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Variantology 3

On Deep Time Relations of Arts, Sciences and Technologies in China and Elsewhere

Edited by Siegfried Zielinski and Eckhard Fülus
in cooperation with Nadine Minkwitz

Text Editor: Gloria Custance

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SIEGFRIED ZIELINSKI

& ECKHARD FÜRLUS

Introduction: *Ars brevis umbrae et lucis*

Seeing and comprehending are complementary fields. They complement each other in the various modes of thought and action with which we learn about and appropriate the world. “The history of vision and knowledge” are “closely intertwined”,¹ writes Gérard Simon in his study on optical concepts in ancient Greece. When Simon wrote this book, his research field was to lay the foundations of the classical age of science through a new *physics of the visible* (Johannes Kepler, Galileo Galilei, René Descartes). Irritated by the way in which the texts written by ancient Greek theorists of the gaze had been handed down, which were also of great importance for pre-modern concepts, Simon plunged ever further into the deep time of ancient theories of optics, particularly into the texts by Euclid and Ptolemy. What especially went against his grain was that histories of science appeared to map their contemporary ideas of the subject of optics and the gaze onto ancient history—they literally forced the modern view upon these ancient authors.

Inspired also by Michel Foucault’s archaeologies of knowledge and power, Simon’s intention was to uncover what precisely was being discussed when the ancient Greeks wrote about the complexity of the relationships between the person who sees and that which is seen; that is, he endeavoured to get behind and beyond the comfortable separation into subjective and objective, and active and passive, with which we are familiar today. Meticulous and critical re-reading of the translations, transcriptions, and copies of the ancient texts produced a clear result—contrary to the established conclusions of research: the beam of vision coming from the eye, that fascinating phenomenon to which was ascribed multifarious meanings and of which the “ancient geometers” had spoken repeatedly and tried to research intensively, must not be imagined as a physical quantity, “is not the same as a ray of light [...]. The object of their

¹ Gérard Simon, *Der Blick, das Sein und die Erscheinung in der antiken Optik* (Munich, 1992), p. 24. The French original was published in 1988 by the Paris publisher Éditions du Seuil. See also Simon’s essay: Science de la vision et représentation du visible. *Les Cahiers du Musée National d’Art Moderne* 37 (1991): 5–21.

[the ancient Greeks] research is not light, but sight.”² Therefore, in the history of science the research field of the ancient texts does not belong to physics or mathematics or geometry, not to the field of *techné*; instead, it belongs to the field of the *psyché*, to work on a “theory of the soul”. Classical Greek research was articulated first and foremost as questions about the particular nature of the “seeing human, his relation to the visible”.³

For Western philosophy, Plato’s allegory about the prisoners in the cave is the master text that looks at the relationship between those who see, and that which is seen, from philosophical angles.⁴ Unable to free themselves, or even move their heads, the captives think that the shadows of objects and figures, which are passed in front of a fire behind their backs, are real. They are real of necessity because the shadows are the only visible things that the prisoners are allowed to experience; they cannot even turn their heads to see the person next to them. If they could cast off their chains, turn away from the shadows, leave the firelight made by humans behind, and go out into the sunlight they would overcome the view associated with the cave. They would begin to recognise truth, first the reflections of things in water, then the reflections which divine light throws from the things to the eye of the observer, and ultimately they are able to see the pure light of knowledge.

Epistemologically the shadows in Plato’s allegory have the status of things that are specious, misleading, *negative*. They are bloodless like the denizens of Hades. In the late 1960s Jean-Louis Baudry took the cave allegory and applied it to the theory of the cinematographic apparatus and its effects, and at the same time, without attracting much attention, Baudry utilised some of the psycho-analytical ideas of Jacques Lacan, the mirror stage and formation of the ego, for media theory.⁵ In *A Short History of the Shadow* Victor I. Stoichita discusses Plato’s cave allegory, with very similar implications, in connection with the

2 Ibid., p. 13.

3 Ibid., p. 23.

4 Plato, *Politeia*, Pol 514a–517a; English edition, e.g., *The Republic of Plato*, trans. Allan Bloom (New York, 1991).

5 See in particular the two essays: Jean-Louis Baudry, Effets idéologiques produits par l’appareil de base. *Cinémathèque* 7/8 (1970): 1–8; Le dispositif: Approches métapsychologiques de l’impression de réalité. *Communications* 23 (1975): 56–72; English trans.: Ideological Effects of the Basic Cinematographic Apparatus, in: *Film Theory and Criticism. Introductory Readings*, ed. Gerald Mast, Marshall Cohen, and Leo Braudy, 4th edition (Oxford, 1992), pp. 302–312; The Apparatus: Metaphysical Approaches to the Impression of Reality in Cinema, in: *Film Theory and Criticism: Introductory Readings*, ed. Leo Braudy and Marshall Cohen, 6th edition (Oxford, 2004).

origin of painting and photography with reference to the famous story recounted by Pliny the Elder in *Naturalis historia*: the projected shadow image of the absent lover who had gone away to war.⁶ Theory and artistic praxis of the mass media have been profoundly influenced by both master texts. In his highly original *Histoire(s) du cinéma*, the god of the European post-war film avant-garde, Jean-Luc Godard, speaks in a breathy voice-over from the blackness of off-screen about the white screen and its status as a winding-sheet upon which dark shadows are thrown: cinematographic life as a reflection of death, combined with a quantum of hope when in its text the dark shadows change into “ombres blanches”, which technically they are on the film’s negative.⁷

These can be counted as scholarly and artistic farewells to the hierarchies that the modern age erected in connection with (visual) perception. On the historic eve of modernism there were clear declarations of belief in Platonic dualism. Francis Bacon called the twelve members of his “house of Salomon”, who bring knowledge and inventions from foreign lands to *The New Atlantis*, “merchants of light” and he divided them into four groups of three: “depredators”, “mystery-men”, “pioneers or miners”, and “dowry-men or benefactors”.⁸ They are merchants of light who trade in the results of work that produces knowledge.

From the perspective of media archaeology a high point was the discriminational judgement of shadow and everything that resided in its neighbourhood semantically, which is expressed in the light metaphysics of the seventeenth-century master of the affective and effective arts of sound and image, Athanasius Kircher. His *Great Art of Light and Shadow*, which was first published in 1645, contains a wealth of artefacts and apparatus for projection and technical visualisation. At the end of Book 10 Kircher formulates in a condensed and schematic form the horizontal and vertical coordinates from a visual perspective out of which the cross of Western knowledge may be constructed. His “metaphysica lucis et umbrae”⁹ has as its base the four Empedoclean elements,

6 Victor I. Stoichita, *Brève histoire de l'ombre*, originally published as *A Short History of the Shadow* (London, 1997).

7 Jean-Luc Godard, *Histoire(s) du cinéma*, video film in eight parts for French television (Canal Plus), 1988–1998, quotation from Part 2. The complete soundtrack appeared on ECM Records, New Series, Munich, 2000, text inserts and still images in two volumes at Gallimard–Gaugmont, Paris, 1998.

8 Francis Bacon, *Neu-Atlantis* (Stuttgart, 1982), pp. 54–55; quotation in an excerpt from *The New Atlantis* online: <http://www.uvawise.edu/history/wciv2/bacon.html>.

9 Athanasius Kircher, *Ars magna lucis et umbrae* (Rome, 1645), pp. 917–929; the schema is on p. 924. From an art-historical perspective see also: Fabio Barry, Lux and lumen. *kritische berichte* 4 (2002): 22–37.

fire, air, water, and earth. At the level of living creatures these elements correspond to God, the angels, humans, and animals; to these Kircher assigns the quintessential cognitive faculty of thought (*mens*), the intellect, reason, and sensory perception. Beneath this, he arranges the qualities horizontally in a range from brilliantly light to abysmally dark:

Lux is the light of light (*lume di lume*), the divine light, which has no corporeal presence, and of which all other light phenomena can be but a pale reflection. *Lumen* refers to the light that is tied to shining or reflecting bodies; etymologically it is also lightning or the gleam of gold, in Kircher's hierarchy it is the bodies of angels that propagate light. Humans represent the second-order medium (*secundum speculum*) that reflects divine light. To humankind he assigns the quality of shadows (*umbræ*), which defines life—negatively—from death; non-human animals are assigned in their entirety to the realm of darkness (*tenebræ*). In the middle plateau of his classifications Kircher even provides the corresponding colour scale: divine light is colourless; it simply shines and represents pure brightness. To the angels belongs *albedo*, the pale white that we are familiar with, for example, from polished white marble statuary. Humans, creatures with blood, are *rubedo*, deep red, and the lowest order, the animal kingdom, is *nigredo*, which corresponds to the black of unstructured matter, as depicted by Robert Fludd in a copperplate engraving of 1617.¹⁰

Deus .	Angelus .	Homo .	Animal .
Mens .	Intellectus .	Ratio .	Senfus .
Lux .	Lumen .	Vmbræ .	Tenebræ .
Lux .	Albedo .	Rubedo .	Nigredo .
Supercœlestia .	Cœlum .	Nubes .	Terra .
Lux perpetua .	Meridiana .	Crepusculum .	Tenebræ nocturnæ .
Ignis .	Aër .	Aqua .	Terra .

Fig. 1 “Deus sons lucis est, & Angelus primæ lucis speculum; secundum speculum, homo.”¹¹
 In: Athanasius Kircher, *Ars magna lucis et umbræ* (1645), *Epichirema V*, p. 924.

¹⁰ See also the chapter on Kircher in S. Zielinski, *Deep Time of the Media* (Cambridge, MA, 2006), pp. 101–157; on Robert Fludd’s black square, see pp. 111–113.

¹¹ “God is the source of light, the angel is the reflection of this primary light, and the human is the second reflection”.

If one flies towards the sun in regions of the Earth where the sun rises in the morning one encounters a different view of the complementary relationship between light and shadow. When Plato wrote his allegory of the prisoners in the cave it is possible that he had seen a performance of a (Near) Eastern shadow play, a cultural practice which was most probably known in Ancient Greece. Or at least this is one of our favourite speculations in media archaeology, for Plato's detailed description of the *dispositif* of projection reads in places like a manual for putting on such a shadow play. In this cultural and technical practise the shadow thrown by a three-dimensional body when illuminated by artificial light has a meaning opposite to that in Western philosophy: the shadow is an object of enjoyment, contemplation, instruction, religious ritual, and only sometimes of fear or terror.

And the shadow in this tradition is above all an object of longing. It is generally held that Chinese shadow play originated in the Western Han dynasty (206 B.C.–A.D. 8). Like the myth concerning the origins of painting written down by Pliny the Elder mentioned above, the origin of the shadow play, too, is associated with a tragic love story. When Emperor Wu's favourite concubine died, a magician named Shao Weng put up a white cloth screen at night and made an illuminated female figure dance behind it whose shape resembled exactly the emperor's departed loved one.¹²

From ancient times—that is, from the deep time of Chinese knowledge culture—knowledge concerning calculation of the passage of time, from day to night and light to dark, was not dubbed heliology or heliologics, but was known as *gnomonics*. The name comes from the *gnomon*, a perpendicular rod that was driven into the ground or a many metres-tall obelisk, which then cast a shadow upon the even plane around it showing the passage of the hours. The *gnomon* is the artificial agent positioned between the natural light of the sun and the abstract measurement result that can be read off the graduation: the shadow rod functioned as the medium in gnomonic projection.

A master text from the deep time of Chinese natural philosophy that expressly engages with optical phenomena is the so-called *Mobist Canon*, which is named after its founder Mo-tzu and was written between the late fifth and the mid third century B.C. The *Later Mobist Canon* consists of a great number of short *propositions* on various themes, particularly of a philosophical nature. The Can-

¹² According to Clara B. Wilpert in her book *Schattentheater* (Hamburg, 1973), p. 59; on the modern history of Chinese shadow theatre and its many cultural meanings see particularly Fan Pen Li Chen, *Chinese Shadow Theatre. History, Popular Religion, and Women Warriors* (Montreal, 2007).

on is regarded as an early thought system that competed with Confucianism.¹³ Eight of the highly condensed statements are devoted to optics.

Even a superficial reading of the propositions leaves an astounding impression. The character for *kuang* (light) appears only a few times, whereas the character for *yin* (shadow) appears in all eight propositions and several times in each one. Nathan Sivin, whose work is as ground-breaking in the field of the deep time of optics in China as Simon's studies on classical European antiquity's concepts of the gaze and optics, sums up the import of this distribution thus: "The Mohist optics is primarily the study of shadows."¹⁴

Already the first proposition regarding the physics of the visible celebrates shadows in a very special way, namely, as *positive*. Here the question under consideration is whether a shadow can move under its own volition. "A shadow does not shift", says the Mohist canon and propagates the view that a shadow is a product of the moment and constantly renews itself. It is a sensational event of an instant, which the text explains in spatial terms: "Where the light reaches, the shadow disappears", and, vice versa, "where the shadow is born the light disappears".¹⁵ The moment that light falls on the shadow it destroys the shadow, which then ceases to exist. For example, the shadow of a bird flying past the sun, which appears a little further on, is a new shadow wrested from the light and also only exists for a very short moment.

The second proposition about optics concerns the phenomenon of the double shadow, which is produced through two sources of light that illuminate an object. The definitions that follow engage succinctly with the inversion of a projected object, with the use of planar, convex, and concave mirrors as well as the size of shadow silhouettes in relation to the size and distance of the light source.

According to many modern commentators these physical definitions are probably the result of experiments with artificial experimental apparatus, which in the history of optics we know as the *camera obscura*, or pin-hole camera. Nathan Sivin has reservations about drawing this conclusion; in his opinion the descriptions are not precise enough to allow any definite statement. Notwithstanding,

13 For a thorough and systematic analysis see: Angus Charles Graham, *Later Mohist Logic, Ethics and Science* (Hong Kong, 1978), which also contains meticulous translations of the traditional texts.

14 Here we follow primarily the essay by Nathan Sivin and A.C. Graham, A systematic approach to the Mohist optics (ca. 300 B.C.), in: *Chinese Science*, ed. N. Sivin and Shigeru Nakayama (Cambridge, MA, 1973), pp. 105–152, quotation p. 113.

15 All three short quotations: *ibid.*, p. 116.

the clarity of the propositions and definitions of the Mohist Canon is infinitely superior to the extremely vague circumlocutions of Aristotle, who from a European perspective was the inventor of this instrument for studying optical phenomena. Aristotle's observations were not made with a constructed *camera obscura*. They derive from watching light rays fall through foliage, a sieve, and the intertwined fingers of both hands; with a lot of good will they can be interpreted such that Aristotle knew these optical effects or tried to describe them himself. Further, the observations do not occupy a central position in his philosophical work, but are among the mixture of news about physics.¹⁶

Without question, observations in connection with the phenomenon of shadows attained a high degree of precision in the Chinese scientific tradition long before the advent of the Italian Renaissance. This is due in no small part to the work of the polymath and outstanding astronomer, Shen Kua (1031–1095) from Ch'ien-t'ang, today's Hangchow in Chekiang province. His *Dream Book* (*Meng ch'i pi t'an*) of 1086 contains the discovery of what we know today as the focus (or focal point), the exact centre mid-way between the object and the projection surface. Shen Kua described its function for seeing via optical instruments giving impressive and also beautiful examples of flying birds and moving clouds, whose shadows were already included in the propositions of the *Later Mohist Canon*.¹⁷

Shen Kua was the contemporary of another great polymath and optics researcher from a region where the sun stands high at its zenith, Ibn al-Haytham from Baghdad, who spent much of his life in Cairo in Egypt. Like Shen Kua, Ibn al-Haytham was also a passionate observer of the two principal celestial light sources for terrestrial life, sun and moon. Also like Shen Kua, he defined more precisely the collected optical knowledge of the previous 1500 years, up to and including its technical objectification as a dark room in which the realm of shadows could be scientifically investigated. Ibn al-Haytham, in fact, wrote his studies on optics some decades before Shen Kua's *Dream Book*—in the early eleventh century. He will play a prominent role in the Fourth Volume of our *Variatology* series, together with other polymaths, natural philosophers, and engineers with which we shall celebrate the *l'âge d'or* of Arab-Islamic science, an epoch that we Europeans have too long regarded as the dismal and science-less Dark Ages.

¹⁶ Aristotle, *Problemata physica*, trans. Hellmut Flashar, in: Aristoteles, *Werke*, vol. 19 (Darmstadt, 1975), esp. pp. 140–141.

¹⁷ Nathan Sivins published a lexical essay devoted to Shen Kua in 1975, which appeared in *Sung Studies Newsletter* 13 (1977): 31–56.

But first we invite the reader with this Third Volume in our series to embark on an exploration of the deep time relations between the arts, sciences, and technologies, which takes us f. e. to Bulgaria, England, France, India, Italy, The Netherlands, Spain, and with a special focus on China. To all who came from far away to Germany in order to make these imaginary expeditions into their research areas possible we extend our heartfelt thanks. And that from our discussions came texts, which we had the privilege of editing, is a great gift. We thank all the authors for their work and for the patience and assistance they gave us in preparing the manuscripts for publication, which for us contained most unfamiliar material. Mareile Flitsch and Dagmar Schäfer were invaluable mediators in the discussions with our Chinese guests; Jens Bleiber translated in the widest sense the essay by Xu Fei; Christoph Zeller assisted with the contribution of Dai Nianzu, and he also helped us tremendously with all the final editing of the sections in Chinese. The author's individual variants of transcriptions, symbols, and for time periods have been retained.

One of the first to formulate fragments of a future theory of tele-communication in twentieth-century Europe was not a scientist, but a poet and dramatist. In 1927 Bertolt Brecht published a short provocative text with the title "Radio—An Antediluvian Invention?" As so often in his theoretical writings, he used a parable to illustrate what he meant:

"I recall an old story in which the superiority of Western culture is supposed to be made clear to a Chinese man. He says, 'What have you got?' They reply, 'Railways, automobiles, telephones.' 'I am sorry to have to tell you,' replies the Chinese man politely, 'that those are things *we* have already forgotten.' I immediately had the terrible impression with regard to radio that it was an unbelievably old institution, which had sunk into oblivion because of the deluge."¹⁸

Translated from German by Gloria Custance

¹⁸ The short text appears in vol. 18 of Brecht's *Gesammelte Werke* (Schriften zur Literatur und Kunst I.) (Frankfurt, 1967) pp. 119 ff; for an English translation of the text see: *Brecht on Film and Radio*, ed. Marc Silberman (London, 2000), p. 37.