

Article

Arts as a tool for communications and rehabilitation. The findings from Neurosciences

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Abstract. The link between arts and brain is reported, describing the relationship between several brain area and the artistic behavior, the modifications of the art performances following pathologic conditions, art performed by mentally disabled patients as an instrument of communications and rehabilitation, and finally the example of Stendhal syndrome as a condition in which arts may stimulate brain, in susceptible subjects, leading to physical and psychological disturbances.

Keywords: art and brain, Stendhal syndrome, art and brain pathology.

From long time the relationship between arts and brain have been very much investigated, discussing the problem from the psychological and neurobiological point of views, due in the recent years to the growing interest among neuroscientists and vision scientists in art and aesthetics, exemplifying a more general trend toward interdisciplinary integration in the arts, humanities, and sciences.

The experience of art is a complex one. It emerges from the interaction of multiple cognitive and affective processes that have been also deeply clarified by integrative research by neuropsychological and neuroimaging studies able to show the brain networks linked to them.

This network can be divided into three main functional components:

- (i) prefrontal, parietal, and temporal cortical regions supporting evaluative judgment, attentional processing, and memory retrieval;
- (ii) the reward circuit, including cortical, subcortical regions, and some of its regulators, that is involved in the generation of pleasure and emotions, and the valuation and anticipation of reward; and
- (iii) attentional modulation of activity in low-, mid-, and high-level cortical sensory regions enhancing the perceptual processing of certain features, relations, locations, or objects.

By investigations with functional neuroimaging also differences have localized in left and right hemispheres, the first one mainly involved in motion, in language, in analytic thinking, in rationality and mathematics, while right brain is mainly involved in holistic thinking, in creativity, in arts and music. In the relationship between the two brains, a crucial role is played by mirror neurons, whose main role is to connect and interact between the different brain areas.

One of the main artists' capacity is to emphasize different visual attributes: shapes; colors; motion; spatial positions. These features derive from interactions between the dorsal (where) and the ventral (what) visual stream. The dorsal stream is sensitive to contrast differences, motion and spatial position. Since shape can be derived from luminance differences, that artists can use contrast to produce shapes, leaving color for expressive, rather than descriptive purposes (see example: Derain's portrait of Matisse) (1,2) (Livingstone, 2002; Chatterjee, 2004).

Is artistic performance influenced by pathological brain diseases?

In consequence of the concepts previously reported, it seems evident that pathological alterations of brain, after different diseases like neurodegenerative (Alzheimer's diseases and other dementias; Parkinson's diseases, etc) or vascular diseases (stroke, brain hemorrhage) or other conditions may influence the drawing style and general performances.

Following an interesting case affected by Alzheimer's diseases, Crutch et al (2001) (3) reported that the brain localization of the lesion (vascular or neurodegenerative) has a different influence on artistic performance: Damage of the right hemisphere changes the spatial arrangements between the parts of an image. Damage of the left hemisphere induces an oversimplification of drawings while maintaining the overall spatial organization. A combination of these drawing deficits has been observed in patients with Alzheimer's disease.

Espinel (1996) (4) described the changes in drawing performances by De Kooning, a member of the USA expressionist movement, showing how colors and forms changed with the severity of personality and memory disturbances.



A)



B)



C)



D)

Fig 1. Drawings by W. DeKooning (1904-1997), in the course of the dementia illness: 1952, Woman I; B) 1958, Suburb in Havana; C) 1979 and D) 1985, Untitled. (Espinel, 1996, 4).

Similarly, Lythgoe et al (2005) (5) described a case in which a painter after the subarachnoid hemorrhage presented severe depression and complained of a “split-mind disorder.” He also claims to have had difficulty in shaving the left side of his face and his very early drawings show some signs of left hemispatial neglect. In fact lesions of the right parietal lobe inhibit the identification of the space at the left part of the environment and this is reflected also in the drawing paintings that lack of the left part of the space originating the clinical syndrome of hemispatial neglect.

More evident are the link between psychic troubles, abuse of toxic substances and artistic performances, where many examples are known and a large literature is present.

Also in patient with elective mutism, it is present an interesting phenomenon, with a better capacity of drawing in the phase of a more severe deficiency of verbal communication. When it was improved, after psychotherapy, we may assist to a decrease of capacity of graphic performances, similar to those of children of the same age (fig.2) that is parallel with the increase of the verbal communication capacities (Reda M, et al, 1998) (6).

These findings were also reported by Selfe, L. (1977) (7) in autism.



Fig 2. Drawings from a 6 old children, with selective mutism before therapy showing a very good graphic performances, not related with the age , and one year after, when he was able to have a normal verbal communication but the very good graphic capacity have been lost (Reda et al, In Federico A, 1998) (6).

Evaluation of the esthetic capacity of the brain

Data from functional neuroimaging have reported that the complexity of the forms activate the fusiform girus, complexity and aesthetic judgements activate orbitofrontal cortex, complexity and symmetry judgements activate right prefrontal and premotor area (Jacobsen et al., 2006). (8)

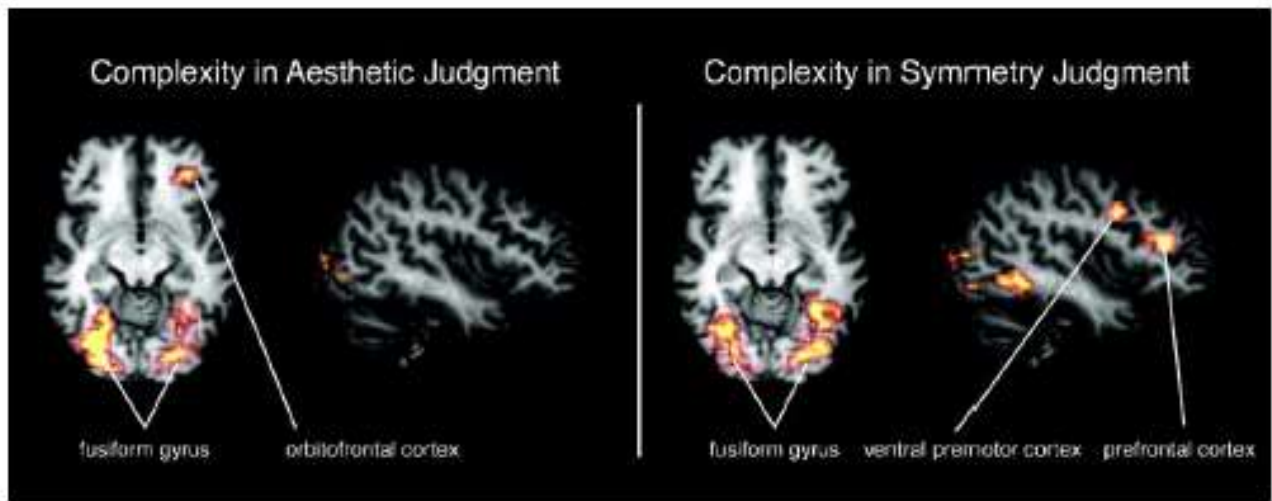


Fig.3 . Parts of cortical network involved in aesthetic judgments activated in social, moral and other evaluative judgments. (Jacobsen et al, 2006) (8).

But also mirrors neurons are involved. In fact the frontal and parietal areas are activated during the vision of a classic statue, and if it is well and symmetrically done, the insula (i.e. the part of cerebral cortex where informations are directed from inside and outside), is very much activated.

Stendhal syndrome

Stendhal syndrome is a psychosomatic disorder occurring as a reaction to art, producing an overwhelming reaction to a large amount of art being present in one place or if a work of art is particularly attractive to the viewer. It is manifested by physical symptoms as the result of the psychological and emotional reaction to art.

Its name is related to the French writer, Henri-Marie Beyle, with the pseudonym Stendhal, who experienced overwhelming symptoms of anxiety and even fainted while viewing art in Italy. The Italian psychiatrist, Graziella Magherini, however, in the 1970s first began to apply this name to patients with symptoms similar to those first described by Stendhal in the 19th century. Symptoms of Stendhal syndrome include anxiety, heart palpitations, dizziness and fainting. Some individuals also manifest hallucinations while observing great works of art (9).

Stendhal published it in his book "Naples and Florence: A Trip from Milan to Reggio". In the book, when writing his visit to Florence, in the Basilica of Santa Croce the author describes the symptoms he had. He indicates that he spent all day visiting works of art, in churches, museums and admiring statues, frescoes and facades. Everything happened when he entered the Church of Santa Croce, where he feels stunned. He indicates experiencing unique sensations when contemplating the Sibyls of Volterano. For example, he felt a lot of emotion, his heart was racing and he was dizzy. "I was in a

kind of ecstasy, of the idea of being in Florence, near the great men whose tombs I had seen. Absorbed in the contemplation of sublime beauty... I reached the point where one encounters celestial sensations... Everything spoke so vividly to my soul. Oh, if I could forget. He had heart palpitations, which in Berlin they call "nerves." Life was drained from me. I walked with the fear of falling." (10)

Art production by severely mental disabled patients

Another important questions deriving by art observation of drawings by mentally disabled patients, is the fact that in some cases they are similar to paintings of great artists opening a question whether all art manifestations are true art and which difference may exist between the drawings of an artist and those of a patient that utilizes this type of non verbal communication type. Similar performances has also been collected by monkeys (The painting monkeys, You Tube).

We discussed all these findings in a meeting followed by a book several years ago (A. Federico. 1998) (11).

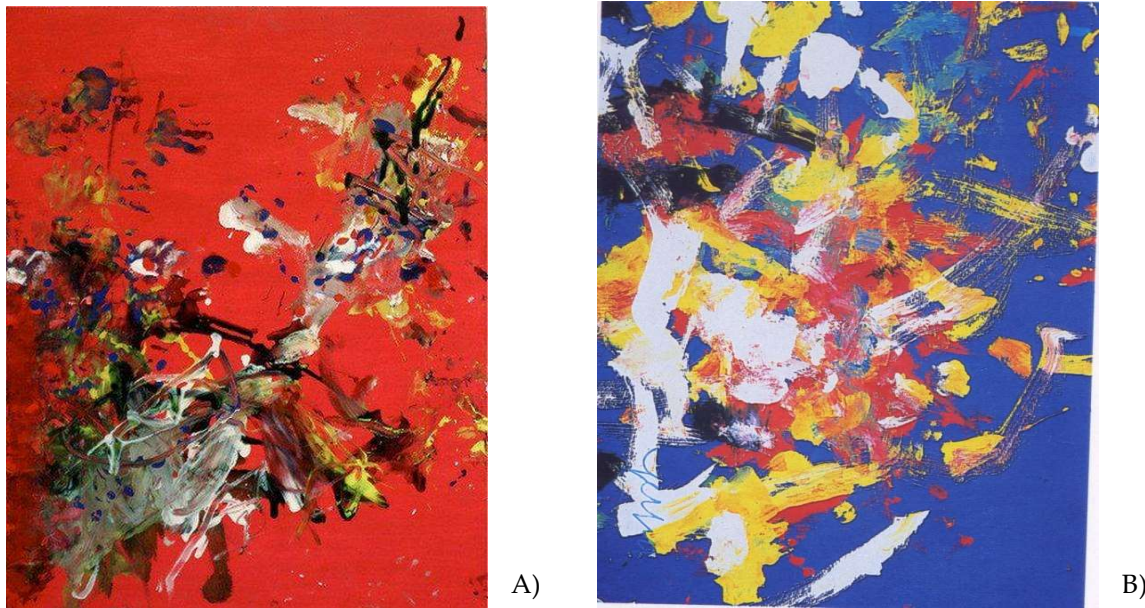


Fig. 4. A) A painting of Pollock. B) A painting of Germana, a 16 years old patient, affected by severe microcephaly, epilepsy and severe mental retardation (Federico, 1998) (11).



Fig 5. The Painting Monkey (You Tube, see reference 12).

But art is a very important means of communication and it may be also utilized as rehabilitation with good success. This is art therapy or better indicated as expressive not verbal therapeutic activity, better definition than art therapy, since it does not imply an esthetic evaluation, that is not required for the therapeutic finalities. The first ateliers of drawings in psychiatric hospital have been in USA since 1920 and after they have been organized everywhere also outside the Psychiatric Hospitals. In Italy, we remember the important experiences of the Trieste Psychiatric Hospital, The Marco Cavallo, and many others.

Art therapy is further organized as a discipline linked with other rehabilitation methods (psychotherapy, horse- therapy, work-therapy, music-therapy, etc).

The ARTEinMENTE experience (Rome, 2017-18)

The ARTEinMENTE experience was created by one of us (FF) in collaboration with an Architect and designer (E. Sartogo) and an art advisor (C. Turati) to promote the children interaction with the artistic experience in order to improve their cognitive skills through a series of workshops, cultural visits and recreational activities. The focus of the experience is the creative and interactive process: art can be a natural tool to widen the expressive potential of children through a thorough and technical knowledge. Art can be a powerful tool to promote creativity, fun, concentration and potentially the behavioral positivity of the individual. The cognitive rehabilitation, also taking advantage of the artistic support, aims to enhance the thought processes by developing and stimulating the functions involved. Intellectual processes can be modifiable, educable and re-educated thanks to the influence of effective educational mediations.

The ARTEinMENTE project provided a cycle of free art workshops for groups of children with ADHD with the idea of enhancing their creativity and resources , strengthening their self-esteem and the capacity for emotional regulation.

In a study by Abraham et al. (2006) (13), adolescents with ADHD, adolescents with conduct disorder, and a control group were each assessed with creativity measures. The ADHD group was found to have a higher rate of being able to overcome constraining examples ("thinking outside the box"), but

had difficulty creating an invention from an imagery task. In a study by White and Shah (2006) (14), people with ADHD were found to score higher than those without ADHD in a measure of divergent thinking (ie. coming up with creative solutions to a problem). However, people with ADHD did not score as well as those without ADHD on a measure of convergent thinking (ie. giving the "correct" answer to a test question).

A later study by White and Shah (2011) (15) found that people with ADHD scored higher in original creativity and creative achievement than those without ADHD. It was also found that people with ADHD preferred generating ideas, while those without ADHD preferred clarifying problems and developing ideas.

Aim of each workshops was narrating an illustrated story through the Works of Art, Architectural Spaces and / or the Artist's Atelier and to make it continue to each child through their imagination and dreams. In each workshop we produced a narrative space, a productive space and a small artistic snack to be shared together .

During all the workshops the children were individually followed and had the opportunity to interact with the artist's work by engaging all together to build a single work / final story together with the Artist or Collector.

In a mixed group with typically developing children all child founded his space and his special talent: they experimented the possibility to be out of the rule inside the rule of each workshop.



Fig. 6. ARTEinMENTE. Pictures during a workshop with ADHD children.

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