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Living statues

Bewegung liegt allem Werden zugrunde. ... Auch im Weltall ist Bewegung das Gegebene. Paul Klee[1]

On March 15, 1912, Umberto Boccioni wrote a letter from London to his friend Vico Baer, announcing: »I am obsessed these days by sculpture! I think I can perceive a complete renewal of this mummified art.«[2] At this time avant-garde painting had definitely outsped the other arts, with sculpture and architecture lagging furthest behind. In Boccioni's mind, it defied explanation »how generations of sculptors can continue to construct dummies without asking themselves why all the exhibition halls of sculpture have become reservoirs of boredom and nausea, or why inaugurations of public monuments, a rendezvous of uncontrollable hilarity.«[3]

The general aim of the futurist movement was to synchronise the arts with the development of modern society and technology. Hence, in the first futurist manifesto, published in the Parisian *Le Figaro* on February 20, 1909, Filippo Tommaso Marinetti renounced any fixation on the past, despite himself being burdened with history because of his Italian education and his birthplace of Alexandria in Egypt. He declared: »In truth I tell you that the daily round of museums, libraries, and academies (cemeteries of vain efforts, calvaries of crucified dreams, registries of aborted beginnings!) is as damaging for artists as the prolonged guardianship of parents is for certain young people drunk with their talent and ambitious desire. ... We want no part in it, we are young and strong Futurists!« Instead of following the outdated model of classical art, Marinetti declared that a roaring race car is more beautiful than the Nike of Samothrace. Moreover, »against the conception of the immortal and imperishable« as implied by classical ideas, Marinetti »set up the art of the becoming, the perishable, the transitory and the expendable« and insisted »that a masterpiece must be burned with the corpse of its author.«[4]

Marinetti's ambitions concerning architecture were similar. Hiding behind the name of the futurist architect Antonio Sant'Elia, he declared nothing to be more beautiful than the steel frame of a house in construction, for the frame of a house in construction symbolises the futurists' burning passion for the coming-into-being of things. Thus, the »harrowing cry and heavy thud of a fallen construction worker, and a great drop of blood on the pavement« only enhance its beauty.[5] While in his advocacy of steel architecture Eugène-Emmanuel Viollet-le-Duc had set the future

lifetime of a building at 100 years, Marinetti proclaimed that our houses will last less time than we do and every generation will have to make its own.[6]

Not only did the futurists reject the notion of timeless and eternal masterpieces in art, but they also wanted to involve the dimension of time in their works. Instead of the harmony and repose of the Apollo of Belvedere, the futurists searched for dynamics, movement, speed in each art form. The notion of movement has in recent years become a major focus of architectural theory, as well. Many projects by recent avant-garde architects, such as Greg Lynn or Bernard Cache, can be seen as continuing the futurist project. It is not at all by accident that Lynn's House Project for Long Island, for example, recalls the forms of Boccioni's sculpture. To understand recent architecture, then, it is necessary to take a look at Boccioni and the theoretical presuppositions that animate his work. Boccioni declared that »sculpture should give life to objects by rendering their extension into space palpable, systematic, and plastic«.[7] This is the objective behind his series of sculptural exercises that culminated in the *Unique Forms of Continuity in Space* of 1913. It is a statue about movement: a living statue marking the death of mummies.

Mummies

The ideal of representing movement in sculpture was, however, not first formulated by the futurists; rather, the illusion of a movement was an interest to many classicists. In his adoration of ancient Greek art, J. J. Winckelmann had sought to de-emphasise the influence of the Egyptians on the Greeks by complaining about the »lack of movement« in Egyptian sculpture. A dramatic example of what Winckelmann referred to is provided by the statue of Senmut, the 18th dynasty architect of Queen Hatshepsut's mortuary temple; his body being encompassed within a cubic block with hieroglyphic engravings on its surface. However, this statue is unusual. A more typical portrait convention is exemplified in the statue of Ranofer from the fifth dynasty: more realistic but yet not completely hewn from the rectilinear granite block. The statue of Ranofer is rigidly axial, idealised and static but it also suggests movement: Ranofer is moving his left foot forward, as if starting to walk. This position also characterises archaic or Daidalic *kouroi* and *korai* in Greece. It was only from the fifth century onwards that Greek sculptors started to make statues in other positions.

However, when it comes to relief sculpture and especially painting, Egyptian artists show a much wider range of expression in the representation of movement. There are very lively frescoes showing animals, scenes from domestic life, images of battles with bodies falling from towers, etc. Particularly interesting for the present essay are the frescoes, which Napoleon's archaeologists found in the 12th dynasty tombs in Beni-Hassan, showing two wrestlers in a series of eight sequential instantaneous images. In fact, quite a few Egyptian reliefs and frescoes tell stories in se-

quence, like comic books or film stills. The artists used arrested motion or seemingly endless repetition of the same element along an axis to express movement. The human figure was usually shown facing right, the same direction as the hieroglyphs are read. Pictures were probably read less as spatial than as temporal compositions, in the manner of literature.

Johann Gottfried von Herder was, then, right in 1774 when he criticised Winckelmann for assuming that Egyptians could not master the representation of movement. Rather, Herder suggested, Egyptian hieratic and religious sculpture was not intended to show movement: »*Mumien sollten sie sein!*«[8] Mummies and statues had no need of movement. (Etymologically speaking, a »statue« stands upright and still; this meaning was recognised by Salvador Dali who, upon seeing Alexander Calder's mobiles, retorted: »The least one can expect of a sculpture is that it should keep still.«) Nevertheless, it was essential for Egyptians that both mummies and statues looked lifelike so that they could fulfil their main function, that of extending the life of the person depicted. In this sense, Egyptian statues were certainly pointing the way that European artists would follow until the end of the nineteenth century: the ideal of verisimilitude, the duplication of nature through art.

When Boccioni called sculpture a mummified art, he hit the mark in two ways: in regards to the conservatism of sculpture in comparison with other artforms at the turn of the century and as well as in regards to the origin of Western sculpture. At least classical authors traced the origins of sculpture back to Egypt. While in his *Biblioteca*, Apollodorus called Daidalos the best builder and the first inventor of statues, Pliny the Elder explained that Daidalos learned both sculpture and architecture in Egypt. The architectural creation for which Daidalos is remembered today, the Minoan labyrinth, might have had an Egyptian model. It is popular to derive the word ›labyrinth‹ from the Lykian double axe, *labros*, which would make it a Greek invention, but already in the nineteenth century H. Brugsch suggested a different etymology based on the name of an Egyptian building, *lapi-ro-hun-t (*R-pr-n-hnt)*, meaning »temple at the mouth of the sea«, a derivation which has recently again become popular.[9] Furthermore, Daidalos' sculptural inventions recall those made by Egyptian sculptors. The Egyptian word for ›sculptor‹ translates literally as ›he who keeps alive,‹ and the mythical inventor of Egyptian sculpture, Hermes Trismegistus, was credited with making living statues. According to the *Corpus Hermeticum*, Hermes constructed »statues living and conscious, filled with the breath of life, and doing many mighty works; statues which have foreknowledge, and predict future events by the drawing of lots, and by prophetic inspiration, and by dreams, and in many other ways; statues which inflict diseases and heal them, dispensing sorrow and joy according to men's deserts.«[10] Even before the Hermetic books were written, similar feats were attributed to Daidalos. Ancient sources report of three sculptural works by Daidalos: a bronze statue, a wooden statue of Hermes and a wooden Aphrodite injected with mercury. The significant point is that these statues were described as being alive.[11]

Since the days of the ancient Greeks and Egyptians, the dream of the living statue has been a recurring vision in western culture. It has appeared again and again as a version of the myth of Pygmalion; its fascination is the same as that giving rise to the perverse pleasures of wax cabinets and the works of John De Andrea and Duane Hanson. To determine how statues could be alive, however, classical accounts of the origins of sculpture need to be considered.

Shadows

In his *Natural History*, Pliny described the origin of painting as the conscious manipulation of shadows as representation. »All the ancients who have treated the history of the art agree, that the first attempt at what may be considered the formation of a picture, consisted in tracing the shadow of the human head or some other object on the wall, the interior being filled up with one uniform shade of colour.«[12] In a curious way, Pliny's speculation was confirmed by Julian Huxley nineteen centuries later. In the 1940s, Huxley was observing a gorilla at the Zoological Society with a fellow scientist when he suddenly noticed that the animal traced the outline of its shadow projected on to the wall of the cage, repeating this gesture three times.[13]

Pliny probably would not have been impressed by Huxley's observations, for he had a more substantial and human theory of the origin of painting. In an other part of his *Natural History*, he went into more detail, telling about the daughter of Butades, a potter from Sicyon, who »was in love with a young man; and when he was going abroad, she drew in outline on the wall the shadow of his face thrown by her lamp. Her father pressed clay on this and made a relief, which he hardened by exposure to fire with the rest of his pottery; and it is said that this likeness was preserved in the Shrine of the Nymphs.«[14] This account gives rise to a few questions, as observed by Viktor Stoichita. Why did the woman want an image? Why was the two-dimensional image made three-dimensional? Why was the image placed in a temple?[15]

In order to answer the second question, it is important to consider the difference between two- and three-dimensional images and their relation to the story. Both the silhouette drawing and the statue are related to shadows but in opposite ways: the drawing is a tracing of the shadow and thus a secondary representation of the shadow while the three-dimensional statue no longer can be reduced to the original (two-dimensional) shadows but it can even cast a shadow itself.

In the classical world, the notion of shadow was intimately connected with death. In the *Odyssey*, the dead in the Hades flutter like shadows or phantoms; later in Greece, whosoever entered the precinct of Lykaian Zeus was believed to lose his shadow and to die within a year.[16] However, an upright shadow might have different connotations. In Egyptian religion the shadow (*swyt*) was considered an em-

anation of a deity and a reflection of divine power; it was drawn as the silhouette of the body.[17] According to Erwin Rohde ancient Greek religion also linked the shadow, the soul and the person's double.[18]

The personification of the shadow might have been one of the motivations behind the iconoclastic movements during the Dark Ages. Early Church fathers criticised sculpture for two (contradictory) reasons: on the one hand they quoted Diogenes Laërtius and Horace who ridiculed the idea that a divine spirit could be caught in tangible matter, on the other hand they warned that statues were possessed by evil spirits. It is this latter idea, which imputes evil life to statues, which is relevant here. While the Bible contains precepts against graven images, the iconoclasts attacked any images that cast a shadow as being idolatrous and blasphemous. The reason may be that an image that casts a shadow can no longer be told apart from real things; hence, its creator is competing with God.

An echo of the doctrine that a shadow is an unreal element that makes the real appear real can still be heard in the third *Canto* of the *Purgatorio*. As Dante is about to ascend the mountain, he sees something that escaped his notice in the darkness of Hell: his guide and comfort, Virgil, does not cast a shadow because he lacks the human reality of a corporeal body. In fact, Dante is the only character in the whole of the *Divine Comedy* who has a shadow. He is therefore a constant source of amazement for the dead whose fate is to live as mere shades, their virtual bodies made of air.[19]

The casting of a shadow, then, makes statues fundamentally different from paintings and also *bas relief* sculpture: the latter are unreal images, the former is the real thing. Playing with the implications of Pliny's account of the origin of painting, F. W. Schelling speculated that »the magic of painting« consisted in allowing »negation to appear as reality, darkness as light, and on the other hand reality as negation, brightness as darkness, and through the infinity of gradations to allow the one to blend into the other such that they remain distinguishable in their individual effects without, however, being distinguishable in themselves. The material of the painter ... is darkness.«[20] Moreover, Schelling associated non-light with the real, with matter, corporeality and gravity. Thus for him, the body in general is non-light, just as light, in contrast, is non-body. From this point of view, then, the statue made by Butades of the young man arises from the opposition between light and gravity, between pure thought and pure matter, between ideal and real.[21] The father definitely saves the image from the land of shadows, giving it physical consistency and material reality. What is also noteworthy here is that the father is a potter who fires the statue together with his vases. The equation of the body with pots relates to another classical topos, the idea of the body as a vessel of the soul.[22]

From this point of view, it is easy to suggest the answers to the two remaining questions. In Egypt and Greece the statue thus stood for either a god or a dead person.[23] Since the young man was merely human, the only possibility that remains is that he was dead when Butades made his image in clay. The girl wanted an image

or a substitute when the man was going away, anticipating the possibility he would never return. It is therefore likely that the man went to war and died a hero, otherwise he would not have been honoured in a temple. The first statue in Greece was thus a funeral monument for a young hero in a war.

Living statues

In Egypt, Greece and Rome, sculpture achieved a remarkable level of verisimilitude. In the play *Theoroi* or *Isthmiastai* by Aeschylus, satyrs enter a sanctuary only to be frightened by statues:

> »This image full of my form
> this imitation by Daidalos lacks only a voice.
> ...
> It would challenge my own mother!
> For seeing it she would clearly/turn and (wail)
> thinking it to be me, whom she raised.
> So similar is it.«[24]

The only thing separating the statues from living beings is their lack of speech. This is essential, as early Greek philosophers often identified speech with the divine. Empedocles, for example, imagined the ancestors of men and women as being human in form but lacking speech, like infants. The human voice is the sign of divine spirit filling the body and something that images could never possess. Socrates says that »creatures of painting stand like living beings but if we ask them a question, they preserve solemn silence.«[25]

While what Socrates says would obviously apply to sculptural images as well, there is a way in which statues had a voice in archaic Greece, especially funeral statues such as the one by Butades. Tombs and statues were always equipped with inscriptions which before 550 BC were autodeictic, i. e. referring to themselves in the first person.[26] »Here I am, the tomb of Krites« is what a *sema* from the plain of Marathon declares.[27] Such inscriptions were written in phonetic writing in what is known as *scriptio continua*, without any marks as to where words begin or end. This is true phonetic writing but it makes difficult reading, unless one reads it aloud – but silent reading was in any case unknown in Greece at this time. If read aloud, however, the autodeictic inscription, which belongs properly to the statue, assumes acoustic reality by the voice of the person reading it. The statue, announcing its continuing life, takes over the body of the passer-by uttering the words. The deceased person lives through others every time the text is read or, as it were, re-enacted.[28]

The autodeictic inscriptions of archaic Greek funeral statues gradually lost their magical power of evocation and re-presentation. In the passage quoted above, Socrates continued to say that written words were not really alive: »You might

think they spoke as if they had intelligence, but if you question them, they always say the one and the same thing.«[29] In other words, the sign of life for Socrates was not voice (borrowed or not) but change.

In classical Greece, then, the ultimate condition of verisimilitude and the criterion of a second creation of life was that the statue should be able to move. The creation of moving statues was also the most celebrated of Daidalos's inventions in the classical world. Socrates, who twice claimed Daidalos as his ancestor, recounted that the statues of Daidalos were so alive that »unless bound, they run away and escape, but if they are fastened down, they remain in place.«[30] The methods used to achieve such feats are not clear, however. Mechanical dolls and clockwork automata were known in antiquity but Daidalos was praised for more fluid and less mechanical creations. In discussing Democritus' theory of the soul as the principle animating the body, Aristotle remarked in passing on Daidalos, claiming that the sculptor gave life to a wooden statue of Aphrodite by pouring quicksilver in it.[31] Again this image may be of Egyptian origin. Firstly, both mummies and statues were infused with life through the ceremony known as the »Opening of the Mouth,« which prepared the mouth for speaking and for receiving food, letting life flow in and out.[32] Secondly, ›mercury‹ could refer in the ancient world equally well to the metal or to the god Hermes and thus to Hermes Trismegistus, the inventor of the living statue. In Greece, Hermes was the god of messages and voice; in Egypt, he was called Thoth and in Rome, Mercurius.[33] Thus, the reference to mercury may not have been more than a remembrance of the living statues of the Trismegistus.

Modern Pygmalion

Partly because of the availability of cheap labor, the ancient Greeks did not apply their mechanical ingenuity for practical ends but tended to place the machine in the service of religion and miracle. The most famous of Hellenistic engineers, Hero of Alexandria designed a mechanical theatre for religious plays, several acts long. It featured dolls, looking like bacchants, that could dance and moved around on wooden rails.

The Greek fascination for miraculous automata was passed on to the Arabs and it survived throughout Islam into the eighteenth century. Sigfried Giedion stresses that what created a sensation in Europe at the birth of the industrial era were not the invention of utilitarian spinning machines but rather the manlike automata that »walked, played instruments, spoke with human voices, wrote, or drew.«[34] Such feats were made possible by the high standard of the crafts in general and the clockmaking industry in particular. The most spectacular ones were three automata constructed by Jacques de Vaucanson and presented to the Paris Academy of Sciences in 1738-1741. The »flutist« possessed lips that moved, a moving tongue and fingers that operated the stops of the flute. The »drummer« also played a three-holed

shepherd's pipe in addition to the drums. The most admired of the inventions was the »duck« that could waddle and swim, beat the air with its wings, wag its head, quack and pick up grain, swallow and even digest it in a way. The philosophers of the Enlightenment were astonished; Voltaire, Condorcet and D'Alembert were full of praise for Vaucanson. In 1748, Julian Offray de La Mettrie referred to Vaucanson's automata as evidence for his thesis that man was merely a complex machine, a giant watch, and that the only thing that separated inorganic things from living beings was, that the latter were organised matter that possessed the principle of motion. La Mettrie even suggested that some modern Prometheus might soon construct an artifical man.[35] By 1773 technology took a step closer to realising La Mettrie's prediction when Pierre-Jaquet Droz and Jean-Frédéric Leschot constructed a doll that sat at a desk and wrote sentences such as »we are the androids« and »cogito, ergo sum.«[36]

Towards the end of the century, however, critical voices became louder, culminating in the popular success of Mary Shelley's *Frankenstein* in 1808. Yet the idea of the moving statue lived on. At the end of the nineteenth century, Auguste Rodin insisted that the goal of art, the illusion of life, could not be achieved except by the representation of movement. He defined movement as the transition from one attitude to another, and this could only be suggested by showing successive positions simultaneously.[37]

Still, the representation of something does not imply the actual presence of the thing represented; representation of movement could be achieved without the statue actually being mobile. Indeed, some sculptors were able to thematise movement precisely through the immobility of the statue. In his 1913 discussion of the *Moses* by Michelangelo, Sigmund Freud suggested that the tense pose of the figure embodies a series of movements arrested at the last moment by the immense will power of Moses' superego. Freud began his reading by pointing out that the patriarch is holding the sacred tablets in a most casual way, which seems sacrilegious. This could, however, also be taken as a cue to another reading involving a whole narrative. According to Freud's reading, Moses has just returned from the mountain where he received the Ten Commandments from God, as he sees his people dancing around the golden calf. Moses pulls his beard in fury and anguish and is just about to storm into the crowd when he decides to hold his anger, perhaps realising that the sacred tablets might be damaged.

Even without going into Freud's psychoanalytic analysis of the statue as representing the dynamics of the human mind, it is still possible to suggest that Michelangelo has succeeded in representing movement by stressing the inevitable immobility of a statue. One should not exaggerate the originality of Freud's reading: it recapitulates Ovid's account of Pygmalion and his statue Galatea. Ovid sings:

> A very virgin in her face was seen,
> And had she mov'd, a living maid had been:
> One wou'd have thought she cou'd have stirr'd, but strove

With modesty, and was asham'd to move.
Art hid with art, so well perform'd the cheat,
It caught the carver with his own deceit.

If in Freud's reading the immobility of Moses attests to his spiritual strength, in Ovid's description Galatea's immobility is proof for her chastity. However, such a concept cannot be repeated too many times. In the nineteenth century, artists were increasingly interested in a very direct representation of movement in both painting and sculpture. From about the 1840s onwards several books on the locomotion of the horse were written by veterinarians, cavalry men and animal physiologists. The first to photographically represent the gait of a horse was Eadweard Muybridge, an English photographer in the service of the U. S. Government. From 1872 to 1878 he photographed the gallop and the trot by arranging a system of clockworks and electrical circuit breaking mechanisms that were triggered by the animals themselves. The pictures were published internationally in 1878 and 1879 and they created a sensation in the art world, for they looked absurd and disgraceful. Upon first seeing Muybridge's photographs in 1881, the great horse painter Ernest Meissonier gave a cry of astonishment and accused the camera of seeing falsely. Meissonier, who prided himself on surpassing the fidelity and verisimilitude of photographs, had gone to the extreme of constructing a miniature railway beside a racing track so that he could observe and sketch the galloping horse, propelling himself on a small trolley.

Criticism

Some years later, Muybridge contemplated on the initial response to his books: »It is impressed on our minds in infancy that a certain arbitrary symbol indicates an existing fact; if this same association of emblem and reality is reiterated at the preparatory school, insisted upon at college, at pronounced correct at the university; symbol and fact – or supposed fact – become so intimately blended that it is extremely difficult to disassociate them, even when reason and personal observation teaches us they have no true relationship. So it is with the conventional galloping horse; we have become so accustomed to see it in art that it has imperceptibly dominated our understanding, and we think the representation to be unimpeachable, until we throw all our preconceived impressions on one side, and seek the truth by independent observation from Nature herself. During the past few years the artist has become convinced that this definition of the horse's gallop does not harmonize with his own unbiased impression, and he is making rapid progress in his efforts to sweep away prejudice, and effect the complete reform that is gradually but surely coming.«[38]

However, the initial response was critical. In the *Gazette des Beaux-Arts* in February 1882, Georges Guérolt ridiculed the idea that Muybridge's photographs

were a revelation which should overthrow all accepted notions about the drawing of horses. He insisted that the pictures were impossible and false because they present us with an image »at the moment when, because of speed and the persistence of impressions on the retina, we should be unable to see anything but a blurred image, the shape of which being made up at one and the same time of the preceding and the following positions. Considering the way the human eye is constructed, it is certain that it cannot see and will never see the galloping horse as it is shown in these pictures.«[39] This line of criticism had been already forwarded before Muybridge's pictures were published. In 1878, the philosopher Eugène Véron discussed the representation of movement in art and photography. He insisted that the recent discovery of the persistence of vision had undermined the classicist immobility in drawing. Photography could not render movement, »simply because it is only able to seize absolutely stationary attitudes. This is one of the chief disabilities which will always effectively prevent it from usurping the place of art.« Inverting Plato's argument against illusionist perspective images, he maintained that reality should be represented »as it presents itself to our visual sense, not as it is.«[40]

For most viewers the instantaneous images of Muybridge did not appear to be moving. Even some photographers were opposed to such pictures. »What is the good of taking a photograph of a train going sixty miles an hour when in the print it looks like it is standing still?« asked P. H. Emerson in 1889.[41] In this case, then, the photographic image may be accurate and yet miss the essence of the phenomenon entirely. From similar observations, Rodin concluded that »it is the artist who is truthful and it is photography which lies, for in reality time does not stop, and if the artist succeeds in producing the impressions of a movement which takes several moments for accomplishment, his work is certainly much less conventional than the scientific image, where time is abruptly suspended.«[42] An instantaneous photograph was deceptive because it illustrated arrested movement; but the artist was interested in movement itself, and this could only be represented by certain conventions. Against Muybridge, Rodin defended Géricault's paintings of racehorses with their four legs simultaneously extended. While this never occurs in reality, he claimed that this is how viewers experience the horse running.

However, Rodin's arguments against Muybridge were not exclusively based on convention. Like Guérolt, Rodin also referred to the physiology of the eye, suggesting that an artist can lead the gaze of the viewer from one point in the sculpture to another so that the viewer will receive images of different phases of movement in the same sequential order as they happen in reality: thus, the movement is in effect reconstituted by the eye in a way similar to the cinema. If a sculptor designs the figure in such a way that the successive points will correspond to an actual trajectory in time, he will succeed in creating an illusion of a moving statue.

However, Rodin's idea that the illusion of motion is a product of eye movements was experimentally refuted only little more than a decade later. In 1910, one of the founders of Gestalt psychology, Max Wertheimer took a train from Vienna

to Germany for a holiday. When the train stopped in Frankfurt he bought a stroboscope, an instrument which like the zoöpraxiscope of Marey and Muybridge could be used to create the illusion of movement with still images. The toy gave Wertheimer the idea for an experiment similar to ones first conducted by Sigmund Exner in 1875. With a tachistoscope, Wertheimer showed two lines alternating: for a moment one line appeared on the left hand side, then another line on the right. If the interval was one second or more, the subjects correctly perceived two lines that appeared and disappeared. When, however, the time between the lines flashing was shortened to one-fifteenth of a second, the subjects saw one line moving from left to right and back again. At one-thirtieth of a second, finally, the illusion of movement was no longer present: the subjects perceived two lines that persisted side by side without any change.[43] Even more curiously, one could also produce the illusion of two lines moving in opposite directions. On the basis of such findings, Wertheimer concluded that the perceived motion was not generated by the eyes but rather by the brain. The movements of the eye on their own are far too rapid and random to allow anything but Brownian movement be reconstituted.

Cinema

To demonstrate the correctness of their methods, Muybridge and other chronophotographers occasionally demonstrated how the original movement could be recreated with instantaneous images. As early as 1881, Meissonier gave a zoöpraxiscope performance of Muybridge's photographs.[44] The zoöpraxiscope consisted of a central light source illuminating transparent glass discs, each of which was illuminated through a slit cut into an opaque disc set behind the glass. On each glass disc was a painting taken from Muybridge's photographs. As the discs revolved, the photographic subject appeared to move.[45] While the principle of the zoöpraxiscope in various forms was known already at the end of the eighteenth century, it was not before the 1890s that it was developed into cinema. In 1893 Thomas Alva Edison, who had known Muybridge since 1886, introduced the kinetoscope. It was a small cabinet with an endless loop of photographic film moving rapidly past a lamp so that from a viewing hole one could see the image moving. Edison, however, never thought of projecting the image on the wall to create what we would call cinema. This invention was patented by the Lumière brothers in 1895.

While the moving image proved an instantaneous success which has not faded, the cinematic illusion of movement was not exactly what chronophotographers had set out to accomplish. The leading French authority of chronophotography, Ètienne-Jules Marey, originally developed his famous photographic rifle in order to surpass our physiological limitations and make visible things that the naked eye cannot grasp, e. g. motions that were too fast or too slow to see. Because Marey was convinced that the unaided eye often falls prey to illusions, he never endorsed

the moving picture, for that would have meant perpetuating illusion, even though he once made a zoöpraxiscope demonstration of his pictures of a bird in flight at the *Académie des Sciences* on September 5, 1887.

Photography of time

Marey had already become a national celebrity in 1860 when he invented the sphygmograph, a mechanical device for measuring the pulse. When presented to the *Académie des Sciences* in 1860, the sphygmograph was considered a revolution, and Napeoleon III requested a demonstration of the device in court. A few days later, after Marey's instrument had detected irregularities in the pulse of a courtier, the man was found dead in his bed, and Marey became famous overnight.[46]

Other inventions by Marey include the myograph, a device for making tracings of a frog's muscle contractions; the first cardiograph for registering heart beat without an implantation; the pneumograph for registering respiration and the thermograph measuring heat. However, the most important invention was the photographic rifle, the *fusil*.[47]

The great mathematician Henri Poincaré called Marey a »veritable artist of the mechanics of life.« His influence on work efficiency and fatigue studies was enormous; Frank Gilbreth should be counted as one of his followers. Another admirer of Marey was Charles Henry, the founder of psychological aesthetics, who might have been the model dressed in white in Marey's bicycle photographs. Henry's achievement, the analytic decomposition of visual sensation into light, color and form, parallels Marey's decomposition of motion, and was a major influence on postimpressionism.

While Marey's earliest chronophotographs resemble those by Muybridge, he soon went in a different direction. Marey wanted to represent motion itself and not still poses, like Muybridge. With his extremely high speed camera he was able to show the movements in closer time segments and finally merge the images together in diagrammatic drawings. To analyse the movement of a man or a horse, Marey attached some white lines and points for reference, the trajectory of which could be accurately recorded on the photographic plate. In the original images the coherence of the body begins to dissolve and what emerges are fluctuating lines gently curving around. Later, Marey got increasingly interested in eliminating the mobile thing and concentrating on the dynamics itself. Thus, he started photographing turbulences in water and air, creating very abstract patterns.

In his analytical diagrams based on the photographs, Marey often reduced the movements of a leg or an arm into a series of triangular figures. This convenient notation was directly adopted by a number of painters in the beginning of the century, when Marey's photographs had become well-known through popular scientific magazines. Marcel Duchamp's *Nude Descending a Staircase* #1 and #2 are examples of very faithful translations of chronophotographs into paintings. In 1967 in an interview with Pierre Cabanne, Duchamp explained that he was not influenced by cinematography but by Marey: »I saw it in the illustration of a book by Marey, where he showed men who were fencing,,or horses in gallop with a system of dotted lines delineating the different movements. That is how he explained the idea of an elementary parallelism. It is a bit pretentious and formulaic, but amusing. That is what gave me the idea for the execution of the nude descending a staircase.«[48]

Umberto Boccioni and, in particular, Giacomo Balla also painted many images that are also direct applications of Marey's photographs, just like Duchamp's two nude paintings. What the futurists most appreciated was Marey's »unification of the concept of space, to which Cubism was limited, with that of time« and his demonstration of »the non-reality of the motionless body.«

Also the futurist photographer Antonio Bragaglia applied methods similar to Marey, even though his »photodynamics« was simply based on very long exposure which caused any moving object to appear blurry. For Bragaglia, photodynamism succeeded where chronophotography failed, as the images seemed to dematerialise into the continuous movement of the figure. In his 1913 *Fotodinamista futurista* he compared chronophotography to the quarter hour markings on the face of a clock, cinematography to the indication of minutes, and photodynamism to the intermovemental fractions existing between seconds.

Not surprisingly, the futurists were accused of being photographic or cinematic by other artists and writers, including Robert Delanay and Apollinaire.[49] In the defence of the movement, Boccioni insisted that »we have always rejected with disgust and contempt even the most distant relationship with the photograph because it is outside the boundaries of art. The photograph has a value in as much as by reproducing and imitating objectively, it has succeeded in its perfection in freeing the artist from the burden of reproducing reality with precision.«[50] With some justification, Boccioni repudiated superficial similarities between futurism and the primitivist tendencies in cubism, claiming in another letter to Baer in 1913 that »our primitivism is the extreme climax of complexity, whereas the primitivism of antiquity is the babbling of simplicity.«[51] While the use of Marey by futurists is undeniable, one should also consider the more radical philosophical underpinnings of futurist art.

In the 1909 manifesto, paraphrasing Marey, Marinetti talked about how the »sick lamplight through window glass taught us to distrust the deceitful mathematics of our perishing eyes.« What was deceitful for Marinetti was the whole ontology given in vision, the world of things in space and time. One of Marinetti's idols, Friedrich Nietzsche had already argued in the 1880s that in reality there are no such things as bodies, lines, planes, causes and effects, movement and rest, atoms, divisible times, divisible spaces and so on; rather, the human mind projects these structures onto the world in order to make it anthropomorphic and livable. Moreover, he insisted that »the body, the thing, the ›whole‹ constructed by the eye, awaken the distinction between a deed and a doer; the doer, the cause of the deed, conceived even more subtly, finally left behind the ›subject.‹«[52] Following this line of reasoning, Marinetti insisted that the familiar Kantian categories had become obsolete in the modern world: »Time and Space died yesterday. We already live in the absolute, because we have created eternal, omnipresent speed.«[53] In his 1913 Manifesto, Marinetti developed his poetic program in detail: »we should express the infinite smallness that surrounds us, the imperceptible, the invisible, the agitation of atoms, the Brownian movements, all the exciting hypotheses and all the domains explored by the high-powered microscope. To explain: I want to introduce the infinite molecular life into poetry not as a scientific document but as an intuitive element. It should mix, in the work of art, with the infinitely great spectacles and dramas, because this fusion constitutes the integral synthesis of life.«

While Marinetti never explained in detail how painters, sculptors and composer should achieve such effects, Boccioni was more explicit in the technical manifesto of futurist painting, arguing: »The gesture which we would reproduce in canvas shall no longer be a fixed moment in universal dynamism. It shall simply be the dynamic sensation made eternal. ... Space no longer exists.... Who can still believe in the opacity of bodies, since our sharpened and multiplied sensitiveness has already penetrated the obscure manifestations of the medium? ... Our bodies penetrate the sofas upon which we sit, and the sofas penetrate our bodies... The harmony of lines and folds of modern dress works upon our sensitiveness with the same emotional and symbolical power as did the nude upon the sensitiveness of the old masters... we have to start from the central nucleus of the object that we want to create, in order to discover the new laws, that is, the new forms, that link it invisibly but mathematically to the Apparent Plastic Infinite and to the Internal Plastic Infinite.«[54]

Boccioni tried to fuse Marey's mechanistic chronophotography with the philosophy of Henri Bergson, an attempt the philosopher himself did not endorse. Colleagues at the *Collège de France*, Bergson and Marey participated in 1902 in a group for the investigation of parapsychological phenomena, but they had known about each other's work since 1884. In *Creative Evolution*, Bergson uses Marey's famous comparison of the chronophotographs of the horse's gallop and the »per-

fect rendition of the gallop in the Parthenon frieze« by Phidias as the illustration between chronophotography and the consciousness of *durée* or »duration«, which is a central concept in his philosophy. In 1878, Marey had come to the conclusion that the ancient Greeks had already grasped the science of the horse's locomotion; later he repudiated this view and took the Phidian reliefs as nothing but a happy coincidence. Bergson, in contrast, felt that while Phidias had represented duration by capturing an essential moment in the horse's movement, pregnant with the past and the future, Marey's chronophotography »isolates any moment; it puts them all in the same rank, and thus the gallop of the horse spreads out, into as many successive attitudes as it wishes, instead of massing into a single attitude, which is supposed to flash out in a privileged moment, and illuminate a whole period.«[55] Bergson used the comparison to call attention to the crisis of positivist science as a result of its spatialization of time as a sequence of discrete, frozen moments instead of appreciating the indivisible experience of duration. For him, chronophotography represented objective time consciousness which reduces quality to quantity by assuming that time is arbitrarily and infinitely divisible and moments are organised spatially.[56]

Bergson distinguished between the perception of extension and the conception of space. Every expressive medium is the end of a process whereby the inner, manifold self becomes spatialised through a process of self-representation, a process from a highly emotive and ilogical state of mind to a non-emotive, rational state.[57] This process involves the use of intuition rather than intellect; only with the former would it be possible to reach absolute knowledge, a kind of intellectual sympathy by which »one places oneself within an object in order to coincide with what is unique in it and therefore inexpressible.«[58]

Such ideas found a receptive ground among artists in the early twentieth century, especially among the futurists. Thus, Gino Severini explained that the »spiralling shapes and beautiful contrasts of yellow and blue« in a painting like his *See=Dancer* were »intuitively felt one evening while living the movements of a girl dancing.« In another text, Severini added that »it is by his intuition that is penetrating into the life, the soul, the activity of things« and quoted Bergson to the effect: »To perceive is after all nothing more than to remember.«[59]

Bergsonism

Bergson's philosophy involves a rejection of Aristotle's categories, in particular that of substance. Aristotle had assumed that there are things, or rather, substances, such as men and stones onto which, as it were, properties and qualities were pinned. One cannot have qualities without things qualified, no quantities without quanta, no movement without something that moves. It is precisely this Aristotelian metaphysical doctrine which Bergson denied, insisting that there are no things,

there are only actions.[60] He elaborates: »There are changes, but there are underneath the change no things that change: change has no need of a support. There are movements, but there is no inert or invariable object that moves: movement does not imply a mobile.«[61] Moreover, he also rejected the idea that there was a stable subject perceiving the world. When Bergson contemplated his inner self he found a continuous flux, a succession of states, each of which announced that which followed and contained that which preceded it. For Bergson the truth is that there is neither a rigid, immovable substratum nor distinct states passing over it like actors on a stage. There is simply the continuous melody of our inner life.[62] In the concluding paragraph of *Creative Evolution*, Bergson promised that a philosopher would see the material world melt back into a single flux, a continuity of flowing, a becoming. In 1889, he wrote of a self whose former states permeated, melted, or dissolved into one another as did the notes in a melody.

Bergson suggested that our dependence on an ontology of things was related to the dominance of sight, although he did not belabour the point which by the late nineteenth century had become a commonplace.[63] He claimed that with the sense of hearing we can more easily conceive of change without anything changing. Listening to a melody, we have the clear perception of a movement that is not attached to a mobile, of a change without anything changing.[64]

There are cases where we would normally think of movement or change as essential and other cases where it does not seem constitutive of an entity's essence. Think of a billiard ball moving around on the table. The movements are of the essence to the game, but contingent or accidental to the ball. Indeed, the game could not be played at all unless the billiard ball retained its characteristic shape and colour, independent of its trajectories. A melody, on the other hand, is essentially changing: it would not be the same melody if it did not unfold in time, or if only a part of it would be played. In this sense, then, a melody is an organic whole and indivisible. Of course, the different notes in a melody come to my ears at different times which I can measure with a stopwatch but these isolated notes are not the melody itself. The melody is what the notes do but the melody does not change, rather it is change.

In this sense, a melody is a different kind of entity than a person, for example. Like a melody, a person exists in duration; unlike a melody, a person remains the same at any instant or part of that duration. Dennis Rodman, also known as the »Worm«, changes his appearance all the time. There used to be a billboard over the highway to the airport from the centre of Chicago showing the stars of the Chicago Bulls. Rodman's hair in the picture was painted anew every time he actually dyed his hair, i. e. on a weekly schedule. Despite such changes and many others, Rodman remains Rodman. Should I meet him today at eight, I would meet the whole of Rodman, the »Worm« himself, rather than a time-slice of a four-dimensional space-time worm; such would be Rodman's life-history, not the man.

Bergson's conception of a melody as an indivisible whole is in harmony with the

conceptions of many composers and musicologists. Igor Stravinsky explained that *melodia* in Greek is the intonation of the *melos*, which signifies a fragment, a part of a phrase.[65] Thus, the different tones in a melody (each with a particular pitch and duration) cannot be isolated but belong to the melody as much as the melody is made of them. This observation has led some musicologists to conclude that music is not a matter of tones but rather of the spaces or the movement between them. Viktor Zuckerkandl even insisted that the notes in a melody are in truth vectors with a direction.[66] However, it is not clear how much this theory explains. If the tones are vectors that in some way contain information of the next note, it is curious that empirically any such orientation seems impossible to verify. Even if a good melody often seems inevitable once we have learned it by heart, there exist so many different reasonable melodies that no rules could be formulated to determine whether a note in a sequence should be higher or lower than the previous one in order to constitute a melody. This practical fact suggests that the notes are not vectors in any strong sense of the word.

Insofar as we understand a melody to be movement without a mobile we have to ask what it is that gives isolated pitches the continuity of melody. One possible candidate is the timbre. When listening to an orchestra, we can usually follow the sounds of individual instruments. Yet, it is also possible to discern different voices played by the same instrument. The fugues of Bach, for example, combine three to four voices that are all very easy to isolate in the listening experience. One reason for this is the fugue form: the melody is first introduced and then transformed in a few regular ways. Rather than the timbre, the individuation of the melody line from all the different sounds that take place simultaneously is here based on perhaps some kind of *Gestalt* principle.

Indeed, the notion of *Gestalt* was first formulated with regard to melody in a 1890 paper by Christian von Ehrenfels.[67] For Ehrenfels and the Graz School, form was itself an element created by the mind to be added to elements of sensation. In suggesting this, Ehrenfels was not far from Ernst Mach's earlier notion of a space-form dimension, as seen in simple and recognisable geometrical figures, and a time-form dimension, as heard in a melody. For Mach, it was important that a particular geometrical configuration (say, a triangle) could be conceptually separated from the exact shape, size, or colour of any real triangle, and the same melody could be played in different keys by different instruments.[68] While Mach and Ehrenfels still thought in terms of additive dimensions, later Gestalt psychologists adopted a more Bergsonian position in denying that experience could be divided into elements.

Duration

Without accepting the Gestalt account of melody it seems reasonable to take a melody as an example of movement without a mobile. Yet, movement implies, at least

metaphorically, a dislocation in a certain direction (up, down, or just forward slower or faster) and any such dislocation and direction requires a frame of reference. The frame of reference need not be established by a thing, nor does it have to be stable. Rather, the individual sounds in a typical Romantic melody imply tonal centres which are based on our expectations and familiarity with musical conventions and these may be fleeting. The tonal centre is not the mobile itself, but the melody moves as the successive pitches are related to the constructed centre. Thus, the tonal centre is merely virtual, a retrospectively constructed epiphenomenon. In certain kinds of serial music or in melodies written through randomised operations, it is very difficult for most listeners to construct any centres that could rationalise the relationship between more than a few notes; such music is often experienced as not having a melody that moves but rather tones that appear and disappear. While the experience of movement in music might require the unconscious construction of tonal centres, other arts and architecture can employ other means as well to constitute frames of reference required by the individuation of movement.

In the Bergsonian conception of melody, there is another aspect that needs to be stressed. Bergson assumed that a melody existed in duration through a consciousness and a memory.[69] A melody is thus something experienced whereas in the physical world outside the mind there are only discontinuous, discrete and momentary notes or vibrations.

To restore the continuity required of any kind of movement, Bergson proposed the concept of duration. He argued that either you had to suppose that this universe died and was born again miraculously at each moment of duration, or you had to make its past a reality which endured and was prolonged into its present.[70] If one did not experience the world as duration, one could not hear a melody, for example, rather one would hear separate sounds.

For Bergson, all memories are of the same kind and duration is immediate: the past continues to exist in us. On this point, his contemporaries William James and Edmund Husserl disagreed and argued that the more distant past cannot be immediately present to the same degree as the present moment or a very recent past. If that were the case, then when one listened to a melody, notes already played would continue sounding and the melody would merge into an unintelligible cluster. Consequently, Husserl and James articulated two kinds of memory: immediate retention of the recent past and recollection of a more distant past. Time is never experienced simply as the succession of discrete moments, and the awareness of the present moment is inseparably connected with the immediate past through retention and with the future through protention.[71]

Bergson associated time with heterogeneity, unity and qualitative change – things are never really independent but influence and change into each other – while he associated space with homogeneity, plurality and quantity. To count something, one must assume that the things to be counted belong to the same concept and are thus homogeneous but also different in order for them to form a plurality. They must exist in space. Such a postulate, however, immediately gives raise to a few questions. Must every plurality really be spatial or could sounds, for example, form a non-spatial plurality? Does counting entail spatiality? One needs no mental image of things in space to comprehend a number. Furthermore, the discreteness of space/extension should be questioned. In duration we experience a melody as a temporal whole but do we not also see a circle as a spatial whole, in the manner discussed by Gestalt theory?

Be that as it may, Gilles Deleuze has articulated some spatial conditions for Bergsonian movement, making the distinction between smooth and striated spaces which corresponds roughly to Bergson's distinction between intensive vs. extensive magnitudes. The latter allow for metrical division and quantification while the former refer to qualitative differences. Thus, according to Deleuze and Félix Guattari, all becoming occurs in smooth space whereas movement is frozen by striated space which they characterise as optical and define by constancy of orientation, invariance of distance through inertial points of reference, immersion in a larger, coherent milieu and the constitution of a central perspective.[72] In contrast, smooth space is an accumulation of vicinities, a patchwork or quilt of tactile relations without an overarching ordering principle. It possesses a haptic »animality that can be seen only by touching it with one's mind, but without the mind becoming a finger, not even by way of the eye.«[73]

Deleuze and Guattari believe that in striated space, trajectories or lines tend to be subordinated to points while in smooth space points are subordinated to lines. Sedentary city-dwellers travel in order to get from a position of rest at point A to a position of rest at point B while nomads do not travel in order to reach any particular destination but to remain on the move. On the other hand, as smooth space is not structured in magnitudes, Deleuze and Guattari conclude that nomads move by not moving: »they are nomads by dint of not moving. ... Voyages in place: that is the name of all intensities ...«[74] The space of the nomad is directional rather than dimensional or metric. It is haptic rather than optical and it is filled by events or *haecceities*, far more than by things. Smooth space is occupied by intensities, wind and noise, forces, and sonorous and tactile qualities. For the Greeks, *nomos* or pasture land was nondelimited, unpartitioned, and as such fundamentally different from the gridded space of the *polis*. Yet, Deleuze and Guattari argue that it is possible to live in smooth space even in cities, mentioning Henry Miller as an example of an urban nomad.[75] They explain that movements, speed and slowness are enough to

reconstruct a smooth space. Yet they caution us not to expect that »smooth space will suffice to save us.«[76]

These pronouncements seem to indicate that smoothness and striation are not objective properties of physical things but rather two ways of imagining or knowing spaces. Yet Deleuze and Guattari's text has also been read as description of objective conditions, perhaps because of the analogies the authors use in order to characterise the difference. They say, for example, that the steppe, the desert, the ice and the sea are smooth spaces because of their lack of articulation. On the other hand, they claim that such environments can turn from smooth to striated without in themselves changing their physical articulation. The sea was turned into a striated space by navigational innovations in the fifteenth century but undetectable submarines in the twentieth century restored some of the sea's original smoothness.[77] It seems likely then that the sea was originally smooth not because of its geometric properties but because of human experience of the sea as a space.

Other examples offered by Deleuze and Guattari tend towards the identification of smoothness and striatedness as objective qualities of physical things or events. They suggest, for example, that fabric is to felt as striated space is to smooth space and suggest that nomads somehow belong essentially together with felt. Another analogy concerns music. According to Deleuze and Guattari, Pierre Boulez was the first to propose a distinction between smooth and striated space: in a smooth space one occupies without counting while in a striated space one counts in order to occupy.[78] For Boulez-Deleuze-Guattari, striated space is constituted on the basis of a *logos*. In music, such a *logos* might be the octave, for example. Smooth space, in contrast, possesses a *nomos*; for Boulez, non-octave forming scales would be an example of a smooth condition. Deleuze and Guattari later propose that harmony and melody characterise striated organisations while rhythmic values are essentially smooth.[79]

Their geometrical illustrations of the dichotomy tend even more in the direction of objectifying smooth and striated space. They posit that in smooth space the line is a vector with a direction and not a dimension or a metric determination, and present the van Koch snowflake curve as an example of smoothness. Provocatively, Deleuze declares that any geometrical aggregate (akin to point, line, plane, or volume) with a whole number of dimensions represents striated space while fractals with their dimensions in between whole numbers are smooth. Since smooth space is also the space of becoming, there needs to be becoming and movement in fractals. At this point, Deleuze and Guattari panentheistically discern living forces, movement and changes in all kinds of lines, coming close to the *Einfühlung* theory and the speculations of Kandinsky and Klee. Deleuze and Guattari explain that in smooth space, such as the snowflake curve, »space and that which occupies space tend to become identified, to have the same power,« so that »what defines smooth space, then, is that is does not have a dimension higher than that which moves through it.«[80] Moreover, on the basis of what they characterise as »pseudophysics«,

Deleuze and Guattari claim that »smooth space is constituted by the minimum angle which deviates from the vertical, and by the vortex, which overspills striation.«[81] The smooth line is for Deleuze and Guattari also the abstract line, »a line that delimits nothing, that describes no contour, that no longer goes from one point to another but instead passes between points, that is always declining ... and deviating ... changing directions ...«[82] This line is related by Deleuze and Guattari to Wilhelm Worringer's mechanical line, as opposed to the organic line. Though mechanical, the line is alive and can be slow or extremely fast.[83]

Movement in architecture

Deleuze and Guattari's notion of smooth space can be compared with Edmund Husserl's phenomenological theory of the construction of space. Husserl maintained that »all spatiality is constituted through movement, the movement of the object itself and the movement of the ›I‹.«[84] What he had in mind is not only the well-known fact that the speed of the observer affects the experience of space. Driving a car or just riding a bicycle changes our perception of the space of the street from what we would experience if walking or remaining stationary. As the speed increases, the space narrows down into a corridor in front of us, and our awareness of what lies behind or beside us weakens.

Like Kant, Husserl argued that the body is the source of our notions of space, as embodied in the three-dimensional vectoral grid system of analytic geometry. However, while Kant insisted that the cardinal directions of space originate in the bodily orientations of left-right, front-back, and up-down, Husserl did not derive the vectors from the body but rather the origo. He postulated that »everything in the world can run before me, but not my own body«, thus suggesting that the body is always the *Nullpunkt*, the zero. Thanks to the body, I am the centre of things, an *Ichzentrum* with a body unlike any other, a *Nullkörper*.[85] Here, Husserl assumed a distinction between a lived body vs. a physical body.[86]

Moreover, Husserl postulated the concept of *Nahsphäre* or near-sphere which forms a major part of a subject's *Kernwelt* or core world. Kinaesthetic sensations play a crucial part here. Our movements, through for example visual parallax, make it possible for use to recognise that things are their locations in space. In a later essay, Husserl uses the example of walking in order to explain how a notion of infinite and coherent Cartesian space is constituted. In walking, according to Husserl, »my organism constitutes itself: by means of its relation to itself as an animate organism it is also constituted as moveable, along with the ›I stretch out my arm,‹ the ›I move my eyes‹, along with spatially rolling my eyes in their sockets, etc. The kinaesthetic activities and the spatial movements stay in union by means of association.« The first kinaesthetic activity is to unify one's moving body. Once the body is unified as the *Nullpunkt*, it can bring about a unified core-world and ultimately a

Cartesian space.[87] Yet one should not exaggerate the connection. Husserl explained: »My body – in particular, say, the bodily part of ›hand‹ – moves in space; ... the activity of holding sway [*walten*], kinaesthesis, which is embodied together with the body's movement, is not itself space as a spatial movement but is only indirectly co-localised in that movement.«[88] While the mobile body was the source of our notions of abstract and homogeneous space, Husserl nonetheless argued that the body did not entirely conform to this notion of space. »External space is homogeneous, even though it presents itself as oriented in various ways ... But the lived body and its bodily space break the homogeneity asunder.«[89]

Hydrogen House

Husserl's notion of *Nahsphären* resembles the Deleuzean notion of smooth space in that both are heterogeneous and can only be explored by the body. Edward Casey believes that Deleuze and Guattari also dissolve the body into the space it inhabits, at least in the case of a nomad in smooth space. Deleuze and Guattari suggest that a nomad is distended in the region. The absolute has become local because place is not delimited.[90] In smooth space, Deleuze and Guattari declare, the absolute does not appear at a particular place but becomes a nonlimited locality. As a result, smooth space is constituted by local operations or actions and it is also experienced intensely through local operations of relay and recurring reorientations in close proximity to the ground or sea in which one moves. Smooth space is directional rather than metric. One does not possess a bird's eye view of coherent spatial grid or knowledge of dimensions and distances between points; rather, one orients one's body relative to landmarks, aligning oneself to their implicit vectors. Thus, smooth space can only be explored by actions at close range, for example »by legwork«, by walking, hearing and other haptic modalities.[91]

The phenomenological reading of smooth space makes it clear why some formal representations of movement, as in the works of Lynn or Cache, fail despite their following the geometrical analogies of smoothness, as presented by Deleuze and Guattari themselves. Such representations of movement spatialise time in the way science does, according to Bergson who argued that »the function of science is to scan the rhythm of the flow of things and not to fit itself into that flow.«[92] When static diagrams of movement are built as architecture, they incorporate movement in themselves only by accident. The Hydrogen House which Greg Lynn designed for Vienna should be discussed briefly as an example.

Lynn likes to call attention as to how the building registered the movements of cars and of the sun in one continuous surface.[93] He claims that such a registering is analogous to how natural phenomena, natural objects, and organic beings have developed their forms. Two problems in this account are worth stressing. First, not every natural process or object is continuous in the sense that Lynn appears to

mean. Of course, organic beings can indeed be seen to some extent as autarchic unities that are in themselves continuous but discontinuous with the ecosystem in which they participate, but such individuation of plants or animals is clearly dependent on (functional or other) criteria which cannot necessarily be translated into architecture. Secondly, Lynn reinforces the subject-object dichotomy in creating an absolutely static thing which by the continuity of its surface is deliberately marked apart from its surroundings and the viewer. Besides registering certain movements, such as that of the cars and of the sun, the Hydrogen House does not interact with its environment or the forces it illustrates. The projected building is a three-dimensional record of its own becoming which has been completed. For any observer who is not intimately familiar with its design history, the Hydrogen House is a standard building as a static, rather than animate, architecture.

The mummy

The same criticism does not apply to Boccioni whose attempt was to dissolve the continuity of the object. He argued that sculpture must give life to objects by a system of interpenetration, for objects do not exist in isolation. In a series of remarkable pieces of sculpture created between 1912 and 1914 Boccioni put this doctrine into practice. In 1912 he produced the *Fusion of a Head and a Window* and *Head+House+Light*, 1912; two years later, *Horse+Rider+House* for which a series of preparatory sketches also remains. Boccioni attempted to represent »not the construction of bodies but the construction of the action of bodies« for he believed that not only were time and space dissolved by speed, as Heinrich Heine had famously remarked in 1843 in response to the railway, but that the materiality of bodies was destroyed by movement and light.[94] He explained the »double concept of form« as »form in movement (relative movement) and movement in form (absolute movement) and added that only this double concept can render in the duration of time that instant of plastic life as it was materialised, without cutting it apart by drawing it from its vital atmosphere, without stopping it in the midst of its movement, in a word, without killing it. ...This is why a body in movement is not for me a body studied when immobile and afterwards modelled as though it were in motion. It is, on the contrary, a body in movement, a living reality absolutely new and original. In order to present a body in movement, I take care not to give its trajectory, that is, its passage from one state of repose to another; instead I force myself to determine the unique form that expresses its continuity in space.«[95]

As the futurist manifests promise, these works outline »the art of the becoming, the perishable, the transitory and the expendable« but the futurists were not able to bring their project to completion. In July 1915 Boccioni, Marinetti, Sant'Elia and others joined a battalion of volunteers to enter the First World War, »the world's only hygiene«, in Marinetti's phrase. The following year Boccioni left his native

Reggio Calabria for the last time and died at the age of thirty-three in Sorte, leaving behind the *Unique Forms of Continuity in Space*, the immortal and imperishable masterpiece on which his posthumous existence rests.[96]

Anmerkungen

1 »... im Weltall ist Bewegung das Gegebene« Paul Klee, Bekenntnis (1920) in: Manifeste Manifeste 1905-1933. Dieter Schmidt (ed.), Dresden, 1964, 249.

2 As quoted in Herbert Read, Modern Sculpture. A Concise History. New York 1989, p. 115.

3 Umberto Boccioni, Technical Manifesto of Futurist Sculpture. In Robert L. Herbert (ed.), Modern Artists on Art, Englewood Cliffs/N. J., 1964, 50.

4 Reyner Banham, Theory and Design in the First Machine Age, Cambridge/Masss. 1981, 135, 122.

5 Filippo Marinetti, Marinetti. Selected Writings. Translated by R.W.Flint and Arthur A. Coppotelli, New York 1972, 81.

6 Hanno-Walter Kruft, Geschichte der Architekturtheorie, München 1985, 325.

7 Boccioni, as in ft. nr. 3, 51.

8 Johann Gottfried Herder, Histoire et cultures. Une autre philosophie de l'histoire. Idées pour la philosophie de l'histoire de l'humanité (extraits). Traduction et notes par Max Rouché. Présentation, bibliographie et chronologie par Alain Renaut (GF Flammarion, 1056). Paris, Flammarion, 2000, 204 pp.

9 The etymology was first proposed by H. Brugsch in »Das altägyptische ›Seeland‹«, ZaeS 10, 1872, 89-91; more recently it has been revived by R. Stieglitz, Labyrinth: Anatolian Axe or Egyptian Edifice? in Lionel Casson, *Coins*, Culture and History in the Ancient World: Numismatics and Other Studies in Honor of Bluma *L. Trell*. Detroit 1981. See Martin Bernal, Black Athena. The Afro-Asiatic Roots of Classical Civilization. London 1991, 64.

10 Asclepius III, 24a, Hermetica, quoted after Sir Walter Scott (ed.), Boston 1993, 339-341. The Hermetic Books were written under the dictation of Thoth, the scribe of the gods. Iamblichus gives their number as 20.000, but Manetho raises it to 36,525. These books state that the world was made out of fluid; that the soul is the union of light and life; that nothing is destructible; that the soul transmigrates; and that suffering is the result of motion.

11 Sarah P. Morris, Daidalos and the Origins of Greek Art. Princeton 1992, 245, 236. For Hermes, see Plato's Comicus, Fr. 188, for Aphrodite see Philippos or Euboulos and for the bronze statue see Kratinos, Thracians, Fr. 74.

12 Pliny, Natural History, translated by H. Rackham, Cambridge/Mass. 1938(1991), viii, 228.

13 Julian Huxley, The Origins of Human Drawing, in *Nature*, CXLII/3788 (1942), 637. As quoted in Thierry Lenain, Monkey Painting, London 1997, 176.

14 Pliny, Natural History, as in ft.12, xxxv, 43. See also Victor I. Stoichita, A Short History of the Shadow, London 1997, 19.

15 Ibidem, 15.

16 See Homer, Odysseia, X, 495; XI, 207. When Odysseus seeks to embrace his mother, »she fluttered out of my hands like a shadow [skiei] or a dream [oneiroi]. Achilles concluded: »Even in the house of Hades there is left something, a soul [psyche] and an image [eidolon] but there is no real heart of life in it. *Iliad*, 104. See also Pausanias, VIII, 38, 6; Polybius XVI, 12, 7; Plutarch, Quaestiones Graecae, 39; see, Richard Broxton Onians, The Origins of European Thought about the Body, the Mind, the Soul, the World, Time and Fate, Cambridge 1994, 95.

[17] Even the sun god had a shadow, which meandered through the underworld as the sun charioted across the sky. The idea of the sun casting a shadow carries over into Egyptina architecture in the form of buildings known as ›sun shadows‹. Erik Hornung, Idea into Image. Essays on Ancient Egyptian Though, translated by Elizabeth Bredeck, n.l. 1992, 179.

[18] Erwin Rohde, Psyche. Seelenkult und Unsterblichkeitsglaube der Griechen. Darmstadt 1980, I, 3-7.

[19] Dante Alighieri, The Divine Comedy, translated by Mark Musa, New York 1985, Vol. II. Purgatorio III, 25-29: »Evening has fallen on the tomb where lies my body that could cast a shadow once; from Brindisi to Naples it was moved. If now I cast no shadow on the ground you should not be surprised.« The shades are surprised by Dante's shadow: Purgatorio III, 88; V, 7-9;VI, 51-57. The anatomy of shades is explained in Purgatorio XXV, 88-108.

[20] Schelling, Philosophy of Art, §87, 137.

[21] Ibid., 120-121, 122, 125.

[22] Eg. Cicero's *Tusculan Disputations*. As quoted in Stoichita, as in ft. 14, 18.

[23] Ibid., 19.

[24] Morris, as in ft. 11, 218. Decades later, Euripides extends this imagery in the play Hekabe (470) in which Hekabe despairs of her power to persuade Agamemnon (Hekabe 836-40): »If only I had a voice in my arms/and my hands and my hair and my footsteps/ either through the arts of Daidalos or through some divine agency/so that in unison they could clasp your knees/ crying, invoking every argument.« Morris, 220. In this image, the body parts become independently alive through the power of speech.

[25] Plato, Phaedrus 275d.

[26] Jesper Svenbro, Phrasikleia. An Anthropology of Reading in Ancient Greece, translated by Janet Lloyd Ithaca, N.Y. 1993, 40.

[27] Ibid., 32.

[28] In this sense, ancient Greek tomb monuments may be compared with a famous minimalist sculpture, Tony Smith's *Die* (1962) which is a black six foot cube made out of steel plates. Scale is important here, as most internal relationships in the work have been deliberately suppressed or minimized. Robert Morris remarks that in the perception of size the human body enters into the total continuum of sizes and establishes itself as a constant on that scale. Smith's work is neither a monument nor an object, rather it is a substitute for another person. Like Don Siegel's classic *Body-Snatchers*, the *Die* forces man to face mortality by taking his place. Michael Fried, »Art and Objecthood«, in: Morris Philipson and Paul J. Gudel (eds.), Aesthetics Today, revised edition, New York 1980, 225.

[29] Phaedrus 275d. A little bronze statue found on the Acropolis in Athens and dating from the end of the sixth century bears the following inscription: »To whomever asks me, I reply with the same answer, namely that Andron, the son of Antiphanes, dedicated me as a tithe.« See Svenbro, as in ft. 26, 28-29.

[30] Plato, Eythyphro 11c-d, the pseudo-Platonic Alkibiades 1.121a, Plato, *Meno* 97.

[31] Aristotle, De Anima 406b, 15-12.

[32] Hornung, as in ft. 32, 168, 118.

[33] Thus, Hoole writes in *Ariosto*, book viii: »So when we see the liquid metal fall/Which chemists by the name of Hermes call.«

[34] Siegfried Giedion, Mechanization Takes Command, New York 1975, 34-35.

[35] Julian Offray de la Mettrie, Man A Machine, La Salle/Illinois 1991, 140-141.

[36] Horst Bredekamp, The Lure of Antiquity and the Cult of the Machine, translated by Allison Brown, Princeton 1995, 4-5.

[37] Auguste Rodin, Movement in Art, in Elizabeth Gilmore Holt (ed.), A Documentary History of Art Volume III. From the Classicists to the Impressionists: Art and Architecture in the Nine-

teenth Century, New York 1966.

[38] As quoted in Aaron Scharf, Art and Photography, Harmondsworth 1974, 214.

[39] Ibid, 216.

[40] Ibid. 226.

[41] Ibid., 223.

[42] Ibid., 226.

[43] Max Wertheimer, »Experimentelle Studien über das Sehen von Bewegung.«, in: Zeitschrift für Psychologie, vol. 61, 1912, 161-262. As referred to in Robert W. Lundin, Theories and Systems of Psychology, Lexington/ Mass. 1985, 237.

[44] Scharf, as in ft. 38, 260.

[45] James Burke, Connections, Boston 1995, 280-281.

[46] Anson Rabinbach, The Human Motor, New York 1990, 89-90.

[47] Ibid., 96.

[48] Ibid., 115.

[49] Scharf, as in ft. 38, 256, 258.

[50] Ibid., 258.

[51] Read, as in ft. 2, 116.

[52] Friedrich Nietzsche, Die Fröhliche Wissenschaft, Stuttgart 1964, §112, 121; Friedrich Nietzsche, Der Wille zur Macht, Stuttgart 1964, § 547.

[53] Filippo Marinetti, »The Foundation Manifesto of Futurism, 1908«, in: Herschel B. Chipp, Theories of Modern Art, Berkeley 1968, 86.

[54] Read, as in ft. 2, 126.

[55] Rabinbach, as in ft. 46, 112.

[56] Ibid., 110-113.

[57] Mark Antliff, Inventing Bergson. Cultural Politics and the Parisian Avant-Garde, Princeton 1993, 47.

[58] For Bertrand Russell's comments see Bertrand Russell, Mysticism and Logic, New York, n.d., 13.

[59] Antliff, as in ft. 57, 165.

[60] Henri Bergson, Creative Evolution, translated by Arthur Mitchell, New York 1911, 248.

[61] Henri Bergson, The Creative Mind, translated by M. L. Andison, New York 1946, 173. In *Durèe et simultanéité*, he describes the continuity of our inner life as that of »a flowing or of a passage, but of a flowing and of a passage which are sufficient in themselves, the flowing not implying a thing which flows and the passage not presupposing any states by which one passes: the thing and the state are simply snapshots artificially taken of the transition; and this transition, lone experienced naturally, is duration itself.« Bergson, *Matter and memory*, 98, L 95. XXX???

[62] A. R. Lacey, Bergson, London 1989, 106.

[63] Friedrich Nietzsche, »The Philosopher: Reflections on the Struggle Betwen Art and Knowledge,« §54, in: Daniel Breazeale (ed.), Nietzsche, Philosophy and Truth. New Jersey and London 1979, 19-20.

[64] Bergson, Creative Mind, as in ft. 61, 174.

[65] Igor Stravinsky, Poetics of Music, translated by Arthur Knodel and Ingolf Dahe, Cambridge/ Mass. 1970, 39.

[66] Viktor Zuckerkandl, Sound and Symbol. Music and the External World, Princeton 1973, 75.

[67] Christian von Ehrenfels, Über Gestaltqualitäten. in: yerteljahrsschrift für wissenschaftliche Philosophie, 14, 1890. Another precursor was Ernst Mach who discussed both space-form and time-form constants.

[68] Robert W. Lundin, Theories and Systems of Psychology, Lexington, Mass. and Toronto 1985, 235-236.

[69] Hernri Bergson, Mélanges, Paris 1972, 353; Lacey, as in ft. 62, 29.

[70] Bergson, Matter and memory, as in ft. 61, 52, 142.

[71] Bernet, Rudolf, Kern, Iso, und Marbach, Eduard: An introduction to Husserlian phenomenology. Evanston, III. (Northwestern University Press) 1993.

[72] Edward S. Casey, The Fate of Place. A Philosophical History, Berkeley and Los Angeles 1998, 308; Gilles Deleuze and Felix Guattari, A Thousand Plateaus: Capitalism and Schizophrenia. Minneapolis 1987, 483.

[73] Ibid., 494.

[74] Ibid., 482.

[75] Ibid.

[76] Ibid., 500.

[77] Ibid., 363, 479-480.

[78] Ibid, 477. XXX???

[79] Deleuze and Guattari, 488.

[80] Deleuze and Guattari, 488.

[81] Deleuze and Guattari, 489.

[82] Deleuze and Guattari, 497-498.

[83] Deleuze and Guattari, 499.

[84] See Edmund Husserl, »Ding und Raum« 1907, in: Husserliana. Gesammelte Werke. The Hague 1973, 16: 154.

[85] Edward S. Casey, as in ft. 72, 218.

[86] Ibid., 222.

[87] Ibid., 224-225.

[88] Ibid., 223

[89] Ibid., 220.

[90] Ibid., 304-305.

[91] Ibid., 306-307.

[92] Bergson, Creative Evolution, as in ft. 60 , 346 (376).

[93] It is not clear, however, if the three-dimensionality of the surface is necessary: clearly a complex of forces could be registered one-dimensionally or two-dimensionally, as well. A police speedometer that indicates the velocity of each passing car would register a complex of forces in one dimension; similarly, the gasoline meter at a nearby gas station would also act as a one-dimensional register of the movements of at least some of the cars. In the summertime, the unevenly tanned arms of the car driver's would two-dimensionally indicate relative facts about the direction and time of day that they were passing the building. The Hydrogen House maps a number of variables on a more or less continuous three-dimensional surface but such mapping is not necessarily any better than a one- or two-dimensional one, except that the physical representation of the mapping can also be used to house functions.

[94] Chipp, Theories of Modern Art, as in ft. 53, 293.

[95] Boccioni, as in ft. 3, 48.

[96] Boccioni was born in Reggio Calabria on October 19, 1882 and died in Sorte on August 17, 1916.