

POWER TOUCHES THE IMAGINATION

“My mental boundaries expanded when I viewed the Earth against the black and uninviting vacuum .. ” (Rakesh Sharma, Indian astronaut)

“Mind is a living measure which achieves its own capacity by measuring other things.”
(Nicholas of Cusa, 1514)

“Maps shape perceptions, structure social experience, and order reality. They are systems, classifying natural phenomena. Maps also mirror social knowledge and a society’s view of the world around it.” (J.R. Stone, ‘The Medieval Mappaemundi: Toward an Archaeology of Sacred Cartography’ *Religion*, 23, p. 200)

“Several days after looking at the Earth a childish thought occurred to me - that we the cosmonauts are being deceived. If we were the first ones in space, then who was it who made the globe correctly? Then this thought was replaced by pride in the human capacity to see with our mind.” (Igor Volk, USSR cosmonaut)

“Cartography is never merely the drawing of maps: it is the making of worlds.” (J.B. Harley, ‘Cartography, Ethics and Social Theory’, *Cartographica*, 27.1, p. 16)

“Henceforth I spread confident wings to space:
I fear no barrier of crystal or glass:
I cleave the heavens and soar to the infinite.”
(Giordano Bruno, 1591)

“When the history of our galaxy is written, and I think it may already have been, if the planet Earth gets mentioned at all, it won’t be because its inhabitants visited their own moon .. What will be worth recording is what kind of civilization we Earthlings created and whether or not we ventured out to other parts of the Galaxy. Were we wanderers? Human history so far indicates we are indeed. It’s human nature to stretch, to go, to see, to understand. Exploration is not a choice, really, it’s an imperative.”
(Michael Collins, USA astronaut, 1981)

“It seems I am leaving the planet forever. And there is no power that could bring me back.” (Valeri Ryumin, USSR cosmonaut, 1981)

Introduction/statement of problem

- *The technology of cartography ..*
- *From mappaemundi to universal imaginary ..*
- *The cartographic/spatial revolution*
- *Social policy and the hegemony of ocular technology*

In this session we need to think again about ‘the gaze’, as identified in Foucault’s account of the birth of the clinic; a type of ‘regard’ that during the 18th century took at it’s point of application the body of the citizen and the functioning of cities. This type of gaze surely, as Ian Hacking has outlined, became in the 19th century a *statistical function*: the avalanche of printed numbers aiming to get a jump on the newly found biological characteristics of populations and individuals. This was certainly the moment of a transformation of the power to govern, and a transformation of the political economy of security. Yet can we retrace its ‘zero-point’ - the point in history when its inevitability was by no means certain? In short, before the gaze - the political regard - passed into the realm of truth and regular practice?

When we think of this question we surely have to come to terms with what Foucault in *Madness and Civilization* called the ‘imaginary landscape’; the coordinates of a primary system of rationalization that would become through time merely a social space: an empty box on a register or table, waiting to be written over with a number or identity. Put another way, the importance of cartography is in its relation to certain ‘technologies of bodies’ that would later dominate social and historical reality; it allows us to ask the question ‘is there an a priori to this technology of bodies, to this *regard*?’ It allows us to ask the question, and suggests if not so much an answer, as a certain and possible space within which such an a priori could emerge: the space of originally looking outward, and imagining - as a kind of lived-experience in advance - the very nature of the world, its phenomenology, and the a priori that allows us to comprehend it.

Cartography *is* the true battleground of truth and the imagination, of power and bodies, and chaos and history. Might it be possible to trace a political history of bodies in relation to a political imaginary of spaces?

The technology of cartography

PREPARATIONS: RECONCEIVING TIME/SPACE

Hecataeus of Miletus (Turkey)[circa. BC 500]¹ historian

Dicaerchus of Messina (Sicily) [circa. BC 335]² map-maker

Zhang Heng [circa. AD 110]³ mathematician

¹ Hecataeus of Miletus: traveller and historian, developed one of the first maps of the world, showing Europe and Asia surrounded by water

² Dicaerchus of Messina: a student of Aristotle, was the first to place the map of the world on a sphere.

³ Zhang Heng was first to develop the method of using a grid to locate points on a map.

Claudius Ptolemaeus (Ptolemy)	<i>Geographia</i> ⁴ trans. into Latin, 1406
Prince Henry of Portugal (1394-1460) ⁵	mariner
Erhard Ratdolt (1482)	produces the first printed edition of Euclid's <i>Elements</i> , the first printed book with geometric figures

INNOVATORS⁶

Bartholomeu Dias (1450-1500) ⁷	explorer
Abraham Zacuto (1480's) ⁸	astronomer
Martin Behaim (circa. 1436-1507) ⁹	cartographer
Christopher Columbus (1451-1506)	explorer, drops anchor on an island in the Caribbean Sea on October 12, 1492
Vasco de Gama (circa. 1498) ¹⁰	mariner
Martin Waldseemüller (1470-1518) ¹¹	cartographer
Thomas More (1470-1518)	philosopher; <i>Utopia</i> , published in 1516

⁴ Written around 100CE. Ptolemy's legacy is that he was the first in the West to treat the world's surface as a neutral space of geometrical coordinates. Building upon the teachings of Euclid about the behavior of light and how people see, Ptolemy provided geometrically rigorous rules which enabled mariners in 15thC Europe to overcome the problem of representing a curved surface (the globe) on a flat surface (a map). Ptolemy is credited as being the first to develop a gridwork of coordinated corresponding to latitude and longitude. Ptolemy's mathematical method allows mariners to make adjustments, which was of great significance on longer journey's. In good measure the rediscovery of Ptolemy helps explain the tremendous take-off in terms of distances travelled and new possibilities opened. The Age of Discovery is unimaginable without the practical, tacit knowledge of the early mathematicians, geometers, architects (particularly Brunelleschi), mapmakers and perspective painters (the so-called 'Quattrocento', Raphael, Giotto, Dürer, Crivelli, Piero della Francesca).

⁵ nicknamed 'Henry the Navigator' sets up a clearinghouse of naval knowledge and a center for exploration at Sagres, on the southwestern tip of Portugal; from this port city Portuguese ships set forth to explore the Atlantic and the African coastlines.

⁶ by no means an exhaustive list ..

⁷ Portuguese explorer, rounds the Cape of Good Hope in January 1488; the first European to have done so.

⁸ Spanish astronomer, develops a table of solar heights above the Iberian Peninsula to determine latitude by measuring the height of the noonday Sun.

⁹ makes the first globe map of Earth in 1492, omitting the about to be discovered 'America'.

¹⁰ becomes the first European to sail round to India by rounding Africa, arriving in May 1498.

¹¹ German cartographer, publishes a thousand copies of a map on which 'America' is first applied to the new continent discovered by Columbus and later explored by Americus Vespucci. Vespucci recognised that he is exploring a new continent, and not part of Asia. Waldseemüller later prepares, in 1513, an atlas with 200 maps.

Johannes Schöner [AD 1515] ¹²	explorer
Peter Apian (1495-1552)	cartographer, publishes a book on cartographical method
Reiner 'Gemma' Frisius (1508-1555) ¹³	mathematician/geometer, later discovers how to chart longitude (<i>De principis astronomiae et cosmographie</i>)
Bayfius (circa. 1536)	<i>De re navali</i> , a book on shipbuilding
Sebastian Münster (1489-1552)	<i>Cosmographia universalis</i> ¹⁴
Nicolaus Copernicus (circa. 1514)	<i>De revolutionibus orbium coelestium</i> , published in 1543 ¹⁵
Gerhardus Mercator (1512-1594)	Flemish geographer; in 1568 introduces the map project that bears his name
Francis Bacon (1651-1626) ¹⁶	philosopher; first treatise on technological utopia - <i>New Atlantis</i> - published in 1627
Issac Newton (1663-1727)	<i>Systemate mundi</i> ¹⁷

¹² Johannes Schöner: German geographer and mathematician, was the first to construct, on a globe, a map of the world that includes America.

¹³ circa. 1530; describes the method of separating a region into a series of triangular elements for surveying. He later becomes the first to point out that knowing the correct time according to a mechanical clock and comparing it with Sun time can be used to find longitude. Unfortunately this is still impractical, in most part because of the motion at sea, but also because of the available accuracy of mechanical clocks. An effective solution will not come for another 200 years. In the meantime - in trying to address the problem - all kinds of discoveries will be made, specially in astronomy (Gallileo), and in chronometry (John Harrison).

¹⁴ published in 1544 in Basel: the first major compendium on world geography.

¹⁵ a works of pure mathmatics. His ideas were circulated much earlier, but for fear of persecution by the various Inquistions, they were circulated anonymously.

¹⁶ science's purpose - argued Bacon - was to provide 'relief' from 'man's estate'. Technology is thus allied to human welfare.

¹⁷ following upon the success of his 1682, *Philosophiae naturalis pincipia mathematica*, where he established the three laws of motion and the law of universal gravitation (giving birth to theoretical mechanics), Newton published *Systemate mundi* (System of the World), where is described - among other things - how to launch a satellite with a cannon. It was only a matter of years between having discovered the world'f hidden secret (gravitation, the Earth's 'pull'), and the subsequent attempt by all means possible to violate it (flight, space flight, ballistics, etc.).

From mappaemundi to universal imaginary

- *All of this activity - borne for the most part from the commercial expansion of certain cities like Venice, Antwerp, Barcelona, Genoa, Florence, Amsterdam - gave birth to a new range of practices of relating both to space and time; the lived environment in all its detail.*
- *yet we're still - in the 14th, the 15th, even the 16th centuries - barely separated from the primary system of the Medieval epoch; its theology (quite different from 16th and 17th century religious dispute), its imaginary of the cosmos (which schematized all social relations), and its overall ethical and moral coordinates.*
- *the one thinker who heralds the break is Copernicus. It is because of Copernicus that we see the expansion - the geometrical explosion - of the Western imagination. At issue here is the **Copernican revolution**, and the fall of the Aristotelian/Ptolemaic system (the universe conceived as a series of concentric rings, or sphere, with the Earth as the core, around which all other bodies move).*
- *the revolution that Copernicus heralds is not one merely in which the Earth was decentered in the universe - though its difficult for us to capture what a break that must have been in the overall scheme of thinking and rationalization .. 18*
- *far more important was Copernicus's calculation of the possible size of the universe. If the stars are always fixed in relation to nearer bodies as the observer swung with the Earth's orbit round the sun, the stars themselves would have to be considerably further away than had perviously been suggested.*
- *Indeed, Copernicus's universe took on a volume **400,000 times** that of traditional accounts!¹⁹ Such spatiality was close to infinity, and didn't much sit well with the Medieval 'sacred cartography'. Copernicus himself had little to say about what all of this meant for everyday life. It fell to Giordano Bruno (1548-1600) to spell out the implications of Copernican theory.*

*“There is a single general space, a single vast immensity which we may freely call Void: in it are innumerable globes like this one on which we live and grow; this space we decalre to be infinite, since neither reason, convenience, sense-perception nor nature assign to it a limit.”
(Giordano Bruno, quoted in, Alexandre Koyré, *From the Closed World to the Infinite Universe*, pp. 40-1)*

- *For his troubles he was burnt to the stake in Rome in 1600.*
- *to Calvinists, Lutherans and Aristotellians alike this vision must have sounds more*

¹⁸ akin perhaps to us actually discovering life on another planet, or the scientific truth of ghosts, etc.

¹⁹ see Thomas S. Kuhn (1957) *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought* (Cambridge, p. 160).

like Milton's 'chaos' than the universe made possible by benevolent creation. Though executed for heresy, the toothpaste was out of the tube, and would be impossible to put back.

The cartographic/spatial revolution

- *while the concept of 'absolute space' (the space of what would become classical physics) rocked the celestial and theological discourse, terrestrial sciences got something of a fillip, taking-off precisely because of the immovable, immobile (thus measurable) expanse of the possible infinite. If there seems a paradox, there was none for those present at the time. Freed somewhat from theological overseeing, a renewed activity was devoted to quantifying Earthly space, and regularizing it in measurement and navigation.*
- *what Blaise Pascal would call 'terrifying' was for a new breed of geometers, mathematicians, mariners, astronomers and urbanists a **liberation** from the old restrictive and sacred domains best represented in the mappaemundi of the Medieval world - what Joseph Needham called 'the Great Interruption' in cartographic evolution²⁰*
- *there is an aesthetic and practical threshold marked here (around the 16thC). Spirituality (qualitative assessment) give way to pantometry (quantifiable experience) - the general **mechanization of the world picture**, or mathematization of reality*

“For many parts of nature can neither be invented with sufficient subtilty nor deomstrated with sufficient perspecuity nor accomodated unto use with sufficient dexterity, without the aid and intervening of Mathematics: of which sort are Perspective, Music, Astronomy, Cosmology, Architecture, Enginery, an divers others.” (Francis Bacon, 1605)

The rise to hegemony of ocular technology

- *In many ways cartography prepared the ground for 'enlightenment'. At the most basic level it was part of that general reorganization - the collection, codifying, regularization of all kinds of exoticism in the 16th century; animals, landscape, humanity, etc.*
- *Above all perhaps, this general reoganization is a reorganization of 'seeing'; of visuality and the power of the gaze.*

“Well after the Sun King stung Colbert into action with his dictum: 'Let there be Light and Security!', well before the Nazi theorist Rosenberg

²⁰ Joseph Needham (1954-) *Science and Civilization in China*, in 6 Volumes (Cambridge University Press).

delivered his extravagant aphorism: ‘When you know everything you are afraid of nothing’, the French Revolution had turned the elucidation of details into a means of governing. Omnivoyance, Western Europe’s totalitarian ambition, may here appear as the formation of a whole image by repressing the invisible.” (Paul Virilio, *The Vision Machine*, p. 33)

- *visualization - the rationalization of the gaze has been central to the rise of rational knowledge:*

“Science and technology have advanced in more than direct ratio to the ability of men to contrive methods by which phenomena which otherwise could only be known through the senses of touch, hearing, taste, and smell have been brought within the range of visual recognition and measurement and thus become subjects to that logical symbolization without which rational thought and analysis are impossible.” (William N. Ivins, Jr., *On the Rationalization of Sight*, p.)

- *or, in the words of Leonardo:*

“The eye is the master of astronomy. It makes cosmography. It advises and corrects all human arts .. The eye carries men to different parts of the world. It is the prince of mathematics .. It has discovered navigation.” (Leonardo da Vinci, quoted in David Woodward, *Art and Cartography*, p. 15)

- *as quattrocento aesthetist, Marsilio Ficino would argue: light is nothing less than the ‘shadow of God’²¹ In the words of St. Bonaventure, Franciscan scholastic, “God is light in the most literal sense.”²²*

Mapping/ordering the social polity

- *and of course that which can be ‘seen’ can be comprehended, appropriated, manipulated and altered to will:*

“It has always been this way with the mapmakers: for their first scratches on the cave wall to show the migration patterns of the herds, they have traced lines and lived inside them.” (Maya Sonenberg, *Cartographies*, p. 3)

- *so cartography - the imagination and writing of space - is also a technology effecting power over men and things. It is the defender of a certain worldview (that*

²¹ *The Letters of Marsilio Ficino* (London, 1975), Volume 1., p. 38.

²² Patrick Boyde (1981) *Dante, Philomythes and Philosopher*(Cambridge), p. 210.

*of rational, geometrical/mathematical knowledge)*²³

The poetical content of reality, the a priori of the world, which is the ultimate frame of reference for any truly meaningful architecture, is hidden beneath a thick layer of formal explanations. Because positivistic thought has made it a point to exclude mystery and poetry, contemporary man lives with the illusion of the infinite power of reason. .. For many architects, myth and poetry are generally considered synonymous with dreams and lunacy, while reality is deemed equivalent to prosaic scientific theories .. Mathematical logic has been substituted for metaphor as a model of thought. Art can be beautiful, of course, but only seldom is it understood as a profound form of knowledge, as a genuine, intersubjective interpretation of reality. And architecture, particularly, must never partake of the alleged escapism of the other fine arts; it has to be, before anything else, a paradigm of efficient and economical construction.” (Alberto Pérez-Gómez, *Architecture and the Crisis of Modern Science*, p. 6)

- *in the words of Fra Mauro, 16th century cartographer to the Court of Venice:*

“Ptolemy has always been my hero. Ever since I first read the eight volumes of his massive *Geographia* during my novitiate, I have been under his spell. He gave us the coordinates of latitude and longitude, the very principle of ordering the surface of the earth.” (James Cowan, *A Mapmaker’s Dream*, p. 4)

²³ one needs only to compare the *mappaemundi* of the Medieval period with the Ptolemaic charts of the 16th century to see the radical break in political technology associated with the geometrical appropriation of space.

“Philosophy is written in this grand book, the universe, which stands continually open to our gaze, but the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand a single word of it; without these, one wanders about in a dark labyrinth.” (Galileo, *Discoveries and Opinions of Galileo*, pp. 237-8)