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Inside the Body: Medical Imaging and Visual Arts

The inner body, that "dark continent" which sustains our life and which most of the time remains invisible and intangible, has always been an object of curiosity for physicians, artists and the lay people. Long before TV series brought to our homes the show of emergency rooms with all the paraphernalia of sophisticated medical images, people crowded the anatomical theatres, bewitched by the simultaneous view of death and of the hidden machinery of life[1]. When, by the end of 1895, Wilhelm Roentgen discovered X-rays and invented radiography, the show of the inner body took stage again with a spectacular improvement: people would not look anymore at messy anatomy of corpses, but at ghostly images of the interior of living human beings (or animals ranging from cats to frogs). Radiographs raged in scientific journals, photography magazines and popular press, contributing to a radical

change in the way we see our bodies, literally and metaphorically. The so called "X-ray vision", the power to see into and through concrete objects, was seen at the same time as a triumph for science and as a further demonstration of the inadequacy of our senses, vision above all, at catching the world. In the domain of Visual Art, radiography fuelled the ongoing revolution started by photography, even though its influence was less explicit, more conceptual than formal.

In the 20th century, medical imaging evolved in a spectacular manner, re-defining our ability to visualize structures and functions of the human body. Visual Art, on its part, has gone through a number of "revolutions", and in their endless quest for new means and meanings some artists have recurred to medical images and medical imaging techniques as expressive tools. In this short essay I analyse the work of a few of them (it would be impossible to draw a complete map of authors and artworks), in a preliminary attempt to understand how they assimilate medical images and technologies in their work and for what reasons.

John Heartfield: the photomontage

Although theoretical references to X-ray as means of a new kind of vision are present in Modernist manifestos since 1910[2], we must wait until the 1930s to find explicit forms of "X-ray vision" represented in artworks. The first examples were the photomontages created by John Heartfield, a pacifist and politically engaged German artist. A telling example is the poster *Adolf, der Ubermensch: Schlucht Gold und redet Blech* (Hitler the Superman: swallows gold and spouts junk) (Fig. 1) where we see, as if through X-ray, Hitler's rib cage filled with coins that shape his backbone and his gut, while a swastika

Fig. 1 – John Heartfield, *Adolf, der Ubermensch: Schlucht Gold und redet Blech*, 1932.

flashes where the heart should be. Different metaphors are at play here. One is that of x-ray visualization: by mimicking a radiograph the artist tells us that he can see and show the hidden hypocrisy of the Nazi regime, displaying what most Germans cannot, or are not willing to, see and understand. Furthermore Heartfield substitutes bones and gut with coins, meaning that what sustains (the spine) and profoundly motivates (the gut) Hitler's ideology is nothing but greed, and that the dictator's heart is devoted to his own party and definitely not to the people. In *Das ist das Heil, das Sie bringen* (This is the salvation they bring) (Fig. 2) Heartfield Heartfield once again criticizes the National Socialist government and its wars. In this photomontage lies a heap of children's corpses, in the background the ruins of a city. From this despairing scene emerges a gigantic skeleton's hand, whose fingers are the are the jet trails of war planes.

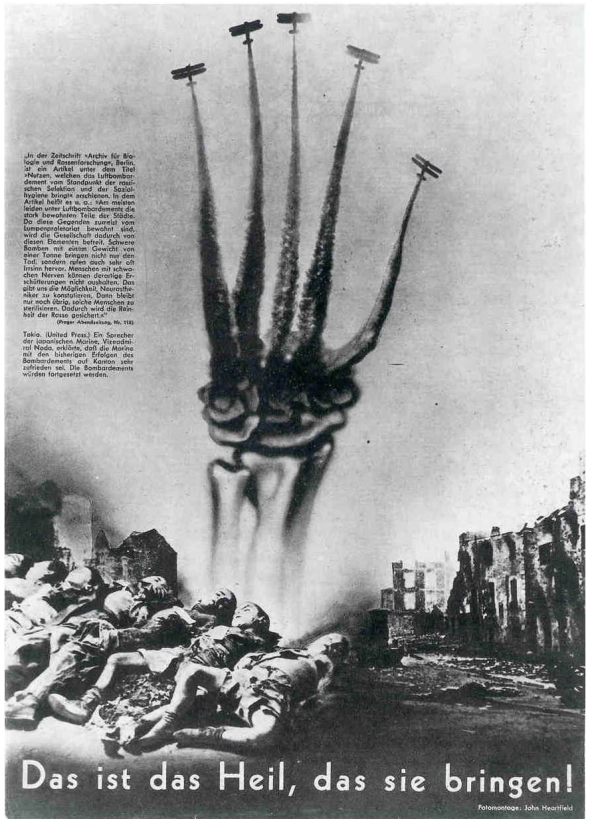

Fig. 2 – John Heartfield, *Das ist die Heil das Sie bringen*, 1936

Skeletons have always been a symbol for death, fear and anguish (the "Triumph of Death", with its dancing skeletons, is an iconographic theme dating back to the late Middle Ages) and, for sure, Heartfield did not need radiography as a reference for representing a skeletal hand as symbol of the consequences of war. Nevertheless this smoking hand, something between the skeleton and the ghost, looks more like a radiograph than an anatomical drawing. As a whole the poster conveys a strong feeling of fragmentation: first of all we see bodies and buildings fragmented by the war, but we can also sense the radical conceptual fragmentation of the body prompted by modern technologies of visualization. In this respect, it is worth remembering that fragments were the material and conceptual bases for photomontage; Hannah Hoch, who collaborated with Heartfield and who was one of the most prominent German artists from the Dadaist movement (the group that coined the term photomontage), traces

the roots of this technique to postcards, war photography and radiography (Kevles, 1998). Clearly, what is at stake here is not a different understanding of the human body, but a different way of "seeing" in the broadest sense. For the Modernist artist X-ray is, on the one hand, the positive metaphor for the ability to "see through", the triumph of intellicence and wit over brutality and irrationality, against appearances. On the other hand, and in overt contradiction with this first stance, it represents the fragmentation of the world as we knew it, a world that the First World War had left in pieces and that was running towards a new and even more destabilizing conflict.

Robert Rauschenberg: the postmodernist portrait

In spite of these early antecedents, it was only in 1967 that a real radiograph was embedded in an artwork. *Booster* (Fig. 3), a gigantic lithograph (182 x 91 cm) by Robert Rauschenberg, rich in humor and boldness, has been interpreted by art historian Wendy Steiner as a "postmodernist portrait", which explores the relation and interconnection between the subject of the portrait and his historical context (Steiner, 1987). The centrepiece of the lithograph is a total-body radiograph of the artist composed by five separates plates irregularly connected in order to form the complete figure. This central image, portrait of an "inner man", is surrounded by other images that inscribe the artwork in a specific moment in history and everyday life: the astrological chart for 1967, two chairs, a jumping athlete, a variety of machines and two

booster rockets of the kind used to propel shuttles into space. The combination of the radiograph, technically and metaphorically related to a deep, inner and personal dimension, with images from mass consumes and technological progress epitomizing the American hegemony[3] can be also read as an ironic visual play. In 1967 radiography was no longer edge science but rather medical routine; however, the unusual dimension of this specific X-ray image transforms it in a symbol of American supremacy and seems to celebrate its culture of superficial imagery. At the same time, the title of the artwork, "Booster" appears to mock this very culture: booster rockets, in fact, are used to propel space shuttles to the sky, but "boosterism" refers to the American tradition of promoting self-confidence and competition (Kevles, 1998). The astrological chart introduces a further level of ambiguity in the artwork. On the one hand it inscribes Rauschenberg's lithograph in the tradition of anatomical drawing[4], pointing to medieval representations of the body as a "microcosm", a miniature world that mirrors in its forms and functions the wider realm of the macrocosm. An idea epitomised in the set of prints *The Four Seasons* (early-mid 17th century), (Fig. 4) where paper flaps are used to progressively disclose further anatomical features of a woman and a man and rotating dials allow to plot astrological conjunctions, presenting a synthesis of the complex cosmological doctrines that dominated science and medicine until the late 18th century (Kemp and Wallace, 2000).

On the other hand the astrological chart represents the resiliency and persistence of astrology as a popular form of magic thought. Rauschenberg took astrology seriously enough to employ a personal astrologer, but this practice is quite at odds with the historical contingencies of the Cold War, in which scientific and technological advances, epitomized by the competition to conquer the Space, were

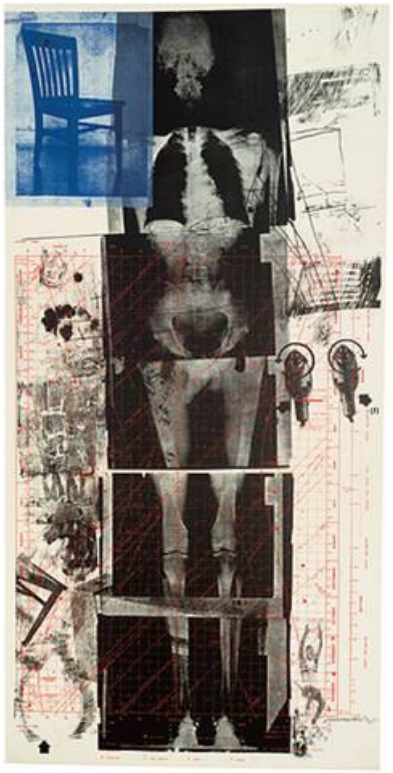

Fig. 3 – Robert Rauschenberg, *Booster*, 1967

were key issues in reinforcing national pride and in conditioning international power relations. Once again Rauschenberg, who was one of the artists selected by the Nation Space Program to translate complex technological and ideological concepts into a language accessible to the lay people, mocks, or rather highlights the complexity and contradictions of the cultural context in which his self-portrait is inscribed.

If the relationship between the artist (subject of the portrait) and society is a central issue in Booster, the unfolding of time and subjective history are at the core of *Visual Autobiography* (1968) (Fig. 5). In this triptych the first panel includes a slightly reduced version of the radiograph from Booster, superimposed on a circle that includes astrological, sexual and mathematical symbols, like a (post) modern Vitruvian man. The middle panel contains a written history of the life of the artist in the

Fig. 4 – *Four seasons*, 17th century

form of a spiral (the spiral of lived time), that recalls a fingerprint and whose centre hosts a family image, framed by the drawing lines of a box. From the box an arrow (the arrow of objective time) points to the third panel where the artist, wearing a parachute, skates on another

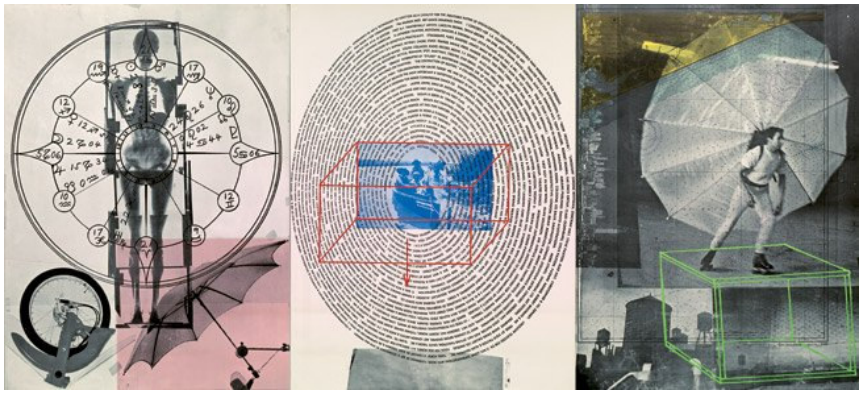

Fig. 5 – Robert Rauschenberg, *Visual Autobiography*, 1967

box, a kind of stage, with the skyline and the roof tops of a city in the background.

According to Steiner, the repetition of the circle in the three panels is related to the artistic quest for a temporal dimension in a static portrait: "The subject appears against the aura of his past, a past that frames him, supports him, and breaks his fall. The connection between atemporal essence and unfolding life is explicit in this

self-portrait of the artist and his parachute" (Steiner, 1987). In these works, then, Rauschenberg is dealing with a problem internal to Art History: the crossings and clashing between the iconic, indexical and symbolic instances of the portrait and its problematic inscription in time. A portrait, Steiner defends, is supposed to be iconic, since it is assumed to resemble what it represents. At the same time it is indexical, because it points to the extra-artistic dimension of the subject, to his or her actuality, so as to render that subject present. Finally, it depends on semiotic symbols (title and iconography) in order to establish the subject's identity. This problem, as old as the genre of portraiture, has been revamped and enriched in the last decades by the improvement and diffusion of high-tech cerebral imaging. With Positron Emission Tomography (PET) and functional Magnetic Resonance Imaging (fMRI) it is possible to produce images of the mind at work, a perfect portrait of the so called "cerebral subject"[5]. A portrait that gives up its traditional iconic function and draws all its strength from being an index, the visible "trace" of a process occurring in someone's brain. A complex index, indeed, since it can be correctly read only when treated as a symbol. That is, only when the observer knows the visual rules that encode the image. In the perspective of Art History reducing the portrait to the portrait of the cerebral subject seems as poor as it seems poor to the phenomenologist the reduction of human experience to the activity of brain cells. Even if we took for granted that PET and fMRI are faithful records of our mental processes, they are far from being compelling images. However, in spite of these premises, images of the brain have ignited the imagination of many artists who have incorporated them in their visual language as a means to elaborate on the issue of portraiture.

Susan Aldworth: Cerebral landscapes

An interesting example of the elaboration of brain imaging into portraits is the work of the British artist Susan Aldworth who conflates medical imaging and portraiture into a landscape. The conceptual framework in which this artist inscribes her work is the reflexion on the enigma of how immaterial thoughts emerge from material structures, as well as the issues of identity and individuality. Aldworth has been working on the idea of portraits based on cerebral imaging since 1999 when, after inhaling by accident white spirits, she underwent a diagnostic brain angiography. The experience was seminal, since she was awake during the procedure and could see her own brain on a monitor. She reported in her diary: "Christmas day, 1999. You are lying on a bed looking up at your brain scan live on a bank of monitors. [...] You are looking inside your head whilst thinking, seeing, feeling – your brain is

Fig. 6 – Susan Aldworth, *Between a Thing and a Thought*, 2000

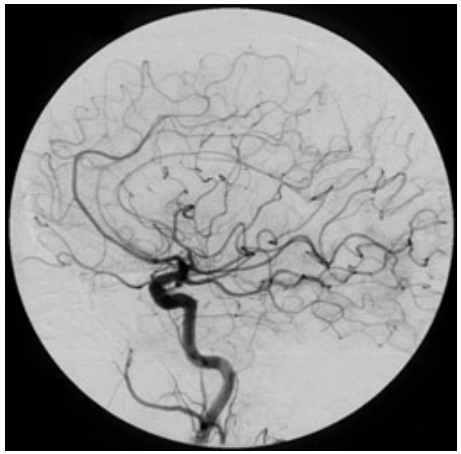

Fig. 7 – *Brain Angiography*

working whilst you are looking inside it". This experience offered the inspiration for the work *Between a Thing and a Thought* (2000) (Fig. 6), a self-portrait suspended between materiality and abstraction. This small engraving (20x20 cm), in fact, is the elaboration, the artistic re-interpretation, of a standard brain angiogram (Fig. 7).

While the "original" is a black and white plate, Aldworth re-works the basic forms of the angiogram in warm colours remindful both of organic life (the deep red of blood) and inorganic matter (bright ochre and sienna). The result is somewhat ambiguous: it seems more like a landscape or, better, a map, than a brain. The red spilling from the main artery catches the attention of the observer. We immediately recognize that it stands for the blood, but it also looks like a river flowing through a harsh land where a "stream of consciousness" spreads out in a number of convoluted secondary threads. The bright central image is surrounded by a brown, yellow-greenish frame, which seems to entangle this single brain, this single thought in the history of life's evolution. In the corners of the frame, in fact, we see small figures that look like fossil leaves and algae. Interestingly, Aldworth, like Rauschenberg, works with a printmaking technique. However, since they use completely different scales, they

get to convey very different feelings and meanings. Rauschenberg works with gigantic dimensions as a statement of confidence in technological power, the body displayed is cheerfully superficial; there is nothing more to be seen, no dilemmas to be solved. The lithograph is taken to its limits in order to show that the artist is in control. On the contrary, Aldworth, working with small dimensions, conveys a feeling of fragility of the work of art in itself and a sense of intimacy (one must get physically close in order to observe it) in relation to the image. The same sense of fragility and of awkward intimacy that one might feel while looking into somebody's head.

Between a thing and a thought was just the first work of a long series in which the artist has experimented different medical images (from angiography to Magnetic Resonance) and different artistic media (I will refer only to engravings, although Aldworth's creations encompass sculptures, videos and installations). For the diptych *Cogito*

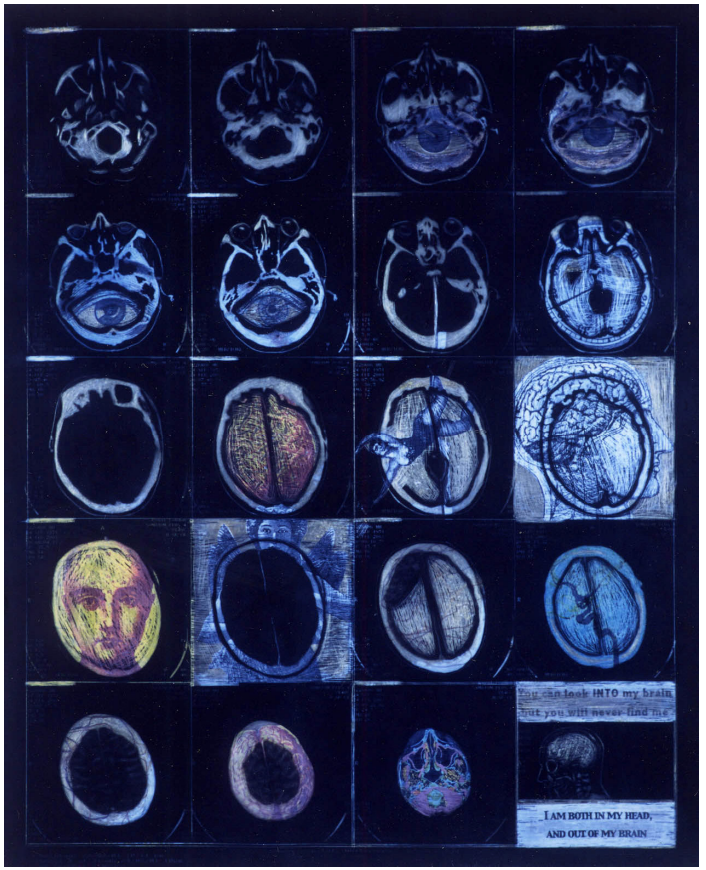

Fig. 8 – Susan Aldworth, *Cogito ergo sum 1*, 2002

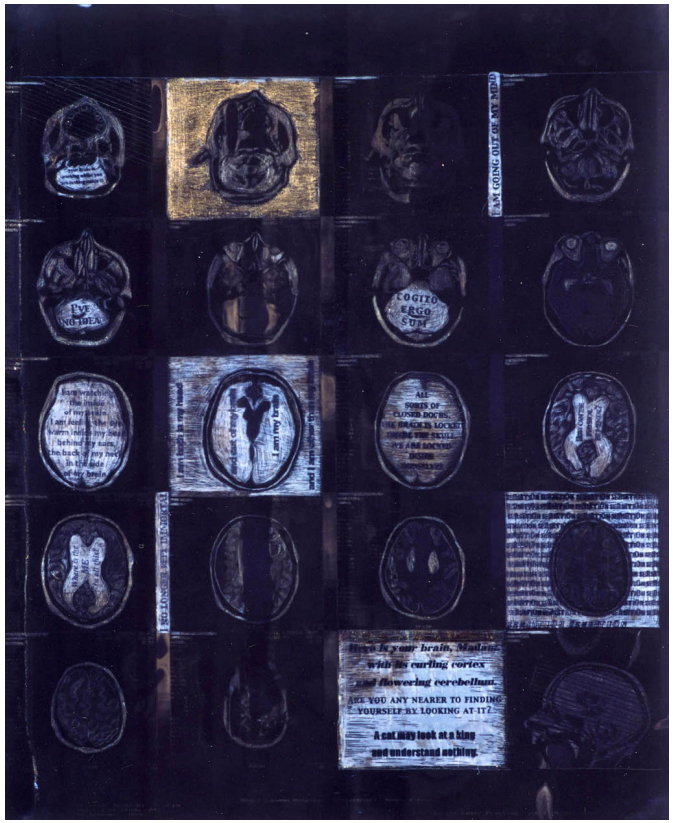

Fig. 9 – Susan Aldworth, *Cogito ergo sum* 2, 2002

Ergo Sum 1, 2 (2002) (figs. 8, 9), for example, she has scratched a brain MRI with acids and gold leaf and has over-imposed collages of images and words. The objective was to connect the scientific images of the brain to another kind of representation of her creative process and of her thoughts. The result is at the same time lyrical and defiant. In *Cogito Ergo Sum 1*, for instance, we see an eye blinking from within four sections of the brain (we might wonder if it is the eye of the mind or the Eye of God). In another frame a woman, who might be a dancer or a circus artist, falls into the void in a dreamily fashion, while in the lower row a fairy stares at us from behind a brain slice. These imaginative visual "intrusions" into the MRI plate literally put on display the ambiguity of cerebral images; they promise to disclose something (the self, identity, consciousness) that they cannot grasp. The artist is fascinated by neuro-images, but at the same time she does not believe that they can give a full account of the life

of the mind. Her distrust is declared in the last frame of the plate where she writes: “You can look into my brain but you will never find me” and “I am both in my head. And out of my brain”. In the second panel of the diptych there are no evocative images, but short sentences that explicitly address the body/mind problem and the sensation of estrangement that one feels when trying to think about the whole experience of the “self” as bare production of the brain. Some of the sentences are clearly typed while others are hard to read. In this way the observer is kept into a “to and fro” movement, into a “conversation” with the artist; in some points her words are easy to comprehend and then they suddenly blur, like in a complex discussion where meanings and ideas are not always clear. In *Cogito Ergo Sum 2* Aldworth overtly convey to the spectators her feeling of bewilderment in relation to cerebral imaging. Her words vary from a dramatic register: “Where is the ME in all this?”, to mockery: “Here is your brain, Madame, with its curling cortex and flowering cerebellum. Are you any nearer to finding yourself by looking at it?”, to dark humour: “I am going out of my mind”. The meaning of the artwork is reinforced by its material structure. The scan is scratched with gold leaf, and this could be read as a metaphor of the “golden promise” it bears, that is to reveal the secrets of the mind. However, as in the quest for true gold that has to be patiently separated from other minerals, it is hard to extract meaning from the brain images and to reach a satisfying explanation for the emergence of mind and consciousness. She notes: “Brain scans [...] are incomplete records of an individual. They are inherently reductionist – breaking down the self into its component parts without offering an explanation of the whole. They pose problems of interpretation, even for doctors”. The artist is fascinated by these images and she thinks that they allow making “alternative and more complete portraits by referencing

Fig. 10 – Susan Aldworth, *Brainscape 8*, 2005

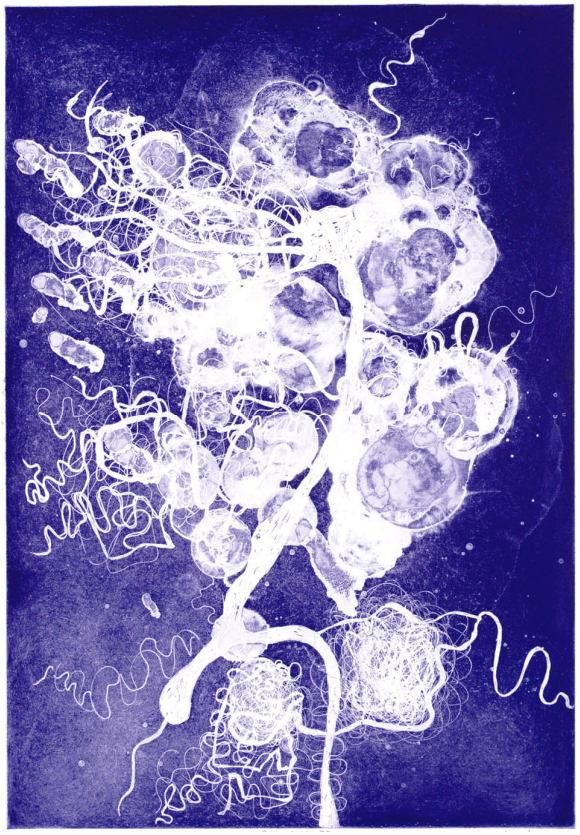

Fig. 11 – Susan Aldworth, *Brainscape 30*, 2006

the dimensions of the self which reside inside the body". At the same time she is aware of their ambiguity, what she calls "the gap between what they do show (the physical structure and function of the brain) and what they don't – the self". They are golden and useless at the same time. There is an inherent paradox in experimental neuro-imaging, since it tries to visualize what cannot be seen nor said: the thought thinking itself, the experience of being human, alive, here and now.

This paradox is re-worked in the series *Brainscapes: inside the brain of thirty strangers* (2005-2006) (Figs. 10, 11), composed by the "portraits" of thirty patients who underwent cerebral angiogram. As resident artist at the Royal London Hospital, Aldworth was allowed to observe and draw interventions on a regular basis. Sitting a few metres away from the operating table she looked at two monitors: one displayed the patient, the other showed the inside of his or her head. Over the years she made hun-

Fig. 12 – Susan Aldworth, *Location 1*, january 2006

dreds of drawings, varying from tentative pencil sketches to watercolours coloured in bold pigment, using the colour as a metaphor for the "self" of the patient on the operating table (Fig. 12). Brain scans came to acquire two meanings in her working process: on one hand she used them as a kind of "photographic" representation of the subject of the portrait, on the other hand she used the lines of the arteries visible in the medical image as the basic graphic pattern that sustains the whole series, creating a coherent visual language. She explains: "The cerebral landscapes I drew from individual brain scans would become part of an abstract portrait of the patient". The collapsing of the portrait into a landscape and vice versa is now patent. If in *Between a Thing and a Thought* the analogy between the brain/mind and the landscape/map was revealed by forms and colours, now it is explicitly stated in the title that is a wordplay of "brain" and "landscape". Like in Between a Thing and a Thought the technique adopted is printmaking. The medium is an essential component in the meaning of a work of art, and printmaking, being a medium of experiment, invention, accident, alchemy and serendipity, is an ideal technique for the production of images which are graphic equivalents of the neuro-chemical processes that are at the basis of the activity of billions of neurons. Etching is in itself a process crucially depending on chemistry and it has the potential to generate imagery in and of itself, because the final image, a negative of the original metal plate, is the (partially unpredictable) result of a series of reactions and interactions between acids, inks, metal, paper and resins. It is the record of its own making-process and in this sense it mirrors the brain at work (Saunders, 2008).

Working with the print master Nigel Oxley, Aldworth was able to push this form of engraving in new directions "inventing a new process by taking bits of old vocabulary and turning them into something else" (Oxley, 2006). By ex-

perimenting with negative etching, they managed to work entirely with white lines, producing a strong contrast with the rich blue of the aquatint background and creating an emphatic light that recalls the spark of ideas and the "firing" of synapses. Moreover, they attained unexpected visual effects by letting methylated spirits seep into the white spirits on top of the aquatint. The result is reminiscent of a brain hemorrhage and of a stream of consciousness, of proliferating organic matter and receding memories. As noted by Gill Saunders, the choice of the colour of the ground is also very evocative. On the one hand blue is a colour that we associate with deep water (where it is hard to determine gravity or perspective); it is the colour of calmness, but also of the mystery and the unknown. On the other hand it is a colour strongly associated with science: methylene blue is widely used as redox indicator in analytical chemistry and it is a basic dye in many biological staining procedures; it is also the colour of cyanotype, an early photographic process, whose first and best known applications were the botanical illustrations of Anna Atkins (Fig. 13). Finally, it is the colour that many patients associate with brain trauma. Mastering this essential palette (blue and white) and the vagaries of intaglio, Aldworth creates "extraordinarily intimate portraits of the mind in action" (Saunders, 2008), landscapes of the brain that as her previous work Between a Thing and a Thought are unsettling maps of an uncharted territory[6]. Commenting on Aldworth's work, neuroscientist Paul Broks has pointed out that she is fundamentally dealing with the body/mind problem and that she gives an "artistic response" to this conundrum that has been challenging philosophy since its origins and that in the last decades has become one of the most debated topics in neurosciences (Broks, 2008). To give an "artistic response" does not mean to give a straight answer (which is the task of science). On the contrary, it implies the amplification and

Fig. 13 – Anna Atkins, *Dictyota dichotoma*, 1843

re-presentation of the paradoxes, ambiguities, uncertainties embedded in every unsolved question. Unlike a scientific or philosophical argument, an artwork has no constraint to adhere to the law of the excluded third, it is allowed to be a locus of contradiction where opposites may coincide or explode. In her artworks Aldworth does not accept, nor reject the scientific perspective on consciousness, identity and personality, but she keeps us in a play where medical images are celebrated and questioned, their epistemological value is acknowledged and their limits are exposed.

Similar considerations have been made by Martin Kemp regarding the installation *Magic Forest* (Figs. 14) created by Andrew Carnie on occasion of the exhibition "Head on. Art with the brain in mind" (London, 2000). Artists and scientist have their own specific ways to deal with the unknown: "The task of the artist and the scientist both begin at the boundaries where knowledge runs thin. The artist gives vent to his awe through the magic of visual suggestion, the scientist through an insatiable urge to explain 'how' " (Kemp, 2002). In Carnie's installation two projectors and three large gauze screens are used to project 160 slides of neural growth, with images dissolving into one

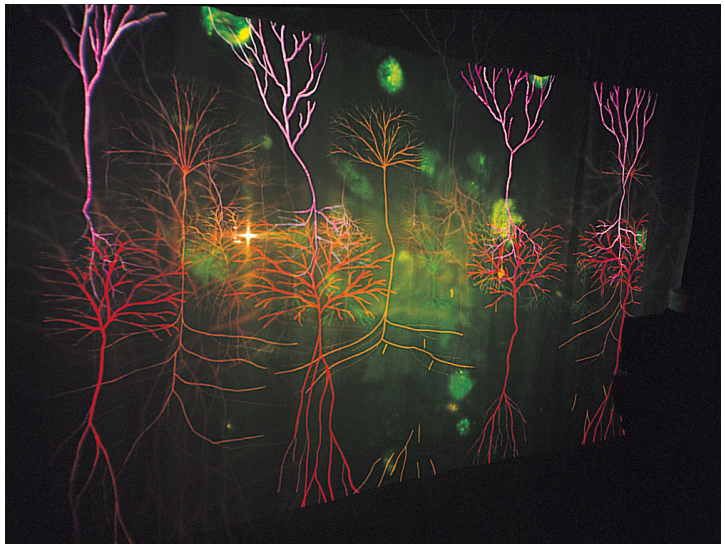

Fig. 14 – Andrew Carnie, *Magic forest* (detail), 2000

another on the screens as to mimic the confocal microscope. The sequence starts with neurones growing in the skull: they gradually proliferate, migrate, and build connections among their branches creating a multilayered forest that completely invades the screens. The cycle ends when the system collapses: neurones disappear, blackness returns and the skull is shown again getting larger and larger, until a new cycle begins in an endless loop of generation and decay. In the to and fro between projectors the spectator can enter the world of the brain in different ways: as the objective, exterior observer of complex neuronal forms or as a lost traveller who wonders inside the intricate forest of his own mind. Carnie's neurons are hand-drawn with colours reflecting the fluorescence used for microscope visualization, they are accurate and fantastic at the same time. The domain of poetry (the magic forest of fairy tales) and that of science (the visualization as if under the confocal microscope) are playfully blurred.

Annie Cattrell: Between the mind and the world

Annie Cattrell is another artist, probably one of the most accomplished, whose work has been inspired by scientific representations, with particular attention to anatomy and the visualization of the inner body in its morphology and functioning. In the series *Sense* (2002-2003) she explores the "physicality of consciousness". *Hearing, Seeing, Tasting, Smelling* and *Touching* are five bright acrylic cubes in which irregular translucent forms seem to float (Fig. 15). These amber-coloured shapes recall clouds and nevertheless they are not fortuitous, they are, on the contrary, very accurate renderings of functional MRI data that "capture" the brain in action. The sculptures isolate the pattern of mental activity corresponding to the stimulation of each of the five senses. They are a very good example of how abstract scientific data can be turned into tangible reality (Kemp, 2003), but in their simplicity and evanescence they are by no means scientific illustration. Cathy Gere has aptly described them as "luminescent artefacts that communicate the sheer, bizarre beauty of the idea that the activity in a living human brain can be visualised" (Gere, 2004). As a matter of fact what strikes the spectator at first is the elegance of forms and colours: crystalline cubes (a transparent skull?) protecting golden patterns (the brain or the mind?). Like in the case of many works by Aldworth, one is driven to get closer, to walk around the white plinths peering inside the cubes with a sense of intimacy and concern. Like in Aldworth's *Brainscapes* we cannot say if the artist is inviting us to commit to neuroscientific explanations of subjective experience (with specific reference to localization theories) or if she is eluding the theory transforming it in a beautiful object that stands on its own. The elegance of the sculptures, in fact, belies the complexity of the technology necessary to create them, in the very same way as the ap-

parent clarity and readability of brain scans produced through fMRI and PET hides the complexity and provisional nature of the theories and the scientific assumptions underlying the production of those very images.

Much of Cattrell's work has focused on the body, perception, sexuality and on the relationship between the inside and the outside. In 1991 she was artist in residence at a psychiatric hospital in Edinburgh and she became interested in psychiatry and in the relationship between the brain, the mind, the world and mental illness. At the same time the problem of "transparency", intended as the possibility to look into something that cannot be touched (for example, looking into a cell through a microscope), became a central issue in her work. This preoccupation led her to work with glass, not because of its intrinsic aesthetic properties, but because glass would allow her to reproduce, to embody in a piece of art, something close to diagrams and models. Glass can be fused in a way that

Fig. 15 – Annie Cattrell, *Sense-Seeing*, 2002

can completely hide the process through which the piece has been constructed. That is, the output does not bear traces of the process that led to it. Similarly, diagrams and models are polished representations that reveal (make transparent) the object they represent and at the same

Fig. 16 – Annie Cattrell, *Operating Theatre*, 2000

time hide their own making process. For Cattrell the question was: "How do you make [an art]work feel like it's a thought about something internal that you've made external?" (Cattrell, in Gere, 2004). The results of this struggle for representing what cannot be seen were works as diverse as *Nervous System* and *Operating Theatre*. In *Operating Theatre* (Fig. 16) Cattrell overtly criticizes the reductionist paradigm. More exactly, she makes a commentary on the dangerous excesses that this paradigm can encompass, namely the practice of leucotomy and lobotomy. The installation is site specific since it was created for and in the Crichton Museum in Dumfries (Scotland), an ancient mental hospital converted into a museum of the history of psychiatry. It consists of a 19th Century surgery room whose operating table has been surmounted by an extremely fragile grid cage of thin glass bars. The grid is a dramatic metaphor of the brain and its double fragility: vulnerable to mental illness and completely exposed as object of neurosurgery. It is a very powerful piece, which literally drags the spectator in the sadness and anguish of mental illness. The abstract object

on the operating table, in all its precision, geometrical rigour and fragility is not simply a metaphor of the brain. It stands for every human being and his/her inherent frailty. It reminds us that we have little control both on what goes on in our psyche (shaped by unpredictable neurochemical events as well as by the social environment) and on the ways the community (family, medical establishment, public institutions) deals with the "insane". Interestingly, as we will see later, the aesthetic formula of the grid (a "neutral" ordering device) has been used by the artist Mona Hatoum to question the nature of prison, hospital, army and other depersonalizing institutions in a number of big installations that dissect and literally anatomize space.

Nervous system (Fig. 17) is a glass sculpture based on an ancient anatomical specimen, brought to England from Padua in the 1640s, consisting of three large, flat wooden boards on which lie, respectively, the veins, arteries and

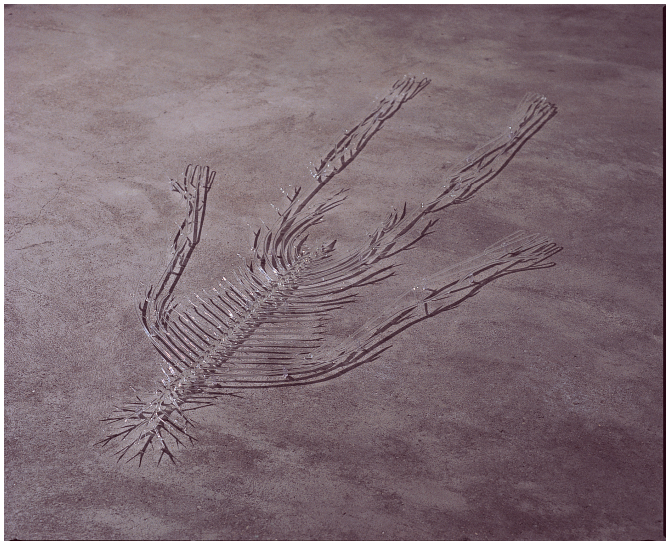

Fig. 17 – Annie Cattrell, *Nervous System*, 1999

nerves of a dissected body, dried and varnished. Cattrell recreates a kind of diagram of the human nervous system. Horizontally suspended at a few centimetres from the ground, the sculpture casts a thin shadow, which might stand for the sensations produced by our nervous system;

the sensations we have experienced, in fact, are unequivocally clear to us but they have no more substance than a shadow. Like in *Senses* scientific accuracy and poetic "evocativity" merge. The glass points to the ability of science to see inside and to extract pristine and readable forms from the mess of the inner body. The interior of the body is made external and the clean result does not bear traces of the complexity of the process[7]. However, like in *Operating Theatre*, the glass also points to fragility, ephemeral presence and fear of breaking into pieces.

Cattrell is with no doubt an "engaged artist". Commenting on her work with brain images she says: "I think of all this work as coming out of the residency in Edinburgh, the idea of the stigma attached to people in psychiatric hospitals. Thinking of the brain as a physical entity affected by its environment was very much what I was thinking about the residents at the time" (Cattrell, in Gere, 2004). Theoretically, if it were possible to relate unquestioningly mental illness to brain functioning, psychosis would be just another physical disorder and this might help reducing the stigma (and find effective treatment). In this sense *Senses* and *Nervous System* can be interpreted as tributes to the reductionist and localizationist paradigms. At the same time, exactly because they are artworks, they involve the beholder in a complex aesthetic experience, showing the inadequacy of localizationism at giving a complete account of subjective experience. Moreover, *Operating Theatre* is an explicit recognition of the inherent dangers of approaching mental disease from a localizationist perspective only. Staging one of the most controversial epochs in the history of psychiatry it reminds us that, more than other illnesses, most of psychic disorders are historically and culturally determined, and that the definition of sanity and insanity is always made on the ground of social conventions. That is, even if we could define the exact neurochemical underpinning of human be-

haviour, the acceptability of any given behaviour (sane/insane) will remain socially determined. Operating Theatre is the dark side of the optimistic view of the brain/mind suggested in The Five Senses. In The Five Senses the brain is transparent, readable and reliable; it stands on its own in a quiet beauty and can be positively moulded. In Operating Theatre the brain/mind is no more isolated, it is re-presented as necessarily being the brain of a specific person whose mind is inextricably embedded in sensations and experience, that is, in the world. In the unfolding of her work Cattrell explores to its whole extent the promise of transparency intrinsic to brain imagery and, more generally, to neurosciences and psychiatry, from the questions related to the production of images and localizationist theories to the ethical dilemmas of medical care and biopolitics. As artist she translates these issues in aesthetic experiences that continuously question the beholder.

Mona Hatoum: Strange bodies, anatomized spaces

The transparency of the body becomes an overtly political issue in the work of Mona Hatoum. This Palestinian artist, born in Lebanon and educated in England, has been working on the relationship between vision, corporeality and the filmic exploration of the interior of the body since she was an art student, in the 1980s, in London. In the performance *Don't Smile, You're on Camera* (1980) (Fig. 18) Hatoum filmed the audience sitting in rows and the images where projected in real time on a wide screen. Behind the scene three collaborators filmed their naked body and edited these frames, together with X-ray scans, into the images of the spectators. As a result members of the audience would see parts of their own bodies suddenly naked, a male torso transformed into a female breast or a rib cage emerging from a jacket. It was as if the

Fig. 18 – Mona Hatoum, *Don't smile, you're on camera* (video sequence), 1980

artist, endowed with special powers and right to vision, was able to see through clothing and skin, and as if she could blur people's genders. Responses ranged from entertained to unsettled and, in general, people had the eerie feeling that the camera could materialize the fantasy of seeing through clothes and into the body (a fantasy that Hatoum says to have cherished since she was a small child). In this early performance the artist was already putting in place two subject matters that would become seminal topoi of her work: gender matters and the issue of surveillance and the "penetrating gaze". In an interview released almost twenty years later she explained: "[when I presented *Don't Smile, You're on Camera*] I was criticized for being aggressive and invasive. I was trying to make people aware of the fact that we are constantly subjected to some mechanism of surveillance – the invasive look. I was making people aware by showing an exaggerated form of surveillance. Of course, I was invading people's

boundaries. [...] At the time people were talking about the gaze being a male thing and I was insisting that it was not necessarily so. I suppose I was trying to challenge the prescribed male/female roles. I have always resisted those stereotypes, and I was criticised, even by feminists at one point" (Hatoum, in Archer et al., 1997). Hatoum's articulated interpretation of the foucauldian ideas of gaze and surveillance emerges in more elaborate ways in her later works, like *Corps Etranger* – where the camera literally enters into the artist's body – and in a series of grid-based installations in which the body of the object of surveillance is physically absent, so that the very meaning of being the observer is put into question.

The first proposal for *Corps Etranger* (1994) (Fig. 19), a video installation in which the most intimate meanders of the artist's body are exposed to the view of the spectator, was written at the time of *Don't Smile, You're on Camera*, but due to technical and economical constraints it remained unaccomplished until 1994, when Hatoum was commissioned an artwork by the Centre Georges Pompidou. The installation consists of a cylindrical white booth provided with two entrances[8]: inside the booth the floor is occupied by the projection of endoscopic images[9] of the artist's body accompanied by a sound track of breathing and heartbeat recorded through an echograph positioned at different points of the body. For a while the camera skims on the surface (skin, membranes, the surface of an eyeball) then suddenly penetrates into the body to show the viscera before it emerges again in an erratic, and quite disturbing, movement. As the space of the cylinder is quite narrow, the visitor is almost forced to stand upon the images, in a claustrophobic atmosphere of undesired intimacy. According to art critic Guy Brett, the choice of projecting the images on the floor forcing the spectator to walk on them was crucial, since it creates a strong analogy between the body and the earth: our gaze penetrate the

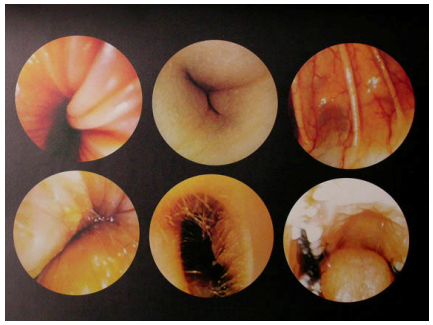

Fig. 19 – Mona Hatoum, *Corps Étranger* (details), 1994

body "like the shafts of wells which plunge into the depths" (Brett, 1997).

Aldworth creates landscapes of the brain, Cattrell provides us with diagrams, maps of the inner body, Hatoum plunges us directly in a tunnel into the earth-body. Once again, the artist wanted to challenge the audience: "I wanted to give the feeling that the body becomes vulnerable in the face of the scientific eye, probing it, invading its boundaries, objectifying it. I felt that introducing the camera, which is a foreign body, inside the body would be the ultimate violation of a human being, not leaving a single corner unprobed." (Hatoum, in Archer et al., 1997). And, indeed, visiting this installation one can feel that many boundaries are trespassed: those between inside and outside, self and other, private and public, intimacy and alienation, attraction and disgust, fascination and abjection, lyricism and violence. Brett is certainly right when he says that the paradoxical relationship of opposites is a fundamental key to understand Hatoum's work (Brett, 1997). If Aldworth celebrates the paradox between subjective experience and neurological models, Hatoum stages and declines different aspects of a more general paradox: that between being an object of observation and an active observer, all and always at the same time. No wonder that a number of interpretations has flourished on her *Corps Etranger*. For Sturken and Cartwritght, for example, it is a political commentary on contemporary medicine: the thesis would be that since modern medical

visualization techniques give access to the invisible part of the body, they provide new means to categorize and typify human beings (Sturken and Cartwritght, 2001). In a similar vein Andrea Duncan points out: "Mona Hatoum has been both attracted and repelled by medical intervention and she exploits the techniques of invasive science to demonstrate what she regards as her own "penetrating gaze" [...] The endoscopic invasion is a slippery journey into soft and impressionable matter which emphasises the loss of physical integrity" (Duncan, 2000). For Nicholas Mirzoeff, *Corps Etranger* is mostly about the relationship between the inside and the outside of the body: "Since the creation of the perspective system visual culture has relied on a distinction between exterior reality and the interior of the body where perceptual judgments about that reality are made. In Hatoum's strange body, the boundary no longer seems secure" (Mirzoeff, 1999). In this perspective the very title of the installation, *Corps Etranger*, acquires a further meaning: if we can no more separate the outside (the world around us) from the inside of our own bodies (which coincide with our vantage point and therefore with our possibility to make judgments about the external world), the body itself becomes a foreign place. The paradox is patent: the look of the observer is no longer a detached, scientific and allegedly "dominating" gaze, because the observer himself is caught in a "foreign place". The observer becomes the observed. And the "torturer" becomes the "victim". With its distorted scale and extreme enlargement, in fact, this (female) body, which at first seems the victim of medical power and/or male domination, becomes "the devouring womb, the vagina dentata" that swallows the spectator up (Hatoum, in Archer et al., 1997).

The questioning of sight as the sense of detachment and distance, as well as the dialectic between victimization and empowerment, to be watching and to be watched,

subject and object are at the core of many other installations by Mona Hatoum. The body and its visibility are always implied, even when it is not represented at all. She does so by reverting the metaphor of the body as a landscape. As aforementioned, in a series of works realised since 1989 the artist uses the Minimalist pattern of the geometrical grid (metal cages, bed frames, barrack beds, linear heating elements) to dissect the physical space of the installation as to create what she calls an "anatomized space". A dissected space that stands for the bodies it is supposed to contain and organize. In works like *The Light at the End* (1989) (Fig. 20), *Short Spaces* (1992), *Light Sentence* (1992) and *Quarters* (1996) (Fig. 21) Hatoum suggests a relationship between architectural spacing, the body and vision. All these works are commentaries on the prison, the mental asylum, the slum, the army. A primary reference is Foucault and his ideas of disciplined body and the panopticon. However, where Foucault stresses

Fig. 20 – Mona Hatoum, *The light at the end*, 1989

the notion of control and internalization (the subject acts as if it was always under the regulating and punishing gaze), the installations emphasize the external, the experience of the observer. Nothing is hidden from the spectator, but the spectator him/herself is exposed and caught in the space-scene he/she observes. Something very similar happens in *Corps Etranger*: the exhibition booth (art-gallery space, medical cubicle, space capsule,

ivory tower, peep-show booth) shelters and exposes us altogether; we penetrate the body with our (medical) gaze, but we are also swallowed up by that body (Philippi, 1996). As a matter of fact, with her unsettling representation of the interior of the body, Hatoum radically discourages any tentative of visual colonization: the gaze, being it aesthetic, scientific or pornographic, is always frustrated (Lajer-Burcharth, 1997), it does not arrive anywhere and it cannot catch anything. The camera has abolished the separation between the visible outside and the impenetrable and opaque interior. Entirely reduced to its visual dimension, the body shows that there is nothing to see in there or, as Frances Morris puts it: "From the Renaissance until our own faithless age the body has been regarded as housing something of spiritual significance. Hatoum reveals a body that is, if anything, dispossessed. No governing agency, no mind, no soul, no centre is revealed." (Morgan and Morris, 1995). Again, we are very close to Susan Aldworth who watches into the labyrinth of the brain and wonders: "Where is the ME in all this?". Apparently, if we look for the "soul", the "spirit", or whatever makes us human, we will not find it into the body. Watching inside the body all we find is pulsing flesh. The body is empty because there is nothing behind and beyond it. It is a hollow body invested with fantasies, myths and reveries.

Fig. 21 – Mona Hatoum, *Quarters*, 1996

Stelarc: The hollow body and techno-topia

The idea of a "hollow body", deprived not only of any agency or "soul", but of its internal organs altogether, has been extensively explored by the Australian artist Stelarc since the end of the 1970s. However, his conceptual frame is quite far from that of Mona Hatoum. Stelarc is not interested in questioning the visual regime of the body. Conversely, he explores the possibility to enhance the human body for it in order to keep the pace with technology, because, as he famously claims "the body is obsolete". In an interview he stated: "We have to design bodies to match our machines. [...] I speculated about engineering a synthetic skin. [...] so simply through a change of skin, we could radically hollow out the human body. You wouldn't need lungs to breathe, a gastrointestinal tract to digest food. You wouldn't need a circulatory system to convey nutrients and oxygen throughout the body. And a hollow body would be a better host for all the technological components you could pack into it!" (Stelarc, in Smith, 2005).

His performance *Stomach Sculpture* (Fig. 22), staged at the Fifth Australian Sculpture Triennale in Melbourne, in 1993, is the coherent aesthetic exploration and incarnation of this vision. Like *Corps Etranger*, Stomach Sculpture relies on video endoscopy. The artist swallowed a capsule of few centimeters (a gold and platinum sculpture) moved by a flexible cable connected to a servomotor and controlled by a logic circuit. Once the capsule had been inserted into the stomach, an endoscope sucked out excess fluid and the stomach was inflated with air[10]. At this point the capsule was opened and extended and it started to emit sounds and lights. This sound, mixed up with stomach noises, was transmitted in the space of the gallery where the performance took place, while the process going on into the artist's body was documented by

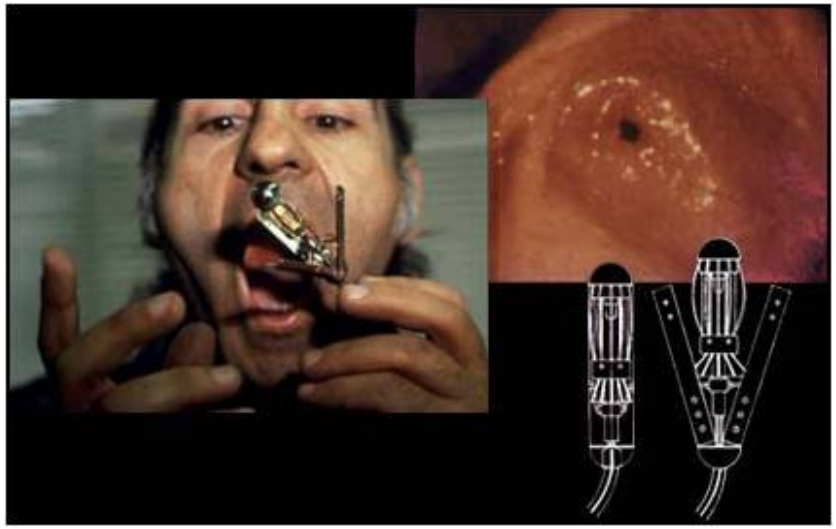

Fig. 22 – Stelarc, *Stomach Sculpture*, 1993

video endoscopy. Commenting on this performance in his web site Stelarc explained: "The intention has been to design a sculpture for a distended stomach. The idea was to insert an artwork into the body – to situate the sculpture in an internal space. The body becomes hollow, with no meaningful distinctions between public, private and physiological spaces. The technology invades and functions within the body not as a prosthetic replacement, but as an aesthetic adornment. One no longer looks at art, nor performs as art, but contains art. The hollow body becomes a host, not for a self or a soul, but simply for a sculpture"[11].

For Stelarc, the body is an empty, obsolete engine. It has no potency and it must be enhanced. Hatoum's inner body, although exposed to the "disciplining" gaze is still able to haunt the observer; it can be empty and completely visible, but it still can swallow the spectator who dares to look into it. Where Hatoum's body is an abyss Stelarc's is a surface (even if it is internal) where art can be staged and technology organized. Although they use the same technology (video endoscopy) Hatoum and Stelarc structure their works with the intent to reach opposite effects. The first creates an involving, pervasive and somewhat suffocating environment, which gives the feel-

ing that one is being sucked into/expelled from a living body. The second aims at setting a distance: he displays his inner body on a screen in a wide exhibition hall and the audience's attention is supposed to focus on the metal sculpture, rather than on the body that contains it. This body is not virtually colonized by a scientific gaze that the artist wants to challenge. It is actually inhabited by a sculpture, metaphor for all the technological devices that might (or better should) enhance our physical and mental performances. Stelarc not only welcomes this colonization, he actively demands and defends it. In his performance the foreign body (the sculpture) is not a stranger and it is not supposed to produce any estrangement. On the contrary, it is the symbol of the body to come: a body actively emptied of its organs in order to be a better cyborg.

Now, one could say that the coherence between Stelarc's statements and his work is compromised by the very nature of his performance. Choosing video endoscopy and amplifying the sounds of his stomach he makes it very hard for any spectator to focus the attention on the sculpture and forget the "host". Technology can be embedded in the flesh, but the flesh triggers our empathy, in a way and with an intensity that cannot be reached by mechanical prosthesis. Shocking and nauseating as they are, endoscopic images short-circuit the distance between vision and enteroception producing a sort of synaesthetic experience in which we viscerally feel what we see. Unlike the other technologies of visualization of the inner body (i.e. X-rays, magnetic resonance or ultrasounds) that produce images of the body without actually entering into it, video endoscopy is much closer to direct vision. The camera does not work "as if" it could see through the skin, it has to be introduced into the body, which means that our own eye enters the body. What we see is what is in there, in spite of deformation due to the scale and to the vantage point of the lens. Unless we have a specialized medical

education we cannot recognize exactly what we are seeing, but we surely understand that we are peering inside a living body. The majority of people have never seen his/her stomach, (and probably would rather not), but we know that inside we all look more or less the same and that what lies under the skin is ugly and unpleasant. We do not need to walk on the images (like *in Corps Etranger*) to feel that that inner body could be ours, that the pain provoked by the endoscopic procedure could be our pain. It means that Stelarc fails in his attempt to present us the body as something "dry" that can be controlled and contained, and therefore he fails at managing our gaze as well as his own body. Hatoum dictates us a politicized gaze, she calls for resistance to any procedure meant to tame the body, from medical visualization to space ordering. In Stelarc's work the body shows itself in all its resilience, against the will and the control of the artist himself. After all, Stelarc is a prominent exponent of Body Art and, as Amelia Jones remarks: "this artist, who rhetorically insists that the body is obsolete, chooses performance as his medium. The medium of performance most insistently begs the question of bodily "presence", materiality, unpredictability, sweat, and stench. Performance is, by definition, polluted by irrationality – the threats of potential disaster and erotic seduction hover over every 'live' event" (Jones, 2005). It remains that Stelarc joyfully and playfully surrenders to technology, while Hatoum presents technology as something we have to resist to or, at least, something that requires a provocative attitude. In both cases they literally embody in their artworks contrasting reveries, preoccupations and fears about the relationship between the individual and technologies of visualization.

Laura Ferguson: Different anatomies

Hollow, hyper-real, visceral or mechanized, the body that Stelarc and Mona Hatoum put on display is always virtual. It is an artistic if not purely intellectual construct. Laura Ferguson, visual artist living in New York, tells us a different story. In the *Visible Skeleton Series* (a work in progress started in 1993) (Figs. 23, 24, 25) she works on actual medical images of her skeleton in order to create paintings that talk about a real body in pain. A body "deformed" by scoliosis and that, nevertheless, preserves its beauty and sensuality.

If Stelarc's and Hatoum's works can be read as political manifestos, Ferguson's can be interpreted as a militant autobiography. She is neither interested in how medical imaging has colonized our bodies, nor in how we could enhance our performance through high-tech prosthesis. She is rather concerned in how physicians use medical

Fig. 23 – Laura Ferguson, *Crouching figure with visible skeleton*, 1996

Fig. 24 – Laura Ferguson, *Bending figure with visible skeleton*, 2004

Fig. 25 – Laura Ferguson, *Bending pelvis/sacrum, study for Bending figure with visible skeleton*, n.d.

imaging to act upon her own body, and in what these images can tell her about herself. In order to find answers she takes possession of those very images and works with them to construct what she calls "an artistic knowledge" of her "different" skeleton. A knowledge that can be used to defy the normalizing gaze, being it medical or social, and that can help to create a ground for public discussion about "normality". In an interview published in 2006 Ferguson explained: "Art is one of the few arenas in which the less-than-perfect body can be portrayed with its own kind of beauty, grace, sensuality and originality" (Neely, 2006) and in her website she explains: "Because I am an artist and tend to think in visual terms, I needed to be able to picture what my scoliotic spine looked like. [...]. Scoliosis is a flawed model of the beautifully designed human musculoskeletal system, but I wanted to portray it as having its own more complex beauty, one that viewed deformity as differentness , and differentness as individuality"[12].

This artist inspires herself in the Renaissance anatomical tradition (among her inspirations she counts Leonardo and the wax anatomical models of the Museum La Specola, in Florence) subverting the use of medical representations that, by definition, are objectifying, distancing and controlling. In this perspective radiographs and computed tomography (CT) scans are neither an object of theoretical reflection nor a metaphor, they are fundamental elements of a "learning through drawing" process[13] that has allowed her to regain a sense of ownership of her own body that had somehow been lost when her experience was "medicalized". Ferguson claims the right to work with the medical images of her body – which normally are intended to belong to medical professionals[14] – in order to learn about its unusual structure. Her aim is creating images that are anatomically accurate and yet personal and inscribed in an artistic tradition: "My body was avail-

able to me, to use as the subject of art – a body that was voluptuous in the artistic tradition of classical nude by Titian or Degas or Renoir, yet deformed by scoliosis: a flawed but perhaps more interesting kind of beauty, an image that in itself embodied duality" (Ferguson, in Neely, 2006).

As a genuine follower of anatomical tradition Laura Ferguson devoted many years to the study of anatomy. She began with Irene Dowd, a dancer and choreographer who teaches anatomy with particular emphasis on movement, which requires a specific focus on the relationship between structure and function. Working on a real human skeleton Ferguson became familiar with the intrinsic dynamism of the bones' structure that in visual terms encompasses the rendering of shape, volume, texture, roundness, translucence, roughness and so on. After one year spent drawing a normal skeleton she approached her own, more complicated one. For this purpose she had to work with X-ray images. Like painting, radiographs present the challenge of rendering a three dimensional world onto a bi-dimensional surface. With an aggravating factor: in X-ray images it is impossible to simulate perspective and all the planes appear superimposed (very much like in a Cubist painting). Ferguson explains this problem very clearly: "On x-ray film there is only one plane: bones appear as white light, essentially transparent, with elements of foreground and background superimposed on each other. The whitest areas are the densest. A small circular mark may represent a cylindrical object like a spinous process that might be projected forward, or backward, or it could be a flat circular groove or an indentation. [...] Each white mark on the X-ray film represents a real structure, but its degree of transparency is the only indication of its thickness or 3D form" (Ferguson, unpublished)[15]. As the aim of Ferguson was to visualize the dynamic of scoliosis, its nature of rotational deformity that

affects the whole body, she had to turn to a plastic model that could be twisted and bent. Afterwards with the help of her anatomy teacher she learned to recognize the landmarks where her skeleton and muscles appeared beneath the skin. Applying the radiographs (that are almost life-size) directly to the body she tried to figure out how the bones on the inside matched with her reference points on the outside. The process of drawing "from outside-in" – trying to represent the inner body with the help of what emerged to the surface – helped the work to gain volume[16]. However, for the artist it was still an incomplete result, which needed to be complemented with an "inside-out" approach.

For this purpose more detailed and sophisticated medical images were needed, namely computed tomography (CT) scans with three dimensional rendering. As an artist in residence at New York University, Ferguson had access to this technology for artistic purposes. This work, beyond being valuable for her inquiry, gave her a remarkable insight in a number of problems related to CT scans reading and in particular to the three dimensions reconstruction. CT images are complex images or, to borrow an expression used by Joseph Dumit in relation to brain PET, they are "expert images", since their intelligibility relies on specialized knowledge (Dumit, 2004). CT scans must be read in series: each plate contains a certain number of frames, each frame corresponding to a "picture" taken by the scanner while rotating around the patient's body. When the radiologist reads the plates he or she has to mentally reconstruct a volumetric figure. In order to simplify and optimize this task, in recent years new computational tools for three dimensional image's reconstruction have been developed. Now, programmers who develop the software for 3D rendering must reconstruct a volumetric figure out of bi-dimensional data. In doing this, they have to deal with the same challenges of the visual

artist. As Ferguson puts it: "With all its sophisticated technology and its bases in medical facts the scan image is still a visual illusion of three dimensionality, and to create this illusion it employs some of the same kinds of technique that artists use, for instance shading and foreshortening. But how, and how well, does technology handle these display issues? To what degree are the solutions strictly data-based rather than interpretative?".

Aware of these problems Ferguson can critically use medical images to attain her desired realism. Once determined the position of the skeleton for her drawings through an accurate work with X-rays, CT scans and direct observation of herself in the mirror, the artist does one or more in-depth studies to become familiar with the smallest anatomical details, up to the texture of the bone. This part of the work is mostly done at the Anatomy Lab at NYU, where she can observe real human skeletons. This meticulous work is aimed at making visible the daunting complexity of the human body. Ferguson remarks: "It's an unusual kind of work – not quite like drawing a real thing that you can see, yet not quite like drawing from imagination either: it's drawing a real thing, but one that you can't see" (it is easy to find here a correspondence with the problem of transparency that hunts Cattrell's work). The almost obsessive attention of the artist for the smallest details in representing the skeleton is not a task she goes through for its own sake. Ferguson takes seriously the ancient maxim "Know Thyself" that guided the work of Renaissance anatomists, according to whom God's created order (which included the microcosm of the human body) was designed for human understanding (Kemp and Wallace, 2000). This contemporary "anatomist" is not looking for a divine order, but she is nevertheless looking for a deeper understanding of what she calls the "interior space", drawing it with details to the small joints with their imperceptible texture, so

that she can create harmony out of asymmetry, beauty out of what is normally considered ugly, softness out of pain. In fact, with all its detail and accuracy, the anatomical drawings are just one preparatory step in the creation of Ferguson's artworks. In her own words: "Getting all the details right is still just the beginning: then I have to endow [the bones] with feeling, meaning, individuality – with the same sense of sensuality and softness that I feel in the rest of my body. And just as the character of the face is formed by life experiences, so the bones have been shaped by the forces working over them over the years, [by] the body's attempts to compensate for its asymmetries". What is at issue, then, is to transform the anatomical drawing into a portrait. Here art departs from science, and Ferguson's trajectory crosses that of the artists analyzed above, with a specific affinity with Aldworth's attempt to transform brain angiograms into subjective portraits. However, while Aldworth and Cattrell look for the subject into the brain, Ferguson looks for consciousness into the whole body, into the vicissitudes of a skeleton that deals with "deformity". In this she is conceptually closer to Mona Hatoum, whose work displays a contested subjectivity embedded into the flesh.

The transformation of the anatomical drawings into sensuous subjective portraits begins with the preparation of the paper on which the final artworks are made. As a genuine artist/artisan Ferguson prepares her paper herself through an original technique that she calls "floating colour process". It consists in mixing oil paints with bronze powder (one different colour at time) and then sprinkling the mix from a brush onto a tray of water. The drops of colour spread out on the surface creating random figures that are transferred to the paper by laying the sheet down onto the water for a very short time, the paper is then let to dry before it can undergo the same process (from twenty to thirty times) with different colours. At the

end of the process the materiality of the paper itself has been transformed through the superimposition of translucent layers that create the optical effect of an organic texture (Figs. 26, 27). The floating colours process was inspired by the technique used for making marbled paper; however, while the marbling technique aims at creating tight, controllable and repeatable patterns, the goal of the floating colours is to let the forms appear freely, so that each sheet presents its own unpredictable patterns and is able to convey different feelings related to colours and shapes. Similarly to what happens in etching, this process entails a good deal of casualty and serendipity (the artist herself think of these floating colours images as the equivalent of mezzotint plate). Ferguson observes: "[these papers] seem to represent the aspect of creativity which is natural, uncontrolled, and unselfconscious". Drawing, on the other hand, epitomizes that aspect of creativity that is "more conscious, wilfully formed, cognizant". On these

Fig. 26 – Laura Ferguson, *Floating colours series #2*, n.d.

papers, which have a very strong "organic" appearance, the artist draws with charcoal, pencil, pastel and oil crayon the dynamic bones and the soft forms of the outer figure of the body that she has carefully studied: "When I've come to know the figure from the outside, and the individual qualities of the bones beneath the skin, I put

the elements together into a 'visible skeleton' drawing, where the viewer sees the skeleton through the transparent surface of the figure". It is a patient work of reiterate and multiple revealing. The long preparatory studies reveal the structure and the images of movement and space that connect the inner and the outer body; the transparent layers of the paper reveal the flesh – with its cells, nerves and vessels – under the skin; the final artwork reveals the beauty, grace, sensuality and originality of a "different anatomy", beyond pain and imperfection. The most surprising effect of Ferguson's drawings is that, contrarily to most depictions of deformity, they elicit neither repulsion nor pity in the beholder. As observed by Alice Dreger they rather create a disorienting effect. One is led to wonder: why is the skeleton there? Why does she look so beautiful and so wrong at the same time? Is that erotic? (Dreger, 2004). This disorientation, the tension and conflict that Ferguson creates between what medical

Fig. 27 – Laura Ferguson, *Bone scaffolding with floating colours*, 2006.

images are supposed to be (dry, objectifying, controlling) and what they become in her work (personal, sensual, empowering) is very close to the questioning of the dialectic between victimization and empowerment staged by Mona Hatoum. They not only defy the medical gaze, but the very idea of gaze as a one-way exercise of power. In the hands of the artist the images (and the alleged victim of the gaze) stare back, calling for a better comprehension of the relationship between images, medical images in particular, and the body.

NOTES

[1] Public dissections, inaugurated before the end of the 15th century, were popular in Italy, France and Holland and were performed until the 19th century. The fascination for the view of the inner body, however, has not faded, as testified by the success of the exhibition *Body Worlds* that displays plastinated cadavers.

[2] In the *Technical Manifesto of Futurist Painting*, published in Milan in 1910, Umberto Boccioni wrote: "Our growing need of truth is no longer satisfied with Form and Colours as they have been understood hitherto. [...] Why should we forget in our creations the doubled power of our sight, capable of giving results analogous to those of the X-rays?". And a decade later in the *Realism Manifesto* Naum Gabo stated: "Just as X-rays are shaded from black to white, so are the layers of tissue they reveal. That grey scale is reality".

[3] The lithograph was made at a time when the competition between United States and Soviet Union to conquer the Space was a key issue in the Cold War. Rauschenberg was one of the artists who worked for the Nation Space Program. In this context, in spite of its irony, Rauschenberg's work has been perceived as embodying an "American spirit". According to art historian Christin Mamiya, this perception is

not due entirely to the artworks themselves (Rauschenberg's images are often visually cryptic and ambiguous), but to the interaction of the works with specific historical circumstances that imbue them with "ideological resonance". Rauschenberg, in fact, was often sponsored by the US government. In 1969, for instance, he took part in the NASA Art Program, an outreach plan instituted in 1963 that overtly acknowledged art's persuasive power (Mamiya, 1993).

[4] In Thomas Mann's masterpiece *The Magic Mountain*, published in 1924, Doctor Beherens defines radiography as "Anatomy by means of light".

[5] The term "cerebral subject" refers to an anthropological figure that embodies the belief that human beings are essentially reducible to their brains (Ortega and Vidal, 2007).

[6] The analogy between the body and the landscape is a timeless poetic *topos*, just like the comparison between anatomical drawing and mapping. For anatomists and cosmographers in the 16th and 17th centuries the analogy between the discovery of the body and the discovery of the land constituted a crucial framework (Kemp and Wallace, 2000). In his *De Humani Corporis Fabrica* (Venice, 1627), for example, the anatomist Adriano Spigelius asserted the necessity of a "mental map" for the body, as enabling condition of correct knowledge (Albano, in Kemp and Wallace, 2000).

[7] An interesting counterpoint to Cattrell's *Nervous System* can be found in the work of another British artist, John Isaac. In his wax *A Necessary Change of Heart* (2000), Isaac re-works the theme of wax anatomies and subverts their aesthetics putting on display the messy reality of the dissection.

[8] This viewing chamber has been interpreted in different ways. It could remind an automatic public toilet, as well as a laboratory cubicle or a space capsule (Duncan, 2000). It could also be a white circular tower that looks both futuristic and medieval (Mirzoeff, 1999). For Lajer-Burcharth it is at the same time an art-gallery space, a hospital cubicle and a peepshow booth (Lajer-Burcharth, 1997).

[9] Endoscopy has been in use since 1822 and in its primitive form simply allowed the simple visualization of internal organs from natural cavities of the body, without producing any picture. Its performance has improved exponentially along with the development and miniaturization of imaging technologies.

[10] This is the standard procedure in endoscopy and colonoscopy. Viscera must be inflated with air to distend its wall, so that the lens of the camera can focus and capture images of the inner space.

[11] http://www.stelarc.va.com.au/stomach/stomach.html [retrieved on 16th June 2010]

[12] www.lauraferguson.net [retrieved on 16th June 2010]

[13] The "learning through drawing" process implies both "visual" and "physical" learning. On the visual side, one must first see the overall shapes and forms, then noticing more and more of the details, the fine points, the texture, the way it occupies space. One must see what is really there and not what there might be. On the physical side there are the fine movements that the hand has to learn and which, in some way, become part of the organic body itself (Ferguson, unpublished book).

[14] In the interview with Neely, talking about the difficulties in visualizing one's own interior body, Ferguson explained: "One problem is that even when you become interested and want to visualize the inner body, the available source material tends to be clinical and hard to relate to. The medical professionals seem to own the images of the inner body" (Neely, 2006)

[15] From now on all quotations are from Ferguson's hand-made book *The consciousness of the body*, in which the artist has collected texts and drawings. It is a work still in progress, but the artist kindly provided me her texts.

[16] Talking about this process in her book, Ferguson makes an interesting remark. She explains that before she engaged in this work she had experienced her back as two-dimensional, with the spine creating a flat "S". Along the process she began to feel her backbone as three-dimensional. It seems to me that it is an interesting example of how our mental images, influenced by what we actually see (or do not see), act on our body schema.

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