Thinking Space

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There is a series of rooms. Each room frames a table, a book, and an opening to the outside—an aperture of some sort. At times they may be called studies or observatories or libraries but they are only rooms. Each has shaped a research.

By chronology, the first is Tycho Brahe's room at the observatory on the island of Hven, in 1576. The next is Johannes Kepler's room in Prague in 1604. Then Thomas Carlyle's fictive study in Weissnichtwo for Professor Teufelsdröckh, in 1830, in *Sartor Resartus*, and then the art historian Aby Warburg's elliptical reading room for the Kulturwissenschlaftliche Bibliothek Warburg in Hamburg in 1926. In each of these rooms, the components repeat—table, book, aperture—in different scales and positions. In naming the table, the book, the aperture, I am thinking of them touching or not touching in different ways, I'm thinking of combinations of overlapping, how the table and the aperture and the book change positions, come to carry different values. So the room is a theatre for a physical comedy. And the room is an instrument. There's a room with an opening, a table, a book. There is a body in the room, a person. It's cold, though a fire is lit. The dog is curled up, sleeping.

The table is heaped with books, each splayed differently upon other things. An ex-library blue paperback biography of Kepler, still with its Dewey decimal mark on the spine (520.92 K443c 1993), a mildewed red

cloth *Sartor Resartus* open to the description of Teufelsdröckh's learning, Warburg's weighty *Renewal of Pagan Antiquity* open to a photograph of the façade of his library at 116 Hellwigstrasse, Burton's *The Anatomy of Melancholy* with cracked spine, Descartes' *Discourse on Method* held together with cellophane tape. Two empty mugs, two burnt matches, two hairpins, a tangle of electrical cables, a tube of hand cream, a small brass dish of paperclips mixed with screws that have fallen out of the Thonet chair, two empty ink cartridges, a pile of bills and unanswered administrative tasks, the glowing screen. The table, once used in the kitchen, is a wooden table with a single profound drawer. The top is constructed of four dark oak planks, now very scarred, with wide gaps between where matches sometimes lodge with crumbs. A small red metal lamp is bent to illuminate the books and my hands, which are rough and marked from carrying wood. Behind me, a woodstove installed inside a huge fireplace. To my right, the west, a door with a window in it looking outside to the mailbox and the narrow dirt road. The dog is curled in an old willow laundry basket by the fire. To the east, a small, high window, very deeply set in the thick stone wall, through which, from my seat at the table, I can

see only the sky.

Of the sleeping dog Walter Benjamin said:

> According to ancient tradition 'the spleen is dominant in the organism of the dog.' This he has in common with the melancholic. If the spleen, an organ believed to be particularly delicate, should deteriorate, then the dog is said to lose its vitality and become rabid. In this respect it symbolizes the darker aspect of the melancholy complexion. On the other hand the shrewdness and tenacity of the animal were borne in mind, so as to permit its use as the image of the tireless investigator and thinker. "In his commentary on the hieroglyph Pierio Valeriano says explicitly that the dog which 'facium melancholicam prae se ferat' [bears a melancholy face] would be best at tracking and running." In Dürer's engraving especially, the ambivalence of this is enriched by the fact that the animal is depicted asleep: bad dreams come from the spleen, but prophetic dreams are also the prerogative of the melancholic.[1]

1 Walter Benjamin, *The Origin of German Tragic Drama* (London: Verso, 1994), 152.

The room is perhaps the dream of the dog.

I arrived at this series of rooms by an elliptical path, moved by the thought of Aby Warburg, whose work, first of all that on Dürer and melancholy, I came across by way of footnotes in Giorgio Agamben's book *Stanzas*. Agamben, who had spent the year before writing *Stanzas* researching at the Warburg Library in London, describes a transformation in the cultural meaning of melancholy, a shift from pathological imbalance, in the pagan and medieval medical tradition, to a key trait of genius and scholarship in the Renaissance, as Benjamin recounts in his description of the dog. *Stanzas* explores a series of figural polarities, recast as cultural transformations—*eros* also underwent a change in value, from pathology to heroic aesthetic trope, for the trobar poets and Dante. It is Aby Warburg who underwrites Agamben's work with the figural polarity as transformational site: "The reconstruction of this history constitutes a confirmation of what Aby Warburg had already demonstrated for the history of images, that is, that Western culture develops and transforms itself through a pro-

cess of 'polarization' of the received cultural tradition."[2] Warburg's concept of memory and its cultural transmission by the image embraced the irregularities in that anachronistic movement; he foregrounded transitional periods, such as the Florentine quattrocento, as matrices of intense historical activity hinging on a kind of innovation that was unopposed to a *problematized* continuity. It was the dynamic movement of life itself that Warburg sought in the image and its stylistic developments and borrowings: the late 19th century language of vitalism, so present in the thought of Nietzsche, Richard Semon, Bergson, strongly inflected Warburg's methods of research, as well as that research's subjects and figures. Here it's not a malady or an affect that I wish to trace, neither melancholy nor love, but a nevertheless dynamic spatial figure, that of the ellipse, the irregularly curving movement traced by the planets on their various orbits around the sun.

In Hamburg in 1926, when Warburg planned the construction of a new building to house his library and research institute, with the young architect Gerhard

2 Giorgio Agamben, *Stanzas: Word and Phantasm in Western Culture* (Minneapolis: University of Minnesota Press, 1993), 112.

Langmaak he designed the library's main reading room and lecture theatre in the form of an ellipse. In a letter to his family just after the building's completion, Warburg amusingly called the elliptical reading room "the traffic island of the thoughtful."[3] His library would be a representation of the traffic of the cosmos. (I am not certain if he knew of the elliptical reading room Leibnitz had designed for the ducal library in Hanover in the early 18th C, but in the same letter Warburg states that the elliptical room was his own idea.) As an art historian, Warburg's work was distinguished by his insistence on shifting art historical discourse from an interpretive practice to an archival research that situated the artwork in a complex milieu, which included the politics of patronage, popular festivals, fashion, literary manuscript circulation, astronomy, and astrology. He had forged his archival method as a young researcher in 1880s Florence, working on Botticelli's *Birth of Venus* by way of painstaking tracking of the gestural traits in the image to those uncovered in period documents. He later described his over-arching research question, the

3 Warburg Archive, Aby Warburg to Paul, Felix, Max and Mary Warburg, 11/05/1926 WIA GC/18359.

one he had pursued for the duration of his career, succinctly: "To what extent can the stylistic shift in the presentation of human beings in Italian Art be regarded as part of an international process of dialectical engagement with the surviving imagery of Eastern Mediterranean pagan culture."[4] For Warburg, a painting was itself a dynamic document—a survival—which transmitted traces of cultural memories by means of gestural lines and figures that were the extensions of older, sometimes ancient, shapes of still actively charged meaning. He had recourse in his theory to Darwin's work on the emotions, as well as Richard Semon's biochemical theory of memory transmission as an electrical continuum of charged engrams that engrave themselves biologically within the receiver's neural makeup. In Semon's theory of memory, the complex of acquired engrams becomes consciousness. For Warburg, it was the representation of swirling folds of cloth and blowing strands of hair—"the surface mobility of inanimate accessory forms," in his terms—in Botticelli's *Venus* that brought a vitalistic, pagan engram forward into the Florentine

4 Aby Warburg, "Italian Art and International Astrology in the Palazzo Schifanoia" in *The Renewal of Pagan Antiquity* (Los Angeles: Texts & Documents, 1999), 586.

mind, not as an abstract or formal proposition, but as an active energetic charge.[5] The mobility and volubility of these accessory ornaments was indicated, by both classical and Florentine artists, by the iteration of an irregularly curved, serpentine line. He proposed in his dissertation that when the Florentines wished to represent the violence of contemporary change, they went specifically to this characteristic Greco-Roman undulating line he called the 'nymphae', the gesture that was so active in Botticelli's images of Venus, as well as on certain ancient sarcophogai and relief carvings. He demonstrated that these classical reliefs were key to Botticelli's image construction, by comparing the still-existing sculptures with preparatory sketches executed by assistants in Botticelli's studio. Such a comparative historical approach to the image was then methodologically innovative—it was through interpretations of Warburg's method, and his library, that iconography was established as a key discourse in 20th C art history, in the work of Saxl and Panofsky. The line of the nymphae articulated by Warburg through his comparative

5 Aby Warburg, "Sandro Botticelli's *Birth of Venus and Spring*" in *The Renewal of Pagan Antiquity* (Los Angeles: Texts & Documents, 1999), 141.

method *embodied*—as opposed to *represented*—time; it directly transmitted the haptic time of uncertain historical corporality, "passionate agitation," by an engrammatic transmission. This was image as *nachleben*—both afterlife, and survival. As he researched this problem of the continuity of time in the image, Warburg also systematically collected books and ephemeral documents, at first for his own scholarly use, then increasingly with a view to shaping a library for others, for the future. His resources were impressive; he convinced his brothers, who were running the family banking business, to undertake a lifelong level of support for his collection that in his mind paralleled the munificence of the Medici family, Botticelli's own banker patrons.

By 1926 the library, containing some 46,000 volumes, for years situated in a willy-nilly but decisively fluid and catalogue-less fashion in the family's Hamburg residence, had been shaped, and somewhat normalized, by Warburg's assistants Fritz Saxl and Gertrud Bing, to become a vital intellectual and research centre in Hamburg, accessible to scholars and students. In the years leading to and just following the construction of the new building, Warburg had been working on the con-

struction of a visual atlas he called *Mnemosyne*, which was also the word inscribed on the stone lintel over the entrance of the new library. Inside, the elliptical reading room was lit from above by a skylight, also in the form of an ellipse, partitioned into twelve radiating lobe-like panes, as the space of the sky has been sectioned, since Babylonian times, into the twelve astrological houses. The large, black, cloth-stretched panels of the *Mnemosyne Atlas* were photographed propped against the reference library shelving in this room; there was a lip built into the shelving for this purpose. The panels also served as lecture aids, in an era of art history just prior to slide projection of images. Yet these complex images cannot be reduced to a merely illustrative role in Warburg's thinking. The *Mnemosyne* panels, originally 150 x 200 cm in dimension, exist now only as glass plate photographic negatives. It's difficult to describe these panels succinctly; they keep moving beyond any referential stability. In the final version there were 63 of them, though during the 5 years of its composition, the *Atlas* was always in flux. Each panel had affixed to its textile background a montage of reproductions of various kinds of documents—maps, charts, documentation of sculptures, frescos, ritual objects, paintings, draw-

ings and news clippings whose representational range extended from ancient Babylonian models of sacrificial sheep livers, to 1920s political events and war propaganda. The grouped images of each panel function as a semantic circulation; they are stages, in the theatrical sense of the word, in the movement of complex historical explorations into the tropes of renewal, and life in motion, concepts elaborated by Warburg over a lifetime of research and thought about the problem of time, survival, and transmission in the long duration of European and Mediterranean culture. Each panel was itself a material concept setting out a proposition about the movement of ideas; it did not function as a secondary discursive aid, but as a proposition about knowledge in flux. Studying the digital files of the photographed panels closely at the Warburg Institute Archive last fall, I had the sense of their speedy composition—images were hastily affixed using whatever seemed to have been at hand—paper clips, pins, grommets and little hooks. Sometimes the same images appeared in more than one panel, in altered contexts. Sometimes they appeared crumpled or slightly torn, so brusquely had they been handled. These panels were extremely active sites of experimental thinking. Georges Didi-

Huberman talks about them as tables, where a table is a horizontal plane of improvisation, as opposed to the static and monumentalizing vertical space of the tableau. Concepts on the table are contingent; they will continue to shift, refreshing and altering their relationships. "We alternatively set up and clear everything that accumulates on our work table, without hierarchy" says Didi-Huberman, who also discusses the table as the ritual space of the magical thinker and altar of the scrier. I'm reminded that in English 'to table' is a verb, as well—to throw down or play a card; to submit for discussion or consideration; to have a meal and converse.[6] The *Mnemosyne Atlas*, a kind of epic table talk then, as well as a divinatory manual, and a typological table become cinematic, was incomplete when Warburg died in 1929; four years later the library was moved by the Warburg family, and Saxl and librarian Gertrud Bing, from Germany to safety in London, where it remains, now a research institute within the University of London.

Mnemosyne means not memory but *remembrance*; it

6 Georges Didi-Huberman, *Atlas, ou le gai savoir inquiet* (Paris: Les Editions de Minuit, 2011).

refers to an active process rather than a representational iteration. Remembrance happens in an actual space, a proscenium or cosmos. But the ellipse is an image not of memory, nor of remembrance, but of time itself: it wobbles, its centre shifts, it doesn't pertain to hierarchy. The mode of rationality of the irregular curve called the ellipse is fundamentally dangerous. Like the passionate agitation of moving drapery, perhaps, it falls short of predictability. The word itself comes from the Greek term for chasm or gap. Warburg called the ellipse a space for thinking, and for him his library with its elliptical hub was a lantern, and it was an observatory. Saxl called the library "*problemsammlung*"—a collection that serves the research of a single problem—the problem of the historical processes of transmission. It was not progress, but struggle, not smoothness but residues, charges, that Warburg traced within the movement of ideas, emphasizing early Renaissance culture as "a locus of conflict."[7] In the dynamic but fragile site of the problem, even a worldview can crumble or erupt,

7 cited in Matthew Rampley, "Mimesis and Allegory: On Aby Warburg and Walter Benjamin" in *Art History as Cultural History: Warburg's Projects*, ed. Richard Woodfield (Amsterdam, G&B Arts, 2001), 130.

and each table, each book, each document, each aperture, is an uncertain opportunity for resurgent thought.

The astronomer Tycho Brahe's observatory, built on the Danish Island of Hven in 1576, had as its core a southwest room containing a wall-mounted quadrant adjusted to the plane of the meridian. The quadrant was constructed to measure the movement of stars using the bare eye and a viewing arm, the marked degrees of arc on the great brass instrument, and a small viewing aperture high on the south wall. The room was otherwise furnished by a table, and a book for recording measurements. Brahe described the room and its contents in his 1598 book *Astronomiae instauratae mechanica*, an illustrated descriptive catalogue of his instruments, among them the enormous fixed quadrant that permitted Brahe and his assistants to make consistent, regular observations of the planets throughout their orbits over the course of thirteen years. The frontispiece of *Astronomiae* depicts the room, the table, the book, the quadrant, and its background decorative mural painting, in which a small dog sleeps beside his master, who is seated at a table holding a book with one hand, gesturing upwards towards the sky with the other.

Brahe's main viewing instrument was the room with its aperture. The quadrant, as precisely and frequently recalibrated as it famously was, could be only as useful as the stability provided to it by the viewing room itself. When Brahe's patron King Frederick II of Denmark died in 1588, the astronomer lost favour with the successor, and so also lost his observatory. His measurements ceased, and he moved to Prague, seeking new patronage, which he found in Rudolf II, the Holy Roman emperor, who appointed him Imperial Mathematician. He built a new observatory. In 1600 he met Kepler, who he employed as his mathematician. Kepler began to calculate from Brahe's years of notations the orbit of the planet Mars, which is, fortuitously for Kepler, the planet with the most irregular orbit. A year later Brahe died suddenly. His lifetime of recorded data was left to the use of Kepler, now appointed Imperial Mathematician in his turn. Working from Brahe's data, Kepler discovered the three laws of planetary motion. The first was the Law of Ellipses: The path of the planets around the sun is elliptical in shape, with the sun being located at one of two foci. A group of smaller-scale cognitive shifts had lead Kepler to replace the theory of stable circular orbits with orbits that moved

in the irregular mode of the ellipse. Each of these shifts represented a movement towards error or irregularity as the potential site of a new concept. Kepler seems to have always moved towards the problem of geometrical irregularity, instead of disregarding it in an attempt to maintain the classical regularity of the Greco-Roman cosmos and Platonic and Aristotelian thought, the norm for all scientific inquiry. For Kepler, the error or the problem were the sites for thinking, where a simultaneity of calculable and uncalculable elements power a profoundly spatial intuition.

The first error concerned a problem with optics. The viewing data itself needed to be rectified to correct faults inherent to the optical apparatus, the retina. Independently from his Martian calculations, Kepler was observing a solar eclipse through a small aperture in an attic room when he noticed the effect of refraction in the path of light entering through the opening, and then bending, before it fell to the floor. He knew this refraction was not particular to this eclipse, but general to all light coming from a fixed radiating point, then passing through a small aperture. He reasoned that accordingly all of Brahe's planetary measurements

would also have been slightly affected by the refraction of light radiating from the planetary bodies through the observatory's aperture, and that the measurements would need to be rectified, before they would be suitable for use in his orbital calculations. So he constructed an optical experiment to help him find the formula he could use to correct Brahe's data.

In 1601 Johannes Kepler transformed his room into a geometrical model of the optical refraction effect. He built a model of an error. Describing this spatial elision, he wrote:

> A certain light drove me out of the shadows of Pisanus[8] several years ago. For indeed, since I could not comprehend the obscure sense of [his] words from the diagram on the page, I had recourse to a personal observation in three dimensions. I placed a book on high to take the place of the shining body. Between it and the floor I set a table having a many-cornered aperture. Next, a thread was sent down from

8 John Peckam, a 13th C English theologist whose writing on optics and astronomy was partly informed by Roger Bacon's experimental methods.

> one corner of the book through the aperture and onto the floor; it fell on the floor in such a way that it grazed the edges of the aperture; I traced the path produced and by this method created a figure on the floor similar to the aperture. Likewise, by means of a thread attached to another, a third, a fourth corner of the book, and finally to an indefinite number of [points] along the edge, there resulted on the ground an indefinite number of traced figures [each having the shape] of the aperture, which together produced a great and four cornered [figure having the] shape of the book.[9]

Kepler's room is now a simulacrum of retinal vision, a camera obscura. He has also transformed the room into a cosmos. The effect is theatrical; comedic: 'recourse to a personal observation in three dimensions', as he put it with his characteristic lightness and restraint. The same model serves two different scales of relationship. The three familiar components of the room are consistent in their banality; only their relationships have altered. The book hovers above the table, which has

9 cited in David C. Lindberg, *Theories of Vision from Al-Kindi to Kepler* (Chicago: University of Chicago Press, 1996), 187.

been pierced through by the aperture. I can imagine him urgently yet precisely cutting the hole in the table the sooner to try out his idea. The usually stationary supports for the researcher's practice become mobile actors in a speculative proscenium. The room is an eye. The table is a retina. The book is a sun. The room is also a section of the solar system fixed in a single moment in time. He published the results of this optical model of error in 1604, then returned to the problem of the calculation of the orbits.

Kepler had accepted Copernicus' orbital model, both in its heliocentrism, and in its adherence to the symmetries of Platonic and Aristotelian geometry and cosmology, so he began by working from these geometric foundations in his calculations. Though he thoroughly accepted the divinity of rationality, finding beauty in the reasoned description of God's creation, he was to discover that now the beautiful universe must admit a dynamic, asymmetric flaw. Using the now-corrected figures of Brahe to calculate Mars' orbit, he attempted to map the planet's path upon a circle. The result was an eight-minute gap—the path of the planet would not close into a circular continuum. Kepler trusted the data,

which he knew to be virtually perfect, given Brahe's ability in instrumental calibration, and he was certain of his own calculating skills. So he accepted the truth of the geometrical error, accepted the non-viability of the circular orbit. He began to seek a solution to the problem of the eight-minute gap: "Now, because they could not have been ignored, these eight minutes alone will have led the way to the reformation of all of astronomy, and have constituted the material for a great part of the present work," he wrote in *New Astronomy*.[10] The radicality of a late Renaissance turn from symmetry to error, where symmetry was a crucial trait of the belief in a rational and hierarchical cosmos, is perhaps difficult to grasp now, but I think it would have had something of the impact of Nietzsche's death of God.

He used the modeling methods of geometrical triangulation in order to translate each of the numerically expressed twelve monthly stations of Mars to a point in a spatial diagram of the planet's movement. To achieve this, he had to add a second focus, or equant, to the model, so that the triangle at any time in the

10 Johannes Kepler, *New Astronomy,* tr. W. Donahue (Cambridge: Cambridge University Press, 1993), 286.

orbit linked both the sun, and the equant with the planet. And yet clearly there are not two suns in the solar system. What is an equant? In another odd move, Kepler took the concept of the second focus from the by-then outmoded and discarded Ptolemaic model of the planetary relationships. Ptolemy, the 2nd century Roman astronomer, without actually knowing how the equant functioned, had proposed it as a hypothetical geometrical device that could account for the variations in the speed of a planet's orbit. Copernicus had rejected the Ptolemaic model, yet Kepler was able to tactically retain certain concepts of both of his predecessors, at the same time as he dispensed with the key traits of their cosmologies. Using both the sun and the Ptolemaic equant as concurrent foci, Kepler came to the understanding that the planetary orbit is elliptical, that the role of the equant was to represent or figure the dynamic interrelation of centrifugal and centripetal movement as the planet spun on its axis during its path around the sun, and that each triangle drawn from the two foci and the planet would have the same spatial area at any point in the orbit. His acceptance of the eight-minute gap in Brahe's statistics directly led to his turn away from a symmetrical and stable cosmos.

Next he used his image of Mars' elliptical 687-day path to chart the orbit of the earth, and locate the position of the earth's equant. There could be an extremely long aside here on the method of calculation—it's something Aby Warburg discussed at length with Einstein one afternoon in 1924, in the garden of the Swiss clinic at Kreuzlingen where the art historian was being treated for manic depression.[11] Einstein explained to Warburg that Kepler solved the problem of the earth's orbit by systematically viewing the problem from the position of Mars' moon, which thus became a figurative "lantern," a virtual observatory. From the vantage of this lantern, Kepler was able to chart Earth's elliptical orbit, and posit that the equant is the abstract expression of the dynamic principle of planetary movement as it is affected by variable gravitational pulls. He transformed astronomy from a static description of fixed relationships to a dynamic account of irregular movements. He published this account in 1609 in *Astronoma nova*.

11 see Horst Bredekamp and Claudia Wedepohl, "Aby Warburg Meets Albert Einstein: Mars as a Lantern of Earth," Lecture published on Youtube June 25, 2012 by The Warburg Institute.

Kepler died in 1639. The radicality of his theories, during a time of extreme religious and political unrest in Germany, had prevented him from maintaining any stability or security, and he had moved constantly, seeking institutional shelter, patronage and backing. He was closely read by Descartes, who continued with his work on optics, Leibnitz, who wrote on the ellipse, and irregular curves, Galileo, with whom he corresponded late in his life, and Newton, who some say appropriated Kepler's theory of gravity. Then his work receded from view.

In 1718, the first volume of Kepler's correspondence, also containing the first biography of the astronomer, was published in Frankfurt and Leipzig. Then, before continuing with the announced publication series, the owner of the Kepler manuscripts was forced to pawn the twenty-two bound manuscript volumes, and for a time Kepler's papers disappeared, to be rediscovered in an attic trunk in 1765. The discovery met with general disinterest; Kepler's biographer and bibliographer Max Caspar explains that the history of science was not yet established as a disciplinary field, so the papers, judged to be of very little factual value for contempo-

rary science, could barely find a buyer, until the Russian Empress Catherine II, of Prussian, Lutheran origin, known as a patron of enlightenment thinkers and values, exchanged a quantity of jewels for the collection in 1773, giving it to the Saint Petersburg Observatory library, where it remained until its transfer to the Academy of Sciences Archives in Leningrad. The first edition of Kepler's complete works was the eight-volume Latin edition edited by Christian Frisch and published between 1858 and 1871; it also contains a 361 page Latin biography.[12]

In 1866 Aby Warburg was born in Hamburg. He attended Bonn University, where his studies in the history of art were accompanied by lectures in religion, philosophy, history, botany, psychology and even medicine. A period interest in the description and explanation of change—historical, technological and affective—inflected all these areas, and problems of transmission and transformation formed the core of Warburg's art historical research in Florence, his developing library, through to his final work, The *Mnemosyne Atlas*.

12 Max Caspar, *Kepler*, tr. C. Doris Hellman (New York: Dover, 1993).

Among these photographed panels, the first three, A, B, and C are unnumbered; they stand apart from the series to present in a broad introductory way the key concepts that will reappear and recombine throughout the following 79 plates. Panel A shows three different kinds of maps of origin, setting up the broad function of the *Atlas*—a map of the heavens divided according to the pagan astrological system, a map of trade routes during the Renaissance, linking Mediterranean regions and northern Europe, and a genealogical tree of the Medici Family. Panel B shows a series of diagrams linking man and man's body to the cosmos, and includes Medieval surgical illustrations, where the body is proportioned by the zodiacal signs, and an illustration by Dürer showing the body's proportions. The third unnumbered panel, Panel C, shows documents relating to Kepler's research on the planetary orbits, and was one of the last panels assembled by Warburg before his death. On the upper left corner of the piece there is an image from Kepler's *Mysterium cosmographicum*, showing his early theory, later abandoned, which identified the nested spheres of the planets with the Platonic solids. (The solids are the five regular polyhedrons that correspond to the humours, the elements, and the

planets—they're described thoroughly in the *Timaeus*.) There is an image showing the elliptical orbit of Mars, according to Kepler's work on Brahe's observations. There is a representation of the planetary orbits according to contemporary belief. There is an image showing the brothers of the war god Mars. And there are finally three images of newspaper clippings showing Zeppelins, used extensively as bombers and scouts by the Germans during the First World War. Kepler's cosmic ellipse and its inception with the planet Mars is one path to an understanding of all of Warburg's work; we can recall his characterization of the ellipse as a thinking space. It is such an insistently dynamic historical space that the *Mnemosyne Atlas* charts. But what brought Warburg, the art historian, to Kepler? How did the baroque astronomer come to occupy such a foundational role in Warburg's research?

Some 150 years after his death, Kepler appears in the thought of the German idealist philosophers, and in the work of Thomas Carlyle, the Scottish Romantic essayist and critic. Carlyle's *Sartor Resartus*, an idealist philosophy of clothes according to the fictional professor Diogenes Teufelsdröckh, was one of Warburg's

favourite books; it is often mentioned in the correspondence between Warburg and his family members. In 1891, he refers to the Scottish writer as "a moral giant" in a letter to Mary, his future wife; much later, in 1924, he recommends *Sartor Resartus* to Ernst Cassirer, commending Carlyle's understanding of the work of symbols.[13] In 1926, as his new library building was completed, he describes the Whistler portrait of Carlyle hung in the "place of honour" in the reception room, thereafter called the Thomas Carlyle Room by the Warburg family.

Sartor Resartus is a book about the idea of clothing, a book about transformation and incompletion, and it is a book about German Romanticism. Carlyle had been an intense reader and translator of Schiller, Goethe and the Romantics since 1819; he learned German specifically to be able to read and translate his German contemporaries. His first published book, in 1825, was a biography of Schiller, which was translated almost immediately into German under Goethe's auspices, and which, along with a range of Carlyle's texts and biogra-

13 Warburg Archives, Aby Warburg to Ernst Cassirer, 20/01/1924 WIA GC/37829.

phies, was an early acquisition in Warburg's library, all still bearing the pre-institute, private AW bookplate. (In an autobiographical text written in 1927, Warburg names Schiller and Lessing as his boyhood ideals.)[14] Carlyle had also been a teacher of mathematics, as well as, with his brother, the anonymous translator of Legendre's *Elements of Geometry*, in 1824. In a letter to his biographer and friend Froude, he said "for several years geometry shone before me as the noblest of all sciences, and I prosecuted it at my best hours and moods." By 1831, when he was beginning the serial text that became *Sartor Resartus*, he had spoken, in a review of Schlegel's *Philosophical Lectures*, of Kepler's ellipse as one dynamic transformation in a larger flux that was political as well as physical: "As Phlogiston is displaced by oxygen, and the epicycles of Ptolemy by the ellipses of Kepler, so does Paganism give place to Catholicism, tyranny to monarchy, and feudalism to representative government—where also the process does not stop. Perfection of practice, like completeness of opinion, is always approaching and never arrived; Truth, in the

14 Aby Warburg, "From the Arsenal to the Library," *West 86th* V 19 N 1, 113.

words of Schiller... never *is*, always *is a-being*."[15] In this long review text he aphoristically opposed dynamic to mechanical cosmologies: "The Artificial is the conscious, mechanical; the Natural is the unconscious, dynamical."[16] And in 1832, Carlyle actually applied—unsuccessfully—for the position of Professorship of Astronomy at the new Edinburgh Observatory. Froude claims in his biography that Kepler was Carlyle's great hero. "Of all men that have ever lived, he honoured few more than Kepler. Kepler's '*laws*' he looked on as the grandest physical discovery ever made by man."[17]

In *Sartor Resartus* Carlyle created a dynamic but absent anti-hero who has disappeared before the narrative begins, leaving the narrator to attempt to piece together a biography, and come to an understanding of the book Teuflesdröckh has left behind. Carlyle places his philosopher in a solitary study cast as an astronomical observatory: "There, perched-up in his high Wahngasse

15 Thomas Carlyle, "Characteristics," *Edinburgh Review: Or Critical Journal*, December, 1831, 380.

16 ibid., 361.

17 James Anthony Froude, *Thomas Carlyle: A History of his Life in London* (Cambridge: Cambridge University Press, 2011), 259.

watchtower, and often in solitude, outwatching the Bear, it was that the indomitable Inquirer fought all his battles with Dullness and Darkness; here, in all probability that he wrote his surprising volume on *Clothes*."[18] The figure of the lonely philosophical astronomer, so close to that of Dürer's melancholic thinker, invests the character with the glamour, complexity and brilliance upon which the text hinges. The observatory itself functions as a kind of synecdoche—the cluttered attic room has replaced the thinker, who has vanished.

For Carlyle, and for the Romantic philosophers, Kepler was a heroic figure, perhaps more accessible as a myth of the independent thinker and researcher, than as the writer of the *Cosmographicum*, the *Optics*, and *New Astronomy*. Hegel's 1801 doctoral dissertation, titled *Planet Orbits*, was a defense of Kepler's originating role for the concept of gravitational force against Newton's stronger reputation, and a detailed exploration of the dynamism of Kepler's thinking about motion: "Curvilinear motion does not produce a real body, but an ideal one, i.e. a square, so the body generated by their line is

18 Thomas Carlyle, *Sartor Resartus* (Boston: Houghton Mifflin, 1924), 18.

nothing other than the space enclosed by the planets' orbits. Thus, if we want to define orbital motion in terms of its opposite, we have to say that it is the overcoming of the body, the reduction of the body or the cube by the square, and this expresses Kepler's sublime law."[19] Hegel here refers to Kepler's third law, which expresses the proportion between the orbital period of a planet, and its distance from the sun. In Kepler's formula, which is key to the calculation of gravitational force, the orbital period is squared, or multiplied by itself, and this is the same as the cube, or the multiplication by itself twice, of the length of the radius. The square, aligned in this theory with force, motion, and the ideal quality of emergence, is what prevents the prevalence of the cube, or material stasis expressed as unmoving distance. The overcoming of the existant body by emergence, in Hegel's terms, is what, for Carlyle's professor, clothing has contributed to thought; in Teuflesdröckh's philosophy, accessory ornament is cosmic and dynamic, as it would be in Warburg's approach to the image. (Here the word cosmic refers

19 G.W.F. Hegel, "Planet Orbits," *Hegel.net*, accessed May 31, 2013, http://hegel.net/en/v2133healan.htm.

to the image's potential to serve as what Warburg called "an *orientation instrument* for the heavens.")[20] The square—the concept of time or motion as emergence, is what, for the idealist thinker, whether Teufelsdröckh, Kepler, Hegel, Carlyle, or Warburg, must be transmitted in order to eclipse a mechanistic model of the cosmos with an intelligent cosmos, which can be expressed or represented via relational or harmonic tension. "This striving is the phenomenon of motion," Hegel says.

In the construction of Kepler as romantic hero, it is a "striving" *style of thinking* that is emphasized: the ability to abide with complexity, contradiction or even chaos, in Hegel's words, to tolerate confusion, and progress intuitively rather than rationally. Whether this is an accurate portrayal of Kepler's mental texture and methodology is not the question. It is more the idea of Kepler that informed Hegel, Carlyle, and in his turn Warburg. Kepler himself contributed to the hybrid characterization of his method, in his introduction to *New Astronomy*. "As is customary in the physical sciences, I mingle the probable with the necessary and draw a plausible

20 Aby Warburg, "From the Arsenal to the Library," *West 86th*, V 19 N1, 118.

conclusion from the mixture. For since I have mingled celestial physics with astronomy in this work, no one should be surprised at a certain amount of conjecture. This is the nature of physics, of medicine, and of all the sciences which make use of other axioms besides the most certain evidence of the eyes."[21] Such a conjectural, combinatory methodology was necessary in order to approach the problem of movement and dynamics, rather than a description of stable systems. Movement is an *astrological* question, in the terms of early cosmology, not a geometrical and physical question, where astrology is an account of the effects of bodies upon each other, as they rotate through the sky. The ellipse is not systemic, but affective.

It could be that Hegel's, Carlyle's and Warburg's understanding of the ellipse was mistaken. What would it mean for their thinking, if their most active epistemological figure was a misrecognized one? This is the argument of Fernand Hallyn's *The Poetic Structure of the World: Copernicus and Kepler*. "Elliptical orbits can't be explained in terms of two foci," Hallyn says, "they

21 Kepler, *New Astronomy*, 47.

can only be modeled this way."[22] We know that there are not two suns; there is not materially both a sun and an anti-sun. The overly tidy dualism that the formal notion of the ellipse might encourage is the misplaced projection of a closed system of thought. The ellipse physically works *as if* it has two foci—the second focus, or equant, as in Ptolemy's description, is there to represent the centrifugal and centripetal gravitational force exerted by the sun and planet, which dynamically shifts the sun's centrality within the planet's path of movement. The ellipse, says Hallyn, is dynamic, not formal, and dualism will never be dynamic. The ellipse is the force of a body, a body that loops beyond formal propriety, and beyond binary theories. Dualism or dialectics inscribe a formal meaning upon an elliptical movement. The point of the ellipse is not that it has two foci, although that is how it can be modeled on a two-dimensional plane; the point of the ellipse is that the movement of a body in space cannot be *formally* described, only hypothetically. The ellipse is not a path that *precedes* a planet's movement, but the

22 Fernand Hallyn, *The Poetic Structure of the World: Copernicus and Kepler* (New York: Zone, 1990), 209.

trace of dynamic motion itself, as it wobbles, speeds up, swoops, in relationship to other moving bodies. The equant is the computational substitute for this dynamism. The ellipse is not a shape, but a temporality.

This is an argument that tends to deflate the allegorical uses made of the figure of the ellipse, from the Romantics and Warburg to Severo Sarduy, the Cuban Tel Quel writer who formally mapped Kepler's ellipse onto baroque stylistic and grammatical structures in his 1972 book *Barroco*. In this text, Sarduy develops the idea of the ellipse as *retombée*, a figure of anachronistic recurrence that he defines as "the coincidence between a scientific discourse and its double within representation, or the inverse."[23] Indeed, Sarduy's view of Kepler's figure reads as predominantly formal: "now the reigning figure is no longer the circle, with its single center, radiating, shining, paternal, but the ellipse, which opposes this visible focus with another focus, equally active, equally real, but blocked, dead, nocturnal, a blind center, the opposite of the solar, germinating

23 Severo Sarduy, *Barroco*, (Paris: Gallimard, 1975), 21. [my translation]

yang: absent."[24] After Hallyn's critique, even in Sarduy's compelling, and seductive casting of the equant into the psychic zone of the abjected other, or the unconscious, we're left with the idea of the misuse of a figure. But once a new figure enters discourse, must it only be used in the way its maker intended? And what access do we have to such putative intention—is intent itself not a retrospective myth, even for the intender? Have Warburg, Hegel, and Sarduy 'misused' the ellipse? Must a figure have guardians?

Fritz Saxl described the space of Warburg's library during the early, pre-institute years, thus:

> The arrangement of the books was equally baffling and the student may have found it most peculiar, perhaps, that Warburg never tired of shifting and reshifting them. Every progress in his system of thought, every new idea about the inter-relation of facts made him regroup the corresponding books. The library changed with every change in his research method and with every variation in his interests. Small as the collection was, it was intensely alive, and

24 ibid., 89.

> Warburg never ceased shaping it so that it might best express his ideas about the history of man.[25]

From here, consider Carlyle's description of the study of the disappeared Herr Teufelsdröckh:

> It was a strange apartment; full of books and tattered papers and miscellaneous shreds of all conceivable substances 'united in a common element of dust.' Books lay on tables and below tables; here fluttered a sheet of manuscript, there a torn handkerchief, or a nightcap hastily thrown aside; ink bottles alternated with breadcrusts, coffee-pots, tobacco-boxes, Periodical literature, and Blücher Boots.[26]

The strange apartment, a library as the *problemsammlung* or thinking space, the wandering astronomer's study, the table that supports the recombinant researches of the melancholic thinker (Warburg's alter-

25 Fritz Saxl, "The History of Warburg's Library" in E. H. Gombrich, *Aby Warburg: An Intellectual Biography* (London: The Warburg Institute, 1970), 327.

26 Carlyle, *Sartor Resartus*, 16.

nate title for the *Atlas* was *Ghost Stories for Grown-ups*): each is a dynamic proscenium. The ellipse has moved through these rooms, destabilizing its thinkers, their methods, linking each epistemological foray, each research, to a founding cosmological disequilibrium.

As for me, at this moment I write in a Paris hotel room, with papers and index cards spread across the bed, and my computer propped up on one pillow. The desk is too small. It's a fifth story room and I look through ruffled tulle curtains across mansard roofs. I've brought in my bag Frances Yate's *Art of Memory* (Yates was a lifelong member of the Warburg Institute), Thomas Bernhard's *Correction*, which is itself about the space of thinking as error, my battered red Carlyle, a large grey Muji notebook I used for transcription in the Warburg archive, and many coloured index cards, clipped together in various loosely themed stacks. To write this talk I've taken, in my own way, Didi-Huberman's description of Warburg's method for the *Atlas*—I keep moving ideas on a surface until there's a fit, an energy, an engram-like stimulus. But the fit isn't about a collapse of ideas into one another, nor is it a chain of

causation or even influence. It's about the charge of a distance, a tension. Warburg began his introduction to the *Atlas* by emphasizing the cultural work of this space between: "The conscious creation of distance between oneself and the external world can probably be designated as the founding act of human civilization. When this interval becomes the basis of artistic production, the conditions have been fulfilled for this consciousness of distance to achieve an enduring social function which, in its rhythmical change between absorption in its object or detached restraint, signifies the oscillation between a cosmology of images and one of signs."[27] We might speak similarly of the function of a misrecognition: it introduces a historical dynamic of emergence. The ellipse is the historical figure of an epistemological emergence, an emergence whose potential directly coincides with the devoted maintenance of an originating difference.

27 Aby Warburg, "The Absorption of the Expressive Values of the Past," tr. Matthew Rampley, *Socks-Studio*, accessed Nov. 4, 2013, http://socks-studio.com/2013/06/16/the-mnemosyne-atlas-aby-warburg-the-absorption-of-the-expressive-values-of-the-past/.

Plates

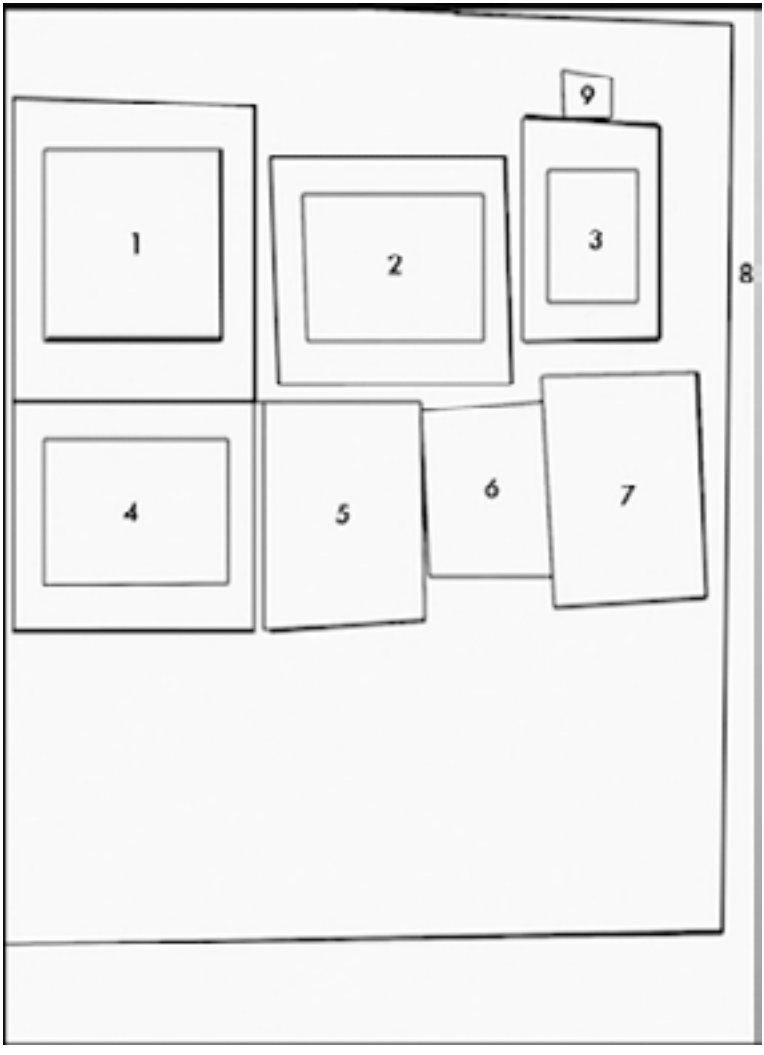

Diagram of Aby Warburg's *Mnemosyne Atlas*, "Panel C." (See following for key to numbered images.)

Mnemosyne Atlas, "Panel C"[28]

1. From Kepler's *Mysterium cosmigraphicum*, 1621

2. "Sonnensystem" or planetary orbits

3. From *Calendrical Houseboook of Master Joseph*, ca. 1475

4. 20th C drawing based on a passage from Kepler's *Astronomia nova*, 1609

5. Zeppelin, from *Münchner Illustrierte Presse*, 1929

6. Zeppelin, from *Hamburger Fremdenblatt*, 1929

7. Zeppelin (over New York), from *Hamburger Illustrierte*, 1929

8. Scissors

9. "C"

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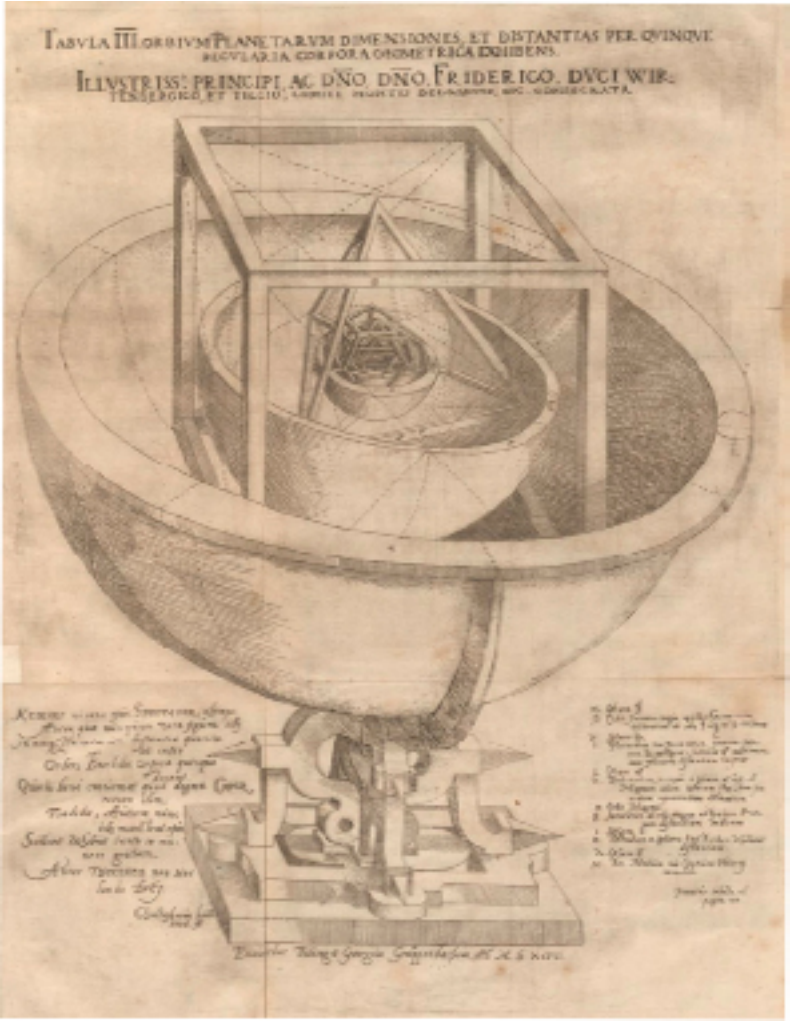
28 "Panel C" legend notes from "Mnemosyne: Meanderings through Aby Warburg's Atlas," Cornell University Library, 2013, http://warburg.library.cornell.edu/panel/c.



Kepler's Platonic solids model of the solar system from the *Mysterium cosmigraphicum*, 1621.

Tycho Brahe's mural quadrant, from *Astronomiae instauratae mechanica*, 1598.

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colophon:

This book is set in various weights and sizes of Garamond and Futura, Roman and Italic. Its contents are digitally printed on Mohawk Via Linen paper.

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This is book of 325.