

MODERN CONCEPTS OF RECOVERY and REHABILITATION-CNS AFFECTIONS (MIRROR SYSTEM)

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Abstract

The concept of mirror therapy is an interactive phenomenon, studies reveal that identical sets of neurons can be activated in an individual given that it is only a witness in an action performed by another person, sometimes activation of these neurons is the expression of emotions or conduct.

Mirror neurons are a particular class of visual and motor neurons, first discovered in area F5 of the premotor cortex in monkeys. To humans, brain activity they are involved in mirror neurons occurs in the premotor cortex and inferior parietal cortex.

An important functional aspect of mirror neurons is the relationship between the motor and visual properties. All mirror neurons show a congruence between actions that respond to visual and motor responses that encode them.

Two important hypothesis have been issued on the functional role of mirror neurons. The first is that mirror neurons activity mediates imitation, the second sustain that mirror neurons are the basis of action understanding. Mechanism makes it possible mediation by understanding others actions mirror neurons is simple. Every time an individual action taken by someone else noticed, neurons that represent that action are activated in premotor cortex of the observer.

This motor representation of the observed action, which is induced automatically, corresponds to that generated spontaneously during an active action, whose result is known individual. Thus, the mirror system transforms visual information into knowledge.

Structural theories are presented and related to mirror neurons and empathy. Empathy is defined as an emotional or intellectual identification with another person, living it indirectly feelings or ideas. Empathy extends

beyond simple understanding of the emotional state of a person through to the other living feel. A fundamental concept is that the similarity in the mirror mechanism is activated closely with a stimulus or more from outside. The catalyst may be observing motor actions and facial expressions such as disgust, joy or fear.

In conclusion, we believe that this class of specialized cells of the brain is located in parts of its responsiveness to sensory and motor stimuli (visual, olfactory, auditory, tactile).

Using functional MRI to study the influence of different scents on the brain, a team of researchers exposed a subject to three types of olfactory stimuli: bad, pleasant and neutral, in order to obtain a sense of disgust, pleasure or a neutral reaction.

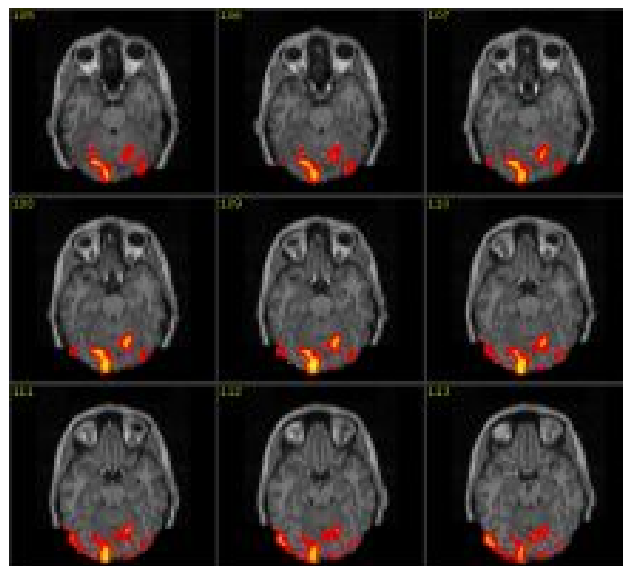


Figure 1. The mirror neurons system of the brain (<http://news.softpedia.com>)

Meanwhile, a functional MRI was done a second topic, which only reactions observed in subjects exposed to facial stimuli. Both the in the case of odor, and of the nice (but not the neutral), researchers reported that both the amygdala (associated with emotions) and island (a structure has extensive connections with the amygdala and other somatosensory areas) observer were enabled. The result sustain role of mirror neurons in human relationships.

Since activation of mirror neurons is dependent on empathetic identification with others, a researcher lead further the idea and distinguish two types of identity: **individual** and **social**. Social identity is a capacity based on neurobiology for empathy and understanding the of others, evolving from the first interactions with others. Thus, there is a connection between

intersubjectivity and empathy, inter subjectivity is defined as the embodiment of empathic processes between an individual and another, when notice an act or expression of feelings. Are considered precursors of empathy: *printing, attachment and synchronization*. Printing is a pattern of behavior transmitted by biological automatically creates a receptivity to certain stimuli (e.g. from mother to child). A This mechanism allows the recognition and attachment to members of the same species. To humans is considered to be the basis social and emotional attachment that has a newborn from the one who caregivers. At a level neuro-anatomical, visual stimuli and affective are transmitted through brain connections into the right hemisphere, between temporal anterior lobe and orbital frontal cortex (located behind the eye), an area associated with the central view.

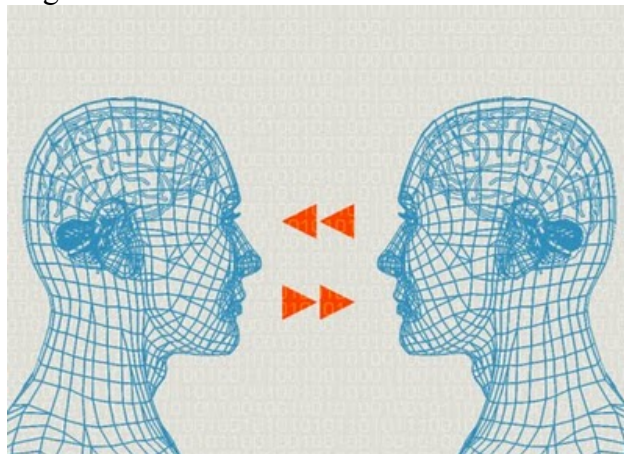
By visual stimulation that comes from interaction of parties supported through mutual eye contact, mirror system print specific areas of the brain child, promoting and facilitating neurobiological development, an increase of dendritic connections in areas that form behavioral types. Dopamine has been identified as the main neurotransmitter that activated the neural interface. Active participation in the mirror system is considered essential for normal attachment training scheme.

Synchronization, even if is often unconscious, start printing and is dependent on familiarity, recognition and knowledge, being a prototype of preverbal communication. Thus, synchronization sets the hidden intersubjectivity and social knowledge.

As dance-movement therapy, the therapy in mirror may have one or more forms, exercised through movement, facial expression or voice. Stand on the basis of dynamic interactions, neurons in networks with similarity in the mirror, within the central nervous system starts actively. In theory, sets neurons from the central nervous system are augmented by therapist when they move in sync with the patient or therapist observe the patient only when moving. In the latter mode, the network generates active mirror neurons, in fact, interneurons connectivity between two individuals.

To see the involvement of mirror neurons and empathy in dance-movement therapy, were offered two examples: a project supported by the dance choreographer Bill T. Jones and a survey on dance-movement therapy done by a student

with the title: "What Muslim women feel their bodies in dance-movement therapy? ". Jones dance started from to some original gestures, which participants served as a basis, these amplifying them or changing them. The second study to preserve the integrity of primary or original movements.



Even if they were different, the two projects have depended on the interaction phenomenon and undoubtedly related to the structure of mirror neurons, which depend on intersubjectivity, synchronization and empathic relationship. Mirror therapy has had positive effects in various diseases, such as phantom limb pain, AVC, and complex regional pain syndrome after surgery on the hand.

Phantom limb pain occurs in 90% of amputations, this type of pain can be produced by a conflict between visual feedback and proprioceptive representation of the amputated limb. Mirror therapy has been used with some success in patients with limb impairment. Under direct observation, patients were performed for 15 minutes daily therapy. Pain intensity decreased by treatment in the mirror, as the number and duration of pain episodes, 100% of patients. The results were different from those obtained in control groups, such as covered mirror group, where only 17% reported improvement in pain, and 50% worsened and mental visualization group, where 33% reported a decrease pain and 67% a worsening.

Reduction of pain that is associated with mirror therapy, may occur due to activation of mirror neurons in the cerebral hemisphere contralateral to the affected limb. Clinical studies have shown that mirror therapy may be used to improve recovery after AVC. In one study, to examine brain activity during unilateral movement 5 handed healthy subjects with or without reflection in the mirror to see the hand

movement. The results suggest that mirror therapy is most effective when used for motion dominant right hand, this phenomenon can be related to different handling of the non-dominant hand and dominant. Some neuro-physiological mechanisms basic to explain these reactions mirror therapy are still unclear.

One hypothesis is that mirror therapy improves cerebral blood flow in cortical areas designated to represent the mirror neuron system, this method is more efficient than the unaffected hand movement observation. The study was conducted on four healthy subjects and 3 with middle cerebral artery AVC, both groups received a functional MRI while executing a series of moves. Results showed that using mirror therapy technique, there was a significant increase in cerebral blood flow in the premotor cortex above. These studies provide neurophysiological evidence that cortical areas designated to represent the mirror neuron system is engaged during mirror therapy in AVC patients.

Ekman said that people show common reactions those that match the better. People are neurologically equipped with the ability to feel, to know and to understand each other. Capacity and level of experience consists empathic responses that influence the definition of personal and social identity, closely linked with its vision of the world. Empathic reflection is considered part of the therapeutic process. Identification of intersubjectivity can be seen as an empathetic projection, a phenomenon of great importance psychotherapy that meet exchange problems that guide the therapist-patient relationship.

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