

*You think that, just because I am black, one of those little black Mozambican boys depicted in the photographs made by the early settlers, the Red Cross or Unesco, I don't understand other people's madness? I do, clearly.*

*Francisco José Viegas, in Lourenço Marques*

## 1. Space

In mathematics, a grid is the result of the tessellation (or tiling) of the Euclidean plane with polygons without any gaps or overlaps. A square grid, in particular, is formed by tiling the plane regularly with squares. Besides its mathematical properties, of which Roger Penrose (b. 1931) is one of the most famous prolific researchers, there is an aesthetical value in tessellation that has been acknowledged and employed by medieval Islam architects in the decoration of mosques, palaces and other buildings (a fortunate consequence of the religious prohibition on depicting life-like figures).

In art, these patterns have inspired the work of artists such as Albrecht Durer (1471-1528) and M.C. Escher's (1898-1972). More recently, Leonel Moura (b.1948) created a series of paintings and collages based on the Voronoi diagrams<sup>1</sup>, a specific type of tiling in which the decomposition of the space is made according to the distance of each point in the plane to a set of points in that same plane. The range of application of tessellation techniques is wide and, in the artistic and ornamental context, we find all types of tiling: regular, semiregular and irregular, periodic and aperiodic, symmetric and asymmetric. However, a square tiling, which is one of three regular tiling of the plane, brings to mind board games like chess, checkers or even the basic tic-tac-toe, rather than eye-catching and intriguing ornament patterns.

Another application of the square grid can be found in graphic design: the typographic grid, which is a structure that “compels” the designer to organize — that is, to put together into an orderly, structured whole — text and images in what is believed to be a rational and harmonious layout. In other words, the typographic grid's purpose is to impose order in what could otherwise turn into a drifting practice with disappointing results. Invisible in the final design, the grid is definitely there though, like a skeleton that sustains the delicate balance of an efficient and appealing design work. It is the designer's (loose) straitjacket or, at least, his chart.

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<sup>1</sup> Named after the Russian mathematician Georgy Voronoy (1868-1908).

A quick look at the taxonomy of the quadrilaterals<sup>2</sup> shows that a square is also a rectangle and a rhombus, being a particular case of each one and the only geometric shape that possesses the rectangle and rhombus's properties simultaneously. Besides, the square is an end-node in the taxonomy tree, meaning that — and now let us leave for a while the rigor of mathematics — while a rhombus may be a square (depending on ratio of the diagonals' length), a square can be nothing more than a square, given that its properties are so “rigid” that it is not possible to define another subfamily of quadrilaterals from it. Maybe that is why the square is so frequently associated with order and stiffness. In the English language, *square* is slang for a conventional, old-fashioned or even repressive person. The one that Uma Thurman (b.1970) draws in the air in *Pulp Fiction* (1994) is still fresh in the popular culture's memory.

In the late 1970s, David Hockney (b. 1937), motivated by an exhibition of photographs taken by painters, started a new period in his career. Hockney, which by that time was already a reputed painter, was invited by the curator of the show to pick up some pictures from his private albums, photos that were taken without the least intention of being framed and hanged on museums' walls. The artist began to reflect on his images and on his feelings towards photography, and experienced a torrent of thoughts on the limitations of the medium: could photography, with its direct one-eyed view and split of a second action, ever represent time and space in all their complexity and range?<sup>3</sup>

These thoughts were followed by a decade's effort on surpassing these limitations, and, in the process, Hockney created dozen of works made of several photos, arranged in a way that defies photography's time and space properties. Some of these works ended up being quite complex and the later collages (“joiners”) show remarkable narrative qualities, but the earlier ones are merely sets of polaroids ordered as a grid. The polaroids cover an area larger than the space depicted by a single picture, and sometimes we perceive a subject “moving”, that provides the entire scene with a narrative element.

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<sup>2</sup> Polygons with four sides.

<sup>3</sup> By that same time, Roland Barthes (1915-1980) and Susan Sontag (1933-2004) published their famous books — *Camera Lucida* (1980), by Barthes, and *On Photography* (1977), by Sontag — in which they addressed the same subject with a less *visual* approach.

With a simple grid of polaroids, Hockney was trying to overcome photography's uniform (or linear) representation of time and space, its rectilinear framing and format, and the loss of information due to representing a three-dimensional world on a flat surface. With such compositions, the *photographic time* can be conveniently manipulated, but, on the other hand, addressing space confronts the artist with other difficulties that must be addressed by a distinct approach, to both subject and collage's scheme. The grid, by suggesting a static point-of-view, was a confinement of which Hockney wanted to free himself. For that, he discarded the polaroids, switching to ordinary colour negatives, and changed his method, by beginning to move around the subject. Then, finally, time and space manifested visually in a multifaceted way. The style has been refined until 1986, when the artist, maybe still disappointed with the medium's limitations, abandoned photography and returned to painting. But the point here is that it was only when Hockney left the grid's confinement that his method started to evolve a sophisticated point-of-view that resembles a kind of cubist approach to photography. In other areas, though, the grid can be the perfect habitat for complexity and diversity. Let us return to mathematics.

A cellular automaton is a grid of cells. Each one of these cells may assume a value (state)  $k$  in each time-step  $t$ . The state the cells is updated in each iteration, according to a set of rules that considers the state of the neighboring cells. Cellular automata may assume several forms and behavioral patterns, depending on the dimension of the habitat, the type of grid, the number of possible states  $k$  and the size and structure of the neighborhood. The *Game of Life*, for instance, is a cellular automaton, discovered by the mathematician John H. Conway (b.1937), which evolves in a square grid. Each cell may assume in two states (live or dead), and interact with its eight neighboring cells. There are four rules that define the state of the cells. If we run several simulations of the *Game of Life*, with different initial conditions, we see an outstanding range of shapes evolving, creating other shapes, stagnating (*still lives*), oscillating between two, four or eight states (pulsars). The diversity is impressive and the general aspect is of a world bursting with life.

Cellular automata, introduced by the mathematician Jon von Neumann (1903-1957), mark the foundation of a scientific discipline known as Artificial Life, and in nowadays are contributing to advances in areas such as cryptography, traffic and forest fires modeling and emergent computation. Meanwhile, Artificial Life gained many branches, from ambitious projects that aim at the synthesis of life,

to the modeling of species' complex behavior and the application of those models to several types of real-world problems. Due to their characteristics, some of the species modeled in those investigations belong to the Order Hymenoptera.

## 2. Time

One of William Blake's (1757-1827) *Proverbs from Hell* states: *the busy bee has no time for sorrow*<sup>4</sup>. In the *Proverbs of Solomon*, of which Blake's text is a kind of corrupted version, the ant is used as a role model: *Look to the ant, thou sluggard, observe her ways and be wise; which, having no chief, overseer or ruler, prepares her food in summer, and gathers her provision in the harvest*. The ants and bees working aptitudes, their efficiency and discipline, qualities that emerge without centralized coordination, were already known in biblical times, as demonstrated by the example above. What was not known is that this "exemplar" conduct is not established in any kind of animal ethics or temperance, but in the genes instead.

Bees and ants belong to the Order Hymenoptera. This group is characterized, amongst other traits, by the haploid-diploid sex determination protocol. As consequence of this reproductive scheme, females have more genes in common with their sisters than with their daughters, which opens an evolutionary path for a workers' cast, devoted to help the queen, since, through an evolutionary point of view, it may be more advantageous for a female to help her mother than to generate her own offspring. From this and other biological traits of the Hymenoptera, results a high level of sociability and a complex and self-organized complex behavior, which suggests, to an external observer, the idea of a super-organism. Friderich Hegel (1770-1831), and also Johann Fichte (1762-1814), Jean-Jacques Rousseau (1712-1778) — and even Edmund Burke (1729-1797), although with a less authoritarian agenda —, took the organic metaphor to the realm of mankind and the consequences were disastrous: a twentieth century devastated by national-socialism and communism. Photography was a tool, like many others, in the development of the collective hysteria.

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<sup>4</sup> William Blake, *The Marriage of Heaven and Hell* (1793).

Due to the aforementioned traits — emergent and self-organized behaviour —, social insects were, and still are, object of research and also source of inspiration for many Artificial Life projects. However, their traits can also inspire doctrines that, ignoring human nature's idiosyncrasy, see the insects' colonies as the perfect real-world example that sustain the ideas of a New Man, freed from the “burdens” of individuality and responsibility. However, these comparisons have no scientific or philosophic basis, and are just sloppy manifestations of what is known as the appeal to nature's fallacy. As seen above, eusociality<sup>5</sup> results from a reproductive restriction that is not present in the humans or other superior mammals. Humans have also a particular sense of time (animals have no past) and of themselves (their body) that do not combine well with full collectivist systems. However, transforming men in obedient social insects — and, in some cases, with highly hierarchical societies — has been the major goal of utopias. Sometimes, the same ideals appear in a less cruel way, sometimes even involuntarily, and excused, to a certain extent, by scientific curiosity. Anthropological photography is an example.

Impartiality, objectiveness and truthiness. These are the characteristics frequently associated with photography. The attributes are far from characterizing accurately the photographic process and object, but for the common sense, they are a fair description of photography, which in fact is a reliable means of storing, ordering, and interpreting visual information, and therefore it is often used for scientific purposes. Just after its inception in 1839, photography was adopted by anthropologists, which trusted in its validity as an objective method of reproducing reality. But photography is not objective, at least not in a strict sense. To begin with, the framing of the subject already compromises its supposed impartiality. Therefore, photography requires additional procedures to synthesise and interpret the information, without the interference of external factors, and that was how it was used in anthropometric anthropology as a systematic classification method: with the aid of grids and rulers for measuring the dimensions and inspecting the proportions of the subject in order to produce lasting documents for research.

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<sup>5</sup> Eusocial animals are the ones with the highest degrees of sociability, with overlapping generations in the nest, cooperative care of the offspring and labor division.

Photography may thus be, within an anthropological framework, a scientifically objective tool. But soon some difficulties arise. The first problems show up with the already referred medium's limitation in representing time and space. The critics point out ideological biases inherent to the anthropological photography's language that tend to reflect the values of the audience and the epoch in which the documents are examined. The dehumanization of the subject, due to the measuring equipment and characteristics of the medium itself — the grid, the repetition, the variation of skins' tone attenuated by the black-and-white —, upgrades a single body, turning it into a representation of the entire ethnic group to which it belongs. Besides that, the subject is photographed and shown alone, that is, it is taken from the social context that reinforces — by comparison — his individuality. Men, in anthropological photography, are treated like ants, like members of a caste that exists and functions as a whole.

Some critics go even beyond these objections and accuse anthropological photography of being photo-colonialist, an opinion reinforced by the fact that most of these investigations have been made by Westerners portraying the Other. Even if we take into account the hysteria of political correctness, anthropological photography is undoubtedly affected by problems that arise from the presence of an observer (photographer, scientist or audience). And even if some of these difficulties are overcome, in part, by the grid and the standardization of the posture, we then have the Barthesian *punctum* and the *memento mori* (besides new problems that arise from the grid and standardization) to disturb the scientific abstraction. When a study that is required to be scientific is disturbed by the subject, there is no "science" left in the process; we know that objectivity has been hopelessly lost when we start to look at an anthropological portrait as if it was a Paul Gauguin's (1848-1903) painting. In concluding, its use in anthropology reminds us that photography is always in that diffuse region between art and science, even when it is used mainly as a tool. If then we mix it with pseudo-science and extreme ideology (clearly intentional, in this case), then we obtain an even more disturbing object: the photography of eugenics.

Modern eugenics was founded by Francis Galton (1822-1911), which also coined the term, from a Greek root meaning "good in birth". In the book *Hereditary Genius* (1869), Galton concludes that it is possible to produce "a highly gifted race of man" by a judicious

process of selective breeding, which he termed as *positive eugenics*. The effect of these policies could then be reinforced by discouraging the reproduction of undesirables (negative eugenics). In a few words: eugenics is the improvement of race.

Francis Galton also believed in photography as an objective and truthful scientific tool, and he started to use it in his research in 1878, devising a technique that he called *composite photography*, which consisted in juxtaposing several subjects in the same negative. Since he thought that the mental traits were related to facial expression, Galton hoped that he could acquire the specific traits of each class in the society, so that, later, he could identify an individual's class by examining his looks and morphology. As a practical application, he thought that his method could eventually contribute to criminology, by making it easier to identify possible criminals. Although he tried almost his entire life, Galton was ultimately forced to recognize that his efforts were condemned to fail.

The eugenics movement was widely accepted in Germany during the first half of the twentieth century. The Imperial administration did not approve the methods because they considered a violation of individual freedom, but the World War I devastation brought with it a fertile ground for such ideals. In the Weimar Republic, research on eugenics received state funding and some scientists made appeals to the sterilization of certain elements of the society. However, sterilization remained illegal until the national-socialists gained the elections in 1933. The annihilation of Jews and other undesirables, during World War II, was the most atrocious manifestation of eugenics, and since then its popularity decreased, although the eugenics temptation had not disappeared until the 1970s, when sterilization campaigns finally ended, in countries like Sweden and Canada.

Please note that photography has been used in eugenics much by the same reasons it is used in anthropology: due to the belief/illusion that it is an objective tool. In 2001, the International Center of Photography, in New York, held the exhibition *Perfecting Mankind: Photography and Eugenics*. In an introductory text, the curator, Carol Squiers, wrote: *both eugenics and photography were products of the nineteenth century belief in the power and rectitude of direct observation — that seeing is believing*<sup>6</sup>. Let us disregard the

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<sup>6</sup> In the brochure of the exhibition *Perfecting Mankind: Photography and Eugenics*, edition of the International Center of Photography, 2001.



overstatement — photography was the result of distributed knowledge and centuries of research — and focus on what is evident: the belief in the power and rectitude of direct observation. German photography has been firmly linked, during the last decades, to this belief in impartial and direct observation.

In 1929, the photographer August Sander (1876-1964) published the photobook *Antlitz der Zeit (Face of Our Time)*, which gathers sixty portraits that typify Germany's society of the time. Sander depersonalizes the subjects with titles like *Der Pianist*, *Bürgerliche Familie* ou *Revolutionäre*; each photographic subject is proposed as symbol of class to which he belongs. It is also worth noting the use of the singular form in the title, as if the sixty portraits represented the Whole, the face of that time, the face of the *zeitgeist*.

Can we devise a relationship between Sander's work and the photography of anthropology and eugenics? In his portraits, the impulse of classification — an urge of (anthropological?) categorization of the German society — is evident, and the photos, to a certain extent, are like caricatures, in the way each one encompasses the different sectors of the society. There are, definitely, in Sander's work, traces of the aforementioned themes. However, we assume that the link is involuntary, because nothing suggests us that Sander's intentions were motivated by prejudice. On the contrary, the photographer was outcaste by the Nazis; the most ferocious practitioners of eugenics did not accept Sander's work, maybe because the portraits were also subversive: those in the photographs were the *volk* (people), all those men and women, with different beliefs, ideologies and morphologies.

The urge of classification and systematization is strongly grounded in Germany's photographic tradition. From August Sander and Karl Blossfeldt (1865-1932), who did with plants what Sander did with people, to Bernd (1931-2007) and Hilla Becher (b.1934), this tradition evolved towards what is nowadays known as the *Düsseldorf School of Photography*<sup>7</sup>. The Bechers photographed ordinary structures — water towers, warehouses, etc — with identical framing, and then exhibited them side by side, in a grid layout, to facilitate the perception of the subtle differences in the shapes of the objects. Recently, Idris Khan (b.1978) used the Bechers' images

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<sup>7</sup> Bernd and Hilla Becher taught photography at the Düsseldorf Art Academy and influenced many students that are now famous photographers, such as Andreas Gursky (b. 1955) and Thomas Ruff (b.1958). From that comes the designation *Düsseldorf School of Photography*.

for a work that reminds Galton's composite photography. Khan juxtaposed, in a single image, the photos of each type of structure, and digitally manipulated the result, enhancing details and areas of light and shadows. The Bechers' systematization is thus reversed. (*You can see the illusion of my hand in the layering. It looks like a drawing. It's not systematic or uniform.* Idris Khan.<sup>8</sup>) The resulting image is not about the small differences in the structures, but instead about what is similar between them, is about the general form that is common to every structure and perceived in the blurry sketch. Krzysztof Pruszkowski (b.1943) has been using, for more than thirty years, a similar process, although he coined the term: *Photosynthesis*. The photographer once stated that *single photographs are boring*<sup>9</sup>. David Hockney could have said that, but he searched for an alternative to the one-eyed perspective in a peculiar arrangement of the space, while Pruszkowski tries to gather, in a single frame, the narrative of time. Apart from the conceptual differences in the approaches to the "problem", both artists are concerned with the same issue: *we can learn from those images nothing more than what we are able to see directly.* (Krzysztof Pruszkowski).

Hiroshi Sugimoto (b.1948) pushed composite photography to its limits. The Japanese artist, who recently stated that *to be a good photographer you have to be a scientist as well*, recorded, in a famous series called *Theatres* (1978-2000), entire movie sessions in a single negative. Sugimoto condenses a movie in a photo, but what we see, due to the long exposures, is just a white and bright projection screen. We see light!, nothing more than light, the basis of photographs (which, in their turn, are the building-blocks of cinema). In the same line of work, Jim Campbell (b.1956), an artist with scientific formation by the *Massachusetts Institute of Technology*, recorded (2000) in a single digital image all the frames of Alfred Hitchcock's (1899-1980) *Psycho*. We could continue through many examples of contemporaneous artist that, like Khan, Pruszkowski, Sugimoto and Campbell, work in the context of photographic synthesis. But, for now, let us go back to analysis.

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<sup>8</sup> <http://photoslaves.com/idris-khan%E2%80%99s-multi-layered-photos/>

<sup>9</sup> [http://www.iphotocentral.com/showcase/showcase\\_descrp.php/75/1/0/0](http://www.iphotocentral.com/showcase/showcase_descrp.php/75/1/0/0)

Eadweard Muybridge (1830-1904) and Étienne-Jules Marey (1830-1904) left a body of work that is as important to the History of Photography as it is to the science. They both studied the human (and other animals) body in motion by recording it with a camera. But while Muybridge recorded the movement in successive negatives, that were exposed by different cameras triggered by the body's movement, Marey used only one camera and exposed the entire action in a single image. However, Marey's method also recorded the motion in discrete time, and not with a long and continuous exposure, allowing the viewer to identify the different stages of the movement. That is, Muybridge and Marey's works are both about *analysis*. *Diagrams*, because it records and displays the human bodies in successive photos, is analysis. But it is also *synthesis*. From these (apparently) opposing qualities emerges the project's main line of force.

### **3.Continuum**

The Kazimierz is an historical quarter of Kraków, where once lived a large community of Jews. The Nazis have cast an eternal shadow on that place, which however, is no longer the degraded refugee for petty criminals that it was during the communist rule; now, it is an elegant and welcoming spot in the city. Sadly, Kazimierz's Jewish community is, in nowadays, not even a reminder of what it was before World War II. We are left with the restaurants and the synagogues.

In 2005, by the end of the summer, I was wandering through the Kazimierz when I passed by a synagogue. I stepped in. There was an exhibition of portraits of those that lived in the quarter and died in the concentration camps. A text that accompanied the prints asked us to read the names and look at the faces. It invited us to spend a few seconds in each face. Names and portraits had been put together to humanize what the Holocaust dehumanized. Many of those photographs were probably taken by the Third Reich services. The bureaucratic Nazi machine, so efficient in the dehumanization of the Other and the trivialization of evil, is also, paradoxically, what provides today with the information required to give a face and a name, millions of faces, to those that otherwise could be nothing more than just a number. Of the *gulag*, for instance, to which the enemies of Stalinism were sent to die, there are no such records, and therefore the infamous soviet concentration camps and those who suffered there have less impact in our collective memory. Lives were

lost in the gulag, but personal histories also vanished (giving a terrific meaning to the famous Stalin's sentence: *one death is a tragedy, a million dead is just a statistic*). In the process of dehumanization of the Other, the Nazi bureaucracy produced the necessary stuff for us to *re-humanize* the victims.

*Diagrams* dehumanizes for later re-humanizing. The eyes, the lines our faces, all that define us most as individuals, is hidden behind an anonymous back. We also see a grid, an anthropological grid that measures, confines and catalogs. But if we “take a step back”, and look at these images as a whole, mentally filling the gaps between the photos, or the spaces between consecutive right-hand/left-hand, we may recognize a kind of wave, with harmonics and dominants, a wave of many possible textures, as much as the bodies that we were allowed to photograph. Repetition, just like in the Becher's photographs, allows us to perceive the details, the discrete and the clear differences, the individuality of each subject. Within the whole, the bodies become once again individuals. Totalitarianism only dehumanizes, by shaping the whole in order to control the parts, eradicating the differences between the individuals. Men, then, become like ants.

In the *Disembodied Lady*, a story included in the book *The Man who Mistook His Wife for a Hat* (1985), Oliver Sacks (b.1933) describes the disturbing case of a patient that loses proprioception (kinesthesia. The loss of this kind of sixth sense, activated by centrally processed distributed information, is almost like losing the body. Physically, there is a body, it has volume, it occupies space, but it is not felt. The patient must look at his hand if he wishes to move his hand. Deprived of proprioception, we have to see the body in order to own it again and assume our place in the real world. By depicting and showing us — trough the most *impartial, objective* and *truthful* approach (photography) —, what, together with memory, define us as individuals, *Diagrams* invites us to reflect on an inseparable part of individuality and human condition.