
Exploring Emotion: An Essay on the Neurology of Emotion and the Theory of Karma

R Anand

Citation

R Anand. *Exploring Emotion: An Essay on the Neurology of Emotion and the Theory of Karma*. The Internet Journal of Mental Health. 2005 Volume 3 Number 1.

Abstract

In this essay, there is a summary and integration of the various aspects of emotion from a neurological point of view. Advances in imaging technology have given us access to the intricate functioning of the nervous system at the molecular level and beyond. We are crossing new frontiers in mind-brain connections. Yet much remains unknown. Starting with case examples, this essay explores the structures and mechanisms underlying human emotion through pathology, psychology, and physiology. Facts are integrated from neuroscience and the social and cognitive sciences. Taking a holistic view of health, they are integrated with a particular aspect of Eastern philosophical and spiritual thought called Karma. Hopefully, this essay will stimulate a novel way of looking at feelings and improve the understanding of emotional responses.

INTRODUCTION

Emotions play an important role in our lives: From the patient who has a disorder of emotion following a stroke, to the doctor who has been busy on duty the whole night without rest and is now having to deal with a particularly stubborn and difficult relative of a patient. Our emotional reactions are many and varied and seemingly automatic, whether to patients, ward condition, attitude of a colleague, to a lecture or seminar, the weather, or the traffic on our way to work. We often say, "I don't want to feel upset, but I can't help it." The harder we try to look for rational and logical explanations for such feelings and their motivated actions, the more elusive they seem. In the East we may say it is kismet or karma. This is a rather common Indian expression showing a sense of resignation to a seemingly hopeless situation. Or sometimes it is also said in jest as a way of explanation or rationalization of a knotty personal situation. It is undoubtedly an emotional response. This essay tries to explore this further and to perhaps see if we can really understand emotion from a neurological perspective and find a link to the theory of karma which is so ingrained in the Eastern psyche.

For example, let us look at the case of Mr. Spock from the popular TV serial and movie, "Star Trek." He is half human and half alien (Vulcan). His temperament is stoic. His words and deeds are based solely on logic. In order to completely follow logic, it is necessary to completely suppress

emotions. This is his Vulcan heritage. Emotions hinder order and tranquility. So, Vulcans consider emotions as dangerous. They repress it and replace it with logic. But because Mr. Spock has a human ancestry, he continually struggles to suppress his emotions. But his Vulcan side is usually in control. He manages to put his feelings aside, and finds logical and rational explanations for situations.

By contrast, take another science fiction movie, "2001: A Space Odyssey." The onboard computer called HAL9000 interacts with the crew on an emotional level. In the movie Dr Poole says "he acts like he has genuine emotions. Of course he is programmed that way to make it easier to talk to him. As to whether he has real feelings, I don't think anyone can truly answer that." HAL is even able to recognize the emotional states of the crew and adapt his language and behavior accordingly. HAL eventually malfunctions and even kills. Was it his emotion? Modern artificial intelligence research is trying to make the computer more and more 'human'. Is it really desirable to have machines that are capable of becoming emotionally unstable? The argument offered by artificial intelligence researchers is that until computers can become 'emotional' they cannot associate judgments of salience and value with decision making. We will see later how emotional circuits in the brain are required for decision making. But if an intelligent machine kills, like HAL did, who is to blame, the machine or its creator?

We can see how this thing called emotion is both desirable

and not desirable! Of course it is not as simple as that. So, what is emotion? What are the systems that are involved in its operation? How does it affect us and those around us? Why is it important to have a better understanding of it? What evolutionary purpose is it serving? Does it have a spiritual dimension? Can the Karma theory be used as a useful explanatory model in understanding emotion? These are some of the questions that this essay will clarify as we begin this exploration of emotion.

CASE ILLUSTRATIONS

It is 11:00 PM on the medical ward. Ivan is a 45 year-old man with a diagnosis of delirium due to alcohol withdrawal. The patient is in terror. He is shouting and trembling, fighting to escape from imaginary assailants and voices. To him they are very real. Evan is in a state of acute confusion. He is experiencing visual and auditory hallucinations. He has an emotional disturbance due to disorder of perception.

It is visiting hours on the psychiatric ward. Julia is a 26 year-old woman with a diagnosis of schizophrenia. Her mother has come to visit her. Julia believes that she is plotting to kill her. She is angry and shouts at her mother. She impulsively gets up and advances menacingly towards her mother to hit her. But she is held back by a nurse. Julia has a paranoid delusion. Her emotion is comprehensible in the context of her delusion. She has an emotional disturbance due to disorder of cognition.

It is visiting hours on the neurology ward. George is 75 years of age. He has a diagnosis of stroke from ischemic infarct with left sided hemiplegia, vascular dementia, and hypertensive disorder. George's old friend John has come to visit him. Seeing his friend, George bursts into uncontrollable tears. Later as they chat, John recalls an amusing anecdote in their lives. George bursts into a bout of loud and prolonged laughter. Soon after, he becomes tearful again. Here the emotion is excessive but appropriate to the stimulus. The affect is congruent There is a vacillation from one state to the other. George is showing a disinhibition of emotional expression called emotional lability. It is considered as a sign of "organic brain disease."

Nina is a 70 year-old woman who is visiting the outpatient department. She has a diagnosis of recurrent ischemic infarct with spastic bulbar palsy and hypertensive disorder. There is a history of transient ischemic attack with left-sided hemiplegia 2 years ago, but she recovered from it completely with no residual deficits. The daughter who has accompanied her narrates that Nina's speech suddenly

became stuttered and difficult to understand and she is unable to swallow food or drink. On examination she has a right facial palsy and brisk jaw jerk. Palatal reflexes are normal. During examination Nina starts to cry suddenly and uncontrollably for no apparent reason. Her daughter recounts that earlier at home she had a sudden outburst of laughter for no apparent reason which lasted for several minutes. Here, in contrast to emotional lability, there is a striking incongruity between loss of voluntary movement of the muscles involved and the preservation of the same in the spasmodic laughing and crying. Nina has pseudobulbar palsy and is showing a disinhibition of emotional expression called pathologic or forced laughing and crying.

Alex is a 23 year-old man brought to the accident and emergency department by the police. He was arrested on the street for disturbing the peace. He is disheveled, agitated, shouts, and swears. Four police and security men struggle to subdue him. He is aggressive and tries to kick and bite others. No amount of talking and pleading can calm him. A friend who has accompanied him says that Alex was normal that evening. A group of friends were going to the movies. He had only a pint of beer beforehand. There was a minor argument. Suddenly Alex became aggressive and violent towards the friends. They knew him to be hot-headed and impulsive. There was a history of aggressive outbursts with minor provocation before. He was admitted and managed in the psychiatric intensive care unit with a diagnosis of episodic dyscontrol syndrome and personality disorder.

Anna is 84 year-old woman admitted to the geriatric ward. She has a diagnosis of frontotemporal dementia. Anna presented with a gradual change in her personality. She talked less and less, her movements became slowed and she became indifferent to her surroundings. She carried out certain ritualistic activities, showed perseveration in her speech and actions. She appeared to lack spontaneity and impulse (abulia). However she was oriented and her memory was relatively preserved. Anna is demonstrating the emotional disturbances of apathy and placidity. This is seen in frontal and thalamic syndromes and the Klüver-Bucy syndrome.

Michael, a 60 year-old man is admitted to the neurology ward with a diagnosis of Parkinson disease. Following full assessment he was started on the medication combination of L-dopa/carbidopa preparation. After a few days the nurses complained that he had become sexually disinhibited. But when the medication was withdrawn, his hyper sexuality disappeared. It was a side effect of the drug. Hyper-sexuality

can occur due to lesions of the orbito-frontal cortex. Hyposexuality with loss of libido can occur in depression, temporal lobe epilepsy, due to drugs like antihypertensives, serotonergic antidepressants, anticonvulsants and neuroleptics. Altered sexuality is an emotional disturbance which is a part of many neurological diseases affecting the cerebrum. This is in contrast to sexual impairment due to physical disability or to disorders involving the spinal segmental reflex mechanisms.

Natalia is a 30 year-old woman with a diagnosis of multiple sclerosis. Her mother visits the doctor and complains that she has become very talkative, needs less sleep, speaks rapidly, talks in rhymes, and that her mood is elevated. Natalia is showing a state of hypomania. Neurological disorders can cause endogenous fear, anxiety, depression, and euphoria. Examples include fear and anxiety in temporal lobe epilepsy, mixtures of anxiety and depression in temporal lobe tumors, and tumors of the hypothalamus and third ventricle at the onset of degenerative disease like multiple system atrophy.

NEUROPATHOLOGY OF EMOTION

We have thus seen the varied presentations of emotional disturbances. Disorders of emotions cause difficulties for those affected to relate to their external world. Perhaps the most striking is the case of Nina. She has a pathological emotion. Patients with this condition show intermittently primary emotional behaviors of laughing, crying or both in response to trivial environmental stimuli. These stimuli may have little or no emotional significance. The emotional behaviors are real and involuntary. They have an 'all or none' quality. The behaviors do not actually reflect the patients' actual internal feelings. Often patients complain of their inability to control these behaviors. Many are distressed by the fact that they are exaggerated and socially embarrassing. Pseudobulbar palsy is seen in patients with lesions involving bilaterally the bulbar regions of the neocortex motor system or its descending connections. In patients with pathological emotion without pseudobulbar palsy there is a different mechanism. Here unilateral or bilateral lesions or rarely epileptic activity are seen in the basal forebrain, medial temporal lobe, diencephalons, or brainstem tegmentum.

There is another category of patients with pathological emotion where lesions are not seen in the above areas. These patients have left sided upper motor neuron weakness or weakness of at least the face and arm. They also have major

depressive disorder. In spite of their depression, the patients report that their emotional behaviors do not reflect their internal feeling state and that they are socially embarrassing. The condition improves rapidly with antidepressant treatment even weeks before the depression lifts. These patients have unilateral lesions predominantly involving the right frontal operculum (1).

The posterior hypothalamus is an important area for organizing species-specific primary emotional behaviors. Further, the above syndromes associated with specific brain lesions suggest that the cortex exerts a direct inhibitory control on these behaviors. Also, there are the rules of display of emotional behavior which show that control also involves cognition and is learned during the socialization processes of infants and children (2).

Lesions of the prefrontal cortex cause behavioral disturbances involving executive function and self-awareness. These produce clinical syndromes causing, to a variable degree and in different combinations, impairments in the following areas:

insight, foresight, judgment, social graces, creativity, empathy, reasoning and reliability, facetiousness, social disinhibition, puerility, environmental and stimulus dependency, euphoria, irritability and apathy despite relatively preserved overall intelligence, mnemonic, gnostic, language and perceptual function (3).

The frontal lobes may act at three levels (4):

- A) To maintain and organize information stored in the sensory-bound cognitive systems in the posterior regions of the brain into meaningful behavioral sequences in order to initiate and drive behaviors.
- B) To exert executive control on behavior through anticipation, planning, goal selection and the monitoring and evaluation of outcomes.
- C) To involve activities like self-awareness, relation of the self to the environment, metacognition (knowledge that one has knowledge), self-reflection and awareness of the past and the future.

NEUROPSYCHOLOGY OF EMOTION

Emotion is an expression of a basic mechanism of life regulation developed in evolution and is indispensable for survival. In a way it is communication to oneself and others. It consists of behaviors, physiologic changes and subjective experiences as evoked by thoughts or external events,

particularly those that are perceived as important (5).

The James-Lange theory proposes that emotion is experienced when the organism becomes aware of visceral and somatic changes induced by some event. Specific combinations of visceral changes produce different emotions (6). This view was challenged by Cannon, Bard and others.

The Cannon-Bard thalamic theory proposes that emotions result from concurrent brainstem and cortical events. Normally the cortex inhibits the thalamus. Emotion producing event removes this inhibition. The impulses that are released to the autonomic nervous system produce the emotional behavior (7).

The Schachter and Singer theory proposes that emotions and emotional behavior is produced as a result of information from two systems: the internal state regulated by the hypothalamus and the limbic system and the external environment or context in which the internal state occurs. When adrenaline is injected to humans, they can report feeling elated or hostile depending on the environmental stimuli. When adrenaline was given to three groups of individuals, informed, uninformed and misinformed groups, there was no significant change in the informed group to pleasant or hostile environment. But change was seen in the other two groups (8).

The most important method of evaluating emotions and emotional disorders is from observation. The observable emotional behaviors are called emotional indicators. These are: changes in heart rate, breathing, sweating, pupillary size, lacrimation, capillary circulation, sphincter control, endocrine secretion, freezing-flight-fight reactions, arousal, specific vocalizations and behavioral displays that vary with species, and in humans, verbal and prosodic aspects of language. These are organized through the endocrine system and the autonomic and somatic nervous systems. Cognition (thinking, knowledge) plays a very important role in the experience of emotion and its modification.

THE LIMBIC SYSTEM

The limbic system has long been seen as the emotion circuit in the brain. Broca introduced this term to describe the ring of gray matter (formed primarily by cingulate and parahippocampal gyri) encircling the corpus callosum and underlying upper brainstem. The medial forebrain bundle lies at the core of this system. It is a complex set of ascending and descending fibers that connect the orbitomesiofrontal cortex, septal nuclei, amygdala and

hippocampus above and certain nuclei in the midbrain and pons below (1). The limbic system is an abstraction and not an anatomical referent. It is an attempt to integrate neurobiological and psychoanalytical thought on drives, affects, behavior and learning. It is defined around the hippocampal formation. The hippocampal formation is the center of sensory integration and hence seen as the center of emotional experience. It projects to the hypothalamus which gives rise to emotional expression. Various components of the limbic system and their relationships to and from emotion circuits in the brain have been proposed which bear the names of the respective researchers – Panksepp sensory-motor circuits, the Papez circuit, the Gray circuit, the LeDoux circuit (9).

The functions of emotions as understood through the limbic system can be summarized as follows:

- Elicitation of autonomic response
- Flexibility of behavioral response to reinforcing stimuli
- Motivation
- Communication
- Social bonding
- Survival

STRESS AND EMOTION

Survival is a basic instinct. Thus the primary or basic emotions are those which serve an evolutionary need. These are experienced by all social mammals. Fear is a primary emotion. Many consider anger also as a primary emotion. Whether happiness and sadness are primary emotions is debated. Primary emotions in humans appear in the first year of life. They are consistent across all human cultures and also social mammals. In humans a given expression of emotion may no longer serve an evolutionary need. For example, the experience of fear while watching a horror movie. Secondary emotions or derived emotions are variations or combinations of primary emotions. Examples of secondary emotions include pride and gratitude.

When sensory stimuli enter the brain they are processed by various anatomico-physiological systems. We must know which systems lead to adaptive behavior and which to symptoms of illness. Experiences are processed and turned into memory. The areas of the brain implicated in the

processing of stressful or threatening or traumatic stimuli are the amygdala, the hippocampus, the locus ceruleus, and the orbital frontal cortex.

Research on patients with post traumatic stress disorder (PTSD) has shown that the amygdala is activated when exposed to traumatic elements of stimuli as compared with neutral stimuli. In other research, individuals who were exposed to trauma but did not develop PTSD were studied. Here the orbital frontal cortex was highly activated which differs from the experience of PTSD patients. The orbital frontal cortex has inhibitory control on the amygdala. Thus it is possible that if the orbital frontal cortex is not activated and thus not inhibiting the amygdala during trauma, the individual is more likely to show PTSD (10).

The locus ceruleus is a norepinephrine-rich nucleus situated in the pons. It is implicated in experiencing anxiety and stress. It is activated by stimuli that are especially threatening to the survival of the organism (10).

The hypothalamo-pituitary-adrenal (HPA) axis is a slow-acting stress response. Corticotrophin releasing factor (CRF) is a key neurohormone in this system which causes the release of corticotrophin or ACTH and thus the stress hormone cortisol. This system is affected in PTSD. This system may be significantly altered leading to long-term consequences if an individual is exposed to stress very early in life or even perhaps prenatally. This has implications for babies and children raised in traumatic environments and children born to mothers undergoing a variety of stresses during pregnancy including drug and alcohol abuse and smoking (10).

Research shows that exposure to stress can produce changes in the hippocampus including atrophy and cell death. Stress can stop normal neurogenesis or new cell growth of neurons in the dentate gyrus of hippocampus. MRI studies in PTSD patients and victims of early trauma have shown decreased volume in the hippocampus (10).

Modern methods of functional imaging like positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) have allowed researchers to study patterns of activity common in individuals with similar emotional orientations (11). Determining the biological basis of emotional response is a step toward understanding how emotions influence an individual's health. Modern imaging methods have allowed research to focus on positive emotions rather than the traditional study of disordered

emotion. Thus, we may be able to understand how positive states of mind influence the body.

Imaging of people characterized as having “approach related positive emotion” who are characterized by enthusiasm, alertness, energy, persistence in goal orientation and other positive traits show a distinctive pattern of left prefrontal activation. This is opposite to that seen in depressed individuals who show right prefrontal activation. Individuals who show the pattern of left prefrontal activation in infancy and early childhood show signs of exuberance and are highly social. Differences are also seen in the amygdalae of people who seem to be happy, positive individuals compared to individuals who seem more vulnerable to stress and tend to show more depressive responses to emotional life events (12).

A shift in this attention from research on pathological states to brain systems that regulate positive emotions and how they influence the overall health of the individual can help develop strategies to promote health by decreasing susceptibility to disease and increasing resilience.

Thus, the role of higher cortical areas in emotion is receiving increasing attention in modern research. Recent research suggests that emotions are essential for guiding and driving prefrontal behavioral functions. They ensure that actions based on logical premises and rational reasoning, are appropriate to the social situation and context. This has given rise to the concept of emotional intelligence. The prefrontal cortices have a primary role in the modulation of this most important aspect of human life (13).

EMOTIONAL INTELLIGENCE

Emotional intelligence is the ability to read, interpret and respond appropriately to the moods, needs and behaviors of others, to regulate ones own emotions and behavior and to effectively use emotions to motivate, plan and achieve goals to be successful in life. The components of emotional intelligence are self-awareness, managing emotions, motivating oneself, recognizing emotions in others and handling relationships (13).

Each individual has his or her own profile of varying abilities in these components. This is determined by nature or the bioneurological endowment, and nurture. Each individual has underlying neurological set-points that determine temperament. So, what determines this bioneurological endowment? Genes and heredity can partly explain this. But the patterns of emotionality are so individualistic and unique that the bio-psycho-social model

is an inadequate explanation. The fact that positive change can be induced by an effort of will gives it a spiritual dimension. This is where the Karma theory may help our understanding as we will see later.

COGNITION AND EMOTION

An intense stimulus produces an instant emotion. It is not logical as it is not processed by the rational mind. The accompanying thoughts are therefore 'automatic' and the behavior impulsive. There is a slower secondary component of an emotional reaction. This is reflective with extended appraisal. Here cognition plays a key role in determining the emotional response (14).

Emotional intelligence is what has been suggested to operate in the process of emotional relearning during psychotherapy. The dynamic between the amygdala and the more informed prefrontal cortex forms the neural basis of how psychotherapy reshapes deep rooted and maladaptive patterns of emotions. What change in psychotherapy are the responses people make once an emotional reaction is triggered. But the tendency for the emotional reaction to be triggered does not disappear completely. The limbic circuits continue to send alarm signals in response to perceived dangers but the prefrontal cortex may have learned 'emotional lessons' producing new healthy responses (13).

THEORY OF MIND

Another important concept to consider is the 'theory of mind'. To understand this we must first know about metacognition. This is knowledge that one has knowledge, or thinking about thinking. Thinking can be conscious or unconscious. This is revealed through metacognition or the regulation of cognition. It appears at about six years of age when a child begins elementary school. An important aspect of metacognition is the appearance-reality distinction: things may not be as they appear to be. This kind of knowledge requires some sense of the person's awareness of the existence of separate minds. It is the capacity to have a representation of another person as having ideas, perspectives and emotions that can be shared. This is called the theory of mind. Children with autism are believed to have a core deficit of this capacity (15). So, the theory of mind forms a most important part of social cognition and social behavior.

Impairment of emotion and social behavior is seen after damage to the ventromedial area (VM) of the prefrontal cortex. Previously very well adapted individuals become

unable to follow social norms and conventions and decide to their advantage in personal matters. They have difficulties in expressing their emotions and experience feelings in inappropriate social situations. Impaired judgment and decision-making are the core deficits.

However, the cognitive processes that subserve the extremely diverse and flexible social behaviors are complex. The neural substrates for processing of transgressions of social norms are hence complex too. Recent experiments using fMRI have shown changes in the more dorsal regions of the medial prefrontal cortex bilaterally and in the temporal poles. Both regions overlap with areas engaged in the theory of mind. However, these regions also participate in mechanisms of memory, emotion, and decision-making. There are many still unanswered questions and more research is needed for a clearer understanding of the complex neurology of socio-emotional cognition (16).

Chaos theory suggests that nonlinear complex systems must move continually towards maximizing the complexity of the system. To achieve such a goal requires a balance between various contrasting elements: continuity versus flexibility, familiarity versus novelty, and predictability versus uncertainty. Disruption of the balance towards either end gives rise to dysfunctional mental states: excessive rigidity in the pathology of character and excessive fluidity in the pathology of cognition or of mood (15). What purpose is this serving? It cannot be just for survival as evolutionary biology might suggest. The answer perhaps lies much deeper, perhaps somewhere in the unconscious?

TEMPERAMENT, CHARACTER AND PERSONALITY

Development of character and personality depend on emotional processes. The neurological substrates of emotion determine certain temperaments. Temperament involves emotions associated with one's basic needs (e.g. safety) called primary motives. After basic survival needs are met, the goals of normally developing personality changes to include not only the integrity of the physical self but also that of the mental self (e.g. self-esteem) and also a number of social goals and emotions like shame, pride and empathy. These are called secondary motives or social or growth motives.

The secondary emotions are linked to the formation of character and personality. The primary emotions of fear, anger, disgust, and excitement are transformed into more complex and predominantly positive secondary emotions of

love, empathy, compassion and resourcefulness. The transformation occurs by the process of interaction between internalized concepts associated with character and with basic emotions associated with temperament. The secondary emotions become the motivators for further development and maturation of character and personality. They initiate development of more flexible and adaptive personality traits (17).

Abnormal motivation or immature or deviant motivation occurs when two or three excessive, basic emotional needs are associated with threats to survival and basic physical integrity. Mature motivation develops when all the basic emotional needs are met and the person is thus free to experience the numerous secondary growth motives. This explains why there is inflexibility and poverty of motivation in deviant personality and flexibility and rich motivational diversity in mature personality (17). Can this be changed? Is there a possibility to move from inflexibility to flexibility?

PERSONALITY DISORDER

Consider the case of persons with a certain class of severe personality disorder termed Self Disorders (Classified under Cluster B Personality Disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) which includes Antisocial, Borderline, Histrionic and Narcissistic Personality Disorders (18). Such persons are usually charming and appealing. They can get another person to give away more personal information than is appropriate, all as a means to demand more attention, more intimacy and special treatment. They are impulsive with unstable emotions. They are selfish, self-centered and egotistic. There is no limit to their demands and need for control. Hence at some point the person becomes disappointed and feels betrayed by the other person. From 'saint' he is suddenly reclassified as 'devil'. When confronted, they threaten or actually begin to cause trouble. They use immature defensive tactics of accusations, lies, and denials of responsibility (19). Psychologically speaking they use primitive ego defenses of splitting, denial, projection, projective identification, etc.

Something more sinister is a condition called Munchausen syndrome by proxy (MSP). There is a difference of opinion as to whether this is a mental disorder or a crime. In 1977, Roy S. Meadow, consultant pediatrician, Saint James University Hospital in Leeds, UK, first reported a case of a six-year-old girl admitted with foul smelling and bloody urine. Analysis detected a heavy load of bacteria. She was

treated with high doses of antibiotics for massive urogenital-tract infection with little effect. There was something odd. The morning urine sample would show one kind of bacteria and the evening sample, another. Then an afternoon sample would have no bacteria. Nurses finally noted a pattern. Bacteria were found only in samples that the girl's mother helped to collect. Forensic analysis proved that the urine samples were contaminated with menstrual blood (19).

Jennifer Bush in the US was a child with multiple medical complaints since infancy – resistant disorders of her urinary system and digestive system and problems with immunity. By the age of nine, she was hospitalized 200 times and had undergone 40 operations and still had not improved. In 1996, the girl's mother was appealing through the press for help to meet her daughter's astronomical medical bills. She was arrested following detective work by the police and child-welfare workers in Florida where they lived. The girl's diseases were neither due to pathogen nor gene. The symptoms had been created by her mother. It appeared that the mother had been putting feces into Jennifer's feeding tubes. She was spending some of the money received through donations on her own self. What had looked like a letter appealing for help to President and Mrs. Clinton from Jennifer was actually scrawled by the mom (19).

Using an innocent child as a stand-in, so that attention and excitement can be gained at the expense of another's pain is very difficult to comprehend. These individuals are usually very charming and seductive. They insinuate themselves into the inner workings of the hospital. They gain the trust of the hospital staff, even infiltrating into their personal lives. They insist on helping out in every medical procedure and dismissing as absurd any suspicion. But when their actions begin to be suspected and they are confronted, they start using their prime defensive tactics – accusations, lies, and denials of responsibilities (19). Studies have shown that women who are involved in such behaviors exhibit traits of severe personality disorder classified under Cluster B Personality Disorders (18).

Individuals with such severe personality disorder who exhibit psychopathic behaviors seem to possess an affectless, cold-blooded and sinister ability to manipulate others' emotions. In the same context, the behavior of serial murderers who kill in cold blood and often torture their victims is incomprehensible. What is mind boggling is when some of them speak of "loving" their victims. A lot of research is necessary to more fully understand this

phenomenon.

But we can see how the above account of temperament and development of character may be used to partially account for the persistent maladaptive behaviors. A developmental model of personality takes into account the underlying biogenetic predispositions to observable behaviors and individual differences in responses to emotional experiences during growth and development. Childhood emotional trauma and how the child develops adaptive or maladaptive coping strategies during development help determine personality. There is some research to show that some progress can be made in improving or correcting some of these enduring character abnormalities in certain forms of personality disorders through the expert use of psychotherapy, cognitive behavioral therapy and its modifications, group therapy, therapeutic community method and also pharmacotherapy. But there is no evidence so far of a cure. How can one reconcile with such things in this existence? What purpose are they serving? Is transformation possible at all?

It may be relevant here to look at the story of Angulimala from the Buddhist text *Paramatthadipani* of Dhammapala (20). Shravasti was the capital of the kingdom of Kosala (part of modern Uttar Pradesh state in Northern India) in circa 500 B.C.E during the time of the Buddha. In the forest on the outskirts of Shravasti lived Angulimala (literally 'garland of fingers' in Sanskrit), a dreaded and ruthless highway bandit who plundered, terrorized, and killed travelers. He cut off the fingers of those he killed and wore them around his neck as a garland, thus giving him his name. His actual name was Ahimsaka ('the non-violent one'), a brilliant young man and a favorite of his teacher in the school. This aroused the jealousy of his fellow students who hatched a plot to estrange the teacher from him. As a result Ahimsaka incurred the displeasure of the teacher and was dismissed from the school. In those days this was a dishonor and a shameful thing. His family disowned him. The whole town shunned him as well and no one would employ him. He left the town and in disgust and desperation he became Angulimala the bandit, to take revenge on the society that rejected him. Though he was shunned by all, the Buddha chose to cross his path. This historic meeting between the forces of violence and non-violence eventually caused the latter to prevail. Angulimala became a disciple of the Buddha. We could probably call this story the making and breaking of a psychopath! There are valuable principles incorporating the doctrine of Karma in Buddhist teaching

that can enhance our understanding of aberrations of human emotional existence.

NURTURING THE BRAIN

Emotion directs the flow of energy – the activation within specific circuits of the brain – as the arousal/appraisal system focuses cognitive processes on elements of the internal and external environments. The energizing and deenergizing bodily responses are represented in the brain as somatic markers (12). They let the brain know how an individual feels about an experience. These somatic markers can then be used in future emotional assessments, or gut feelings or intuitions to an experience. The orbitofrontal cortex is the site implicated in the processing of somatic markers. This plays a central role in self-regulatory and self-organizational functions early in development with basic emotional reaction and social functioning. Early experience with caregivers is important in the maturation of this area (12).

A careful look at the mechanisms of early problems suggests how deficits in emotional and social competencies form the foundation for social and psychiatric problems. Hence there is a need for early identification and understanding of socio-emotional deficits. Only then can well aimed corrective and preventive measures be applied to make children more resilient and therefore ensure a healthy future. 'Nurturing the brain' is an emerging research field which integrates brain science, child care and education, and child neurology and neuropsychiatry (21). The development of the brain throughout infancy, childhood, and adolescence is paralleled by the growth and maturation of the mind. Neurological mechanisms underlying the theory of mind, personality development, mirror neurons, internal model, cognitive control, cognitive emotion regulation, and emotional intelligence are important themes in our understanding of the brain and the mind (21).

Prevention is better than cure. It is better to vaccinate and prevent meningitis than to send an ambulance to the rescue when the child is unconscious with high fever! Political and economic measures have their role in diverse areas such as alleviating poverty, improving social conditions, and improving the overall health of the family. But above all what is most important is to equip the child with emotional competence so that the child has emotional resilience in the face of hardship (13).

The skills that have been seen to make a difference are (13):

- Self-awareness
- Identifying, expressing and managing feelings
- Impulse control and delaying gratification
- Handling stress and anxiety effectively
- Developing interpersonal skills: reading social and emotional cues, listening, being able to resist negative influences, taking others' perspectives and understanding what behavior is acceptable in a situation
- Building self-esteem and self-confidence
- Assertiveness training

Since these are skills, it means they can be taught and learned. This means trained teachers who are themselves competent in these skills are needed. Parents can act as mentors in this endeavor. Mere teaching and learning are not sufficient. Like all other skills they have to be practiced. Practice is a continuous effort to achieve a steady state. Practice becomes well-grounded when continued with earnest attention and devotion without interruption over a long period of time (22). This needs the exertion of the will. When efforts are directed to achieve perfect mastery, then they become spiritual. Then perhaps one becomes qualified as an effective agent of transformation.

HOLISTIC HEALTH

There is nothing more valuable than our own health. We seem to realize it only when we lose it. We are living in a time of radical transformations of our environment. Our lifestyles and our thinking are constantly changing. It is a stress or what some have termed as “future shock”. Many experience this with fear and anxiety. There are so many things that are unknown including whether our culture will survive and even our planet (23). Can you see those basic words appearing again – stress, fear, survival? To be healthy and remain so in such a climate is a great responsibility. And to be emotionally healthy is a greater one. What about the teacher or health care professional who will have to help the child or for that matter an adult to achieve emotional competence?

All health care professionals, to whichever field they belong to and whatever tradition they follow, will be confronted by “difficult cases” that they are unable to explain with their classical or traditional knowledge. It is almost like the

problem is firmly rooted in the persons own history. Often the history is a secret one originating somewhere in the unconscious domain. It emerges at particular periods like flashes, psychologically or physically and through illnesses, accidents and even death (23).

Connections exist between the mind and body. This has been known since ancient times. An interdisciplinary science called psycho-neuro-immunology has emerged as a field showing the mind-body connection. Over 100 neuroreceptors have been discovered in white blood cells and in the immune system. The mechanism of the immune system itself reveals that the emotional states of the mind influences the number of T-cells and the immune reactions (24).

Freud noted in his ‘The History of Infantile Neurosis’: “The first relates to the phylogenetically inherited schemata... I am inclined to take the view that they are precipitates from the history of human civilization (25).” Similarly this is shown in works like Josephine Hilgard's anniversary syndrome, where symptom repetitions are observed during anniversaries (26) and Anne Ancelin Shützenberger's ancestor syndrome, where family ‘emotional secrets’ or ‘emotional ghosts’ are passed on through the unconscious of subsequent generations and can present as unexplained illnesses. In therapy patients are helped to rediscover their ‘history’ and thus find relief. What is more remarkable is how symptoms in children disappear when a parent is able to understand their own ‘history’. It appears as though the momentum of the past is passed on to the future. How the transmission occurs is still unknown (23).

THEORY OF KARMA

In the philosophies of the East we come across a concept called Karma, a Sanskrit word. A literal translation means ‘action’ or ‘work’ or ‘doing’. In Eastern philosophy and spirituality it has a special meaning. It is seen as a condition necessary for existence and continuity of beings. It is the will to live, to exist, to re-exist, and to continue, to become more and more, to accumulate more and more. In Buddhism it is interpreted as ‘mental volition’. It is seen as the cause of dukkha or ‘suffering’ or ‘impermanence’. Further the philosophy states that the cause of the arising of dukkha is within dukkha itself and the cause of the cessation of dukkha is within dukkha itself. To state it as a theory, any system, if it has within itself the nature of arising and coming into being, has also within itself the nature of its own cessation and destruction (27).

Karma is volitional action which may be relatively good, positive, healthy or relatively bad, negative, unhealthy. The effect of karma is to continue in either of the two directions of either good, positive, healthy or bad, negative, unhealthy. The terms themselves are relative and are within the 'cycle of continuity' called samsara. Karma is not to be confused with moral justice where a supreme being of God who is a law-giver administers rewards and punishments for good deeds and sins. Every volitional action produces its result by virtue of its own nature. This is not difficult to understand. What is difficult to understand about the karma theory is that the volitional actions belong to not only an individual but the individual's family, social group, ancestors and in a sense all beings past present and future, all relatively contributing to produce the effects even in a life after death. The will, volition, desire to continue, to exist, to become more and more is a force or energy that moves lives, existence, the whole universe and beyond and does not stop with the non-functioning of the body. It is seen as a great momentum. So when Eastern philosophy talks about rebirth or re-existence it is seen as part of continuity or samsara (27). It is irrelevant whether the person has any memory of his past life. So the re-existence does not mean reincarnation. Studies such as those of Ian Stevenson have looked at past life memories. Stevenson has gathered evidence for repeated lives or reincarnation – the survival of the human personality after death. The child remembers and recollects people and events from a previous life (28). Rudolf Steiner, founder of anthroposophy, has written much about Karma, though from a different perspective. He quotes Julius Baumann, professor of philosophy, University of Goettingen, from the Sketch of a Summary of Real-Scientific Religion: "Just as in inorganic nature the physical-chemical elements and forces do not disappear but only change their combinations, so is this also to be assumed, according to the real scientific method, in respect of the organic and organic-spiritual forces." (29). But the analogy has to end here because the author and Steiner further talk about soul or soul-spirit which reincarnates in future bodies, which is beyond the scope of this essay. Whereas re-existence is describing a process within the continuity of samsara, reincarnation is describing a state. The analogy used is that of a flame that burns through the night: it is not the same flame nor is it another. The re-existed person is not the same nor is he another (27). He (the present) is the effect (of the past) and also the cause (of the future).

Shankaracharya the great Indian philosopher who propounded the philosophy called Advaita or Non-dualism

explains that "as long as pleasure and pain are felt, so long are the karmas, past and present, are working themselves out. The effects or ripening of the fruit is because of former actions or karmas; where there are no longer karmas, there is no fruit. From the discernment of the truth or real nature of things, karmas heaped up through hundreds of millions of ages are dissolved as dream-actions on waking. Whatever be done at the time of dream, whether good or manifest evil, after he is awake, how can it visit him with heaven or hell? Similarly, when he has come to know the truth or reality, which rises detached like the sky, he is no longer entangled with future karmas forever." (30).

He further goes on to say that "Karmas already entered on retain their momentum or energy even in the case of those who have attained wisdom; only through being experienced are they consumed. Former karmas, karmas accumulated and future karmas melt away in the fire of perfect wisdom." He quotes the ancient Vedic scriptures saying that "the development of karmas exists to bring growth to those who are full of doubt and inert in mind through the experience of external things, but it is not to establish in the wise the belief in the reality of outer things." (30). All the great spiritual teachers and philosophers, both of the West and the East have stressed on personal responsibility. There is truth in the Chinese proverb "If there is righteousness in the heart, there will be beauty in the character. If there is beauty in the character, there will be harmony in the home. If there is harmony in the home, there will be order in the nation. Where there is order in the nation, there will be peace in the world." So, taking responsibility for one's feelings has a much wider implication and on a time-scale beyond just one's life span.

The mind-brain connection is indeed most complex. Interdisciplinary research covering the social sciences, molecular biology, medicine, quantum physics, animal and human ethology, philosophy and spirituality will allow us to better understand the neurology of emotions thus enabling the new knowledge to be incorporated into modern health care.

CONCLUSION

"I can't believe the purpose of life is to be happy. I think the purpose of life is to be useful, to be responsible, and to be compassionate. It is above all to matter; to count, to stand for something, to have made some difference that you lived at all." (Leo Rosten)

We started with looking at disorders of emotions and their

various manifestations. We then looked at specific neuropathologies in specific brain regions in people who have disorders of emotion. We explored the psychological theories. We then saw how stress affects emotions. We looked at the role of cognitions. Emotional intelligence then emerged as an important necessity which can be cultivated. We journeyed further into the theory of mind and then the emotional basis of development of temperament, character, and personality. We looked at how emotions play an important and intriguing role in personality disorder. In nurturing the brain we looked at the importance of training children to manage their emotions as a preventive measure. In holistic health we explored the mind-body connection. By presenting the karma theory at the end, this essay hopes to demonstrate a new way of looking at how emotions are at the very core of all human activities. More wars have been fought as a result of emotions. We can see how emotions continue to be the major factors in chronic conflicts between individuals, groups, religions, and nations. Neurology tells us the where and the what. The Karma theory perhaps gives us a glimpse into the how and the why. This knowledge is very helpful in understanding our own emotions and thus makes us more aware of its power. It may perhaps help us to come to terms with and accept our own actions and reactions. This will perhaps help us manage ourselves better and conduct ourselves more responsibly. It gives more meaning to the prayer: "May I have the serenity to accept the things I cannot change; courage to change the things I can; and wisdom to know the difference."

ACKNOWLEDGEMENTS

I am grateful to both Dr. Vladimir A. Zhadnov, MD, DSc, Assistant Professor and my supervisor, and Prof. Anatoliy S. Starikov, MD, DSc, Professor and Head, Department of Neurology and Neurosurgery, Ryazan Regional Clinical Hospital, I.P.Pavlov Medical University, Ryazan, Russian Federation, for their guidance and kind support.

CORRESPONDENCE TO

Ramanujapuram Anand MBBS, DPM, MD (Neurology)
Clinical Ordinatur Department of Neurology and
Neurosurgery Faculty of Medicine I.P.Pavlov Medical
University Ryazan, Russian Federation E-mail:
ranand@medscape.com

References

1. Victor M, Ropper AH. 2001. The Limbic Lobes and the Neurology of Emotion, In Adams and Victor's Principles of Neurology, seventh edition. International Edition: McGraw-Hill Companies Inc. 2001.

2. Damasio AR. Descartes' Error: Emotion, Reason, and the Human Brain. New York: Grosset/Putnam; 1994.
3. VanScoy, HC. Unraveling the Biology of Emotion. Available at http://psychcentral.com/library/biology_emotions.htm Accessed 4 May 2001.
4. Stuss DT, Benson DF: The Frontal Lobes. New York: Raven Press, 1986.
5. Darwin C: The Expression of the Emotion in Man and Animals. London: John Murray, 1872 (reprinted by University of Chicago Press, 1965).
6. James W: The physiological basis of emotion. Psychol Rev 1894; 1:516-529.
7. Cannon WB. The James-Lange theory of emotion: A critical examination and an alternative theory. Amer J Psychol 1927; 39:10-124.
8. Schachter S, Singer JE: Cognitive, social and physiological determinants of emotional state. Psychol Rev 1962; 69:379-399.
9. LeDoux JE: Emotion and the amygdala. In: Aggleton JP, Ed. The Amygdala: Neurobiological Aspects of Emotion, Memory, and Mental Dysfunction. New York: Wiley-Liss, 1992:339-351.
10. Charney, DS. 2000. Understanding PTSD in Discovering Ourselves: The Science of Emotion Executive Summary. LC/NIMH Decade of the Brain Project. Available at <http://www.loc.gov/loc/brain/emotion/Charney.html> Accessed April 16, 2005.
11. Mazziotta JC. Imaging: window on the brain. Arch Neurol 2000; 57:1413-1421.
12. Damasio AR, Tranel D, Damasio H: Somatic markers and the guidance of behavior: Theory and preliminary testing. In: Levin HS, Eisenberg HM, Benton AL, eds. Frontal Lobe Function and Dysfunction. New York: Oxford University Press, 1991:217-229.
13. Goleman D. Emotional Intelligence in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, seventh edition on CD-ROM, Philadelphia: Lippincott Williams & Wilkins. 2000.
14. Ross, ED. 1997. Neurology of Emotion and Cognition in Timble, M and Cummings, J (eds.): Contemporary Behavioral Neurology. Oxford: Butterworth-Heinemann. 1997.
15. Siegel DJ. Perception and cognition in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, seventh edition on CD-ROM, Philadelphia: Lippincott Williams & Wilkins. 2000.
16. Bechara A. 2002. The Neurology of Social Cognition. Brain, Vol. 125, No. 8, 1673-1675, August 2002.
17. Collinger CR, Svrakic DM. Personality Disorders in Kaplan and Sadock's Comprehensive Textbook of Psychiatry, seventh edition on CD-ROM, Philadelphia: Lippincott Williams & Wilkins. 2000.
18. American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 4th Edition. Washington, DC, American Psychiatric Association, 1994.
19. Sapolsky RM. Nursery Crimes. The Sciences, vol.39/Number 3. May/June 1999. New York: The New York Academy of Sciences.
20. Dhammapala. Circa 600 A.D.E. Achariya Dhammapala's Paramatthadipani edited by D.L.Barua. London: The Pali Text Society. 1979.
21. Ito M. 'Nurturing the Brain' as an emerging research field involving child neurology. Brain Dev. 2004 Oct.; 26(7): 429-33.
22. Patanjali Yoga Sutras - ancient Indian text on Yoga, exact period not known, probably circa 500 B.C.E. Translated by Swami Prabhavananda and Christopher

Isherwood. Chennai: Sri Ramakrishna Math.

23. Ancelin Schützenberger, Anne. Translated from French by Trager, Anne. 1998. *The Ancestor Syndrome: Transgenerational psychotherapy and the hidden links in the family tree*. Hove and New York: Brunner-Routledge. Reprinted, 1999.

24. Ader R. 1981. *Psycho-neuro-immunology*. New York: Academic Press. Revised edition, 1991.

25. Freud S. 1915. *The History of an Infantile Neurosis in the Complete Psychological Works of Sigmund Freud*. London: the Hogarth Press, 1953.

26. Hilgard JR. 1953. "Anniversary Reactions in Parents Precipitated Children," *Psychiatry* 22: 113-121.

27. Sri Rahula, Walpola. 1959. *What the Buddha Taught*. Oxford: Oneworld Publications. Reprinted, 2001.

28. Stevenson I. *Children Who Remember Previous Lives: A Question of Reincarnation*. Charlottesville: University Press of Virginia, 1987.

29. Steiner R. *Reincarnation and Karma*. Translated from German by Lisa D. Monges. USA: Anthroposophic Press. 1962.

30. Shankaracharya. Circa 788-820 A.D.E. *The Crest Jewel of Wisdom (Vivekachudamani in Sanskrit)*, 69-71. Translated by Swami Turiyananda. Chennai: Sri Ramakrishna Math. 1991.

Author Information

Ramanujapuram Anand, MBBS, DPM, MD

Department of Neurology and Neurosurgery, Faculty of Medicine, I.P.Pavlov Medical University