The Visualization of Knowledge in Medieval and Early Modern Europe

eds Marcia Kupfer, Adam Cohen, and J. H. Chajes
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This broad collection of nineteen extensive and lavishly illustrated essays authored by leading scholars, organised and put together by the joint efforts of Marcia Kupfer, Adam S. Cohen and Yossi H. Chajes, focuses on how graphic devices contributed to the production, aggregation, archiving and dissemination of knowledge from the early Middle Ages to early modernity. Mostly looking at the multifaceted Latin, Byzantine and Hebrew written and visual manuscript traditions, with an emphasis on religious texts, the volume covers the seventh to the sixteenth century.

Considering the paramount importance of cognitive visuality in the current forms of experiencing knowledge, light needs to be cast on the intellectual origins of the scientific and editorial project, with the definition and analysis of the intellectual and material archaeology concerning the affirmation of visuality as a way of thinking, producing and disseminating knowledge in the medieval and early modern past. To this end, the book investigates the forms of mental definition, 'coding,' production, use and dissemination of non-pictorial images – in the sense of not explicitly artistic representations – such as diagrams, charts, tables, calendars, lists, anatomical and architectural images, geometric drawings and maps, mostly but not exclusively included in written religious, philosophical and scientific texts, from the seventh to the sixteenth centuries. These nearly 1,000 years, generally overlooked by scholars interested in the cognitive functions of visuality in the past, deeming the period not particularly significant for this field of investigation, 'stand as a formative era,' the editors write, 'during which visual structures, both mental and material, increasingly shaped and systematized knowledge.' Decisions about space and time coverage and organisation are as important in a multi-authored volume as the concepts and analytical categories that inform the essays. In the case of *The Visualization of Knowledge in Medieval and Early Modern Europe*, the broad horizon of research on which the volume is grounded is Christian (Greek as well as Latin) and Jewish (Hebrew) visual traditions and the transfer, also through images, of Arabic learning. However, the principal investigators and editors of the book complain that the original plans to include the

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rich Islamic visual traditions suffered substantial limitations because several specialists from Islamic countries declined the invitation on the grounds of the project's association with Israeli academic institutions.

The research hypothesis

The main, transversal research hypothesis that supports the 20 essays (including a remarkable introduction by Marcia Kupfer that gives an extensive presentation and discussion of the overall structure of the volume, its four sections and each essay individually) is a critical questioning of the generative power of medieval and early modern visuals in the formalisation of abstract concepts, as Kupfer, Cohen and Jossi write, by providing grids through which 'to process data, set in motion analytic operations that give rise to new ideas, and create interpretive frameworks for understanding the world.' To this end, the authors of the essays and the members of the research group scrutinised hundreds of manuscripts and to a lesser extent also printed works, which include religious texts (in particular the Bible and the Talmud), medieval calendars, *computus* works and the Kabbalistic tradition, astronomical works, cartographic devices (maps, charts and *mappae mundi*), and also works that visualise music and medicinal devices, while deconstructing and analysing the layouts of pages that combine text and images and transform written contents into graphic contents though schemata, diagrams, charts, geometric drawings, calendars and cartographic representations, mostly in (religious) manuscript works. The main concern of the book is the search for and analysis of the epistemic transformations in different fields of knowledge induced by or connected to the appearance of page layouts that integrate graphic devices, transforming the ways in which readers interacted and conceived the world through visual mediality. Starting from the practice of *ars memoriae* in classical antiquity and the invention of locational imagery through which real and imaginary places were transformed into repositories (*loci*) where concepts, topics and knowledge could be stored and retrieved, the essays explore the production of visual models and the way they worked as cognitive mechanisms in the past. This strong interpretive through line can be seen in most of the essays.

The structure

The large-format volume comprises nineteen extended, monographic-style essays, with an average of no fewer than 10,000-15,000 words each, which investigate a broad set of topics relating to specific, mostly Latin, Byzantine and Jewish cultural contexts, spanning the seventh to the sixteenth centuries. Given this editorial and scientific architecture, in a review it is not possible to discuss all the chapters individually, let alone do them justice. Yet quite apart from the significant contributions of each essay, *The Visualization of Knowledge in Medieval and Early Modern Europe* dazzles with the sheer magnitude of its ambition. The book comprises four wide-ranging sections. Part I, 'Visualization between Mind and Hand,' includes three chapters ('Geometries for Thinking Creatively' by Mary Carruthers; 'Visualization of a Universal Knowledge: Images and Rhetorical Machines in Giulio Camillo's *Theatre of Memory*' by Lina Bolzoni

and 'Mind Mapping: The Diagram Paradigm in Medieval Art – and Beyond' by Jeffrey F. Hamburger) that explore and map the cognitive, rhetorical and material processes that link the imaginal to the conceptual, and then to the graphical and pictorial, from a cognitive, psychological and literary perspective.

Part II, 'The Iconicity of Text,' comprises six essays following chronologically from manuscript to print culture: 'Framing the Gospels, c. 1000: Iconicity, Textuality, and Knowledge' by Beatrice Kitzinger; 'Biblical Gloss and Commentary: The Scaffolding of Scripture' by Lesley Smith; 'The Topography of the Talmudic Page' by David Stern; 'Seeing the Forest beyond the Trees: A Preliminary Overview of a Scholastic Habit of Visualization' by Ayelet Even-Ezra; 'Functional Paratexts and the Transmission of Knowledge in Medieval and Early Modern Jewish Manuscripts of Magic' by Yuval Harari; and finally 'More than Meets the Eye: What Made the Printing Revolution Revolutionary' by A. Mark Smith. By simply reading the titles of the six essays that make up Part 2 we can grasp the heuristic vastness of the reflection, which cannot be traced back or reduced *ad unum*. However, one aspect unites these six essays, originally conceived as individual and heterogeneous research trajectories: altogether, they explore the page, its materiality and the plurality of *mise en page* developed in the Middle Ages, as a 'locus of thought, indeed the plane where the visual arrangement of discourse reproduces and transmutes knowledge,' as Marcia Kupfer convincingly argues. The page is therefore not a mere locus on which pre-existing knowledge is made visible: on the contrary, it is precisely in the *mise en page* process that ideas are possibly transformed into organised, structured, transmissible and retrievable knowledge. The creation of page layouts across different cultures that combined writing and graphemes – also in the sense of 'writing *as* graphemes' and 'graphemes *as* writing' – is therefore at the very centre of the cognitive processes of knowledge creation, in particular in religious books such as the Talmud and the Bible. In this regard, while reading Part II, one is gladly taken back to *In the Vineyard of the Text. A Commentary to Hugh's Didascalicon* by Ivan Illich, a book that announced and captured some of the material and epistemological passages that led to the creation of the page as a gradually more structured space of knowledge in the passage from scrolls to codices, starting from the very early Middle Ages.[1]

Part III, 'Graphic Vehicles of *Scientia*,' focuses on the way graphic devices placed inside books – three-dimensional models, diagrams, maps, patterned frameworks, musical notation and pictorial vignettes – were assembled and used in different branches of both theoretical and applied branches of knowledge. It comprises four essays: 'The Idea of a Spherical Universe and Its Visualization in the Earlier Middle Ages (Seventh to Twelfth Century)' by Barbara Obrist; 'The Rhetoric of World Maps in Late Antiquity and the Middle Ages' by Marcia Kupfer; 'Visualizing Knowledge in Medieval Calendar Science: A Twelfth-Century Family of "Graphic Glosses" on

[1] IVAN ILLICH, *In the Vineyard of the Text: A Commentary to Hugh's Didascalicon* (Chicago: University of Chicago Press, 1993), in particular Part 6, 'From Recorded Speech to the Record of Thought' and Part 7, 'From Book to Text,' 93–124.

Bede's *De temporum ratione*' by Faith Wallis; 'The Visualization of Music in the Middle Ages: Three Case Studies' by John Haines and finally 'Visualization in Medicine between Script and Print, c. 1375–1550' by Peter Murray Jones. Cosmology, cosmography, cartography, religious calendars, music and medicine were the principal branches of scientific knowledge in which graphic devices were deployed to translate written knowledge into visual forms that were integrated into the spatial, mostly textual structures of the pages. While on the one hand, these translations gave birth to new forms of page layouts, on the other, they transformed the ways readers conceived and related to both visible and invisible realities through the intermediation of graphic devices, whether these realities coincided with the supernatural or physical structure of the cosmos, its celestial and sublunary parts, or the *orbis terrarum*, the macrocosm and the microcosm, the flow and the cyclical structure of religious and secular time, the human body, or the musical universe.

It is somehow easy to underestimate the importance and centrality of the appearance of cognitive graphic devices – such as perpetual calendars for the determination of Easter and all mobile religious holidays, which combined and coordinated the lunar and solar calendars, rather than the circular *mappae mundi* – which have often been overshadowed by more recent and developed devices, more familiar to current readers' eyes. In this regard, one of the greatest achievements emerging from this part of the book deals with the medieval reception of the graphic and visual heritage of antiquity. Through a philological approach, both Obrist's and Kupfer's essays highlight the recovery and transformations in medieval times of the diagrammatic and graphic heritage of antiquity, an overlooked, if not forgotten chapter of cultural history. Their research broadly expands Marcel Destombes' and Patrick Gautier Dalché's pioneering works[2] and, to provide a significant example drawn from Obrist and Kupfer, readers can follow the first appearances in late antiquity of the tripartite *imago mundi* in numerous diagrammatic world maps called *mappae orbis terrae* or 'T-O maps,' often found in the cosmographic chapters of classical works during late antiquity and into the Middle Ages. Examples of these are Sallust's *De bellum Iugurthinum* (first century BCE, traditionally chapter XVII, in correspondence with the beginning of the description of Africa), Macrobius's *Commentarius in somnium Scipionis* (fourth century), Martianus Capella's *De nuptiis Philologiae et Mercurii* (fourth–fifth centuries, usually in the geographic section of book VI, *De Geometria*) and Isidore of Seville's *Etymologiae* (sixth-seventh centuries, especially books XIII and XIV.2.3, respectively *De mundo* and *De terra*). Placed on the beginning pages or at the bottom of the page in the chapters, the *mappae terrarum orbis* schematically indicate the inhabitable and inhabited parts of the Earth, called the *ecumene*. These diagrammatic maps were by no means unsophisticated, nor did they reflect the idea of the Earth as flat; rather, they were

[2] PATRICK GAUTIER DALCHE, 'De la glose à la contemplation. Place et fonction de la carte dans le manuscrits du Haut Moyen Age,' in *Testo e immagine nell'Alto medioevo, atti della XLI Settimana di studio* (Centro italiano di studi sull'Alto Medioevo: Spoleto, 1994), 693–771. For a rich although not exhaustive catalogue of *mappae orbis terrae* or 'T-O,' see MARCEL DESTOMBES, *Mappemondes A.D. 1200–1500* (Amsterdam: Nico Israel, 1964).

mnemonic and pedagogical devices to be used in educational contexts, putting the otherwise invisible Earth into material form through the juxtaposition of text and images.

Finally, the five chapters of Part IV, 'Diagrammatic Traditions,' focus on the way text, geometric schematisation and pictorial elements interacted in the Middle Ages: 'A Prolegomenon to Byzantine Diagrams' by Linda Safran; 'Diagramming the Diagrammatic: Twelfth-Century Europe' by Adam S. Cohen; 'Templates for Knowledge: Geometric Ordering of the Built Environment, Monumental Decoration, Illuminated Page' by Madeline H. Caviness; 'Religious Instruction and Devotional Study: The Pictorial and the Textual in Gothic Diagrams' by Lucy Freeman Sandler and 'The Kabbalistic Tree' by J. H. Chajes. To the reviewer's knowledge, this is one of the most systematic cross-cultural analyses of corpora of schemata from the medieval Greek, Latin and Hebrew cultures. If recent scholarship has highlighted the importance of diagrammatics in the development of human cognition,[3] the essays in Part IV provide a historical and documentary basis for this branch of cognitive psychology and phenomenology. The five essays scrutinise treatises on astronomy, *computus*, astrological divination, philosophy, theology, military sciences, music, glossed religious texts, cosmography and geography which include tabulated data and coordinate information as well as architectural patterns. At the same time, they analyse the forms, typologies and functions of *schemata* and *figurae* – the synonymous Greek and Latin words that were used to refer to diagrams – such as geometric figures, the mnemonic figure of the hand and the Tree of Life and its transformations, as well as the complex geometric armatures in stained-glass windows as possible models for the development of schematic forms of thinking.

The graphic apparatus

The impressive graphic apparatus of the volume, made up of 248 colour illustrations, deserves a specific analysis and appreciation. The graphics go beyond the specific connections with the respective essays which, in the opinion of the reviewer, seem set out and conceived more as (well-researched and erudite) standalone monographic essays rather than essays that integrate with each other. The iconographic apparatus of the volume is instead a genuinely transversal repository of exemplary quality graphics that give readers unique access to a multiplicity of late antique, medieval and early modern graphic documents and layouts that are not commonly found in contemporary publications. This generous editorial choice is and will remain one of the most significant and enduring legacies of the volume, providing a solid base on which the numerous communities of specialists interested in the history of the visualisation of knowledge will be able to expand and develop their own research.

[3] SYBILLE KRÄMER and CHRISTINA LJUNGBERG, *Semiotics, Communication and Cognition. Thinking with Diagrams: The Semiotic Basis of Human Cognition* (Boston and Berlin: Mouton De Gruyter, 2016).

Below is a very partial selection of the most significant types of images displayed and analysed in the volume, in what is the largest collection of cognitive graphic material currently available in press. They include the diagrams of cognition and memory (derived from Avicenna, 37), the Tower of Wisdom (*Thebit De Scientia imaginum*, 48), the Seven Gifts of the Holy Spirit (Hrabanus Maurus, *In honorem sanctae crucis*, 69), the Tree of Porphyry (Boethius, *Logica vetus*, 75), the Tree of Knowledge (*Etz Hha-Da'at*, 199), the Tree of Vices and Virtues (398), the Tree of Life (431), the Kabbalistic Tree (452, 456) and the *Ilan* parchments (a new fifteenth-century genre of Kabbalistic tree expression, 462, 463); the Canon Tables of the Gospels (the graphic system of dividing the four Gospels between late antiquity and the Middle Ages, before the introduction of chapters and verses in the thirteenth and the sixteenth centuries respectively, 92–93); the complex schematic layouts of the pages of Peter Lombard's *Magna glossatura* of the Psalms (116), a selection of impressive medieval layouts of glossed pages of the Gospels with readers' additions (121, 123, 126), the complex page layouts and outlines of the Babylonian Talmud with Rashi and Tosafot (138, 149, 150) and of the Pentateuch with Targum and Rashi (144, 148); the textual schemata in biblical texts (166, 167, 169); the layouts of commentaries on Aristotle's works (173), Peter Lombard's *Sentences* (177); *Pterygoma* (triangular-shaped) formulas, candelabrum schemas in Jewish texts of magic and recipes (186, 188, 195); new forms of highlighting concepts through the iconicity of the printed text (219) and printed geometric drawings (225); the earliest images of the spherical geocentric universe (231, 241, 248) and the earliest world maps (in Macrobius's *Commentarii in somnium Scipionis*, 264; Isidore's *De natura rerum*, 265; and Lambert of Saint-Omer's *Liber floridus*, 273, 274) including the first map that placed Jerusalem at its centre (in Isidore's *Etymologiae*, 278); lunar calendars in the form of *rota* (300); diagrams of the harmony of seasons, qualities and humours in Isidore's *De natura rerum* (307); images of the 'musical hand' (333) and interval diagrams (308) for music notation; medical images in the first *incunabula* (348, 357); Byzantine zodiac and wind diagrams and tables (363, 364), astronomical diagrams (369), 'Trinity diagrams' (374); consanguinity trees (389), diagrams displaying the elements of the Creation (391); the architectural-diagrammatic structure of medieval stained glass windows (413, 417); the rectangular diagrams of the instruments of the Passion (440) and the tables of the Twelve Articles of Faith (442).

When looking at these heterogeneous yet connected graphic corpora, readers will recognise the archaeology – in certain cases also including the most ancient and foundational examples – of the mental imaging and strategies of textual and graphic mediation and their reification through numerous graphic devices – mostly originally from religious works – many of which, despite the different contents, we still use today when we take notes, prepare class outlines, structure indexes and tables of contents, and organise and consult PowerPoint presentations and websites. The volume is a magnificent showcase that enables readers to observe the archaeology of the interactions between texts and graphemes, diagrams, geometric images, music notations, maps, charts and tables involving and mobilising the iconicity of the text and its multiple transformations into charts, tables, diagrams, vectors and schemata in

the Hebrew, Greek and Latin cultural traditions. It is remarkable to observe the functional complexity of the layouts of medieval commentaries and their ability to structure and connect different and yet connected levels of text through the extensive deployment of graphic devices and complex layouts in ways that we would now define as 'multilayer' and even 'hypertextual.' At the same time, the iconographic apparatus can show readers other graphic devices and layouts that were not continued or developed further, in particular in religious texts, or did not withstand the transition from manuscript to printed forms of reproduction. But most of all, the same visual apparatus gives stimulating and easy access and a good reason for non-specialist readers to approach the nineteen essays that make up the volume, either together or individually. Through the images, readers will recognise the archaeological traces of many intellectual and cognitive practices still involved in their scholarly routines today.

Staccato

These considerations on the transversality of the iconographic corpus as a true connective tissue supporting and keeping together the entire editorial project provide a launch pad to reconsider the structure of the volume as a whole. If we are to turn our attention back to the essays that structure the book, their heterogeneity and their methodological, heuristic, linguistic and cultural versatility is one of the strengths of the volume and at the same time one of its limits. The strength of the essays' variety mainly lies in the breadth of the points of view adopted, which shows how between the seventh and sixteenth centuries visual and graphic phenomena branched out and transformed in the variegated multilingual worlds of manuscript production in Greek, Hebrew, Latin and to a more limited extent also Arabic. As its broad and at the same time specialised structure suggests, the book attempts to be all things to all people: an introduction to the subject, reference work and showcase for cutting-edge research.

However, this approach is restricted by its not emphasising or highlighting the explicit and implicit interactions among the cultural and linguistic translations from the main three cultural traditions considered by the authors of the volume. In this regard, it is well known that the circulation of manuscript works originally in Greek, then translated into Syriac (a specific variant of the Aramaic language), Arabic and Persian, and then into Latin, built up a complex geography of cultural translations involving fundamental works such as the Aristotelian corpus.[4] In this respect, the absence in this book of emblematic case studies that could have shown the circulation of visual models across cultures and languages within the vast areas under analysis comes as something of a surprise. As an example, works such as *Almagest* and *Geography* by Alexandrian scientist Claudius Ptolemy (second century CE), undoubtedly of paramount importance in the way knowledge was visualised from antiquity to early modern Europe across ancient Greek, Syriac, Arabic, Persian, Byzantine Greek, Latin and several European vernacular cultures, would have offered an extraordinary and

[4] MARIA MAVROUDI, 'Translations from Greek into Latin and Arabic during the Middle Ages: Searching for the Classical Tradition,' *Speculum* 90, no. 1 (2015): 28–59.

easily accessible ground though which to grasp the transformations in the visualisation of graphic knowledge at the crossroads of very broad linguistic and cultural traditions. The search for cross-cultural examples of the reception of works, implying the mobilisation of several visual cultures rooted in the Mediterranean basin, would have further enriched the cultural breadth of the volume.

There is also a second aspect that would have helped place the volume better in the long history of the use of visualisation strategies as essential pathways in the creation, aggregation, archiving, conservation and transmission of knowledge. Since the book also takes the sixteenth century into consideration, it could have been opportune to consider a fundamental transformation in the visualisation of knowledge which took place starting from about 1530s, and its cultural roots.

The matter in hand is the complex epistemological transformation, specific to early modern book production, concerning the aggregation, organisation, storage and dissemination of heterogeneous knowledge through the creation and printing of wide-ranging collections of cognitive images that were not intended as illustrations of written or practical knowledge, towards which they were traditionally regarded as dependent or even subordinate, but as centres of knowledge: genuinely independent *lieux des savoirs*. These practices of defining and structuring images gave birth to a new range of bookish objects generally identified by titles such as *theatrum*, *speculum*, *descriptio*, *compendium*, *atlas* or *cosmographia*. These all shared the characteristic that they mainly consisted of numerous normalised cognitive images forming thematic collections of city views, maps, the human body in all its parts, animals, plants, machines, buildings, costumes, just to mention the main topics. The list could nevertheless go on and on.

De humani corporis fabrica libri septem (Basel, 1542; Venice, 1543) by Flemish scholar Andreas Vesalius (Latinized from Andries van Wezel, 1514–1564), with hundreds of images by Jan Stephan van Calcar (plagiarised by Juan Valverde, along with the engravings by Antonio Lafreri, in Rome, in 1559); *Herbarum vivae eicones ad naturae imitationem* by Otto Brunfels (1488–1534), published in Strasbourg in 1532 with 238 illustrations by Hans Weiditz (1495–1537) or *Di Pedacio Dioscorides Anazarbeo libri cinque della historia, et materia medica*… by Andrea Mattioli (1501–1577) published in Venice in 1544; treatises such as the *Aquaticium animalium historiae* by Hippolito Salviani, with Antonio Lafreri's engravings, printed in Rome in 1554; treatises on architecture and city views such as the *Quattro libri dell'Architettura* by Andrea Palladio (1508–1580) printed in Venice in 1570; the *Theatrum orbis terrarum* by Abraham Ortelius (1528–1598), printed in Antwerp in 1570; the 'theatres of machines,' such as the *Theatrum instrumentorum et machinarum* by Jacques Besson, published in Lyons in 1578, are just a few, albeit striking examples of organised and serial collections of normalised images put together since the mid-sixteenth century.

In these collections, images became laboratories, operational spaces in which knowledge was aggregated and produced and, once published, they set in motion other operations and practices of the intellectual mediation of reality. These cognitive images

not only were not subordinate to the written text – with respect to which they were, if anything, in synergy – but inverted the hierarchy: the written text – often relegated to commentaries, captions or simple titles – became subordinate to the images, and the latter became the fulcrum on which the intellectual, social and productive practices converged and developed.[5] These processes involved and were implemented in different fields of knowledge such as anatomy, natural history (for the description of some types of animals, in particular fish, and plants), architecture, theatres of machines, as well as geography and cartography. This great variety of sectors of knowledge were united by having been transformed through codified and normalised images, used as cognitive aggregators and 'producers' of knowledge. This was a major epistemological turning point, amplified by the invention, implementation and dissemination of printing, but which originated and descended from the manuscript culture which is unjustifiably overlooked in the volume, especially in the essays that deal with printed works.[6]

These critical reflections are by no means intended to diminish the value of this editorial and scientific enterprise. The volume's goal to show how medieval patterned text, lists, tables, diagrams, schemata, charts and maps, in mainly religious, philosophical and scientific texts, had a generative power which enabled them to formalise abstract concepts and provide grids that set in motion analytic operations and created interpretive frameworks for understanding the world, is without any doubt fully achieved.

As a conclusion, it is important to focus on and highlight the genesis of this ambitious scientific and editorial project, which could inspire other colleagues and institutions who wish to undertake similar collaborative research projects. The volume *The Visualization of Knowledge in Medieval and Early Modern Europe* is the result of the homonymous research project organised between 2014 and 2015 by Marcia Kupfer (independent scholar, Washington DC) and Katrin Kogman Appel (Ben-Gurion University of the Negev), supported jointly by the Israel Science Foundation and the Israel Institute for Advanced Studies (IIAS), a national institution devoted to academic research located at The Hebrew University of Jerusalem, whose primary function is to support and encourage collaborative research. Collaborative international research groups composed of eight fellows plus additional visiting scholars are given the funds to meet in Jerusalem to engage in research questions of common interest. Both foundations could be instrumental for informal groups of scholars who are looking for research funds to support collaborative research projects, without necessarily having to resort to more complex and laborious financing schemes.

[5] See the essays collected in Wolfgang Lefèvre, Jürgen Renn, and Urs Schoepflin, eds, *The Power of Images in Early Modern Science* (Basel: Birkhäuser, 2003).

[6] See JEAN-MARC BESSE, ed., *Forme du savoir, forme du pouvoir. Les atlas géographiques à l'époque moderne et contemporaine* (Rome: Publications de l'École française de Rome, 2022). In this volume also see ANGELO CATTANEO's essay, 'Conoscere attraverso le immagini: genesi e forma degli atlanti. Una svolta epistemologica della prima età moderna.'