

1 EDITORIALS MIRROR NEURONS:

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Essentially, *mirror neurons* respond to the actions that we observe in others. These "*mirror neurons*" were hypothesized as a part of the brain's motor system. Many questions can be answered by these *mirror neurons* i.e. Why we so deeply feel bad and pain and involved emotionally when we see people in agony and distress? How is it that we can read other people's body language and faces as well? Why we show empathy? How we learn language by imitation? A special circuit is found in brain that helps us the ability to connect with one another. This is the brain's mechanism of translating what we see so we can relate to the world and understand others. This a very important step in social evolution and socialization of human being and so we call a man is a social animal. This neuronal brain circuit is called Mirror neuron systems or mirror neurons. Mirror neurons are neurons which fire while watching some one perform an action and observing an event. They provide an internal neuronal representation of actions and intentions of others. A mirror neurons fires both when a man/animal acts and when the animal observes the same action performed by another. Thus, the neuron mirrors the behavior of the other, as though the observer were itself acting. From the evolutionary point of view, these neurons are deeply involved in skill learning, implicit learning, emotional attunement, empathy and social behavior. Mirror neurons found by Giacomo Rizzolatti in 1992 when he placed electrode in motor cortex of the monkey. Actually he wanted to study the neurons specialized for the control of hand actions i.e. grasping, when monkey observes and perform similar action performed by other. And thus Mirror neurons were discovered. Similar sets of neurons were also observed in human being by fMRI Study of brain. They showed that regional activation in fMRI when witnessing an action. The same neurons fired when one observe an emotion on faces. It suggests that mirror neurons send signals to the limbic and emotional systems in the brain. This in turn allows us to empathize. Humans instinctively respond to emotion seen in other's faces and bodies.

Deeper in our brain, we are meant to be together, and socially interact.

Researches done on primates and humans with the help of TMS, PET and fMR found convincing evidences that mirror neurons fire during goal-directed actions, observation of similar actions and even when observed action is partly hidden and brain try to complete with mirror neurons. It follows that the Mirror Neuron System codes the intention associated with the observed action of others. It is further hypothesized that the Mirror Neuron System is vital for the understanding of emotional states in others (which are mostly communicated by facial expression). In human being, the Broca's area plays an important role in imitation and language learning in early life by Mirror Neuron System. Mirror neurons are more active during "mirror"-imitation than in anatomically correct imitation. Mirror Neuron System interacts with motor areas and the dorsolateral prefrontal cortex during imitative learning.

Anatomically Mirror neurons are presumed to be present in F5 area and orbito frontal areas in prefrontal lobe, and act via amygdala and insula. Mirror Neurons of these areas codes abstract aspects of an action and intention. Mirror neuron system activity in the human

of area F5—the pars opercularis in the inferior frontal gyrus—has been consistently reported during imitation, action observation, and intention understanding as observed by Rizzolatti. Neurons located in the ventral premotor cortex and inferior parietal lobule that respond when the individual makes a particular movement or sees another individual making that movement. The mirror neuron system includes the mirror neuron circuit I for the purpose of intent of the Action/Mediation of Understanding of Emotional States of others Recognition involves the ventral stream of the visual association cortex including the inferior temporal cortex. The Perception of location and movement involves the dorsal stream of the posterior parietal cortex. An action is understood when its observation causes the motor system of the observer to begin to 'resonate.' So, when we observe a hand grasping an apple, the same population of neurons that control the execution of grasping movements are activated in the observer's motor areas. In other words, we understand an action because the motor representation of that action is activated in our brain." The neurons responded to either the sight or the execution of particular movements.

As Mirror Neuron System plays a key role in social cognition, studies have revealed structural abnormalities in Mirror Neuron System patients with autism. Autistic children showed reduced Mirror Neuron System activity during observation and imitation of emotional facial expressions and social cognition. Such autistic Infants avoid contact & fail to anticipate being picked up Incidentally during first few Years of life they develop some skills such as 'walking' or 'talking' quicker than normal but other skills and developments are considerably delayed .As toddlers autistic show abnormal behaviors i.e. Start to see social dysfunctions "Insistence of sameness", lack of imaginary play ,avoidance of eye contact .Autistic Individuals are lacking the ability to attribute mental states or understand that another individual has a different perspective. Though 10% of autistic kids seem to have a certain remarkable talent ,ultimately it has been concluded that individuals with autism are lacking mirror neurons that would normally allow them to have an understanding of the thoughts, feelings, actions and emotions of others. So in short autistic children demonstrate deficits in 1) social interaction 2) verbal and nonverbal communication 3) repetitive behaviors or interests. In addition, they will often have unusual responses to sensory experiences, such as certain sounds or the way objects look. Each of these symptoms runs the gamut from mild to severe. They will present in each individual child differently.

Discovery of the mirror neuron system allows for finer tuning of social interactions between robots and humans. Humanoid" robots socially interact with humans. Not only humanoid robots, but in future robotic limbs ,muscles will also perform actions by control mirror neurons of human being also.

References

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