.

In modern democratic society, this monarchic structure of the society has disappeared, but symbiosis still persists in different forms and in different sectors maintaining the same hierarchy of mental status.

Now if we take the genetic basis into consideration, this type of society will favour those emotional traits which are considered by the leader or leaders most socially useful. Like, the king will favour the emotion 'the sense of beauty' because it will advance arts, literature, architecture, and many others. The king will promote the emotion 'curiosity', because it will advance science and discoveries. Altruistic activities of the king will be directed to the beholders of these emotions most. Advancement of science and arts occurred in the greatest amount in history always under the greatest leaders.

(2) Every emotion has a specific manner and way of expression. Of these emotions, 'love' is the single most emotion, the acts of expression of which are specifically designed for protective and caring activities towards the recipient. So it could be designated as 'the true altruistic emotion'.

Now the expression of this emotion 'love' is primarily

designed for taking care and protecting weaker offspring in the initial stages of the development. And it is responsible for the development of strong parent-child attachment promoting better child care, and survival and transference of the genes to succeeding generations.

But though this emotion has been evolved primarily to protect weaker offspring, the expression of it could not be restricted towards the offspring only. The beholder of this emotion has to exercise his this emotion to become happy or satisfied whether he has offspring or not. And this is the reason behind most of the altruistic activities observed in common population, and reason for the development of fraternity, fellow-feelings in the society.

Considering the genetic basis for the survival of the genes of this emotion – where the genes for this emotion 'love' is predominant in a group, there will be greater bondage, fraternity and fellow-feelings among the group members. They will fight against the enemies and adversities better being united together. So, as a whole group there is a better chance of survival of that group.

Now someone of this group having this emotion 'love' in lesser magnitude, inducing him in lesser altruistic activities, though will also enjoy the community benefit, but will be devoid of the first advantage, that is promoting his own genes to pass into future generations (showing less parent-child attachment and care). So the contradiction of survival of altruistic gene in support of group selection is being nullified here, as the disadvantage in individuals with less altruistic emotion 'love' overweighs the advantage of having it in lesser magnitude.

One thing is to be admitted here that being satisfied on 'love' emotional scale, the person is also subjugating the recipient. As we often see, if parents show too much lovable feelings and acts, the children get annoyed and irritated, and sometimes react with 'anger'. Because it is subjugating them. But the recipient can counterbalance it by loving in return. Children often take the subjugation on the basis of beneficiary effects of it with regard to other emotional scales, like 'fear', 'anger' etc. Children feel protected under parental care from the negative effects of these emotions from the outside world.

So whenever 'emotional bondage' is established, there happens reciprocal 'upjugation' and 'subjugation' on the bonded persons' emotional scales. For that, we need family and friends, to share both our 'subjugation' and 'upjugation'.

'Fear', 'anger' and 'love', these three emotions can be truly called social emotions. But any inanimate object also could be conditioned as the object of these emotions. And in that case, the adaptation process occurs only on the emotion beholder's emotional scale, without creating any reciprocal emotional bondage. And at present, we are not sure whether all the emotions have these emotion-sharing properties.

2.1.3. The Expression of Different Emotions and Their Role in Adaptability with the Environment

Now let us look at some specific expression patterns of

different emotions and how they help man and animals to adapt with the emotion provoking situations, by making them suited for the best (Table-1). In this case, it should be

regarded that expressions of emotions involve both our autonomic and somatic nervous system, that is expression is both autonomic and volitional.

Table 1. The expression of different emotions and their role in adaptability with the environment.

Fear	(1) Dilatation of pupil and widening of eyes.	(1) Increases visual field to detect the object of fear.
	(2) Increase in heart rate.	(2) Provides maximum blood supply to brain and muscles to take actions if needed.
	(3) Erection of body hairs.	(3) Produces a larger and fearsome image in the mind of the opponent.
Rage	(1) Strengthening of body muscles.	(1) Helps for taking ready actions against the enemy.
	(2) Showing of canine teeth (in case of animals).	(2) Helps to produce fearsome effect on opponent and also prepares jaw muscles ready to take actions. (It has been modified in man in teeth clenching, because man does not need his teeth to attack his enemy).
	(3) Erection of body hairs.	(3) Same as in fear.
Disgust	Constriction of nasal aperture and oral opening. Decrease in respiratory rate.	Reduces the chance of inhaling noxious and harmful air. (Opposite occurs when we go to open natural space or seaside).
Surprise	Dilatation of pupil and widening of eyes.	Helps in detecting the object which is responsible for sudden change in environment or surroundings.
Shame or Embarrassment	Constriction of the posture to attain a reduced or smaller form.	Hides the vulnerable parts of the body against unfavourable environment.
Joy and Hope	Increase in respiration rate, expansion of chest and increase in lung volume, also free expression of the body.	Takes O ₂ rich air for maximum activities and activities in organized manner.
Laughter	Repeated forced exhalations of air from lungs.	Purifies our blood from noxious CO ₂ which had been produced by the stress induced respiratory depression.
Sense of Beauty	Fixes our gaze and promotes slow movements towards the object.	Helps to come in close proximity of the object of beauty.
Curiosity	Fixing of gaze and fixing of focal views.	To detect and find out object unknown.
Love	Clinging the object of love to the breast.	Protects the weak offspring from external assault.

Yet it has to be admitted that many of our emotions have lost their significant roles in the context of modern days society. Like, 'Nostalgia', 'Romance' or 'romantic feeling towards opposite sex', and others. 'Nostalgia' creates a feeling of home-sickness that bars our progress. 'Romantic addiction' to someone of opposite sex may be fruitless and waste of time.

But for that, it has to be remembered that evolution is not an already finished process. It will continue to work on as long as the life exists upon this earth.

So, maybe, many of our emotions we will lose in the course of future evolution, and there will be emergence of new, unknown emotions.

2.2. Evolutionary Perspectives of Mood

We often get confused with the conception of 'mood' and 'emotion'. 'Mood' has often been intertwined with 'emotion' in literature, as 'mood' has been defined as a "sustained emotion or feeling tone that colors a person's perception of being in the world" [25]. Alternatively it has been defined as "feelings that tend to be less intense than emotions and that often (though not always) lack a contextual stimulus" [26]; or "longer term affective states that do not have unique facial signature or eliciting conditions" [27].

But 'mood' is not an emotion at all. Mood is the energetic state of the mind. In a particular time mood defines how much power or energy is being contained or held by the mind at that respective moment. Elevation of mood is known as elation, and degradation of mood is known as

depression. An elated mind possesses more power or energy, and a depressed mind possesses less power. This power can be utilized in all the essential activities of the four houses of mind – that is 'emotion', 'intelligence', 'memory', and 'physical activities'.

In elated state –

The person can solve a difficult mathematical problem more easily (helping intelligence).

The person can memorize a difficult study material more effectively (helping memory).

The person can play a musical instrument to the best of his ability (helping emotion).

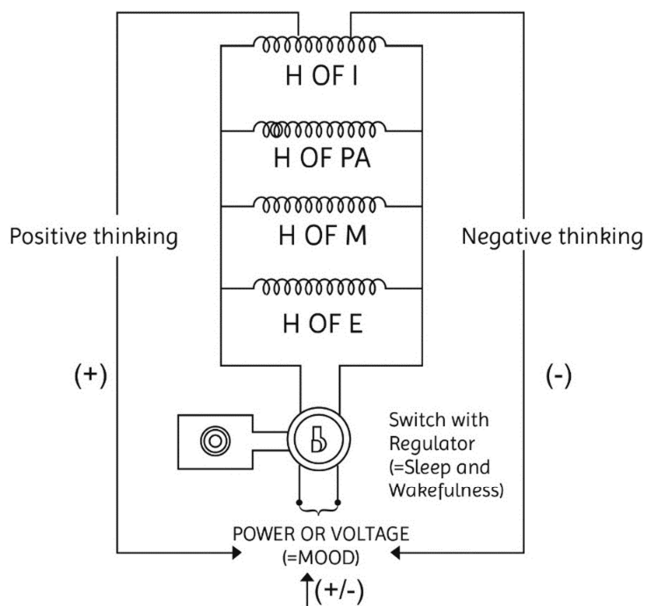
The person can run a mile to the best of his time (helping physical ability or motor cortex).

When 'mood' is degraded or depressed, the activities of all these faculties of mind are diminished.

As mood defines the power of the mind, 'sleep and wakefulness' defines the state of arousal of our conscious mind. So 'sleep and wakefulness' can be compared with the electric switch, voltage between its two points that provides power can be compared with 'mood', and activities that are done with the electricity can be compared with the activities of four 'houses of mind'. But this switch just does not have an 'off and on' mechanism, there is a regulator attached with it through which graded power can be supplied (Figure 1).

In a gravely depressed mind, there occurs a serious lack of energy that even may restrict doing normal basic daily activities.

In an elated mind, though there is a large amount of energy, by which the person can do a lot of mental works, yet too much excess of this energy may present in some form of distress that is undesirable. These are – increased psychomotor activity ranging from overactivity to restlessness; the person is more talkative than usual; there is marked increase in activity with excessive planning and at times the person tries to do many things at one time; sleep is reduced and hypersexuality may occur; there is appearance of euphoria, increased sense of psychological well being not in keeping with reality, delusion of grandeur and delirious mania.



Different Chemical Substances, Drugs, Alcohol, Melatonin

[H=House, I=Intelligence, PA=Physical Activity, M=Memory, E=Emotion]

Figure 1. Comparison between Electrical Circuit and Brain.

Normally in our day-to-day life, our mind contains the middle amount of energy with minor variations within acceptable limits between two extreme ends of elation and depression. Elevation and depression of 'mood' within normal range is a natural phenomenon. It is like part of our life.

But when there is marked variation of 'mood' which causes enough distress to a person and disrupts the individual's normal occupational and social activities, the person may seek medical or other advice.

'Mood' is controlled by the midline Raphe nuclei in the brain stem. From there the nerve fibers go to the hypothalamus, limbic system, cerebral cortex, and spinal cord (Figure 2). Different chemical substances (3,4-methylenedioxy-methamphetamine), drugs (SSRIs), alcohol, melatonin have either positive or negative effects on the neuronal centers for 'mood'.

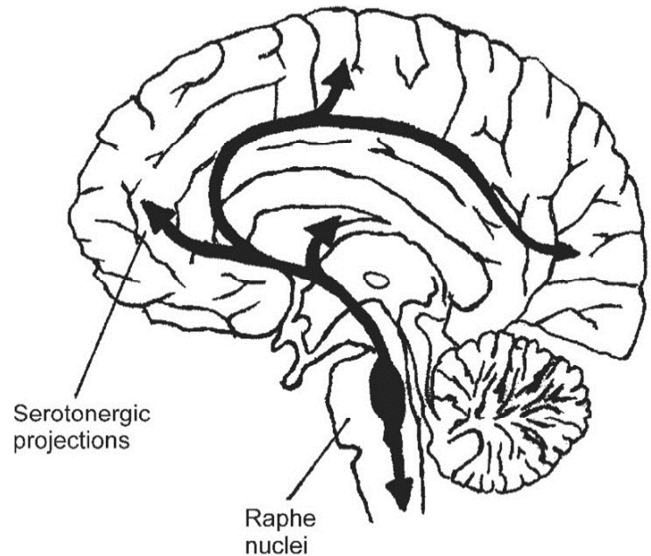


Figure 2. Area controlling 'Mood'.

But in a normal person what causes elevation or depression of mood apart from drugs and chemical substances and considering there is no pathological derangement underlying it?

– "Positive thinking causes mood elevation or elation, and negative thinking causes mood degradation or depression".

The question comes here, 'positive thinking' or 'negative thinking' about what?

To be stated in simple words, 'positive thinking' means thinking about the probability of satisfying an emotion; or probability of creating an emotional response positivewards beyond the adaptive range on any emotion scale, so that the adaptive range (AR) may have the chance to shift positivewards on that emotion scale. In a case of 'negative thinking', the vice versa is applied.

'Grapes are sour' is a typical example of depressive remark, though it is fictional. When the fox saw the grapes, there was a thinking of probable positive response on hunger emotion scale. So when the fox was jumping at the grapes, his mood was elevated. When he failed and realized that it is not possible for him to get those grapes, there was consecutive negative thinking. He felt depression and made a depressive remark to combat his negative thinking or check depression.

In this regard, a person's life-philosophy; educational status; cultural, social and family background; cultural beliefs – every thing is important.

To think positively, every thing mentioned above has significant role.

If a man has a positive attitude towards everything, that is, if he can make his mind think positively in every situation, he can get out of his depression.

But it is not always become possible for everyone on their own. True enlightenment of the mind is what is most important. Enlightened mind knows to take things, whether good or bad, in positive strides, and the person is more stable or static on his mood.

And it follows the rules of evolutionary psychology. When there is negative thinking, that means environment is

unfavourable. So, through the connections from the prefrontal and limbic areas, the centers of mood get depressed, and they in turn send less energy or stimulation to the neurons of cerebral cortex and limbic cortex, reducing the activities of all four faculties of the mind – memory, intelligence, emotion, and physical or motor activities. Had it not happened this way, we would have lost mental energy unnecessarily in unfavourable conditions.

3. Conclusion

This study tries rigorously to explain not only evolutionary perspectives of 'emotions' and 'mood', but also development of social behaviours on the basis of them in respect of social adjustment and adaptations in the road of natural selection and biological evolution. Counter-theories and counter-explanations always exist. These all will aggregatedly enable us to approach closer to the truth and will promote further advancement of science, whether it is evolutionary psychology or classical psychology.

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