

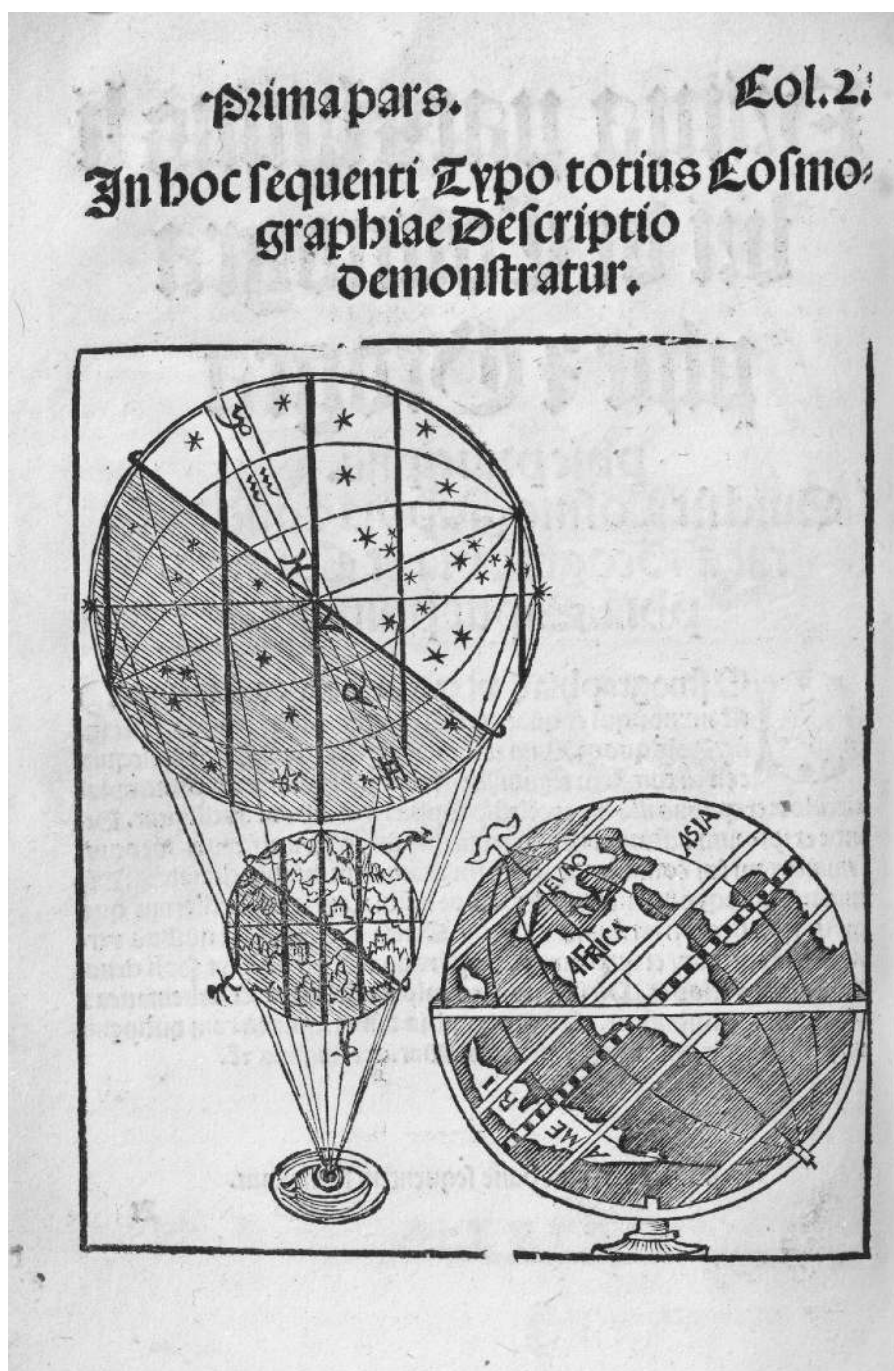
ONE

INTRODUCTION

Learning to Look with Books for the Literate Eye

In the early sixteenth century, images in printed books began to target a new intelligence agent: the literate eye. This eye became the focus of repeated encounters with images that aspired to a range of purposes, including cognitive prompts, memory devices, and instructions for performing specific tasks. The way these pictures began to confront the viewer sparks a reconsideration of the genres in which they were embedded, such as popular astrology or cosmology, as examples of popular science in which eyewitness authority was often constituted by texts but cemented by images. Images in books crystallized knowledge domains; one of the ways in which they did so was by demanding visual attention. This project inspects how sixteenth-century viewing practices were organized around pictures.

The eye was both magnetized by images and also appears in them, especially those in which thinking and seeing came together. The eye that the Ingolstadt mathematician Peter Apian planted at the base of the tandem terrestrial and celestial spheres (Figure 1.1) in his *Cosmographicus Liber* (1524) performs a physically impossible act: it must see “through” the earth to the celestial realm. The eye summoned by sixteenth-century prints was sometimes a literal eye and sometimes a thinking eye. Apian’s eye is both: it sees past the earth and makes visual judgments about the heavens. Apian aimed to show viewers what they saw, but he also wanted to illustrate the theoretical principles that undergirded what the observer was seeing. This “literate” eye both observed and performed other cognitive acts. The stagings of such relationships in

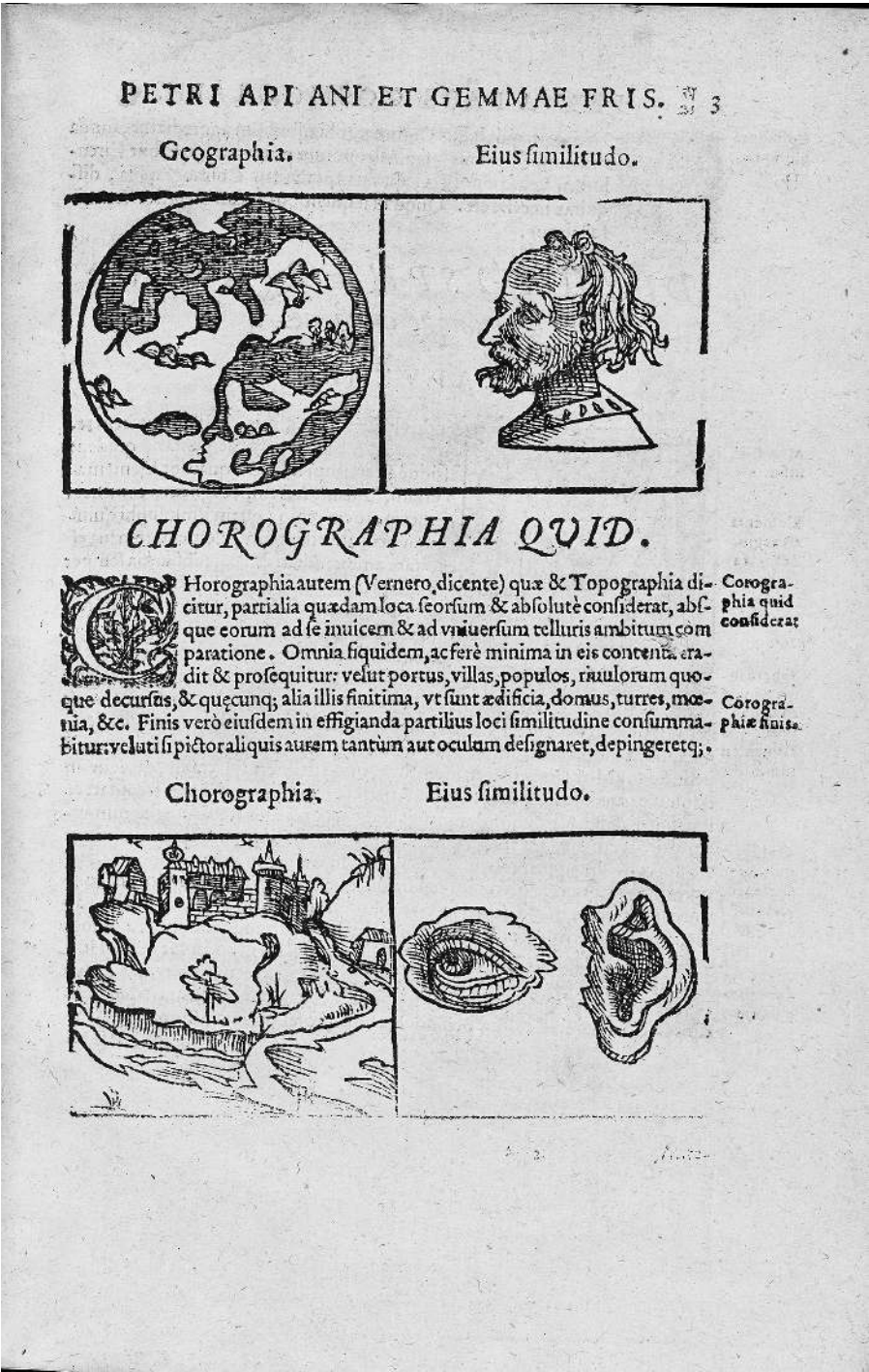


1.1. Peter Apian, *Cosmographicus Liber* (Landshut: Weyssenburger, 1524), fol. 2. Source: Zentralbibliothek Zürich, NR 870. Courtesy of ETH-Bibliothek Zürich.

complex multilevel diagrams became integral to his developing scientific program, but the existing print infrastructure was inadequate to the task of producing these diagrams. Apian set out to build his own printing press to accommodate the pictorial complexities he envisioned for future volumes.

Firmly committed to the didactic properties of images, Peter Apian mobilized different types of pictures throughout a cosmographic text he published in 1524 to promote the merits of visualized thinking. Apian set out to instruct the reader that cognition must be routed through the visual field. Providing a cheat sheet for harder to grasp abstractions of cosmography, Apian chose a method of visual knowing with which he assumed his readers would be more familiar. With a diagram of an ear and an eye, Apian ingeniously linked the concept of cosmography to a genre already constituted as visually knowable: portraiture. This diagram helped viewers recall which mental images to conjure when contemplating complex concepts. The equation of a face with the representation of the terrestrial sphere that Apian announces with this image (Figure 1.2) shows cosmography to be a visual pursuit that can be likened to portraiture and explains them as kindred epistemic pursuits. Although each image reflected distinct modes of knowing the world, they were similar in that they could best be communicated by pictures. This book breaks down this metaphor into its component parts and asks how the subject matter of cosmography and faces, as well as other popular genres aimed at knowledge acquisition, began to shape the visual aptitude of vernacular viewers.

Illustrated books alerted the eye to a new consciousness in the early sixteenth century. Self-confident agents of learning, these heuristic tools aimed to help navigate the viewer's visual horizons. While expectations of viewers' visual sophistication are clear from Renaissance paintings, we tend not to think of books of the period as having a well-developed visual language.¹ But among the earliest printed books were ones in which illustrations were so integral that they were carved into the same block as the text. The first generation of books printed in northern Europe included just such instructional block books, which taught readers how to preach, how to live well, and how to die honorably, as well as warning about the perils of the apocalypse.² Advice for achieving salvation was delivered by pictorialized self-help books in which illustrations were the driving force. Even though these xylographic books (books with words and images cut into the same block) may seem unlikely ancestors of the technical books that are the subject of this study, they were similar in that their illustrations presume the reader as a user. In focusing on the visual epistemology of early printed books, this book argues that such manuals were usable tools that prompted empirical investigations. While manuscripts had delivered elements of the classical tradition through ancient texts, the how-to manuals of the sixteenth century marketed themselves as concise agents of visual data delivery.



1.2. Peter Apian and Rainer Gemma Frisius, *Cosmographia, siue Descriptio vniuersi orbis* (Antwerp: Withagen, 1584). Source: Vault GA6.A55. Florida State University Special Collections and Archives.

Theories of representation emerged from these new printed books and their images became the locus around which practical knowledge collected. The history of early printed books largely neglected images, instead narrating their technical achievement in terms of how many lines of movable type a page could offer (forty-two lines, in the case of the *Gutenberg Bible*).³ While this bibliographic focus on text reminds us that many first-generation technical books were not illustrated, in a very short time, from 1510 to the 1540s, the pamphlets printed in German-speaking lands gave way to graphic layouts that were designed around illustrations. These books still accommodated text but their pedagogical intent was delivered with visual formatting in mind. If, in the past, text had chaperoned the images, images now became the codicological units *par excellence* and were the eyecatchers around which books were organized. In a mad rush to illustrate, publishers of complexion books, shepherds' calendars, and farmers' almanacs included arguably many more illustrations than their contents actually required. Calendars and almanacs were record keepers for wide usage and often covered a range of materials; they were mostly compilations of how-to knowledge, extending from *The Art of a Good Life and a Good Death* to collections of helpful shepherds' lore or instructions for farmers (*Bauern Practica*), from descriptions of purgatory to mnemonics to help the reader remember the Ten Commandments.⁴ Calendar books printed with blank fields encouraged readers to pencil in activities as to-do lists.⁵ Consultation of such visualized books, I argue, armed the viewer with new epistemic potential. Such books equipped vernacular viewers with skills to scan and scrutinize.

Early modern readers consulted printed schedules for lunar conjunctions before planting crops and cued the changing of bed linens to the stars' alignment; meanwhile, amateur observers were scrutinizing the firmament to figure out the time at night. Books taught merchants to gauge volumes of solids via instructive diagrams and formulas that could help them assess values in foreign markets. Another book tried to help readers identify potential scoundrels based on their profiles. Books featuring the palm of the hand engraved with lines (chiromancies) tried to help an employer assess the potential loyalty of an itinerant worker. Some of the information was culled from a number of older genres, such as Pliny's *Natural History*, Konrad von Megenberg's *Buch der Natur*, and the pseudo-Aristotelian *Secretum Secretorum*, but, in their new formats, this information was presented as visual data. Savvy printers such as Johannes Schott in Strasbourg, Sigmund Feyerabend in Frankfurt, and Walter Ryff and Levinus Hulsius in Nuremberg saw the value of repackaging information into pamphlets that were easier to consult. Publishers marketing these diverse genres as handbooks presented a united front that encouraged new audiences to engage interactively with their surroundings. The key to that engagement was the faculty of sight.

This book argues that the visual program of certain early printed books mandated a systematic visual engagement with the world. We might think of the manuals and pamphlets under review here as the root genealogy of books available today for purchase in hardware and drug stores: astronomy manuals, astrology charts, travel guides, and how-to manuals on a host of esoteric topics. They all share a desire to instruct and most of them place a premium on delivering and organizing that information visually. Some books advocated memorization, others delivered information about the care of horses and the types of bit a blacksmith could forge to control them, or they collected motifs for fancy headdresses and furniture designs. Other books offered sections of map gores, which, when cut along dotted lines, could be assembled into personal globes. Music amateurs could purchase instructional volumes that showed the correct finger placements for playing a recorder.

We cannot assume transparency or ease in the process of teaching the average early modern amateur scientific practitioner new skills: the lack of proper instructions on how to operate a rudimentary telescope sent by Galileo to his brother at the Wittelsbach court in 1611 left at least one hapless viewer very confused.⁶ In a letter describing the event to Galileo, his brother ridiculed the observer's ineptitude as he peered through the wrong end of this hastily assembled telescope. While this clumsy observer was called out in the letter, those of us who hang our heads before complex online instructional tutorials might have more sympathy for the unfortunate chap. We tend to assume that knowing how to properly observe was an endowment of nature, not nurture. But according to the productions of the early modern corner presses, pin-pointing where and how to look was indeed a learnable, and marketable, skill.

Of the many genres that were emerging in that market, two were especially insistent about their function as heuristics on the path to making visual judgments: physiognomy and cosmography. Indeed, these two genres were already related through their common origin in judicial astrology. Predictive astrology was the practical outcome of the training of physicians and mathematicians, whose skill sets merged theories of humoral balances with the complex mathematics required to draw horoscopes. The outcomes of astrological observations were made manifest in the many pamphlets marketed as usable knowledge called *Practica*, calendars, and horoscopes. The planets were thought to exert influence on a person's complexion, and if their trajectories were properly tracked, their positions could also render predictions and useful assessments about patients' health. The mathematical foundations of astrology turned planetary positions into complex problem sets that aided physicians and geomancers in determining humoral diagnoses. The printing environment for predictive astrology was served by trained mathematicians who simultaneously drafted horoscopes for courtly patrons and churned out pulp astrology for wider audiences. Eventually, an ecology of urban printers channeled academic

astrology into printed manuals for new publics of cosmographic practitioners whose eyes were schooled by cosmographies, geomancies, physiognomies, and complexion books.⁷

Cosmography and physiognomy find their common inspiration in predictive astrology. Unlike the modern tendency to separate the aims of astronomy from astrology, the array of publications about data drawn from the stars indicates that neither publishers nor readers found those two fields at cross purposes; on the contrary, they functioned symbiotically. In fact, Apian's day job printing prognostications under the title *Practica* was perhaps the most lucrative arm of his press. Apian's understanding of the stars fed both his scholarly preoccupations, and there is nothing to suggest that he privileged one over the other. Both genres aimed to unpack and systematize the knowledge he was seeking in the heavens.

The authors of such *Practica* observed the stars in order to link planetary and lunar movements to vernacular practices in the form of seasonal recommendations. This updated the doctrine of signs from Aristotelian material into more practical concerns: such information circulated for the purposes of weather watching and scheduling seasonal activities. Scanning the heavens closely at night, the day job of most celestial observers was to predict and schedule the occurrence of lunar eclipses for the public and to turn their observations into predictions and prognostications.⁸ While the modern reader tends to consider the purview of astronomy as discrete from astrology, most early modern astronomers were unapologetic about the predictive origins of their trade. Johannes Kepler acknowledged that the astronomy of his era rested on the shoulders of astrologers scanning the sky for practical advice.⁹ The symbiotic nature of the relationship of the two genres was made manifest in their shared iconography. For example, the precise schedule of lunar eclipses provided in Regiomontanus's *Kalendaria* (1532) closely resembles that which appeared in Apian's *Cosmographicus Liber*, a cosmographic manual of the sort that was transitioning from theoretical material to more practical concerns. Eclipses and comets were important events in calendars and *Practica*, linked to omens and prognostications.¹⁰ Calendars and almanacs charted activities of both universal and particular relevance, ranging from the predicting of collective disasters (such as floods and plagues) to the scheduling of personal hygiene and health practices.¹¹ A typical passage in such a publication recommends restricting bathing and cupping to specific intervals in the lunar cycle, when a waning moon appeared in particular star signs.¹² As early as the 1480s, printed almanacs and calendars promoted regimens for scheduling bloodletting and baths. Image programs that included content such as a practitioner setting cups on a patient served as mnemonics for what activities to undertake during that part of the month.¹³

Sometimes it was the printer who cemented the connection of one sphere of study (astronomy) to another sphere of influence (medicinal care of the

body). Jacob Cammerlander, the printer of the *Kalendarius* of Johannes Müller von Königsberg (called Regiomontanus after 1534), specifically geared astronomical information toward readers who used calendars for scheduling health regimens; the preface tightens still further the connection between astronomy and medicine. Many such manuals were printed in Strasbourg, where presses producing books on field surgery provided medical information for a market not driven by the needs of an academic institutional presence — a university would not appear in the city until approximately 1621.¹⁴ Until that time, Strasbourg printers (as well as those in other towns such as Augsburg and Nuremberg) supplied knowledge largely to a vernacular public, and this public played a significant role in shaping publishers' lists. Robin Barnes's *Astrology and Reformation* outlines the prodigious trade in printing astrological literature in the urban centers of the Holy Roman Empire.¹⁵ Vernacular publications are among the best extant sources we have of how craft-based professions were organized; in fact, the publications themselves did prodigious structural work for certain trades. Field surgeons, for instance, were grouped into guilds with barbers by virtue of the common tools that they used. Their instructional manuals were organized according to practical concerns and they helped match battle-induced wounds to the specific tools required for their treatment. *Practica* also articulated relationships between related modes of empirical learning; publishers were often the ones to forge these ties.¹⁶

Astronomy's connection to medicine is cemented in the title page of Regiomontanus's *Kalendarius*: "a pleasant comparison of astronomy with medicine/ [which asserts that] a successful Doctor must also be a skilled Astronomer."¹⁷ This particular section of *Kalendarius* linked health regimens to the movement of the stars. The tracking of stars was related to other types of systematic visual investigations performed by physicians, such as evaluating urine samples.¹⁸ Both types of analysis called for the observation of specific details and even comparative cross-referencing. Such manuals placed expectations of daily observations on the shoulders of amateur observers and vernacular readers. Physicians were expected to keep their eyes trained on the movements of celestial bodies through the constellations as well as on patients' humoral complexion.¹⁹

Early modern astronomy and astrology were locked in a symbiotic bind. The day job of an astrologer required the rigorous training of astronomy. Horoscopes commissioned by powerful patrons depended on correct predictions; these show the related pursuits of astrology and its handmaiden, astronomy.²⁰ Astronomy's tracking of movements in the heavens was the basis of the very practical concerns of judicial astrology. Perhaps the already close connection between astronomy and practical astrology in this period grew tighter as astronomers and mathematicians took the helm of some early modern print shops.²¹ Both astronomy and astrology were underwritten by firsthand

practice, and printers parlayed related skill sets into a wide array of visually profuse genres that would guide future empirical activity.

In these new urban environments arose the twin genres of physiognomy and cosmography. Physiognomic texts can be thought of as guides to navigating a landscape of people, taking the generic data of faces and repackaging it into novel informational formats. Unlike the taxonomy of peoples that would manifest itself in costume books, the physiognomy book was for people watching, a manual that could help levy judgments about neighbors via the close inspection of their features. Physiognomy's collection of character heads presented tools for a practical science that developed around pictures. That many of these illustrated faces were shown in profile should not surprise us: Profiles best reflected the mountains and valleys of the face, the important data points of portraits. The heightened scrutiny that profiles received as a result of these manuals can be mapped onto the new forms of cosmography that likewise encouraged viewers to scan surfaces and volumes, such as the horizon or the heavens. Cosmography was a synthetic science that merged many individual observations. Apian's book tried to reconstruct that process by showing explicitly how to make those observations. In a study of the stimulus to cognition instigated by Apian, one group of book historians invoke these visualized genres in their description of the book itself. They describe the book's morphology as its "physiognomy," while their approach to it capaciousness as a whole work is presented as a measure of its "cosmography."²² It is perhaps therefore auspicious that we consider here how the book constituted and facilitated physiognomic and cosmographic investigations.

TRAINING THE EYE

Prints made their readers look with rapt attention at things, some of which had always been fixtures on people's horizons, such as the stars, the moon, and rises and dips in the land's topography. But unique among illustrated books was the method they prescribed to take in that information via an appeal to the senses. Note, for example, Campanus of Novara's *Theorica Planetarum*'s goal of providing instructions for constructing rotating planetary models: "they may be able to see with their eyes by an instrument which is perceptible to the senses."²³ One thing that books suggested viewers do was to scrutinize in ways that other media did not. Prints of the sixteenth century invited new subjects for viewing as they solicited unfamiliar viewing practices. Some of these subjects were consonant with a newly activated viewer.

That the practice of sight was construed now as subject, rather than as object, can be seen clearly in the shift in visual interest in the eye. Gregor Reisch's *Margarita Philosophica* presented a diagram of the eye from a frontal view as well as a cross-section that showed it like an onion with the layers that

comprised it.²⁴ The image of a passive eye included in Reisch's text is embedded in a discussion of light and the optical power of the organ of the sensing soul. A theoretical discussion of optics as a multiplication of species precedes the depicted eye; these discussions also sometimes pull in luminous bodies, such as the sun and moon, to explain light and shadow, and darkness as the absence of light.²⁵ Reisch's eye is a passive receptor, a theoretical model in the domain of natural philosophy.

By contrast, the eye presented in the *Cosmographicus Liber* was a sensing, judging, and literate eye. Apian's illustration at folio 11 marshaled the reader's eye to participate in an active proof: in order to infer the shape of the earth, an observer was compelled to track the change of the shadow of the earth on the moon's surface during an eclipse. Even readers familiar with basic astronomy had never been ordered to scrutinize the moon so closely, let alone made to believe that their observations could verify such proof. Apian insists that seeing is the key to understanding. We could say that a similar scrutiny of a full moon activated the viewer of the back of the Farnese Hercules, engraved by Hendrik Goltzius in 1595 (Figure 1.3). Walter Melion explores Goltzius's engraving at the intersection of observation, cognition, and *handelingh*, or rendering as an executive skill.²⁶ In the latter, Goltzius's technical virtuosity made advanced claims for how printmaking could visualize observable objects, not just in the pattern of overlain hatched lines, but also in the way in which he conceptualized the process of observation. The print's viewer joins the pictured audience as a fellow onlooker. After exploring the intricate cross-hatched netting of Hercules's gluteal muscles, the beholder is also encouraged to muse on the prospect enjoyed by the pictured observers. Multiplying the angles of eye-witnessing, Goltzius pushes the viewer into reluctant voyeurism. The fine *moiré* pattern that shapes Hercules's rear established a syntax for engraving that diverted attention from the subject matter to the technique itself as another site of optical interest. This graphic feast pointed back to the act of observation itself; for Melion, the fine lines of Goltzius's prints "represent the cognitive act of knowing the world through the agency of attentive sight."²⁷ It was the intense web of lines, the *handelingh* of these aesthetic threads as an extension of Goltzius's burin hand, that commanded the viewer's aroused stare. By the end of the sixteenth century, such self-aware viewing was increasingly in demand.

This book unpacks the journey of the kind of close looking that Goltzius both expected and exposed. The history of our seeing as a materialized act that can be represented takes as an arguable start date the moment when artists posited the picture plane as an extension of the viewer's space. This was ushered in by Florentine architectural theorist Alberti's suggestion to artists that they use a *velo* or a gridded-off perspective screen as a trick of the trade, a crutch with which they might capture the view beyond the screen in the same way that a prospect might appear to an observer. In this conceit, the artist