12. Extraterrestrial Images

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Recognizing Images from Far Away

From the early 1920s, Wilfred I. Eitzman, a science and mathematics schoolteacher from South African Pietersburg (currently Polokwane), repeatedly visited lime-works in the nearby Makapansgat Valley. He was attracted by fossil bone deposits exposed during the mining of lime. The remains were later identified as belonging to *Australopithecus africanus* and being some 3 million years old. In a 1958 article, Eitzman recollects his explorations in the Makapansgat caves, as well as his efforts to draw the attention of scientists and the general public to the site, most of which was irretrievably lost due to the voracious demand for lime (according to his estimates, some 60,000 tons of lime had been removed from the caverns between 1922 and 1937). Even though only a fragment of the original geological deposits remained available for later research, Makapansgat is one of the greatest paleontological records of human evolution in the world.

In the article, Eitzman incidentally mentions his discovery of a remarkable water-worn pebble, extracted in 1925 from a bone breccia and "retained by him ever since because of its extraordinary resemblance to a human face, which he also felt was responsible for its having originally been brought into the cavern by *Australopithecus*" (1958, 180). What later became known as the "Makapansgat pebble" (or, more precisely, cobble) is a small, reddish-brown jasperite stone with surface markings resembling a rudimentary form of a human face. The cobble was found in the sediment associated with australopithecine bones tens of kilometers away from any possible natural source of such stones—hence Eitzman's assumption that someone had to have picked it up and carried it to the cave, most likely because of the appeal of its appearance.

Prehistorian and cognitive archaeologist Robert Bednarik (1998) studied the stone meticulously in 1997 to verify that the markings on its surface were not made or even emphasized by the *Australopithecus* but rather of natural origin. The stone doesn't bear any trace of artificial modification; it was not made but found. The Makapansgat cobble, c. 3,000,000 BP, is the earliest known example of what is called a "manuport" (a natural object which has been moved from its original context by human agency but otherwise remains unmodified), or, to use a contemporary art-world term, it is the first "readymade." Many scholars assume it exhibits an incipient form of consciousness, symbolic thinking, and possibly an aesthetic sense. Paleoanthropologists like to think of the cobble as of the most ancient art object in the world, one that by far predates any kind of human-made rock art or cave art.

However speculative it may be, the story of the Makapansgat cobble makes for a fascinating thought experiment, one that challenges our customary understanding of the emergence of humanity and beginnings of art, as the stone image does not exemplify the peculiar "human" ability to make things but rather a simple form of pattern recognition and apperception. In the often-retold story of this oldest "art object," we must, however, distinguish between two different acts of recognition. The face in the stone was recognized "first" by Eitzman in 1925 (as it is recognized by us looking at it in exhibitions or book reproductions today), who picked it up and has "retained [it] ever since." And, given its atypical deposit, we suppose the *Australopithecus* must have picked it up for the very same reason and liked it so much that she or he carried it the long way back home without even having a pocket or a purse. (Things get more complicated if we turn the stone upside down: It shows not one, but in fact at least two different renditions of a face, one smiley-like and one more apish. It is not certain that even if the *Australopithecus* recognized something in the stone, they did recognize the same image as Eitzman or as we do, given the typical orientation of the image in its reproductions.)

The real enigma lies in the trajectory this image has travelled. Or, more precisely, trajectories, as there are two involved. One is the dislocation that took place circa 3,000,000 years ago, at a time when no one had a reason to move stones around and they kept lying where they, so to speak, developed. Then, one mysterious hominin came around and carried this stone several kilometers away from its natural source, for whatever reason. The second trajectory is no less enigmatic—it is not so much a transmission in space as a transmission in time. The jasperite stone joined the bones of its finder on a long journey of sedimentation, becoming a time capsule hidden in what modern humans have later (fortunately?) considered a valuable commodity. As Eitzman notes, most miners were rough, illiterate men—a different kind of intelligence was needed to recognize a different kind of treasure with a different kind of meaning and value in the natural treasure. A cultured high school teacher with a noble hobby had to come along to recognize a message, albeit unintentional, from his ancestor with a similarly exceptional inclination. For both of them, a piece of rock was more than just a piece of rock. It carried a sign or at least an indication of behavior that may be called intelligent, even if not necessarily human.

In my contribution to this volume, I want to focus on a rather extreme form of image trajectory: on images that travel in space but also and more importantly in time, on images that become time capsules to be deciphered by a different kind of civilization to the one that has made or sent them. We can call them extraterrestrial images; even though some of them, as the example of the Makapansgat cobble suggests, have remained still at the same place on our planet for millions of years, the thin layer on its surface where life takes place and which we call our home has transformed profoundly over those vast reaches of time and has become a different world entirely. I will, however, focus mainly on images that we, as modern humans, send to outer space to communicate with other beings. The "other" in extraterrestrial communication always implies "future"—not only in the sense that the images might meet their receivers in some indistinct futurity, but also in the sense of hoping for more "advanced" or more "civilized" receivers of our messages. In the final chapter of his *Geology of Media*, Jussi Parikka moves "from deep times to future times by speculating on the idea of future fossils, as a future temporality turned back to the current moment" (2015, 109). I want to follow this move while investigating the ways in which extraterrestrial images radically challenge our prevailing notions of time and our understanding of communication. The temporal framework of our media and communication theories is usually circumscribed by the humanly meaningful coordinates ranging from immediate interaction to millennia. As we face growing concerns about the future of human survival on Earth, we are urged to think on a very different scale and to extend our imagination beyond these limits, both in terms of time and forms of life: "A vision of communication committed to democracy cannot foreclose on entering into intelligence with radical otherness, including the earth, other species, machines, or extraterrestrial life" (Peters 2003, 399).

Ultima Thule

Before we take a closer look at some of the images travelling in outer space, I want to touch briefly on the image of space travel—on the imaginary, mainly literary renderings of extraterrestrial contact, which show to what extent travel and transportation are aligned with images and vision. Any communication with extraterrestrials has been imaginary so far, of course. Yet we can distinguish between fictional accounts of any kind of encounter with aliens and actual efforts to send out or receive messages, even though no form of reciprocal communication has been established. Before the nineteenth century, when the telegraph severed the physical link between the messenger and the message, thus separating communication from transportation, one had to travel "in person": the astronaut's body was the prime medium of communication, as the message could not yet be transported without the messenger.

Possibly the most influential of the ancient (preserved) records is Plutarch's dialogue *Concerning the Face Which Appears in the Orb of the Moon* from the end of the first century (1957). A group of learned men discuss the size, shape and distance of the Moon, its phases, eclipse and the nature of its light; thanks to its many references to older thinkers, the book is an important source of knowledge about ancient astronomy and cosmology. The starting point of the dialogue is a "face" seen by many in the spotted surface of the Moon—a classic example of visual pareidolia, the tendency to perceive shapes, often anthropomorphic, in indistinct visual cues. The men also discuss the surface of the Moon and ponder whether it is inhabited, let alone inhabitable. One of the speakers claims that without life or at least the possibility of life, the existence of the Moon would have no purpose, while another speculates about extraordinary beings and life forms incomparable with those living on the Earth. During the debate about the lunar living environment, Plutarch voices a soft critique of anthropocentrism. We can find territories hostile towards human beings and life in general, even on Earth, such as oceans and deserts. But it does not imply that they would have no metaphysical purpose: the world was not made for humans and the inhabitable parts belong to it as well. The dialogue ends with a platonic eschatological myth in the form of a retelling of a narrative by a certain stranger, who has visited the Isle of Cronus, a five-day journey westwards of Britain, populated by Moon-worshiping people. He learns from them that the Moon is a kind of purgatory, inhabited by human souls before their descent to Earth.

Travelling beyond the borders of the known world, to an indeterminate location that classical literature often refers to as "ultima Thule," means reaching a point when outer space can be more or less easily accessed or rather, when the distinction between the inner and the outer, between Earth and the cosmos becomes blurry and obscure: celestial bodies become no more than other islands in a vast and unexplored ocean. In his satirical travelogue *A True Story*, Lucian describes a journey into the western ocean: setting out from the Pillars of Hercules, the travellers first reach the strange Island of Dionysus. When they continue their journey further, they land on the Moon:

> About noon, when the island was no longer in sight, a whirlwind suddenly arose, spun the boat about, raised her into the air about three hundred furlongs and did not let her down into the sea again; but while she was hung up aloft a wind struck her sails and drove her ahead with bellying canvas. For seven days and seven nights we sailed the air, and on the eighth day we saw a great country in it, resembling an island, bright and round and shining with a great light. Running in there and anchoring, we went ashore, and on investigating found that the land was inhabited and cultivated. (Lucian 1961, 259)

During their visit to the Moon, the travellers meet many different peoples of various habits and appearances. The Moonites are not born of women but of men (there are no women, in fact: up to the age of twenty-five, each is a wife and thereafter a husband); men also give birth to children. Some carry their children in the calf of the leg, and when conception takes place the calf begins to swell and they cut it open. The child is delivered dead but they bring it to life by putting it in the wind with its mouth open. Another kind, so-called Arboreals, remove their right genital gland and plant it in the ground—a very large tree resembling a phallus with large acorns grows up from it. When the acorns ripen, new people can be shelled out of them. Only a bald man is considered beautiful on the Moon; some Moonites blow honey from their noses and sweat milk, some have removable eyes and can exchange them with others. In the royal district, they have a large mirror fixed above a well. From inside the well one can hear everything that is said on Earth and by looking at the mirror one can also see anything or anyone there as if one were next to them.

Lucian dedicated one more piece to space travel, a short dialogue called *Icaromenippus, or the Sky-Man*. This work is much more explicit in relativizing earthly habits, norms and truths. Menippus, the protagonist of the story, sets out on his journey because he is dissatisfied with contradictory claims of philosophers and mathematicians about the nature of the universe and hopes to gain a detached view from above by cutting one wing from an eagle and one from a vulture and attaching them to his body. He flies up to celestial spheres with a short stop at the Moon. The visit is not so much an exploration of the satellite as an opportunity to look back at Earth.

First, however, Menippus needed to adjust his sense of sight, as he was able to recognize the Earth from such a great distance but could not make out any details. Empedocles approached him (apparently the only inhabitant of the Moon, burnt and smoldering like a cinder, since the smoke from a volcano he threw himself at brought him up there) and advised Menippus to sharpen his vision by flapping his right arm with the eagle's wing, thus becoming half-eagle and transferring the animal's unique power of vision to his right eye as well.

When Menippus finally sees life on Earth in bright detail, his experience is very different from the overview effect reported by modern astronauts: terrestrial life seems petty, vain and ludicrous, full of conflicts and discord. Even the Moon herself is disgusted by what she has to observe each night, as well as by "hearing quantities of dreadful abuse from the philosophers, who have nothing else to do but to bother about me, what I am, how big I am, and why I become semicircular, or crescent-shaped. Some of them say I am inhabited, others that I hang over the sea like a mirror, and others ascribe to me—oh, anything that each man's fancy prompts" (Lucian 1960, 303). As Menippus plans to continue his journey further toward the heavens, the Moon asks him to deliver a message to Zeus:

> So be sure to report all this to Zeus and to add, too, that I cannot remain in my place unless he destroys the natural philosophers, muzzles the logicians, razes the Porch, burns down the Academy, and stops the lectures in the Walks; for only then can I get a rest and cease to be surveyed by them every day. (Lucian 1960, 305)

The Moon enjoyed relative peace until the beginning of the seventeenth century, when Galileo's telescopic observations aroused new interest in the satellite's surface and secrets. From Kepler's *Somnium*, written in Prague in 1608, in which the lunar adventure prepares ground for an exposition of an alternative lunar astronomy and a defense of the Copernican doctrine of the motion of the Earth, to John Wilkins's *Discovery of a World in the Moon*, Francis Goodwin's *Man in the Moone*, Athanasius Kircher's *Ecstatic Journey*, Bernard de Fontenelle's *Conversations on the Plurality of Worlds*, or Christiaan Huyghens's *Cosmotheoros*, space travel becomes a pretext for explaining the nature of the cosmos, musings on the plurality of worlds and the possibility of life on other planets, or speculations about alternative biological and social structures.

The imaginary space journey is never just the transfer of the traveler's body (whether it moves thanks to a ship, demons, or a flock of wild swans) but always has a visual component, includes some sort of optical apparatus or some mode of enhancing human vision or that which is to be seen. This is apparent especially in pre-telescopic works, such as Plutarch's or Lucian's, or in later visual renderings, for example the cinematographic, such as Méliès's view from the perspective of the flying projectile in his 1902 *Trip to the Moon* or in the actual cosmic flights since the 1960s, which were upheld by the cybernetic vision of the control-room: "one cannot imagine the technical state of space travel arbitrarily separated from the perfection of the process of transporting images" (Blumenberg 1987, 676). To establish contact with outer space, vision must become extraordinarily mobile and swift, also extending with the movement of the messenger. In its simplest form, extraterrestrial contact required a gigantic image: the Moon would become an image of a face or, as a number of eighteenth and nineteenth-century authors suggested, one could create a massive image on the surface of the Earth (Camille Flammarion suggested creating large arrays of electric lamps, Joseph von Littrow proposed a massive circular canal in the Sahara desert filled with burning kerosene, Carl Friedrich Gauss reportedly suggested planting trees in the Siberian tundra in the shape of an immense right-angled triangle with three squares, intended as a symbolical representation of the Pythagorean theorem). Whatever the technique, it seemed only natural that establishing contact with extraterrestrials would involve seeing them or being seen by them through some kind of rescaling of vision. The preference for the optical is conditioned by the fact that vision is a distant sense, but also indebted to the tradition of astronomical observation and to the understanding of an image as a universally intelligible, transparent message.

Moving Images and Communication between Species

The phrase "moving images" typically evokes films (movies, motion pictures) created either by photography or animation: the process of capturing, storing and reanimating scenes by projecting a rapid succession of discrete images. Yet both the emergence and development of these moving images is closely interlaced with another mode of movement, one of transmitting images over distances, whether by cables or wirelessly. Most media histories tend to treat these two forms of movement separately and distinguish between technological systems of recording/projection and transmission while drawing on a more general distinction between temporal and spatial media bias. So far there have been only a few scholarly studies questioning the dividing line between the recorded and the transmitted and instead exploring their intermedial influences and amalgamations. Geoffrey Batchen's remarkable genealogy of new media outlines, among other things, the early history of photographic image transmission methods using telegraphic wires:

> A key breakthrough came in July 1838, when the Englishman Edward Davy was granted a patent for an electric telegraph system in which a current being received is passed through a moving paper tape soaked in potassium iodide, thus leaving a colored mark with each flow. Electricity was thereby turned into a legible image, moreover a kind of image produced very much like a photograph (automatically, as a chemical reaction to received energy). (2006, 36)

More recently, Doron Galili's discussion of the late-nineteenth and early-twentieth century discourses and technologies of the cinematic and the televisual showed that "photographic and electric moving image media were not necessarily understood as separate, mutually exclusive entities" (2020, 75) but were imbricated in a shared genealogical fabric of modern audiovisual culture.

Thanks to the development of electrical telecommunication systems, the ultima Thule moment reappears in the nineteenth century: transmitting messages over the final distances on the globe opens up the possibility of transmitting them to other celestial bodies as well (intentionally, and also as a side effect of terrestrial communication). The main hindrance to be considered, of course, is the existence of a receiver (both technological and intelligent) at the other end of the transmission. That is why the communication begins more cautiously in the mode of signaling rather than actual transmission, following, in a sense, the development from the optical to the electric telegraph.

Possibly the first scrupulous program for extraterrestrial communication was suggested by Edvard Engelbert Neovius, Finnish officer and mathematician (for more details, see Lehti 1998). In 1875, Neovius published a booklet entitled *The Greatest Mission of Our Time*, in which he proposed contacting the inhabitants of Mars using light signals projected by huge beacons. Inspired by Flammarion and Oersted, Neovius believed that practically every planet has intelligent inhabitants, very similar to Earthlings. He also subscribed to the view that the cosmic development of planetary systems proceeds from the edge to the center, which made Mars (being more advanced as a celestial body but also in terms of the evolution of organic beings) the ideal addressee for his message. The message itself, sent by a sequence of light pulses, was analogous to Morse code, which was most likely one of the topics Neovius taught to his students at Hamina Cadet School.

In 1896, Francis Galton suggested a very similar project, still framed in the traditional genre of fantastic literature and presented as a series of imaginary news reports. But it already articulates all the key aspects of interplanetary and interspecies communication (for an overview of extraterrestrial languages, see Oberhaus 2019): "Signals have to be devised that are *intrinsically* intelligible, so that the messages may be deciphered by any intelligent man, or other creature, who has made nearly as much advance in pure and applied science as ourselves" (Galton 1896, 657—emphasis FG).

Galton realized that such communication necessarily lacks any kind of feedback, at least in its initial stages, and thus must involve some sort of "intrinsically intelligible" signals. Interestingly enough, his imaginary reports start with signals being broadcasted from Mars: "Astronomers in various observatories have been much excited of late by the sight of minute scintillations of light proceeding from a single well-defined spot on the surface of Mars, and they are becoming greatly perplexed as to the significance of this strange phenomenon" (1896, 658). The scintillations are produced by an assemblage of heliographs and formed by patterns of dots, dashes and lines—flashes differing in their length and also in the length of intervals between them, which indicate differences between letters, words and paragraphs. The signaling starts with a phatic phase—a succession of lines with intervening pauses, to suggest a communicative intent simply by the regularity of its pattern, then moves on to the definition of basic arithmetical operations and to the description of planets, their distance from the Sun or rotation period, in order to somehow identify the circumstantial coordinates, the whereabouts of the conversation. The "final and most marvelous stage" is one of "effective picture-writing in outlines by means of series of words of three letters" (1896, 662), which can be used to communicate more complex concepts. Galton compares the method of "picture formulas" to expressing the directions and lengths of stiches in a piece of embroidery and refers to his earlier lecture on the "just-perceptible difference" given at the Royal Institution in 1893. Drawing on Gustav Fechner's psychophysical theories and experiments (in which Fechner gradually, in small increments, increased the intensity of some sensory stimulus and then recorded and quantified the subject's perceptions in order to determine the relationship between physical stimulation and psychological experience), Galton deals with "the limits of the power of optical discrimination, as shown by the smallest number of adjacent dots that suffice to give the appearance of a continuous line" and the feasibility of "transmitting very beautiful outline drawings of a minute size, and larger and rougher plans, maps, and designs of all kinds, by means of telegraphy" (1893, 13). In other words, Galton proposes a clever trick: we can exploit the limits of the power of optical discrimination (when in proper size or from a proper distance, a series of dots appears to be a continuous line) to break down the image into discrete picture-elements, which can be converted into signals, transmitted over distance and then reconstructed into the image. His technique of converting images into picture-formulas made of letters, words or numbers also has an economic advantage, as sending strings of texts is much cheaper and faster than using the pictorial telegraph.

The first attempts to communicate with extraterrestrials concerned the neighboring celestial bodies, namely the Moon, Venus and Mars. There were two main reasons for this rather limited field of contact: First, many believed or would at least speculate about intelligent beings living on these nearby planets, as only improved early twentieth-century astronomical observations definitively ruled out any signs of (intelligent and contemporaneous) life on them. Second, communication technologies at that time could not reach greater distances. As a result, the prospect of extraterrestrial communication remained confined to a somewhat intimate neighboring milieu, one that was still tied up with the range of human vision.

On 16 November 1974, at a ceremony to mark the installation of a new reflector surface and a new powerful transmitter on the 305-meter Arecibo radio telescope in Puerto Rico, a so-called "Arecibo message" (Fig. 12.1) was sent to a star cluster named Messier 13 approximately 22,000 light years from Earth. As Carl Sagan and Frank Drake admit, the message "was not so much a serious effort at interstellar communication as a demonstration of the great powers that radio technology has put at our command" (Sagan et al. 1978, 24). If it reached its destination and someone actually replied, the reply would be received approximately 44,000 years after the original broadcast; we have to ignore the fact, however, that the destination will no longer be at its original location when the message arrives. The message—essentially a black-and-white television picture—took 169 seconds to send (when the transmission ended, the first bits were already passing through the orbit of Mars). It was sent via frequency-modulated radio waves in a binary code (as two tones, by switching the radio transmitter between two frequencies) and consisted of 1,679 bits that were meant to be arranged as a bitmap with 73 rows and 23 columns—the addressee is supposed to recognize that 1,679 is the multiple of these two prime numbers, and the bits need to be arranged in a rectangle to form the image. The content of the message consists of numbers from 1 to 10, atomic numbers of DNA components, molecular formulas of nucleotides, graphic representation of the double helix structure of DNA, a figure of a human being, and graphic renditions of the Solar System and the Arecibo radio telescope.

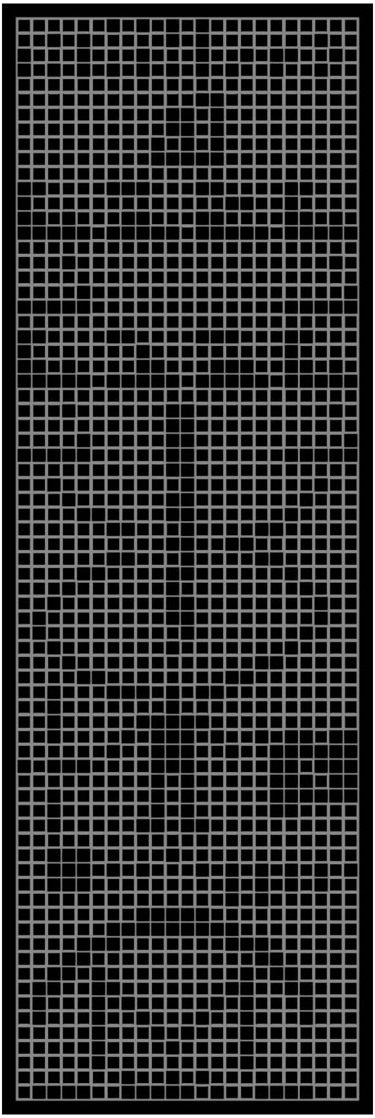

Figure 12.1: The decryption of the Arecibo message.

The radio telescopes in Arecibo and elsewhere are more commonly used for passive surveying of nearby stellar systems for signs of intelligent life rather than for actual messaging (even the idea for the Arecibo message originated from discussions of how to design a response if some signal from outer space was detected). The hope for extraterrestrial contact implies a certain asymmetry: the odds are much higher if we assume intelligence more advanced than us, just like Neovius or Galton did. Even though the messages are designed as intrinsically intelligible, they presuppose life forms very similar to ours and proceed from a communication model based on feedback and exchange. We should keep in mind that apart from these spectacular and, to say the least, sporadic acts of deliberate contact, humans have been transmitting radio signals to outer space since Marconi, or, to be more precise, radio and TV signals have been inadvertently leaking into outer space, forming an ever-expanding sphere around Earth with circa 100 light years radius by now. Large as this is, it is still negligible when compared to the size of our Galaxy.

It seems rather strange that once the technologies of observation (or communication) have shifted within the electromagnetic spectrum—from visible light to radio waves—we still keep thinking about them in optical terms and call the antennas used to receive radio waves "telescopes," tend to encrypt pictures as the preferred form of our messages, or call the data visualizations of space objects "photographs." The perceptual regime of radio telecommunication is, in fact, much closer to hearing than seeing (if we want to use a metaphorical description that can still be related to our sensory experience). More precisely, it is close to what is called overhearing. Overhearing is a strange case of auditory experience: it is neither hearing (a physiological phenomenon, an ability to perceive sounds), nor listening (a psychological act or process that can be developed into a complex technique). Overhearing marks a certain excess of hearing; it is an involuntary registering of a fragmentary pattern that attracts our attention while disturbing the borders of detached spaces—we typically overhear things that were not intended for us, from another room or from the conversation of strangers. Yet overhearing also differs from eavesdropping: it takes place non-intentionally, by accident or mistake, whenever sound leaks out of its proper place. Although the situation of overhearing requires both the "sender" and the "receiver" of the message, they are essentially disconnected and disengaged: the default mode is one of recording rather than of transmission, the infinite distance transforms reception into mere tracing, marking and detecting. As Peter Szendy notes (albeit in a very different context), overhearing is "impossible listening . . . something that is *possible only as impossible*" (2017, xii—emphasis PS).

Space Fossils

Although radio waves are obviously the fastest and easiest way of sending a message to outer space, several physical objects were sent out as well. The first were the famous plaques affixed to Pioneer 10 and Pioneer 11, launched by NASA in 1972 and 1973 to study the environment around Jupiter and Saturn, the asteroid belt, solar winds and cosmic rays. These space probes were the first man-made objects to achieve the escape velocity that would allow them to leave the Solar system and travel at the speed of c. 11 km/s. The pair of gold-anodized aluminum plaques, attached to the probes' antenna support struts are 228.6 x 152.4 mm in size and feature an engraving of a schematic representation of male and female figures with the silhouette of the spacecraft behind them, to scale so that the size of human beings can be inferred by measuring the probe (Fig. 12.2).

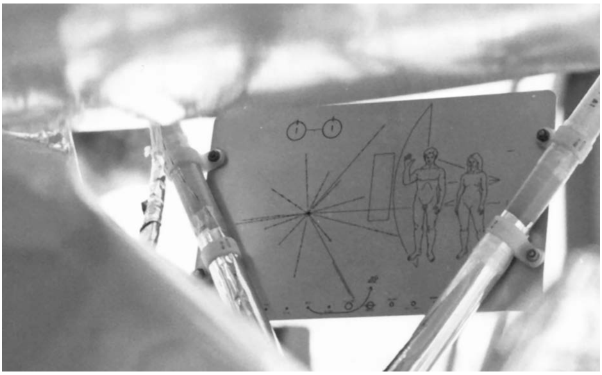

Figure 12.2: The Pioneer plaque.

The key to the message is a diagram of the hyperfine transition of hydrogen, the most abundant element in the universe. The spin-flip transition of a hydrogen atom produces microwave radiation, the period and wavelength of which establish units of time and length used as measurements in other symbols on the plaque. Simultaneously, this calls attention to what was thought to be the most promising frequency for interstellar messaging. The plaques also include two maps: one is a schematic diagram of the Solar System with the trajectory of the probe, the other a radial pattern of fifteen lines that correspond to the distance of the Sun from different pulsars and provide time signatures, making it possible to reconstruct the epoch in which the message was devised. The authors acknowledge the fact that there is only a negligible chance that the probes will penetrate the planetary system of a different civilization. But they find it possible "that some civilizations far more advanced than ours have the means of detecting an object such as Pioneer 10 in interstellar space, distinguishing it from other objects of comparable size but not of artificial origin, and then intercepting and acquiring the spacecraft" (Sagan, Sagan, and Drake 1972, 881).

The hydrogen atom diagram and the pulsar map were reused for the Voyager Golden Records in 1977. Just like the older Pioneers, the Voyager probes' primary mission is to transmit scientific data—pictures and measurements—back to Earth. The Voyagers travel faster than the Pioneers and are currently monitoring conditions in the outer expanses of the Solar System. It is expected that in 2020, limited power will require their instruments to be gradually deactivated and their signal will blend into the noise of the surrounding universe. The mute probes will, however, continue their journey while carrying much more information than the Pioneer plaques. The records are also engraved, but this time data are physically etched into the record grooves. They contain a variety of sounds (collection of world music, greetings in 55 different languages, and sounds made by wind, surf, thunder, and animals) and 116 images encoded into a video signal (20 of them in color). Each image consists of 512 lines, giving a resolution slightly below that of analog television. Much has already been written on the selection of pictures on the records (diagrams and photographs, which are a mix of *National Geographic*, *The Family of Man* exhibition, and coffee table books on various themes from toys to animals and machines); details are provided by Jon Lomberg's chapter "Pictures of Earth" (in Sagan et al. 1978), I also recommend the remarkable three-volume photo book by Martin Eberle (2015), which covers the scientific background of the mission, compiles all the images present on the disc, and assembles images from the author's journey to the scientific institutions that still supervise the voyage.

I wish to focus instead on the various forms of images present, their relationships, and the overlaps employed in order to deliver an "intrinsically intelligible" message. The criterion for the picture selection was their "informative, not aesthetic, value" (Sagan et al. 1978, 154), which is one of the reasons why artworks were not included. Besides, these were omitted because they are reproductions and the extraterrestrials "would have enough trouble interpreting photographs of reality or simple diagrams without our including a photograph of a painting, which is itself an interpretation of reality" (Sagan et al. 1978, 153). Although the authors acknowledge that the notion of a picture is by no means universal even on Earth, they resort to photographs and technical illustrations as pre-symbolic, objective, mechanical forms of images. Such an understanding of photographic images was voiced, among others, by Rosalind Krauss in her article "Notes on the Index: Seventies Art in America," published in 1977, the year the Voyagers were launched. Krauss discusses the indexical relationship of a photograph to its object, which separates it from other, iconic images:

> Its separation from true icons is felt through the absoluteness of this physical genesis, one that seem to short-circuit or disallow those processes of schematization or symbolic intervention that operate within the graphic representation of most paintings. If the Symbolic finds its way into the pictorial art through the human consciousness operating behind the forms of representation, forming a connection between object and their meaning, this is not the case of photography. (Krauss 1985, 203)

The photographic image is, in other words, understood as the object itself, unmediated, uninterpreted and unschematized. This is obviously a very problematic assumption, revoked by many before and after Krauss, and the possibility of showing a photograph to an extraterrestrial (assuming it has some sense of vision) puts it to the test. Our conventional form of photographic representation does not result in any necessary way from the behavior of light or photochemical or photoelectric processes. It is a cultural artifact that employs a larger number of schematizations and symbolic interventions that became embodied in standardized image-making devices, norms and types of images and display, as well as protocols and techniques of seeing and looking. Every photographic image emerges from sedimented practices of measuring, scaling, grading, and calibrating. It seems only fitting, then, that the authors of the Voyager discs tried to devise various ways of helping the recipients understand how to see the pictures, or at least realize that they are looking at pictures: The first two reproduce objects that can be found elsewhere on the probe, namely engraved physically on the record's cover. Thus, the photograph can be compared with an object they can touch. The first image is a simple circle—basically a calibration image. The second one juxtaposes the pulsar map (also engraved on the cover) with a photograph of the Andromeda galaxy as a reference point, a landmark that the recipient might have seen. For similar reasons, several pictures of planets are included:

> Looking at objects that are at least somewhat familiar should help the recipients calibrate their system for reproducing pictures and understand our concept of a picture—how we represent reality on a two-dimensional surface. Certainly it will help them to see something familiar before moving on to those pictures of things that are totally unfamiliar to them. (Sagan et al. 1978, 188)

Showing familiar objects in the form of pictures amounts to teaching the meaning of images through a kind of ostension, a technique of pointing things out related to that employed in silhouettes of photographs: "It is a way of saying 'This is what we want you to see in this picture'" (Sagan et al. 1978, 156). The silhouette maximizes the contrast between the figure and its background and separates individual objects by means of outlines, thus focusing the viewer's attention on certain aspects of the image only, while ignoring other information it carries. Recurrent images or motifs were also used, especially humans, of course, in various situations, poses and perspectives (for example, in many of the pictures showing animals, humans are present observing or measuring them). Some of the images are superimposed with measurements and notations; all the photographs come naturally in the same size and resolution, whether they picture a galaxy or the fertilization of an egg. Among the first, "introductory" images, there are two dictionaries—one of mathematical definitions and one of physical unit definitions—defining symbols that provide contextual information on photographs and silhouettes, indicating the sizes and weights of objects or the durations of processes. In the form of photographs, objects' individual sizes are neutralized in a sense. But the very size of those photographs (and of the discs and plaques) is also determined by human somatic scale and the resolution of the human senses, and so presupposes an extraterrestrial receiver with a very similar makeup.

A number of entry points into the seemingly transparent photographic images needed to be introduced; the most important among them is on the cover of the gold-plated copper LP (Fig. 12.3).

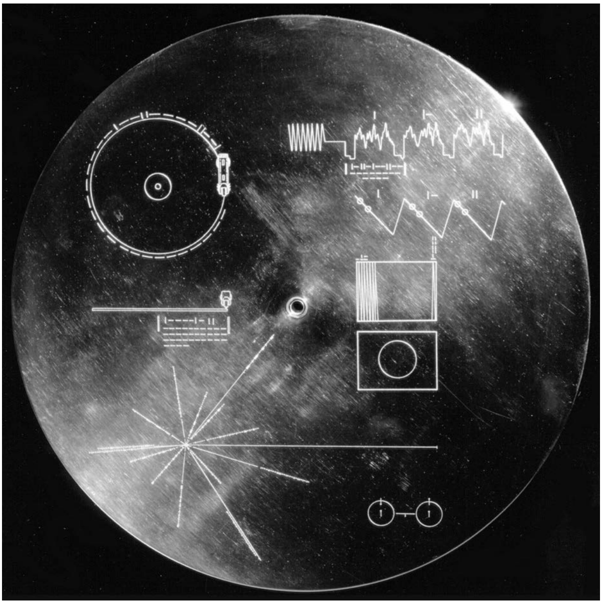

Figure 12.3: The Voyager Golden Record cover.

It provides operating instructions for playing back the disc and decoding the image data: before understanding the photographs, the extraterrestrials must understand the diagram that shows how the audio signal can be reconverted back into video. It utilizes the conventions of technical drawing and starts (if we read it from the upper left corner) with plan and elevation views of the disc and stylus, also indicating the proper speed to play the record. The NASA Jet Propulsion Laboratory webpage dedicated to Voyager calls it "an easily recognized drawing." The next diagram shows a graphic representation of the wave form of video signals, picture lines in binary numbers and the duration of one of the picture lines, the entire picture raster with 512 vertical lines in a complete picture, and a replica of the first picture on the record (the abovementioned circle) to verify that the signals have been correctly decoded.

The arrangement and logical order of images on the record imply that Sagan and his colleagues understood diagrams as more universal then photographs; diagrams provide the clues for reading photographs and also the very possibility of making them visible. They indicate the importance of an expert scientific and engineering visual culture, one that indulges in plans rather than in pictures: we often forget that to make a pretty picture using a camera, what we need is a diagrammatic plan to make the apparatus in the first place. Whereas pictures communicate some information about objects, plans are also used as means of construction, they are generative matrices used for designing, manufacturing and operating objects.

The authors understand diagrams as "scientific language," whereas photographs are cultural (in terms of content but not the medium itself). An exclusion of science, especially mathematics, from the realm of culture is evident throughout their writings; they ascribe to a Platonic conception of science, mingled with a firm belief in progress:

> [W]e might be able to communicate with representatives of . . . exotic civilizations, because they, like we, must come to grips with the same laws of physics and chemistry and astronomy. The composition of a star and its spectral properties are not fundamentally impositions that scientists have made on nature, but rather the other way around. There is an external reality that we ignore at our peril, and indeed much of the evolution of the human species can be described as an increasing concordance between the images within our brains and the reality in the external world. Thus, whatever the starting points, there must come to be a gradual convergence in intellectual content and discipline between diverse planetary species. (Sagan et al. 1978, 20)

Numbers, basic mathematical concepts and operations, as well as technical images are seen as a common idiom of universal communication and as a stamp of advanced intelligence towards which different worlds in their various stages inevitably gravitate. The prerequisite of the more or less simultaneous existence of a higher rationality somewhere in the universe is wishful thinking supposed to guarantee the ascending future of terrestrial rationality. It implicitly assumes that scientific reasoning is a natural consequence of biological evolution; that the process of the development of life inevitably leads to the emergence of rationality, even if embodied in some nonhuman form, physiologically different yet with the same intelligence.

We have shifted significantly from the 1960s and 1970s discourses of the space race, the population explosion and Spaceship Earth grappling with the scaling of man to the planet and exposing the relationships between the parametric conditions of human life and planetary limits. The change in attitude in our "post-planetary" times (Parikka 2018) can be illustrated by another attempt at sending images to the cosmos, Trevor Paglen's artistic project *The Last Pictures* (2012). Paglen employs a similar strategy to the early space image-capsules while refuting some of their claims and assumptions. His micro-etched disc with one hundred photographs, encased in a gold-plated shell, was attached to a commercial communications satellite launched in 2012. The satellite will spend some fifteen years in a geostationary orbit, broadcasting television and internet signals before becoming another piece of space debris, orbiting the planet for several billion years. It is a time capsule rather than a voyager, a future ruin designed to outlast all life on the planet. The other main difference is in the selection of the one hundred last images: Paglen presents the darker side of humanity by including documents of war, poverty, inequality or destruction. His radical gesture is addressed to us, here and now, rather than to some future, other recipient; Paglen also published his project as a book and exhibited frequently. He does, however, employ identical visual strategy, a combination of photographs with a diagrammatic cover etching: "we use scientific concepts that we presume to be universal to communicate . . . ideas, . . . it seems reasonable to assume that the Artifact discoverers will be at least as technologically advanced as we are" (Paglen 2012, 177).

Mysterious Messengers from the Real World

Although the prospect of extraterrestrial messaging has changed, from Neovius to Paglen, from a near-simultaneous "conversation" into dispatching deep-future time capsules, it remains committed to an anthropomorphic register of communication to a surprising degree. It presupposes that other species operate on the same somatic scale, know our science and mathematics, understand humanly standardized measurements, have senses, and obtain information primarily through the sense of sight, or can recognize images. Neovius was particularly influenced by Oersted's book *The Soul in Nature*, which claimed that the laws of nature hold throughout the universe: since the faculty of understanding and knowledge of rational beings is conditioned by the same physical nature everywhere, "this faculty must in its nature be everywhere the same" (Oersted 1852, 99). The assumption of universal rationality and the progressive convergence of life and intelligence in the universe becomes more implicit in the late twentieth-century and contemporary projects. Nevertheless, it still exerts its influence and affects the choice of communication medium: the supposedly universal language of photography.

It seems to me that the most interesting challenge of these projects is not so much the content of their images and what is to be seen in them, but rather the problem of the "image" itself—the important question is not what kind of photographs should we address to extraterrestrials, but rather what might extraterrestrial photography look like. The prospect of deep future and the possibility of communicating with aliens is a radical act of imagination that decenters and unanchors humanity; if we are to communicate through images, we may as well start by decentering the notion of the image by embracing the universe itself as a maze of optical effects.

But perhaps one does not have to embark on a space voyage to encounter alien worlds. In 1963, Hannah Arendt participated in a symposium assembled to address the question "Has man's conquest of space increased or diminished his stature?" and opened her answer with the problem of understanding physical reality:

> The progress of modern science has demonstrated very forcefully to what an extent this observed universe, the infinitely small no less than the infinitely large, escapes not only the coarseness of human sense perception but even the enormously ingenious instruments that have been built for its refinement. The phenomena with which modern physical research is concerned turn up like "mysterious messenger[s] from the real world," according to Max Planck in *The Universe in the Light of Modern Physics*, and we know no more about them than that they affect our measuring instruments in a certain way, suspecting all the while with Eddington that "the former have as much resemblance to the latter as a telephone number has to a subscriber." (Arendt 1963, 528)

Referring specifically to the generation of Einstein, Planck, Bohr or Schrödinger, Arendt notes their discovery that the universe they have tried to conquer is inherently inaccessible, unthinkable, and incomprehensible by the human mind: the categories of human reason have their ultimate source in the earth-bound human senses, which have become detached from the physical world of science, and we may well apply quite different types of natural laws to one and the same physical event. The methods of scientific imaging, which detect, sense, and observe—"overhear"—macroscopic or massively distributed objects, as well as extremely fast or slow-moving events conjure up images rarely coextensive with human vision and point out what extraterrestrial images might actually look like.[1]

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Notes

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