Spatial representations, distortions and alterations in the graphic and artistic production of brain-damaged patients and of famous artists

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Summary

The authors review the drawing disorders that can be observed in patients with brain damage (in particular, those with constructional apraxia and unilateral spatial neglect), the impact of brain damage on the output of professional artists, and the distortions of body image that characterise the work of many great artists, from Rubens to Lucien Freud. These different perspectives share the basic assumption that the graphic and artistic output of patients, normal subjects, and exceptionally gifted individuals may represent a window onto the neural organisation of body image.

KEY WORDS: anosognosia, body image, body schema, constructional apraxia, dysmorphophobia, unilateral neglect.

Introduction

The portrayal of the human body that characterises the work of certain figurative artists, belonging to different historical periods, may evoke “assonances” in the mind of a neurologist. Indeed, some of the body image alterations observed in human pathologies, particularly neurological and psychiatric diseases, can seem, somehow, to reflect the way the human body is represented in famous works of art. The efforts of researchers to understand these assonances has led to an open debate and, in this regard, a quote from Semir Zeki, pioneer of the research currently called neuroaesthetics, is mandatory: “Artists are to some extent neurologists, they study the brain with techniques accessible only to them” (1). The assonances between artists' figurative representations and the representations of body image derived from analyses of the verbal descriptions (and sometimes also from the graphic production) of patients with cerebral lesions, open up fascinating metaphorical perspectives for art (and neuroscience) lovers.

One of the fundamental elements of neuroaesthetics applied to the visual arts, as indicated by Zeki and by other authors who have embraced this approach, is the hypothesis that artistic representation can grant us access to basic neurophysiological aspects of vision (2), and that the infringement of standard physics that can be found in the representations of the outside world, including the human body, in famous masterpieces, may have neuroscientific significance. In short, the suggestion is that the visual brain applies a more simple (reduced) model of physics in order to understand the world. The study of body representation in art opens up an even wider perspective, which transcends the visual brain. This is due to the fact that this body representation does not derive from visual perception alone, but embodies a synthesis of multimodal perceptual data, in which the information originating from the body itself, somaesthetic and proprioceptive, plays a central role.

To understand this issue better, it is appropriate to review some general notions on body representation. The notion of the body image or schema plays a significant role in different fields, such as phenomenology, psychoanalysis and neuroscience. Thus, not surprisingly, definitions are numerous and refer to different theoretical systems not necessarily compatible with one another. The phenomenological definition is particularly fascinating: “Body space may distinguish itself from the outside world and envelop, rather than unfold, its parts since it represents the obscurity of the theatre necessary for the brightness of the spectacle” (3). However, in practice, we must refer to more technical definitions of body representation, based on our knowledge of how the central nervous system is organised. A fundamental contribution to the neuroscientific definition of this concept is Paillard’s distinction (4) between body schema – the representation of the different body parts in space, which is essential in the spatial organisation of movement, and which is not accessible to consciousness – and body image, a conscious visual representation of the body, typically represented in a classic position: standing, facing forward, with eyes, head and body axis all aligned with one another. It is important to emphasise that, pathologically, an alteration of the body schema, due to insufficient or distorted information on the spatial position of the different body segments, may lead to an alteration of the body
image. The fundamental task of the central nervous system, in this regard, is to fill in the missing information—to correct, complete and integrate the distorted or lacking information that can be responsible for apparently bizarre phenomena. Some of the pathological manifestations mentioned in this article may actually be due to our brain’s tendency to reconstruct a coherent reality, even though this may not necessarily be verifiable or compatible with common sense. The phenomenological approach has grasped this concept as well: “A pathology is a complete form of existence and the procedures it adopts to substitute normal functions are themselves pathological phenomena” (3). This, however, is not the only mechanism at work within the disease. A primary body image alteration, rather than an insufficiency or distortion of perceptual information, seems to characterise certain conditions, particularly those observed in psychiatry. In this case, it is possible to hypothesise that the pathogenesis of the phenomenon is due to the damage, within the cerebral cortex, of the information synthesis and integration processes concerned with the body schema.

The neurological literature on body schema disorders is extensive and refers to heterogeneous phenomena, which can be observed in diseases that range from actual body alterations (as in the case of a limb amputation, for example) to damage to the neuronal pathways that convey information on limb position to the brain (as in the case of peripheral nerve lesions responsible for deafferentiation), and to cerebral cortex lesions, specifically within the parietal lobe. This is the cortical area to which the information on cutaneous sensitivity and proprioception is conveyed, and where the integration of visual, vestibular and auditory information, along with the representation of movement, as a result of multiple fronto-parietal circuits, occurs. This integration process may be regarded as the construction of the representation of the different sectors into which space can be functionally divided (personal, regarding the body and peripersonal/ extrapersonal, regarding the space around us), whose complexity we can today begin to understand through neurophysiological and neuropsychological studies (see below). It is common knowledge that the two cerebral hemispheres, apparently identical, possess, as is clearly evident in the human brain, different specialised functions: in the present context, it is the right parietal lobe that has the dominant role, as shown by the fact that most pathologies affecting spatial representation are due to right hemispheric lesions.

Graphic distortion of extrapersonal objects in brain-damaged patients

Identifying the mental processes that underlie the various phases of graphic production, starting from intuition/inspiration to the identification of the motor patterns that implement and execute mental representations, is a difficult experimental undertaking when analysing only the performances of normal individuals. The apparent “wholeness” of the process of artistic production certainly disguises the single, component parts of the information processing responsible for the assembly of the final product. Through neuropsychological study of the behaviour of brain-damaged patients it is possible to draw inferences about normal cognitive functions. In cognitively impaired subjects, we can hypothesise which process has been interrupted, assuming that the system is relatively modular (i.e. made up of functionally and anatomically distinct operations) and multicomponential (i.e. constructed through the assembly of different parts). In the field of graphic and artistic production, the neuropsychological approach has helped to identify a number of fundamental operations in the construction and production of mental images. Without attempting or expecting to explain the origin of the artistic vocation, studies on patients with brain lesions have identified a number of processes whose integrity is necessary for the processes of pictorial and plastic expression. This paper will not cover the artistic production disorders due to brain lesions that impair the first phases in the visual elaboration process, that, on the one hand, preclude successful sensorial analysis, and, on the other, the subject’s visual monitoring of his or her own production (disorders such as partial visual field blindness or agnosias). Instead, we shall briefly describe those disorders involving graphic production that cannot be ascribed completely, at least initially, to a primary sensory or perceptual disorder. In particular, consideration will be given to two neurological syndromes in which, in different ways, the ability to structure a drawing in space is affected, and to the consequences of this both on the final configuration of the patient’s production and on the patient’s awareness of the graphic anomalies produced.

Effects of cerebral lesions on drawing

Neuropsychological studies investigating graphic production are based on the use of simple spontaneous and copied drawing exercises in order to examine the effects of cerebral lesions on the creative process, in controlled and standardised conditions. They have shown that the lesions most frequently resulting in difficulties, both in copied and spontaneous drawing, are found in the posterior area of the cerebral hemispheres and particularly of the right hemisphere. The abnormalities most frequently observed among patients with right cerebral lesions when compared to patients with left cerebral lesions involve: i) reproduction of the object’s shape; ii) evaluation of the spatial relations between the object’s constituent parts; iii) evaluation of the absolute proportions of the object’s constituent parts; and iv) understanding, perception and use of the egocentric space in order to evaluate where to place the object and its parts (5).

Constructional apraxia

Constructional apraxia (CA) is a disorder that interferes with functions such as composition, construction and drawing, both spontaneous and copied, in which the shape of the object is reproduced in a distorted and often unrecognisable way (6,7). This disorder is not due to primary motor or visual/perceptual deficits (limb paralysis or severe visual disorders), or to cognitive disorders (such as mental deterioration), though the presence of such disorders may worsen the apraxia. Many studies
have highlighted the difficulties in classifying CA (8), with the peculiar characteristics of the apraxic trait involving the evaluation, reproduction and representation of the correct spatial relations between the constituent parts of the copied object (Fig. 1).

Patients with CA, compared with normal controls, apply anomalous constructional procedures. When asked to copy a drawing, these patients tend to fragment the picture into elements of smaller dimensions in order to copy them using a “piece by piece” or “line by line” strategy. They also tend to omit portions of the figure, regardless of their spatial position, left or right, within the overall structure of the object (as opposed to what happens in patients with spatial neglect, see below). These patients usually have right hemispheric posterior lesions (occipito-parietal), although copied drawing disorders have also been observed in patients with lesions of corresponding left hemispheric areas. In this latter case, a simplification of the drawing’s structure rather than a defective reproduction of the object’s constituent parts is what makes the reproduction impossible (9-11). Reproduction of drawings in CA patients is nonetheless very different from that of other patients with right cerebral lesions, such as neglect patients (the latter representing, in a sense, the other side of the coin), in whom the damage does not involve the ability to assemble the different parts of the object, so much as the ability to conceive and perceive of the space opposite to the lesion.

Unilateral spatial neglect

Patients affected by unilateral spatial neglect (USN) do not respond to, or seek, stimuli of any kind present within the hemi-space opposite to the lesion responsible for the disorder. Because USN is usually due to a right hemispheric lesion, and the symptoms are most often unilateral, the clinical syndrome usually affects the left hemi-space. The patient behaves as if the world to the left of the body midline no longer exists, ignoring any event taking place in that sector of space. In the acute phase of the disease, patients also present with a conjugated right deviation of the eyes and a right deviation of the head that further worsens their condition. In time, this pathological posture regresses, although they continue to disregard the left sensory world, a situation that clearly impacts on their everyday life. For instance, if, during a conversation, someone addresses the patient from the left, she will certainly not reply, since any event taking place within her left sensory space is apparently ignored. On the other hand, she will react promptly and appropriately to someone speaking within the right sensory space. Neglect patients also have problems in reading because they do not report left part of words and, more in general, the left part of a text and, when asked to write they usually use only the left side of the page. Interestingly, if requested to report from memory a familiar scene, they describe only what is on the right side of their visual image (12). Figure 2 illustrates how these patients typically take their food from a plate. As clearly shown, they neglect to take the food to the left of median line of the plate (13).

After this brief description of USN — for a more thorough discussion, readers are referred to more specialised texts, for example (14) — one question we can ask is whether a pathological condition that clearly impairs representational skills may also influence the graphic production of patients affected by this condition. We may hypothesise that during the mental construction of a pictorial representation there is a mo-
ment when the object, or the scene to be created, are conceived not as an intuition with a purely symbolic format, but as a virtual reality, with specific spatial relations. If the neglect syndrome impairs a priori, in an analogical fashion, the construction of the image’s spatial relations, then we must predict that spatial anomalies will appear in the drawings produced by the patient. Indeed, spatial neglect patients, unlike CA patients, produce drawings in which it is the right-left spatial distribution of the picture’s constituent parts that is affected rather than the relations between the parts of the object or scene. USN often leads to the total omission or simplification of the left half of the drawing compared to the right half. Figure 3 shows several drawings done by patients with USN.

Object neglect and spatial neglect

In 1972, Gainotti et al. (15) asked a number of patients with USN to copy drawings depicting a complex scene, unlike those shown in figure 3. They found that neglect syndrome patients would display one of two possible behaviours. Some patients only copied, as expected, the elements in the right half of the drawing; others copied all the objects present in the scene, even those situated in the left half of the drawing space, but depicted only the right half of each object. This suggested that the representation disorder may manifest itself according to different frames of reference, sometimes related to the intrinsic coordinates of the perceived or represented object (object-centred coordinates), other times related to an egocentric spatial coordinate system (viewer-centred coordinates).

Halligan and Marshall (16) examined this issue in more depth. They asked a number of patients to copy drawings such as those illustrated in figure 4. As shown in figure 4A, when the model portrayed a whole butterfly, the patient with USN would predictably copy only the right half of the butterfly. When the model portrayed only the butterfly’s right half (Fig. 4B), the patient would perfectly reproduce the entire drawing, even though the model also occupied the section of paper occupied by the section of the previous model that had not been copied (the left half). In other words, when the model portrays the right half of objects, it is analysed and copied in an apparently normal...
fashion; that is, the relative left half of the right half of an object is not ignored. Finally (Fig. 4C), when the model depicted only the left half of the butterfly, the patient copied only the central part of the insect's body. It is important to emphasise that neglect patients are not affected by an impairment of the structural memory of objects. It should be noted that, when asked to draw a butterfly, not according to the longitudinal axis, but according to the transverse axis — that is, in a position (sideways on) in which the parts of the object typically recognised as its left and right parts do not correspond to the left and right halves of the working space (Fig. 5B) — the patient just described proved perfectly capable of drawing and copying the object in its entirety.

Neglect patients are apparently unaware of the anomalies present in their drawings. They are usually satisfied with their results and do not comment on the strangeness of what they have drawn. Some authors believe that these patients are satisfied with their graphic productions because their brain effects a pathological completion of the half-drawn object. According to this interpretation, the patient sees something that is not actually there because the brain, rejecting contradictory information, intervenes on the section of space affected by the pathological blank with a filling-in operation, rather as happens physiologically with the blind spot we all have in our visual field. An alternative hypothesis is that these patients, as a consequence of their brain lesion, are no longer capable of monitoring their own performance, due to a total or partial impairment of their self-awareness systems. Were this hypothesis true, their incapacity to see the strangeness of their drawings would not be because they see something that it is not there (activation of a physiological process), but due, instead, to the fact that the injured brain is incapable of using auto-correction mechanisms (inactivation of a process as a result of neuronal injury). The completion hypothesis would argue that completion is triggered automatically and that it should always occur regardless of the capacity to monitor graphic output. On the contrary, the monitoring systems hypothesis would expect the patient, in specific circumstances, to be able to appreciate the drawing's anomalies. In a study on neglect patients (17), we showed that, when the patients were presented with incomplete drawings they themselves had produced, and asked to comment on them, in most instances they continued to maintain that the drawings were correct and did not contain anomalies. A small number of patients, on the other hand, were able to see the anomalies. When one patient was shown the butterfly (depicted in figure 3C) he had drawn a few minutes earlier, he remarked with surprise: "This butterfly will never fly since it is missing its left wing!" The same patient, also affected by left limb hemiplegia, was not able to monitor his paralysis and claimed to be able to move normally, showing that awareness for neurological/neuropsychological symptoms may involve the components of the clinical picture only selectively.

In summary

According to the clinical data described above, we may conclude that:

i. USN syndrome influences the graphic production of non-professional artists, by altering both the egocentric space and the representation of single objects.

ii. Patients are unable to monitor their graphic production, probably because they are often affected by selective and modular awareness disorders (selective anosognosia).

iii. Sometimes awareness can be modulated by asking the patient to comment on his own drawings.

We may, at this point, formulate two questions. First, we may ask whether the effects of a brain lesion in a person who engages daily, and not occasionally (like the patients we studied), in an activity involving graphic/pictorial/plastic production are the same as those observed in non-professional patients, or, on the contrary, whether the constant activation of spatial images, by strengthening the neuronal networks involved in structuring spatial representation, protects professional artists against neglect syndrome. Second, we may ask whether the possibility of modulating patients' awareness of the impairment may help them to refine their graphic production.

Professional artists and unilateral spatial neglect syndrome

An important review (5) describing the consequences of disorders due to cerebral lesions on the pictorial ability of professional artists provides numerous examples of painters whose works show obvious signs of USN after they have suffered a brain lesion (18).

Otto Dix (1891-1969)

Following a right hemispheric stroke, Otto Dix developed motor and sensory disorders in the left part of his body as well as USN. Figure 6 (over) shows two examples of works produced by this painter, one before (A) and one after (B) the stroke. It is interesting to remark that, in the painting done after the acute event (a self-portrait of the artist's own hand), he still displays a complex and well-structured technique. It is striking, however, that the artist uses only the right half of the paper. In this case, USN seems to have affected, primarily, the spatial distribution of the drawing and not the representation of the object itself.
Anton Räderscheidt (1892-1970)

This painter was affected by a right hemispheric stroke, which left him with left hemiparesis, left visual field blindness, and USN. At the time of sustaining the focal brain damage, this artist was probably already developing a form of cognitive decline, on account of which his drawings previous to the acute event were already starting to show a deterioration, from a technical point of view. Figure 7 shows two works, both preceding the stroke, which illustrate his expressive ability. When he produced the first (A), he was not yet displaying any effect of his neurological disorders. At the time of producing the second (B), the cognitive decline had seemingly started. It should be noted that both these works, although they might be described as simple compared to his earlier work, nevertheless embody a remarkable expressive ability, and retain a very intense quality.

Figure 8, instead, shows several pieces that the artist created after his stroke. Figures A and B, which are taken from the period immediately after the acute event, show very obvious signs of USN. Considering the characteristics of the figure, and how it is represented on the canvas, it is hard to decide whether the neuronal lesion had affected the artist’s object or spatial representation skills. Here, the egocentric and object-centred spaces coincide, although, judging by figure 8B in particular, both coordinate systems seem to be affected by the brain lesion. The USN regressed spontaneously in this artist, allowing him once again to perceive, and use, the left half of space.

Despite the evident and significant impairment of spatial representation immediately after the stroke, this
artist’s technique and brush-stroke do not appear to be in any way limited by the brain lesion; on the contrary, his later works seem richer than the ones produced immediately before the stroke, and this is particularly apparent if we consider the complexity of the last illustration (Fig. 8D): indeed, in this illustration the position of the face in the portrait shows a rotation that was not present in previous paintings (Fig.s 8A-C), in which the artist would begin to draw from the right part of the canvas without manipulating his mental image.

Figure 8 - Self-portraits produced by Anton Räderscheidt at different intervals after his right hemispheric stroke. A Self-Portrait (December 1967, two months after the stroke), Cologne, private collection; B Self-Portrait (March 1968, five months after the stroke), Cologne, private collection; C Self-Portrait (April 1968, six months after the stroke), Cologne, private collection; D Self-Portrait (June 1968, eight months after the stroke), Cologne, private collection. It is interesting to notice how, over time, the painter regained his representational ability after the stroke (source: Mazzucchi, Pesci, Trento, 1994).
Guglielmo Lusignoli (1920)

This Italian artist suffered a right hemispheric stroke in 1987. The two works presented in figure 9 pre-date the acute event and undoubtedly bring out Lusignoli's artistic abilities and the particular characteristics of his brush-stroke.

On the other hand, figure 10 shows a painting created after his stroke. It is interesting to notice how the artist uses only the right half of the canvas, in spite of the fact that he could perceive the whole of the background space, as shown by the fact that he coloured the entire canvas. Figures 10A and 10B show the same painting at two successive points in time. Intellectually aware of his disorder, the artist commented that the drawing needed to be completed. However, having said that, he went on to add details only on the right half of the canvas (Fig. 10B). It is interesting to note that, here again, the artist was clearly aware the left half when spreading the background colour. Evidence of USN also emerges in the self-portrait shown in figure 11B.

When commenting on his work, the painter stated that he was aware of an anomaly in his use of space. He did not understand how it occurred, but he realised that, every time he tried to draw a figure, he would “forget” to use the left side of the canvas. Nevertheless, he claimed to have found a solution by drawing objects vertically; this technique allowed him to regain some control over the left-right distribution of his work (Fig. 11A).

Federico Fellini (1920-1993)

Fellini developed USN following a right hemispheric stroke in 1991. Figure 12 shows the artist's performance after he had simply been asked to mark with a pencil the midpoint of a horizontal line (19). Patients with USN, ignoring part of the left half of the line, usually misplace the subjective midpoint, positioning it to the right of the objective midpoint. Fellini shows this characteristic pattern of line bisection. The artist would also exhibit so-called “productive” elements: he would not just mark the midpoint of the line but would also draw little figures indicating it. The lack of detail in the left half of these drawings is also clearly indicative of USN.

Other drawings, demonstrating the effect of the neglect syndrome on the coordinates of objects, are shown in figure 13. The artist actually seems to make normal use of the available space in these drawings, but the details in the right half of the representations are evidently more elaborate compared to those in the left half.

In summary

These examples of the work of artists who developed USN after sustaining acute and localised brain lesions do not show signs of apraxia. The injury seems to have impaired only the artists’ conception of the contralateral side of the sensory world. The relations between the parts of the objects and the structural and semantic characteristics of their reproductions appear ab-
Figure 11 - Two works by Guglielmo Lusignoli. A The Totem (December 1988), Parma, private collection; B Self-Portrait (1988), Parma, private collection. In A the artist exploits the vertical dimension. In B the high/low distribution of the drawing does not prevent the neglect syndrome from manifesting itself (source: Mazzucchi, Pesci, Trento, 1994).

Figure 12 - Federico Fellini, some examples of line dissection tasks. Fellini would often tend to personalise his performance (source: ref. 19).

Figure 13 - Federico Fellini, spontaneous drawings (bicycle, female figures), produced twenty days after his stroke, that show evident signs of object neglect (source: ref. 19).
solately intact, demonstrating a dissociation among the praxic, linguistic and spatial aspects of constructing a model/representation. Furthermore, despite the altered configuration due to the USN, the part of the drawing that is normally conceived and strikingly reproduced conserves the expressive and artistic strength of any work produced prior to the injury.

**Graphic distortion of body image in the work of famous artists**

The depiction of the artist’s world can be distorted not only in its extrapersonal components, as shown by patients affected by apraxia and UNS, but also in the conception and modelling of personal space. Consequently, the representation of the body can be corrupted. Haggard and Wolpert (20) present an excellent review on body schema disorders, in which they also propose a classification based on the possible pathogenetic mechanisms. They suggest distinguishing between sensory input, spatial body representation, extension, updating, coherence and interpersonal representation disorders. Here, we describe briefly only those conditions particularly relevant to our discussion on the resonances with figurative representations. Among the disorders affecting the segmentation of body parts, autotopagnosia and digital agnosia are characterised by loss or impairment of the patient’s knowledge of body structure, be it his or her own or that of someone else. Patients affected by these diseases find it hard to locate different parts of their body (or only their fingers), as though their capacity to conceive of the different body segments in relation to one another, within the global spatial representation, has been impaired. We must point out that these disorders are usually due to parietal lobe lesions in the left hemisphere and not in the right hemisphere, which is dominant for spatial representation. Thus, in this case, we are faced more with an abstract impairment of “semanticised” knowledge, rather than an impairment of the multiple perceptual-motor spatial maps that are mostly organised in the right hemisphere. The phantom limb is the most renowned extension disorder, frequently observed amongst amputees: in this condition, the missing limb is still perceived, even years after the amputation. On the other hand, patients with supernumerary limbs after a parietal lesion, may perceive the presence of extra limbs: in this case, one may hypothesise that the perception of limb movement in space, on the basis of which the body schema is constantly updated, functions in a pathological way. Coherence diseases are astonishing: patients, again due to a parietal lesion, may disown their own limbs, often developing a hostile attitude towards them (misopogia).

The numerous pathological manifestations described above share one feature: they are all characterised by a modification, or distortion, of an aspect of body representation that is not limited to the visual mode, but instead the result of integration of proprioceptive, visual and vestibular information, accomplished within the parietal lobe. As mentioned above, the prevailing hypothesis is that a body schema alteration is responsible for this distortion. On the other hand, a primary body image disorder is believed to characterise eating disorders, dysmorphophobia and Cotard’s syndrome. Indeed, in these disorders, no basic body schema alterations are found; instead, the disease is associated with an altered visual image of one’s own body as well as of those of other people. Body image alterations, particularly concerning body size, have been described in eating disorders, although experimental results are not consistent. On the other hand, in dysmorphophobic patients, the body image alteration is the central aspect of the disease; in this case, the patient is convinced, without an objective reason, that a body part (frequently the face, but not always) is deformed, horrible, and in any case disliked by others. This belief may lead the patient to undergo plastic surgery, after which the altered perception often shifts to another body part. Cotard’s syndrome, named after the author who first described the so-called “délire des négations” (21), is a combination of symptoms that can be found in schizophrenic as well as bipolar disorder patients, but has also been described following lesions of the right hemisphere in temporo-parietal areas. The delirious belief that one’s own body is deteriorating, which ultimately can even lead patients to deny its very existence, is the central trait of this syndrome.

**Quantitative modifications: large bodies, thin bodies**

As mentioned above, a quantitative modification of the patient’s body image has been described in eating disorders, although the data are controversial. Recent studies using functional neuroimaging support this hypothesis, showing an increased activation of the parietal lobe in anorexic patients, compared with controls, when presented with distorted images of their own body (22). Less often, quantitative modification of body image can be attributed to alterations of the body schema, associated with migraine attacks or diseases that alter proprioception: in these cases, however, the dimensional modification is often limited to a body segment. Both aspects of quantitative modification of the body image, namely amplification and reduction, are observable in the visual arts. The work of Pieter Paul Rubens (1577-1640), for instance, reveals extraordinary examples of “amplification”. Leaving aside the possible differences in the aesthetic precepts regarding the beauty of the male or female body, unique to each historical period and culture, a love of monumental forms and dynamic representations is blatantly obvious in Rubens’ work (Fig. 14), where the enormous human figures are characterised by a detailed representation of the muscle mass, in order to depict a “larger than life” ideal. Amongst contemporary painters, body image amplification is one of the peculiar traits of Fernando Botero (1932), the great Columbian artist who represents “harmonically bloated” bodies, constantly searching for artistic expressions that convey mass and volume (Fig. 15). Conversely, Doménikos Theotokopoulos of Crete (1541-1614), known as El Greco, stands out amongst the “classic” painters for his characteristic reduction of volume, usually associated with a pronounced elongation of the human figure. His stretched out figures, often painted using unnatural colours, exemplify the Mannerist approach to the representation of the human body, in
which an interest in technique prevails over the realism of the portrayal (Fig. 16).

Centuries later, the exaggerated elongation of the body is one of the peculiar aspects of the work of Alberto Giacometti (1901-1966): in museums all over the world, one may come across an infinite number of Giacometti statues, in various poses and of various sizes, and be reminded of the essence of the human body soaring in a pure vertical fashion (Fig. 17, over).

Body image distortions: supernumerary limbs, relocated heads

Distorted representations of the body, characteristic of the work of many modern and contemporary artists, mimic the consequences of body schema alterations in disorders due to parietal lobe lesions, particularly those we have called segmentation and updating disorders.

The work belonging to the cubist period of Pablo Picasso (1881-1973) is characterised by extreme distortions
of the human body, the female one in particular: bodies are literally broken down into pieces and reassembled in a fractured and angular fashion (Fig. 18). Distortions based on various peculiarities, soft, rigid, or aggressive, characterise paintings and sculptures from some of the numerous “periods” of his immense repertoire.

The work of sculptor Henry Moore (1898-1986) is full of examples of fragmentation and distortion of the human form; in his case, the intention seems to be to “naturalise” the human body, so that it comes to resemble hills, valleys and other features of the landscape, often allowing Moore’s sculptures to blend in with natural elements (Fig. 19).

The purpose of the body image distortions produced by Francis Bacon (1909-1992) is quite different; here, within the context of a profound alteration of spatial relations, faces and bodies evoke an idea of massacre rather than a process of fragmentation and reassembly: the aim is satirical (or to provoke horror), and has extremely powerful aesthetic results (Fig. 20).

Body image corruption

The disorders described above have an essentially cognitive quality, since they are not usually associated with a strong emotional reaction to the change in body image. Misoplegia, a disorder found in some patients with right parietal lesions, is an important exception to this, since the patient displays, through verbal com-
ments, facial expressions and through rejection and estrangement reactions, an attitude of open hostility towards the paralysed limb. There are other disorders in which the presence of a distorted emotional reaction to the body image is the central element and primary issue. A person with dysmorphophobia is excessively worried about a defect, usually imaginary, of a body segment. The concern is usually associated with the constant need to look in the mirror (23). This disabling disorder is due to a body image alteration, which seems to be particularly vivid, recurring and charged with negative connotations. The tendency to imagine one’s body from the perspective of an external observer rather than from one’s own point of view is a characteristic feature of this disorder (24). The firm belief that one’s own body is deteriorating, due to loss of organs or body parts, through to the unyielding certainty of its death, is the main clinical feature of Cotard’s syndrome. Associated phenomena, such as the sensation that one’s own flesh is decomposing, or even that one’s own body is covered with worms or insects, may be found in toxic psychoses, due to amphetamine, or in many other neurological disorders, particularly extrapyramidal syndromes. Interestingly, delirium of negation may be associated with Capgras’ syndrome, in which the patient has the delirious certainty that identical-looking imposters have taken the place of his own relatives and friends and that they have cruel intentions. The representation of bodies, not deformed in a spatial manner, but rather characterised by corruption, is to be found in the work of some artists belonging to the Viennese expressionist school of the first half of the 20th century, such as Egon Schiele (1890-1918). The frailty of the sunken and suffering bodies portrayed in many of his masterpieces is striking: the eroticism that so upset Schiele’s contemporaries today seems entirely secondary to the sense of pain and, sometimes, of physical deterioration conveyed by his “psychological nudes” (Fig. 21). The work of a great contemporary painter, Lucien Freud (1922), shows, in striking fashion, similar features. His fierce portrayals of nude bodies convey a sensation of the inevitable corruption of the flesh, with a crudeness hard to find in other figurative paintings (Fig. 22).

Figure 21 - Egon Schiele, The Conversion (1912), private collection.

Figure 22 - Lucien Freud, Nude Portrait (1980-1981), private collection.

Concluding remarks

Although the multiple and complex information processing involved in the production of art makes it difficult to piece together the genesis of the artistic creation, by studying the drawing performances of brain-damaged patients we can draw some inferences on at least some aspects of the organisation of drawing in normal subjects. For instance, the double dissociation between constructive apraxia and neglect suggests that the stylistic structure and the spatial representation of an image are organised in separate systems. Also, the ability to assess one’s own graphic production can be specifically altered in brain-damaged patients, suggesting the existence, in the normal brain, of a dedicated action monitoring system. As we have discussed above, neglect patients may be unaware of their drawing disorder. The complex interaction between aware and unaware aspects of conscious processes is demonstrated, in this syndrome, by the fact that even when the patient manages to reach a “linguistic” awareness of his disorder, that is, when he admits to having problems with his conception and use of the left half of space, this verbal awareness does not seem to benefit his performance (consider, again, the example of Guglielmo Lusignoli: he was able to state that his work was incomplete but, when attempting to correct it, added detail and colour only to the right half of the canvas). These findings suggest that the final output of brain-damaged artists results from an interaction between pathological aspects of representation and normal encodings. Like all the private aspects of one’s own experience, an artist’s anomalous phenomenal status is impossible to decipher and his subjective sensations remain sealed within his mind. However, we may con-
clude, from our observation of the work of professional artists affected by brain damage, illustrated in this brief review, that the pathological anomaly need not necessarily be a drawback; in some cases, it could even be a source of perceptual enrichment for the artist, leading to the creation of masterpieces, certainly unusual from a spatial point of view, but also artistically articulate and intense.

On the other hand, the comparison between pathological symptoms and figurative art images is purely formal, and derives from the assonance between these two separate domains (technical knowledge and aesthetic experience) within the minds of observers who have had the opportunity to become familiar with the multiple and often dramatic and unexpected consequences of brain dysfunction.

Overall, we believe that the heterogeneous phenomena described here indicate that figurative art, ranging from the humble sketches of artistically untrained brain-damaged patients to the masterpieces of artistic genius, provide an important window onto the organisation of the normal and diseased brain.

References

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