



## AN ABSTRACT OF THE DISSERTATION OF

Adèle Lorraine Wörz for the degree of Doctor of Philosophy in Geography  
presented on October 10, 2006.

Title: The Visualization of Perspective Systems and Iconology in Dürer's  
Cartographic Works: an In-Depth Analysis Using Multiple Methodological  
Approaches

Abstract approved:

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A. Jon Kimerling

This dissertation uses a new methodological approach for an in-depth analysis of three cartographic works. Studies within the discipline of the history of cartography have followed various methodologies throughout the past century. This dissertation argues that in order to come to a more complete understanding of how maps were produced and viewed throughout history, it is necessary to study their geographical and scholastic context on a variety of scales: their modes of production, the city in which they were produced, the surrounding academic community responsible for the content, the vernacular and academic viewers at the time, and how the maps would be received both at the time of their dissemination and subsequently. Albrecht Dürer produced one terrestrial and two celestial maps in the early sixteenth century under the patronage of the Emperor Maximilian I, which were co-authored by Johannes Stabius and Conrad Heinfogel. Despite the collaborative nature of these maps, Dürer's influence pertaining to the final visualizations is substantial enough to warrant the majority of focus in this dissertation. Widely esteemed during the Renaissance and in later periods throughout all of Western Europe, Dürer is best known for his copperplate and woodcut engravings. The Northern artistic trend of artistic realism and the Italian one-point perspective system were combined in Dürer's terrestrial map, resulting in a visualization of his artistic theory of perspective. This highlights the theme of my dissertation, which is the integral nature of artistic and scientific forces in Renaissance maps. Dürer's experimentation with projection, unfortunately, was too subtle for contemporary audiences, who could not visualize the distinctions

between his projection system and Ptolemy's. I attribute this as the main reason to why his terrestrial map was never printed. His celestial maps were printed multiple times and disseminated throughout Europe. These were novel for the sixteenth century, combining accuracy of star-placement with classical constellation figures. Dürer's cartographic works demonstrate an innovativeness with form and representation. His fame as both a practical and theoretical artist justifies a closer examination of his influence on subsequent cartographic works.

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The Visualization of Perspective Systems and Iconology in Dürer's Cartographic  
Works: An In-Depth Analysis Using Multiple Methodological Approaches

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Adèle Lorraine Wörz, Author

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*The Visualization of Perspective Systems and Iconology in Dürer's Cartographic Works: an In-Depth Analysis Using Multiple Methodological Approaches*

## INTRODUCTION

This dissertation is an in-depth analysis of three cartographic works of Albrecht Dürer (1471-1528): *The Eastern Hemisphere of the Terrestrial Globe*, *The Northern Hemisphere of the Celestial Globe*, and *The Southern Hemisphere of the Celestial Globe*, circa 1515 (Figures 1, 2, and 3, respectively). Working in conjunction with Johannes Stabius, the court historian and astronomer for Emperor Maximilian I who drew the co-ordinates, and Conrad Heinfogel who was responsible for fixing the stars, Dürer produced these two celestial maps and one terrestrial representation early in the sixteenth century. These are collaborative works – the nature of the authorial connections is addressed here – but this study shows that Dürer was the dominant influence in the map's final visualizations. Therefore, his work merits careful scrutiny. Understanding the philosophies – aesthetic and geometric – behind these works and subsequently placing them in the social, political, and economic context of the time will create increased understanding of Dürer's cartography and conceptualizations of spatial representation during the early sixteenth century.

As of now there are no in-depth analyses of Dürer's cartographic works. His maps are referenced in some chronologies, but



Figure 1. Albrecht Dürer. Die Weltkarte des Johannes Stab 1515 Woodcut in four pieces. 645 x 850 mm



Figure 2. Albrecht Dürer. The Northern Hemisphere of the Celestial Globe. 1515. Woodcut. 433 x 432 mm. Graphische Sammlung, Stuttgart



Figure 3: Albrecht Dürer. The Southern Hemisphere of the Celestial Globe. 1515. Woodcut. 430 x 435 mm. Graphische Sammlung, Stuttgart

most of the basic canons discussing the history of cartography fail to mention them. This is unfortunate, for Dürer's artistic training, his philosophical writings, and his mathematical inquiries all influenced how he and his colleagues chose to visualize both terrestrial and celestial space. It is important to construct a composite picture of the environments – social, economic, and religious in particular – in which these prints were made, while also keeping in mind the limits of the woodcutting techniques and how these constraints would have influenced Dürer's representations.

Dürer, considered to be one of the great artists of the German Renaissance, gained his reputation as both an artist and an intellectual. He set up his own workshop in Nuremberg (1495), where he produced his 1498 *Apocalypse* series among others. Revisiting Venice from 1505 until 1507, he wrote as well on art theory. Erasmus (1469-1536) deemed him “the Apelles of black lines.” Dürer's true skill as an artist lies in his engravings – both copperplate and woodcuts.<sup>1</sup> Whether due to his residence in Nuremberg, which was at the time one of Germany's centers for illustrated book production, or due to the popularity of woodcuts in design reproduction, Dürer's prolificacy in this area and his progression and experimentation with this art form reveal a dedication to pushing the limits of the crafts' visualizations. Dürer traveled throughout Europe and this mobility provided him with access to a wider variety of intellectual stimuli. Just as Dürer was aware of projecting the visual realm into his parchment, his interest in geography led to his depictions of the spherical earth, speculating both on how the earth would appear as viewed from the heavens and how to project the celestial realm on a globe. The selected graphical works that Dürer created demonstrate his graphical genius as well as his interests in mathematics, geography, astronomy, and cartography.

This study is divided into five main chapters. I discuss the scope and ambition of each of these chapters later in this chapter. The over-arching theme throughout this dissertation is Dürer's integration of artistic and scientific

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<sup>1</sup> Shaw, J. B. (1973). Dürer the Engraver. Essays on Dürer. C. R. Dodwell. Manchester, Manchester University Press: 43-64.

principles in his cartography. One of the clearest examples of this merging is that of perspective and projection systems. The perspective systems using one vanishing point emerged in Italy in the fifteenth century and quickly gained widespread popularity among artists throughout Europe. Dürer traveled to Italy specifically to learn, from a master, how to correctly utilize this method. Projection systems used to transfer the three-dimensional world as accurately as possible on to a two-dimensional surface were also a matter of discourse at this time. Stabius worked with Werner to produce a cordiform projection system. Collaborators for all three maps, Stabius and Dürer were able to discuss the methods used in both perspective and projection systems. Stabius' knowledge of projection systems informed Dürer's representations of the earth. Furthermore, Dürer's work with perspective and vanishing points aided in the accurately drawn constellation figures, which are notable for both their artistry and accuracy in star placement.

The integral nature of artistic principles in the study of cartography that I advocate in this dissertation is a recent phenomenon in studies of the history of maps, occurring only in the past forty years. This is somewhat surprising, as definitions of maps over the last couple of centuries have stressed their role in "representing" on a planar surface things of a spherical nature. Gregory wrote in 1649:

The terrestrial or earthly globe is an artificial representation of the earth and water under that form and figure of roundness which they are supposed to have, describing the situation, and measuring the compass of the whole frame, and describing the situation and measuring the distances of all the parts...As the earth and water are wholly represented upon the globe, so the whole, or any part of either may be described *in plano*, or upon a plane surface in a map or sea-chart.<sup>2</sup>

In the seventeenth and eighteenth centuries, the definition extended, with added focus on the role of perspective. In his *Cosmography and geography* Varenus

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<sup>2</sup> *Gregorri posthuma: or certain learned tracts written by John Gregorie, M.A. and chaplain of Christ-Church Oxford* (London, 1649), p. 257, 285.



highlighted the rules of perspective as central to map production.<sup>3</sup> *A new general English dictionary* of 1744 defined a map as:

A description or projection of either the whole world or a part of it upon a plane, in which the situation, figure &c. of a country, both in respect to its own absolute possession of a particular space, or in relation to the bordering nations about it, is described according to the laws of perspective.<sup>4</sup>

Subsequent dictionaries labeled maps as “geographical pictures.”<sup>5</sup> This serves to demonstrate the reception and analysis of maps throughout history as both artistic and scientific documents. It is important to understand maps in terms of contemporary artistic conventions and scientific discoveries from a variety of scales, beginning with the individual artist and broadening to encompass their local surroundings, the societal and cultural context in which he or she worked, and the influences coming from outside. In this dissertation I demonstrate the worth of an in-depth analysis on specific cartographic pieces, both informing the individual pieces themselves and the historiography of cartography.

Cartographic research has expanded to the fields of geography, literary studies, art history, and the history of science, with the discipline expanding to incorporate methodology from other disciplines. In Chapter 1, “Methodology and Literature Review,” I examine the disciplines of the history of cartography and art history, analyzing their respective foundations, while focusing on the methodology scholars have used since the start of the twentieth century. It is organized thematically rather than chronologically, with each approach defined and identified in terms of key scholarship. Each chapter concludes with a critique of these specific methodologies. As there are too few emerging cartographic

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<sup>3</sup> The problem of composing geographical maps: the situation of an infinite plain, or one to be produced at pleasure, being given, to represent in that the places of the superficies of the earth, according to the rules of perspective [p. 316] . . . The end of these tables or maps is to the life, and exactly as may be to express the scituation of places in the superficies of the earth [maps of small regions do not require the rules of perspective] [p. 318.] Bernhard Varenius, *Cosmography and geography* (London, 1733), pp. 316, 318

<sup>4</sup> Thomas Dyche and William Pardons, *A new general English dictionary* (London, 1744)

<sup>5</sup> A geographical picture, or a projection of the globe or any part thereof on a plain surface, representing the forms and dimensions of the several countries, rivers, and seas, with the situation of cities, mountains, and other places, according to their respective longitude and latitude (Frederick Barton, *The complete English dictionary or, general repository of the English language* (London, preface dated 1772)).

historians and the literature being published is available only in either journal essays or specialized texts, this dissertation seeks to promote the discipline as both being informed by the critical theory of art history and advancing studies in the history of cartography in a way that is applicable to a variety of disciplines. This study explicitly links the history of cartography and art history.

The recovery and reconstruction of Classical astronomy was enabled by the Carolingian revival of classical texts.<sup>6</sup> Once recovered, these texts became the focus of education and further discussion in medieval universities, gaining both practical and philosophical importance.<sup>7</sup> This movement stemmed from medieval scholars' developing concern for the precise measurement of time.<sup>8</sup> The Renaissance fostered an active scientific community spread throughout Europe. Scientists traveled extensively, corresponding with scholars from many different nations, allowing for the entire body of astronomical thought to be observed in depth and modified. The printing press, which enabled scholars access to a wider variety of texts, the translation of classical works, the navigation around the globe and increased scholarly communication set the stage for further astronomical discoveries in the later sixteenth century.<sup>9</sup> The intentions of the artist reflect in every detail of a constellation chart, particularly in the constellation figures. As there are few star formations that clearly outline the associated figures, celestial cartographers could be extremely flexible, and individualistic, in their representations of constellation imagery.<sup>10</sup> Thus the scientific nature of star placement is intrinsically connected with the artistry of constellation imagery.

I begin this dissertation in Chapter 1, "Methodology and Literature Review," by reviewing the historiography and subsequently exploring the possibilities available for scholars looking at cartographic works, both terrestrial

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<sup>6</sup> Eastwood, Bruce S. The Revival of Planetary Astronomy in Carolingian and Post-Carolingian Europe. St. Edmundsbury Press, Suffolk. 2002.

<sup>7</sup> McCluskey, Stephen C. Astronomies and Cultures in Early Modern Europe. Cambridge University Press: Cambridge, 1998.

<sup>8</sup> Eastwood, 2004.

<sup>9</sup> Pecker, Jean-Claude. Understanding the Heavens: Thirty Centuries of Astronomical Ideas from Ancient Thinking to Modern Cosmology. Springer: Berlin, 2001, 184-85.

<sup>10</sup> Brashear, Ronald and Daniel Lewis. Star Struck: One Thousand Years of the Art and Science of Astronomy. Huntington Library: San Marino, 2001.

and celestial. The sources used for this dissertation encompass antiquarian, contemporary, and modern documents, all of which collaboratively aid in creating a foundation upon which the images can be analyzed. One of the foremost cartographic historians in terms of theoretical approaches is Emanuela Casti, who argues for maps to be analyzed within their semantic and iconic framework.<sup>11</sup> This study addresses how the construction of these maps relates to their methods of production, as well as the possible reasons for their commission by the Emperor Maximilian I. Seen in a multifaceted light, the maps analyzed in this study can be seen within their geographical and scholastic context – that is, by analyzing the city in which they were produced, the academic community who worked to inform the cartographic content, and the social role that financially backed and/or academically supported the creation of these works. Reflecting a commercial enterprise informed by the wide humanistic circle of Nürnberg, I relate these graphic representations of the earthly and heavenly spheres to contemporary discussions on perspective and projection systems. The visual emblems within the maps are analyzed in terms of how they relate to past icons; however, they are also seen as self-referential in terms of Dürer and in terms of the specific documents. This dissertation highlights the correlation between the terrestrial and celestial maps. It is important to read these works together, as documents that inform the other in terms of artistic conventions, scientific discoveries, and visual treatises a wide range of on issues such as perspective. This is ultimately an approach focusing on the concept of visualization, which relates to how the form of the map is conceptualized by the viewer, both Renaissance and modern.

In Chapter 2, “Nürnberg’s Humanism and Print Culture,” I reconstruct an understanding of the political, social, economic and intellectual conditions surrounding the production of these specific cartographic pieces, justifying the importance of the early sixteenth century in future cartographic trends. The “propagandistic spirit” of the Renaissance generated a market for printed pamphlets and illustrations, the easiest and cheapest medium for dissemination

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<sup>11</sup> Casti, Emanuela. *Towards a Theory of Interpretation: Cartographic Semiosis*. Faculty of foreign Language and Literature / Bergamo University / Bergamo / Italy. *Cartographica* Volume 40 Issue 3, 2005.

being woodcuts. Unlike paintings, woodcuts did not rely on a patron's commission. Due to both the potential for mass markets and an increasing literacy, printing presses were set up throughout Germany, with Nürnberg home to one of the continent's largest and well-organized printing presses, that of Anton Koberger, Dürer's godfather, neighbor, and printer during the artist's apprenticeship. In addition to Koberger, Dürer belonged to Nürnberg's humanistic circle, engaging with scholars such as Regiomontanus, Behaim, Münzer, and Schedel, the latter of whom commissioned Dürer to do several prints for his *Nürnberg Chronicle*. Dürer's recognition of a market for scientific prints and publications, augmented by the artist's constant experimentation with the woodcut medium resulted in his large-format block books. Printing these books in both Latin and German can be interpreted to both increase the market for the works and to promote Dürer as a scholar, rather than a mere craftsman. The commercial and ideological influences of the Renaissance continue to impact his work throughout the sixteenth century. This chapter reveals Dürer's engagement with contemporary scholarship as it relates to academic debates and the publication of printed texts, highlighting his mathematic and cartographic capabilities. His awareness of scientific discoveries and mathematical principles in turn influenced his cartographic works.

Dürer's maps, although collaborative works, can be read as being ultimately a work of the artist. One artistic trend during the fifteenth and sixteenth centuries was the increasing realism of artwork and the one-point perspective system. The former trend can be seen in the Northern Countries and the latter as coming from Italy. Dürer, having traveled to both places, gained firsthand experience with each. In Chapter 3, "Patronage and Terrestrial Cartography," I address these interrelated concerns. Dürer's Ptolemaic representation, the first known perspective drawing of the earth, was commissioned by the Emperor Maximilian I and completed in collaboration with the royal astronomer, Johann Stabius. Although he was completing a commissioned piece, Dürer had an academic license that allowed for him to visualize his own artistic theories of perspective, extending the map's projection system beyond the terrestrial limits

and into the surrounding icons as well. While Maximilian wanted to create a cultural, scholastic legacy and Dürer was interested in further promoting his academic capacity, Stabius never printed the map. This chapter argues that the projection system and symbolic implications were too advanced for contemporary audiences; therefore, the illustrated space could not be conceptualized as functioning ideologically. As there was not enough visual distinction between this map and Ptolemy's representations – and there were no accompanying diagrams explaining the projection system – this work was not publicly promoted. Thus, it functioned as a precursor to Dürer's celestial planispheres, his ultimate cartographic accomplishment and one that merged the full extent of his artistic, cartographic, and scientific facilities.

The fourth chapter, "Iconology and Celestial Cartography," focuses specifically on Nürnberg (as a center for both printing and humanistic circles) and on Dürer's relationship with Emperor Maximilian I (1459-1519), Holy Roman Emperor, who was interested in promoting the arts. Here I analyze Dürer's firmament maps within the tradition of celestial cartography. Celestial maps are visualizations of conceptual and theoretical frameworks. The former refers to the viewer's perception and the latter to the perspective or projection system utilized by the cartographer. Dürer's conceptual system relied on the tradition of firmament maps beginning in antiquity and continuing to spread temporally and spatially. Ultimately depicting classical constellation figures and Arabic star locations, contemporary astronomers viewed these Renaissance maps as scientific documents which could serve as reference material. Dürer's conceptual framework is multi-faceted. Referring back to his work with perspective systems and his terrestrial projection, the concept of these firmament maps related to the iconology of spherical perfection. In recognizing the futility of projection systems, two-dimensional maps could never compete with the globe's iconological perfection. These maps, then, as relating to the Renaissance genre of *fantasia*, fuse the concepts of human form and celestial shape in the best possible representation of divine perfection.

A final concluding chapter summarizes the arguments advanced in this thesis and offers a roadmap for future research at the intersection of the history of cartography and art history.

## METHODOLOGY AND LITERATURE REVIEW

Rather than providing a historiography detailing key geographical, cartographic, and mathematical innovations over the past three millennia, in this chapter I address ideologies of space and spatial representation as manifested visually in Renaissance maps. The methodologies I employ encompass a more holistic approach towards studying antique maps than has typically been done in the past. It is applicable to both antique and modern-day maps. Geography is, fundamentally, an analysis of space. As John Pickles argues “In a deep professional and intellectual sense, the geographical imagination is one that is historically and personally identified with the cartographic image.”<sup>12</sup> First defined semantically by Erastosthenes in the third century B.C., the practice of geography – analyzing or describing the earth verbally and pictorially – has arguably been around since the beginnings of written history with the terrestrial descriptions of Homer and the ancient Sumerian maps.<sup>13</sup> It is possible to follow the development of cartography beginning with the trigonometric principles founded in the Greek tradition of mathematical geography, however, Homer is responsible for the first recorded example of spatial analysis. His epic poems, the *Iliad* and the *Odyssey*, together describe the historical and geographical accounts of the Trojan War and subsequent efforts of soldiers to return home to Ithaca. Although contention as to the validity of actual place references in these works remains, the descriptions of land masses, humans, animals, and the interactions between these factors demonstrate a perpetual fascination that ultimately resulted in classifying relationships of locational space, the earth, and humanity.

Surviving examples of cartographic products increase in subsequent eras, with the advent of more permanent media. Maps during the Middle Ages were of two distinct types – small scale cosmological representations and global cadastral and navigational charts.<sup>14</sup> Medieval mapmakers augmented the field of

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<sup>12</sup> Pickles, John. *A History of Spaces: Cartographic reason, mapping and the geo-coded world*. New York: Routledge Press, 2004, 9.

<sup>13</sup> Martin, Geoffrey J. and Preston E. James. *All Possible Worlds: A History of Geographical Ideas*. John Wiley & Sons, Inc: New York, 1993. p. 2.

<sup>14</sup> Rizlin, George. “A Very Short History of Maps”. Copyright 2003.  
<http://www.rizlin.com/learn/history.html>. Consulted 13 November 2004.

cartography in their use of different map shapes. Although their small-scale world maps are stereotypically characterized by a lack of mathematical accuracy, maps were not limited to circular or rectangular outlines. Rather, irregular, ovoid, circular, and clock-shaped maps flourished.<sup>15</sup> Debates as to whether the form of maps indicates a cartographer's or an observer's perception of space have yet to be resolved. Some scholars argue that in the Renaissance and beyond, maps did not represent spatial thought at that particular time; rather they symbolized collected spatial data over a period of several centuries, thus giving the maps a dynamic nature.<sup>16</sup> The subjective nature of maps and mapmaking gained prominence within the discipline in the twentieth century, with Wright first elaborating the distinctions between the "subjective" and "objective" elements in cartography.<sup>17</sup> Indeed, the discipline of cartography has changed as representations of terrestrial and celestial space have become more commonplace, spatially accurate, and dynamic.

This chapter focuses on how maps have been read historically, both as artistic and scientific documents. The discipline of the history of cartography has evolved during the twentieth century. Historically, maps have been analyzed both artistically and scientifically. Cartography – as a form of art, education, livelihood, and propaganda – exists within multifaceted discourses. Scholars have studied the respective maps, their societal and cultural surroundings, and communication networks in order to shed light on the goals, methodology, and fundamental ideologies of space – building upon previous foundations, accepting some fundamentals, ignoring others, rejecting principles, and consciously rebelling against others. Historians of cartography study maps in their historical context. Although former generations of scholars may have focused on maps as physical objects of study, recent trends in scholarship highlight cultural influences that both

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<sup>15</sup> Thrower, Norman. *Maps and Civilization: Cartography in Culture and Society*. Chicago: University of Chicago Press, 1996, 39.

<sup>16</sup> Lestringant, Frank. *Mapping the Renaissance World: The Geographical Imagination in the Age of Discovery*. Translated by David Fausett. Berkeley: University of California Press, 1994, 113.

<sup>17</sup> John Kirtland Wright (1942) 'Map-makers are human: comments on the subjective in maps'



affect and are affected by maps.<sup>18</sup> The discipline of the history of cartography is currently divided between the traditional, predominantly descriptive practices, and the modern historians who approach maps critically and analytically.<sup>19</sup> Prior to 1970, cartographic historians analyzed maps in terms of the extent of geographical knowledge depicted. The modern movement, founded by the late J.B. Harley, changed the methodology. Subsequent research used a progression of different methods and interpretations. Casti defines the three phases in studying the history of cartography during the past century as: “the map-as object,” “deconstruction,” and “semiotics.”<sup>20</sup> The first stage analyzed the social context in which the map was created, examining the relationships between humans and their perceptions of their surrounding environments. The second phase, beginning with the scholarship of J.B. Harley, focused on maps in their wider contexts as social products. The third phase includes Casti’s own theoretical approach of analyzing maps within a semantic and iconic framework.<sup>21</sup> While the maturation of the discipline may be categorized in different ways, it is generally agreed that contemporary historians of cartography focus on three main study foci: the contention that the definition of maps has changed; the claim that maps need to be viewed within their economic and social contexts; and the belief that mapping is a universal pursuit, in all cultures throughout the ages.<sup>22</sup> Additionally, there is a recognizable need for a cartographic culture, which features maps as the focus of a unique discipline rather than their current position within other disciplines – in this case celestial maps representing a sub-discipline of astronomy.<sup>23</sup>

I attempt in this dissertation to analyze these three specific maps within the greater “problematic” or the discipline. Pollock defines a problematic as “the theoretical and methodological field from which statements are made and

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<sup>18</sup> Cook, K. S. (2004). "The 20th International Conference on the History of Cartography." *Imago Mundi* 56(1): 87-93:89. Blakemore and Harley (1980, 1981) – advocate a Panofsky-esque linguistic approach – formerly, the discipline had three, unacknowledged intellectual frameworks: “Darwinian,” “Old-is-Beautiful,” and “Nationalist”

<sup>19</sup> Edney 1999

<sup>20</sup> Casti 2005

<sup>21</sup> Casti’s philosophies of maps as iconic locational surrogates will be discussed later in the chapter.

<sup>22</sup> Buisseret, D. (2003). *The Mapmaker's Quest: Depicting New Worlds in Renaissance Europe*. Oxford, Oxford University Press, i.

<sup>23</sup> Harley and Woodward 1987

knowledge produced.”<sup>24</sup> The implication of this definition for the discipline as a whole and the specific research covered here is that in order to begin any analysis, an examination of the existing knowledge and methodology must be conducted. The disciplinary problematic is not highlighting the fact that cartographic representations have changed through the ages; rather, it is conceptualizing the reasons behind the changes. It is necessary to examine why these maps look the way that they do, investigating if the intended purpose was fulfilled and if the cartographic representations convey other ideologies or goals. The problematic for the history of cartography in this dissertation is my focus on integrating multiple methodologies to create a more holistic view.

The discipline, while still founded on the examination of maps, has extended to include other sources within the analyses. The history of cartography has become a broad field whose scholarship includes analyzing maps, their accompanying texts, manuscripts using maps for support, and the process of producing and marketing a map. The construction of a map always draws upon disparate information sources. Modern cartographic historians referencing these literary and artistic sources argue that maps should be conceptualized as “locational surrogates,” which are visual representations of real locations that use pictorial symbols to convey spatial information.<sup>25</sup> As a document replete with information – spatial, iconic, and otherwise – maps can be argued to be a type of language or literature, allowing for discourse of readership, literacy, authorship, censorship, and even political statements. The images and emblems used in maps are governed by rules and regulations, which in turn are influenced by overarching themes of commerce, social production, and political forces. Thus, maps are subject to and in turn become a source of power gained from knowledge. Cosgrove and Daniels elaborate:

Both in the selectivity of their content and in their signs and styles of representation maps are a way to conceiving, articulating, and structuring the human world which is biased

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<sup>24</sup> Pollock, Griselda. ‘Feminist Interventions in the Histories of Art: an Introduction’, in *Vision and Difference: Femininity, Feminism and the Histories of Art*, London: Routledge, 198: 1-17.

<sup>25</sup> Pickles 2004

towards, promoted by, and exerts influence upon particular sets of social relations.<sup>26</sup>

Perhaps the discipline is best understood as the analysis of the conceptualization, formation, distribution, and application of maps, charts, and other geographic materials in the context of the works themselves, as well as their broader social, political, and cultural surroundings.<sup>27</sup>

Maps – forms of art, education, livelihood, and/or propaganda – shed light on the methodology, artistic conventions, and fundamental ideologies of space pertaining to both the artist and the society in which he or she functioned. A map is a representation of the whole or a part of an area that graphically displays a spatial relationship. In 1973, the International Cartographic Association (ICA) defined cartography as both an art and a science, elaborating that cartographers have an artistic license to visualize spatial concepts, yet are bound by standardized conventions.<sup>28</sup> Hence, maps can be analyzed pictorially (in an art historical tradition). Some scholars argue that there is a difference between maps and other pictorial representations in that maps rely on learned skills for comprehension and thus the viewer relates to the two objects differently.<sup>29</sup> Others believe that the distinction between maps and other graphic images is a recent phenomenon.<sup>30</sup> Despite the belief of some cartographic historians that the debate surrounding the scientific and artistic status of maps is null, modern scholarship suggests otherwise.<sup>31</sup> Maps are currently being analyzed in light of both scientific and

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<sup>26</sup> Denis Cosgrove and Stephen Daniels, “Maps, Knowledge, and Power,” in *The New Nature of Maps*. Ed. Paul Laxton. Baltimore: The John Hopkins University Press, 2001: 50-8, 53.

<sup>27</sup> Harley (2001) created a schema for analysis. Maps could be analyzed in relation to: other contemporary maps, or features between maps; other maps produced by the same agency or cartographer; other maps within the genre (e.g. bird’s-eye views, similar projections or regions); and other maps produced around the same time period. J.B. Harley, “Text and Contexts in the Interpretation of Early Maps,” in *The New Nature of Maps* (Ed. Paul Laxton) (Baltimore: The John Hopkins University Press, 2001): 34-49.

<sup>28</sup> Chrisman, Nicholas R. “Institutional and Societal Components of Cartographic Research.” *Advances in Cartography*. Ed. J.C. Müller. London: Elsevier Science Publisher, Inc, 191: 231-242, 232.

<sup>29</sup> Wollheim, R. (1991). *What the Spectator Sees. Visual Theory: Painting and Interpretation*. M. A. H. Norman Bryson, and Keith Moxey. New York, Harper Collins: 101-150, 119.

<sup>30</sup> Thrower 1996: 3

<sup>31</sup> Cosgrove 2006: 35 asserts: “the history of cartography has freed itself from debilitating debates over the scientific and artistic status of maps” in *Maps, Mapping, Modernity: Art and Cartography in the Twentieth Century*. *Imago Mundi*; Jan2005, Vol. 57 Issue 1, p35-54, 20p

artistic concerns, with one concern usually dominating a particular study. Specifically pertaining to this scholarship, the fusion of science and art in the Renaissance provides an opportunity to fully explore the relationship between the disciplines in the context of both cartography as a historical discipline and studies of visuality.<sup>32</sup> Cook argues that maps are complex spatial representations that are understood on two different levels, the first by a viewer who conceptualizes the information in terms of how well the location is represented visually and the second by a viewer who takes into consideration the time period in which the map was produced, as well as the surrounding historical context that may have influenced the cartographic and artistic symbols used.<sup>33</sup> Maps, as visual representations of spatial locations, have multiple roles: picturing spatial order, depicting spatial relations, and showing aesthetic and historical symbology, among others.<sup>34</sup>

Parallels abound between cartography and traditional pictorial art: medium, color, line, symbolization, composition, form, and perspective. Therefore, it is natural that contemporary historians of cartography approach maps from the many critical thinking methods of art historians. Due to the visual nature of maps as well as to the current trend within both art history and the history of cartography towards interdisciplinary research, it seems as though a collaborative methodology between both fields would satisfy and inform the scholarship of each.<sup>35</sup>

The discipline of the history of cartography has been informed by and transformed interdisciplinary scholarship. It has moved beyond traditional disciplinary boundaries. Cartographic research has expanded to the fields of cartography, geography, literary studies, art history, and the history of science.<sup>36</sup> The information disseminated – both pertaining to contemporary cartographers of past centuries and to the sources used by twentieth-century historians – has

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<sup>32</sup> Visuality will be defined later in the chapter and compared with the term “visualization,” as they are used in contemporary studies.

<sup>33</sup> Cook 2004: 89

<sup>34</sup> Pickles 2004: 4

<sup>35</sup> Casey (2001) argues that geography is becoming increasingly dependent upon philosophy and vice versa.

<sup>36</sup> Edney 1999

provided and will continue to provide new and interesting studies that will continue to expand the field of the history of cartography. One of the disciplines that has informed the history of cartography is historical studies in general. Historical studies have focused on the concepts of cyclical and linear history. Oswald Spengler's *The Decline of the West* (1918) was a study in the philosophy of history that argued for a cyclical view of civilization resulting in the irreversible cycle of growth and decay. He argued that the histories of all cultures follow a similar pattern of development which can be observed in varying degrees in each culture's art, politics, mathematics, and science. In art, the Western manifestation is the idea of perspective as defining view and direction, relating to the overall theme of society as being a culture of will and directedness. Arnold Toynbee contradicted Spengler's philosophies by arguing that societies do not face inevitable decline and, more importantly, that it was possible – even necessary – to break the cyclical pattern of history.<sup>37</sup>

Cyclical histories of art were null with the advent of modernism, which is itself a break from the past. In outlining a continuity between the nineteenth and twentieth centuries, historians disregarded methodology which focused on the cultural context and instead looked to individual achievements. A break in history occurred, as it was no longer possible to trace histories from the pre-modern period to the present; the universal history of the discipline was discarded in lieu of interpretive studies and relativism.<sup>38</sup> Scholars argue that the only remedy for this situation is to examine the relationship between artifacts and the culture in which they are produced.<sup>39</sup> Hatt and Klonk argue that history entails “identifying differences (in time, or in time and space) and using them to reflect upon what we might otherwise take for granted about our own understanding of the world.”<sup>40</sup>

The aforementioned visionary in studies of the history of cartography was J.B. Harley, whose work incorporated philosophies from the disciplines of history, art history, linguistics, and others. Harley strove to discover the social power of

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<sup>37</sup> Arnold Toynbee. *Study of History*. 1934.

<sup>38</sup> Belting, Hans. *Das Ende der Kunstgeschichte*, Munich, 1984.

<sup>39</sup> Fernie, Eric. *Art History and its Methods*. London: Phaidon Press, 1999.

<sup>40</sup> Hatt, Michael and Charlotte Klonk. *Art History: A critical introduction to its methods*. Manchester University Press: Manchester, 2006, 244.

maps, merging the discipline with that of art history and literature in the examination of representations of power. Incorporating the ideas of Michel Foucault, Harley demonstrated the embodiment of cultural ideologies and power/knowledge relations within maps.<sup>41</sup> Harley introduced the concept of a map as a social product and social actor that exists within a complex network of social relations and interests; therefore, any analysis of cartography must include an evaluation of social contexts of emergence, dissemination, and use. Using methodology found in literary criticism and art history allows for discourses surrounding maps as visual texts. Rather than simply locating, naming, and recounting features, maps evaluate, persuade, and appraise. Harley advocates examining the iconology used, as symbols function on different levels and reflect the region, feature, society, and individual cartographer, engaging in a power dynamic. The history of cartography is, therefore, a discovering of hidden agendas, omissions, and ideological critique. It is understanding the prevalence of power-knowledge of cartography over the centuries and the ability to deconstruct the so-called objectivity and science of cartography that comprises the discipline of the history of cartography.

Harley utilized theoretical art history, the focus of which is to examine the culturally- and historically-specific ways of viewing and representing things visually. Incorporating art historical theory into the discipline of the history of cartography makes use of the same methodology, ultimately informing both disciplines by expanding their interdisciplinary breadth. In order to fully develop an interdisciplinary methodology, it is necessary to understand the field of art history. Art historical writings – as they relate to this research – began in the Renaissance. The discipline of the history of art contains many key players and methodologies, in general, evolving from a focus on unique pieces as demonstrating individual artistic genius, embodying social or spiritual beliefs, or demonstrating high culture to the current climate of diverse approaches highlighting the individual artist, works of art, the social or cultural forces, as well as the ideological structures.

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<sup>41</sup> Harley 1988

From antiquity through the Western Middle Ages a continual analysis of art focused on examining each work in terms of size, cost, artist, techniques used, and their degrees of likeness. The Renaissance broke with this tradition in three distinct ways: art became its own discrete subject; the proliferation of printed literature enabled subsequent scholars of the history of art to reference past works, generating a continuous tradition until the present day; and, argued by Fernie as the most important influence, Petrarch's formulation of civilization's cyclical nature became a foundation for the conceptualization of Renaissance culture.<sup>42</sup> Humanism had established the central nature of humanity in understanding the world. In Renaissance studies of the history of art, the focus was similarly on humanist ideology, stressing individual accomplishments.

Arguably the first art historian in the modern sense, Giorgio Vasari published *The Lives of the Artists* in 1550. Stressing connoisseurship and humanism and focusing on judgments about the canon of great works determined by the degree of realism achieved, for the most part Vasari ignored the social and historical context of art in lieu of delineating how individual artists fit into his model of cyclical development. One of Vasari's goals in writing *Lives* was to advance the artists' status from that of an artisan to one of higher social prestige. He writes that some men achieve greatness through perseverance, some through study, others through imitation, and some who use scientific knowledge as an artistic aid. Art historians following Vasari all focused on the individual artist.

The first scholar to focus on the history of art rather than of artists was Johann Joachim Winckelmann, who advocated using relevant information sources to situate documents within their cultural contexts, developing a forerunner to the concept of cultural history. Winckelmann attributes talent, in part, to geographical phenomena, writing:

“The superiority which art acquired among the Greeks is to be ascribed partly to the influence of climate, partly to their constitution and government, and the habits of thinking which originated therefrom, and, in an equal degree also, to the respect for the artists, and the use and application of art” (Book IV: Art Among the Greeks: in Fernie 1999: 74).

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<sup>42</sup> Fernie 1999

Beginning the German tradition of art history that has continued throughout the twentieth century, the above quote highlights the geographical or spatial considerations within the art historical tradition. Winckelmann credits climate as a factor in artistic production within the discipline of art history. The beginning half of the twentieth century proliferated with theories of climatic influence on societies in geographical studies, led by Ellsworth Huntington. Huntington argued that a society's ideals, habits, goals, and institutions are adapted for that specific physical environment.<sup>43</sup> The geographical environment, therefore, is key in the social and economic systems that cultures develop. Similar to Winckelmann, Huntington argues that one of the two dominant factors in influencing cultures is climate:

Climate, of course, operates through soil, vegetation, animals, diet, clothing, housing, disease, and other factors, as well as directly. Nevertheless its greatest social influence is probably its effect on inclination to work. This inclination depends primarily upon man's inheritance of delicate climatic adjustments, which make him extremely sensitive to differences in weather.<sup>44</sup>

Although disregarded by most geographers as an incorrect attribution of cultural accomplishments, Huntington's work is nevertheless critical in demonstrating the far-reaching scholarship possible with geographical studies.

Another seminal influence on geographical thought was Immanuel Kant, who also played a central role in the philosophies of many art historians. Elaborating upon David Hume's empiricism, Kant argued that the foundation of human knowledge lies within sense-experiences, but that there also exist innate conceptions that aid in humanity's empirical organization. Subsequent art historians engaged with Kant's claim that sense perception resulted in a different knowledge than logical or conceptual understandings of material. Wölfflin, Hildebrand, Fiedler, and Panofsky all built upon Kantian principles.<sup>45</sup> His contribution to geography was his delineation of the subject as one that categorizes

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<sup>43</sup> Huntington, Ellsworth. Civilization and Climate. New Haven: Yale University Press, 1924, 286

<sup>44</sup> Huntington, 290

<sup>45</sup> These individual philosophies will be addressed in the following sections on theoretical approaches.



descriptions of things as they relate spatially, writing in his *Critique of Pure Reason* (1781) that physical classifications of knowledge result from studies of antecedent chronology, as similar things have similar origins.<sup>46</sup>

As these examples show, both art history and geography are disciplines informed by other fields. While both borrow from philosophers and historians, it has been only in the past half-century that geographers, and specifically cartographic historians, have engaged with art historical ideology. Art history is a field that analyzes visual culture through multidimensional studies of artwork. Understanding the visual or aesthetic qualities of the pieces, the lives and influences of the artist, the patron who commissioned the piece, the contemporary audience, and the places in which it was displayed are all considerations. Most contemporary scholarship focuses on the relationship between art and the surrounding political and social contexts, the production of the medium, and the market (art collecting, commissions, patronage, etc.), ultimately recognizing or categorizing the recognizable emblems within the works.<sup>47</sup> Pollock defines the discipline of art history as being composed of “representational practices” and ideological discourses that are responsible for delineating certain techniques and procedures designed to produce specific representations.<sup>48</sup> Recent art historians have stressed the interdisciplinary nature of the field. Bourdieu calls for art to be seen in its sociological and historical context, arguing that understanding can only occur after analyzing the production, circulation, and consumption of pieces in light of the viewer’s cultural competence.<sup>49</sup> Similarly, Hatt and Klonk relate that theoretical art history analyzes the ways pictures are viewed in their historical and cultural contexts.<sup>50</sup> Asserting art’s historical foundations – “that art is fundamentally historical” – they describe theory as the method for describing how images can be understood by viewers removed from the original cultural and

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<sup>46</sup> Martin, 110.

<sup>47</sup> Sprocati, S. (1992). *A Guide to Art*. New York, Harry N. Abrams Inc, 7.

<sup>48</sup> Pollock 1988

<sup>49</sup> Bourdieu, Pierre. *The field of cultural production : essays on art and literature*. New York: Columbia University Press, 1993, 112.

<sup>50</sup> Hatt and Klonk 2006

historical context.<sup>51</sup> Baldwin *et al.* stress the explanatory nature of the discipline, writing:

Art history has to be explanatory, because artists are producers; that is to say, if art history is *not* truly explanatory – if the circle of ‘understanding’ is not broken by identification of those types of causal explanation from which our anthropologist abstains – then the status of the artist as a producer will remain masked and his works will continue to generate mere problems of translation and discrimination for those equipped to argue about what place works of art are to have in the decoration and justification of their own lives...<sup>52</sup>

Baldwin *et al.* stipulates logically describing the works of art, understanding the interpretations of artistic must be done while keeping in mind the artistic medium and modes of production, as well as always being aware of and critical of the art historian’s own methodologies, prejudices and interpretations.

It may be argued that one of the reasons critical theory is necessary in the discipline of art history – and the history of cartography – is due to the scholars themselves. Similar to Baldwin *et al.* who stress the role of the academic in interpretations of artwork, Parker and Pollock find art to be an ideological exercise rather than an objective practice.<sup>53</sup> Fernie sees the discipline to currently be fragmented between the iconographers and aesthetes and the revolutionaries predicting the end of art theory. However, he argues that the discipline – which focuses first of the subjective nature of visual perception and second on the illustrations as its subject matter – has great future potential.<sup>54</sup> Emerling (2005: 243) writes of the “gift” of theory to the discipline:

To receive this gift, art history must take as its task a radical passivity: an *ekphrasis* of the work of art that resists giving it meaning and instead attempts to think the event, the interruption of the same, another relation between subjects and objects – an ethics of the self. Theory is an attempt to construct another experience of art.

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<sup>51</sup> Hatt and Klonk (2006: 140) reiterate: “art history is founded on two basic beliefs: (1) the notion that art is historically specific; and (2) that it changes over time in a manner for which art historians can account.”

<sup>52</sup> Baldwin 1981

<sup>53</sup> Parker, Rozsika and Griselda Pollock. *Old mistresses : women, art, and ideology*. New York : Pantheon Books, 1982.

<sup>54</sup> Fernie 1999

Art historians do not strictly adhere to one approach at the expense of others; rather, methods are combined to fulfill different goals. This is not done arbitrarily, though, as not all methods are compatible. Rather, all the theoretical methods used by art historians can be grouped into four broad categories, each highlighting a main approach to the study of why objects look a certain way: studying the object's history to understand the purpose and affiliation, date of completion, technique, and authenticity (formalism); stylistic analysis examining the aforementioned characteristics, but focusing as well on the surrounding pictorial traditions and the quality of the specific piece (connoisseurship); analysis of the social context, the conditions of production, consumption, and reception (Marxism); and an overall application of specific pieces to the broader cultural and historical context, including engagement with ideological and theoretical approaches to artwork (semiotics, post-modernism).<sup>55</sup> Each of these categories will be explored in-depth in the following sections, seeing first how they relate to the discipline of art history, then how they have related to cartography and finally speculating on further applications of each approach within the discipline of the history of cartography.

Taken individually, both art history and the history of cartography are interdisciplinary, resulting in dialogues with other academic fields. Recent scholars have consulted art history theory for guidance in their own methodology when understanding visual documents.<sup>56</sup> Discourse between art history and geography can and will inform both fields. Methodological guidance from art history helps cartographers “read” maps, as pictorial descriptions, as objects delineating “real” representations of the world, visual ways of organizing knowledge, and images showing fundamental beliefs of space. Conversely, Fernie argues that the disciplines are more related than previously thought, as both question objects, humans, and the interrelations between them, writing: “Geography can illuminate art history both practically, by providing particular kinds of physical information,

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<sup>55</sup> List modified from Fernie 1999

<sup>56</sup> Hatt and Klonk 2006.

and metaphorically, by offering different ways of thinking about things.”<sup>57</sup> The disciplines of art history and the history of cartography have transcended traditional disciplinary boundaries, informed and transformed by philosophical/ideological discourses from philosophy, economics, literature, and the natural sciences.

### **Review of Possible Approaches**

Ideological, theoretical, or critical approaches cannot necessarily be classified by period or in chronological order. In analyzing how and why the disciplines have evolved into their current foci, there are many classification schemes that can be used. Martin and James generalize geographic thought over the past three millennia as adhering to either nomothetic or idiographic principles.<sup>58</sup> Fernie roughly classifies thought as moving from a focus on specific or unique illustrations within prescribed value hierarchies to the current climate where a multiplicity of approaches is promoted.<sup>59</sup> Emerling argues for a chronological classification, with thought split between the former tenants of ontology and contemporary critical theory.<sup>60</sup> Mosher argues that current historical geography focuses on a world-systems analysis, categorizing thought in terms of scale.<sup>61</sup> Colton *et al.* categorize current historical geographical scholarship in the United States as focusing on world systems, migration, capitalist development, human use of and impact on environmental factors, and the study of Native Americans.<sup>62</sup> Creating more categories of thought, Colton *et al.* structures geographical scholarship on the basis of collaborative disciplines. Specifically pertaining to the history of cartography, Harley’s theoretical framework included five themes: map availability; how contemporaries viewed maps; the education of users; “the operational suitability of particular maps for specific purposes;” and documented cases of maps being used in decisions related to geographical

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<sup>57</sup> Fernie 1999: 341

<sup>58</sup> Martin and James 1993

<sup>59</sup> Fernie 1999

<sup>60</sup> Emerline 2005

<sup>61</sup> Mosher 1999

<sup>62</sup> Colton *et al.* 2003

questions.<sup>63</sup> Hatt and Klonk trace historical writings from Herder's synchronic philosophies of visual texts – which stresses a work of art's reading in its contemporary context – and the modern diachronic view, which traces social changes as they influence works, both past and present.<sup>64</sup>

In addition to the overall classification schemes, different scholars emphasize different aspects of study. Winckelmann emphasizes social context, whereas others (Frankl, Onians, Belting, Pollock, Oguibe) stress the importance of the theoretical framework of the art historian when analyzing illustrations. Some researchers focus on the aesthetics of the piece and how the various elements fit within the broader discipline/practice of art (Burckhardt, Riegl, Wöfflin, Panofsky, Gombrich, Alpers). It is also possible to analyze both how the individual aspects of a work argue for an overall judgment (Morelli, Berenson) and how the synthetic whole creates meaning outside of its smaller components (Riegl, Wöfflin). Ultimately, each represents a description of changes and an explanation for these changes. Hatt and Klonk identify the hermeneutic problem in contemporary, relativistic approaches in that while it is possible to identify shifts and breaks in artistic traditions; however, it is not possible to explain why these discontinuities are manifested in the particular way.<sup>65</sup>

Each approach has its strengths and weaknesses. Scholars generally do not strictly follow one approach; rather, parts of different ones are combined. Additionally, the approaches themselves rely on how they compare and contrast with previous and subsequent ones (i.e., iconographical studies rely on previous connoisseurial attributions). For this dissertation, pre-existing categories will be used to classify and group the various ideologies. As the groups are not wholly independent, their categorizations are done in a general sense and not without some amount of flexibility of boundaries. The following approaches will be examined: connoisseurship, formalism, iconography, Marxism/social histories of

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<sup>63</sup> An overview of Harley's composite philosophies as summarized in Edney 2005c: 17

<sup>64</sup> Hatt and Klonk 2006: 22 "The task of art history has been widely understood to be that of tracing the changes and developments that artworks have undergone over the centuries...Only with this [diachronic view] in place did an understanding of art as developmental emerge, one which in the full sense constituted a history."

<sup>65</sup> Hatt and Klonk 2006: 163

art, structuralism/semiotics, post-structuralism/post-modernism, and post-colonialism. Connoisseurship stresses aesthetic significance and the qualitative judgments made about works. Formalism also involves looking at works of art; however, it places emphasis on the visual analysis of illustrations within their historical context rather than on their perceived value. Iconographic studies attempt to explain the meanings inherent within images due to the signs used. The cultural and social histories of art focus on the pieces in a broader context, understanding the religious, political, economic, and social background of the artist and the culture in which the pieces were produced. Semiotics and structuralism argue for meaning to be understood in the context of the pieces themselves, looking at the overall system of interpretations. Post-modernism deconstructs grand narratives, arguing for each piece to be read without a sense of progression, while understanding that any interpretation is one of an infinite amount. Finally, post-colonialism argues that academic thought has been dominated by Western ideologies, representing another possible way of viewing both Western and non-Western products. Each of the aforementioned approaches will be discussed in terms of fundamental beliefs, as the foundations behind each ideology are analyzed and key players in the fields of art history and the history of cartography will be discussed.

### **Connoisseurship**

The concept of connoisseurship began in the sixteenth century; however, its evolution throughout the nineteenth and twentieth centuries as an approach to analyzing artwork is distinctly different from the earlier constructs. Contemporary approaches constitute an empirical approach to art history, finding foundations in the methodology of the disciplines of science and history. Ultimately, historical data pertaining to the artist, location, and individual and social facts were important in ultimately making aesthetic quality judgments. Karl Friedrich von Rumohr (1785-1843) initiated the new tradition of connoisseurship, discussing the characteristics of manner/style, artistic character, and the metaphysics of individuality. For Rumohr, “manner” is the artist’s handling of form; “style” refers

to the technical and purpose-related constraints imposed on artists by the medium with which they work and their patron. Rumohr (1827-31, vol.I: 87) writes that style is “a submission, grown into habit, to the intrinsic demands of the material.” Therefore, while manner is subjective, style is both subjective and objective as it is expressive of individual artists as well as their historical surroundings. Therefore, the metaphysics of individuality values the individual expressiveness that creates distinct works which, while retaining individuality, remain characteristic of their age.

Giovanni Morelli (1816-91) argued that Rumohr and other German art historians founded their arguments on unreliable documents and that the only evidence that should be used is the work of art and its visual forms. The culture in which the work was produced only affects the themes and what is pictured in the image, not the style itself. Bernard Berenson, sometimes considered to be the most influential art historian in the beginning of twentieth-century America, used the methodology founded by Rumohr and Morelli, stating in his *Rudiments of Connoisseurship* (1902) that art historians should be concerned only with the authenticity of pieces, rather than their surrounding histories. The connoisseurship approach today is generally described as a comparative analysis of works within their historical contexts.

There exist many historians of cartography who adhere to the philosophies of connoisseurship. Especially at the first half of the twentieth-century, in which qualitative narratives of the history of cartography proliferated, the descriptive chronologies of Hinks, Thrower, Wallis and Robinson stress authorship and date, the classification of maps by type, and the artistic conventions used (i.e. font type, information condensation, stylistic principles – hachure lines).<sup>66</sup> An emphasis on map projection can be seen as a connoisseurial trait. In this sense, different mapmakers’ strategies for representation can be seen in how they chose to represent the world. Just as connoisseurs focusing on art history deconstructed depictions of hands and ears in order to determine authorship, cartographic historians focus on projection and areal accuracy.

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<sup>66</sup> Hinke 1942, Thrower 1996, Wallis and Robinson 1987

In studying Dürer's maps, this approach can be seen by Sladeczek, who compares details of these woodcuts with the images found in the *Weltchronik* to determine the authenticity of the pieces as Dürer's. It is necessary to include aspects of connoisseurship in an analysis of historical maps. Without knowing the authenticity of a piece, it is impossible to conceptualize the historical and societal surroundings that may have influenced its appearance and production. Additionally, all subsequent approaches to art history and the history of cartography build upon the foundations of connoisseurship.

### **Formalism**

Formalism is considered a historiographical method, arguing that a work of art can be understood and analyzed in terms of its physical appearance, which is reflective of an overall style. Heinrich Wölfflin (1864-1945), the founder of formalism, expounded empirical tools that art historians could use to analyze visual style. Wölfflin and Alois Riegl (1858-1905) extended the meaning of style into something characteristic of an age, explaining the historical dimensions of art and culture. Formalist approaches focus on the formal properties of illustrations, arguing that there is a developmental logic inherent within these forms comprehensible to an observer. Riegl's concept of *Kunstwollen* (will to form) altered from art's internal development and autonomy to how the perceptual and social world is artistically represented. Riegl conceived of the history of art as a diachronic series, comprised on individual features, whose stylistic changes reflected perceptual changes on the part of the artist. Contrary to the belief that formalism ignores the surrounding cultural context, Riegl and Wölfflin began by identifying the stylistic changes within the greater cultural surroundings.

While there are undercurrents of formalism in the American tradition for the history of cartography, it has never come to the forefront of the discipline. Strong adheres to a formalist interpretation of the history of cartography when writing of cartographic developments as being characteristic of their time and



location.<sup>67</sup> In general, however, American scholars have not engaged in historical studies to the point of their European counterparts. Sauer criticized geographers for a “lack of interest in historical processes and sequences, even the outright rejection thereof.”<sup>68</sup> In the history of cartography, early mapmakers were identified by their maps, without necessarily extrapolating stylistic conclusions to a wider cultural context and later mapmakers were analyzed in terms of representational accuracy rather than the formal properties of the maps. Kish’s study of renaissance cartography is an example of a study in formalism, with general characteristics of map styles – in this case the tendency to project landforms onto unconventional shapes – related to the broader cultural context without attributing this affect to that of societal influences.<sup>69</sup>

A criticism of formalism is that cultures are not as stylistically homogeneous as the methodology assumes. Gombrich advocates taking into consideration further influences of the technological requirements of the medium, the role of the patron, and the pictorial traditions available to artists at the time.<sup>70</sup> Gombrich represents one end of the spectrum, being hypercritical of the tenants of formalism. While cultures are inherently heterogeneous and infinitely complex, in introducing too many variables, studies are in danger of being too specific. An over-specialization or specificity of specific pieces, movements, styles, or periods loses the focus of the discipline as a whole, which aims to analyze and explain changes in art throughout history. Similarly, in attempting to conceptualize changes in maps and spatial representation throughout history, it is important to understand both the formal aspects as well as the surrounding contexts.

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<sup>67</sup> Strong, Helen M. “Maps and Business”. *Annals of the Association of American Geographers*; Mar27, Vol.17 Issue 1, p15.

<sup>68</sup> Sauer, Carl O. “Foreword to Historical Geography.” *Annals of the Association of American Geographers*; Mar41, Vol. 31 Issue 1, p1, 24p. 2.

<sup>69</sup> Kish, George. “The cosmographic heart: cordiform maps of the 16<sup>th</sup> century”. *Imago Mundi: A Review of Early Cartography*. Vol. XIX. Amsterdam: Hooiberg Printing, 1965: 13-22, 13.

<sup>70</sup> Gombrich, Ernst H. *Art and Illusion: A Study in the Psychology of Pictorial Representation*. (London: Phaidon, 1960).

## Iconography

Unlike formalism, which examines the formal elements of different pictorial works, or connoisseurship, which evaluates the intrinsic attributes of genuineness and quality and aesthetics, understanding works in their cultural framework comprises a “contextual” view of art history. Contextual art history attempts to create a composite of social, political, economic, and religious influences that would have affected the artist and his or her surrounding culture. Aby Warburg (1866-1929) is often recognized as the founder of the iconographic-iconological approach. Naming his method “critical iconology,” he traced motifs throughout cultures and art forms. Iconology, referring to Cesare Ripa’s publication of an emblem collection in 1613 (*Iconologia*), meant the linking of motifs in art to textual sources.<sup>71</sup> Warburg understood critical iconology to mean the analysis of historical materials as they influence contemporary “angst.”

Panofsky, arguably the most well-known practitioner of the iconographic method, argued that critical iconology worked to amalgamate individual subjectivity with an objective conceptualization of the world. In order to understand past cultures, there must be some amount of disjunction – distance and difference between the two. Prior to Panofsky’s conception of art, art historians had rejected Hegel’s theory that art, and other intellectual activities, comprised a certain type of knowledge. Panofsky restored the connection between representations of the world and how it is conceived, arguing that different periods produced different styles, which reflected diverse ways of conceptualization. Panofsky diverged from Hegel’s argument that decreased realism indicates an increased subjectivity in art. Rather, Panofsky contends that art is a way of objectifying the subjective – the conscious, personal, human dimension – so that it can be independently and publicly viewed. Riegl’s formalism had reduced iconography to an auxiliary subject. Panofsky promoted it as central to the study of art, as the theoretical study of signs became central to decoding images.

Panofsky’s theories can also be compared to those of Ernst Cassirer (1874-1945). Both scholars build on Kantian foundations that knowledge of the world

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<sup>71</sup> The word *iconologia* is a reference to the explanatory texts that accompanied allegorical images.

comes through sense perception. Panofsky and Cassirer both argue that perception and cognition can be divided into forms of space, time, and causality, which are all part of ordering the world by the human mind. Cassirer's categories for meaning and order – created by individuals – are known as “symbolic forms,” which he finds to be objective. Therefore, Cassirer argued that different artistic representations and visualizations result from the infinite possibilities of representing the same shared concepts or mental structures. Panofsky disagreed, arguing that all experiences are subjective that it is only through contemplation that objectivity can be attained.

Panofsky's iconographical-iconological method is founded on the belief that the human mind is simultaneously universal and particular; every work is culturally and historically specific but can be interpreted by other cultures and times. His method comprises three stages: understanding the formal elements of an image, analyzing the subject's iconography, and finally understanding the iconology of the culture in which they were produced. Thus, iconography studies the emblems depicted and iconology analyzes the symbols in relation to their historical context. Unlike Wölfflin, who argued that content does not change throughout history, Panofsky argued that stylistic differences signify changes in content, which vary throughout the ages. Pertaining to the Renaissance conception of humanity, Panofsky clarifies its meaning, as it stems both from the human traits of rationality and freedom and on knowledge of humanity's limitations (“fallibility and frailty”), creating themes of responsibility and tolerance, respectively.<sup>72</sup>

Panofsky addressed the historian's conundrum that one must analyze facts in light of a framework; however, that framework is created through knowledge of the facts or events. In studying the history of cartography, both the sciences and humanities must be addressed, as cartography was simultaneously a scientific and artistic endeavor. Panofsky differentiates between science and the humanities, as the former studies the “cosmos of nature” and the latter the “cosmos of culture.”<sup>73</sup>

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<sup>72</sup> Panofsky 1940.

<sup>73</sup> Panofsky 1940.

The two structures are similar in that both are spatio-temporal. Panofsky elaborates:

Two historical phenomena are simultaneous, or have a determinable temporal relation to each other, only in so far as they can be related within one 'frame of reference', in the absence of which the very concept of simultaneity would be as meaningless in history as it would in physics.<sup>74</sup>

It is important to keep Panofsky's concerns in mind when studying the history of cartography. Pertaining to the historian's conundrum, a framework must be created that takes into account the social, political, economic, and religious effects. There is obvious subjectivity in creating this framework in terms of the sources chosen, the interpretation of said sources, as well as the availability of background material (i.e., what has survived, what has been made publicly available). In attempting to merge the sciences and humanities within one frame of reference, it is also important to see the disciplines as comparable, both in terms of time and space. Maps are thus analyzed based on where they were made and when they were made in order to create a framework for subsequent analysis. The key point made by Panofsky that resonated within the discipline of the history of cartography is that the cultural framework encodes meaning within the visual symbols used; in understanding this meaning, historians can better conceptualize how maps were used to visually represent ideology.

In the discipline of the history of cartography, iconography has been defined as "the mechanism for map language itself, by which both factual and symbolic meanings were encoded in a map to affect the map reader."<sup>75</sup> The founder of the critical and analytical movement is the late Brian Harley, the most visible critic of the discipline. Concerned with methodological and interpretative rigor in early map content-analysis, Harley advocated a Panofsky-esque understanding of iconology, focusing on the conscious manipulation of maps by their makers for conveying specific meanings.<sup>76</sup> Harley used Panofsky's iconology

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<sup>74</sup> Panofsky 1955: 108

<sup>75</sup> Harley 1983

<sup>76</sup> Harley 1987

as a foundation for analyzing cartography.<sup>77</sup> In Panofsky's iconological analyses, there exist three levels: the first deals with the artistic motifs, the natural subject matter; the second level concerns the conventional subject matter; and the third is the intrinsic meaning. Harley suggested cartographic parallels to the models so that analysis would include: firstly, dealing with the conventional signs; secondly, looking at the specific locations represented and their pictured topography; and thirdly, examining the "ideologies of space" and the emblematic meanings of the maps.

J.H. Andrews critiques Harley's appropriation of Panofsky's framework elaborating that even on the first level, which in art is represented by primary elements/conventional signs or "point symbols" that typically can be represented verbally with nouns, on a map translate to "indicative statements" of inherent spatiality.<sup>78</sup> The second level in Panofsky's framework is exemplified by common signs that, when placed, together signify more universally-understood meanings such as dining men representing the Last Supper or other iconic configurations. Blakemore and Harley compare this cartographically to the representation of locations – such as a town – where the visual representation evokes the associated verbal proper noun (i.e. a drawn city representing the word "city" in the viewer's mind).<sup>79</sup> Finally, the uppermost level of meaning is "intrinsic, latent, or iconological," representing for Harley the ideological foundations and meanings of maps that are analogous to those of art, music, poetry, and architecture. It is this third level of meaning which is the most problematic for historians of cartography. The first-level meanings of symbols can be empirically identified; however, the abstract or semantic meanings of the emblems used can never be completely verified.

Criticism of Panofsky's methodology by art historians argues that he over-intellectualizes art, that the history of changing social relations is largely ignored, and that through this methodology cultures are homogenized. Fernie criticizes Panofsky's "armchair" approach to art, which focuses more on ideologies than on

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<sup>77</sup> Harley 2001

<sup>78</sup> Andrews 2001:8

<sup>79</sup> Andrews 2001: 9

fieldwork.<sup>80</sup> Discarded by cartographers focusing on map communication and structural linguists, both of the aforementioned groups argued that this theory – as outlined by Harley – overemphasizes the meaning constructed by the map reader.<sup>81</sup> Harley is also purported to have used iconography to prove the political values imposed on map readers, allowing him to make overall statements pertaining to the power of map representations.<sup>82</sup> Despite these arguments, subsequent scholars have found great merit in Harley’s methodology, even elaborating on his ideas. Cosgrove and Daniels assert that the iconology of maps carries not only pictorial symbolism, but also symbolism associated with the geographical location, area, or feature represented.<sup>83</sup>

Harley himself extended his critical approach from iconology to semiotics, eventually conceptualizing of maps as both iconography and language, functioning within the discourse of cartography.<sup>84</sup> As Harley began to expand cartographic analysis from a “language” to a “literature,” he also moved from believing maps to be “iconographic” to “iconological,” replacing Panofsky with W.J.T. Mitchell.<sup>85</sup> Mitchell contrasted “iconography” with “iconology,” the latter referring not only to the decorative or allegorical elements, but to all coded elements within images.<sup>86</sup> This move enabled Harley to focus on all maps’ political symbolism, strengthening his case for map meaning that was determined by the cartographer’s social situation.<sup>87</sup> By extending Panofsky’s framework to focus more on the social context, Harley and other historians of cartography incorporated methodology from Marxist or social histories of art.

### **Social Histories of Art**

The 1970’s marked a criticism of art history from within the discipline, with scholars citing its ignorance of literary and historical critical methodology

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<sup>80</sup> Fernie 1999: 183. i.e. the methods of production, the effect on the work of the techniques available...the social function of the work and the audience’s expectation

<sup>81</sup> Petchenik 1977, also see Harley 1982

<sup>82</sup> Edney 2005e: 6

<sup>83</sup> Cosgrove and Daniels 2001: 54

<sup>84</sup> Semiotics and post-structuralism will be covered in-depth later in the chapter.

<sup>85</sup> Edney 2005e: 93

<sup>86</sup> Mitchell 1986

<sup>87</sup> Edney 2005e

from the prior decades, adding the necessity of studying art within the social context of the artist and observer. Thus the focus shifted from studying the objects themselves (as outlined in the aforementioned methods) to power structures. Marxist and social histories of art focus on the interrelations of images with politics, religion, economics and gender. Marxism is founded upon historical materialism, which argues for change as a result of human action. Hegel argued that ideas shape circumstances, where Marx argued that the human struggle formed ideas. For art history, Marx's idea of form as content is central. Reflecting the base/superstructure concept in which the economic base determines all of the social institutions, political ideologies and individual consciousnesses or the overarching superstructure, the politically-engaged Marxist approach argues that although art is created from the base, it has the potential to transcend ideology even to the point of transforming the base. Thus, the power of art lies not in society's affect on its representation, but on its ability to change viewers' perceptions of both historical and social reality.<sup>88</sup> Social art historians are not merely concerned with how artistic pieces function within society, but with the relationship between the context and the works and the consequences of this affiliation.

Felt by many academics to represent the turning point of the discipline, the writings of T.J. Clark concentrated on understanding art's social history through an examination of economic models and detailed historical evidence.<sup>89</sup> For Clark, the aim of the art historian is to reconstruct the conditions surrounding the production of works, including their reception by audiences and patrons.<sup>90</sup> As styles are argued by Clark to be visually representative of philosophy, in understanding the social context of pieces, art historians can better conceptualize their ideologies. On ideology, Clark elaborates:

Therefore one ought to beware a notion of ideology which conceives it merely as a set of images, ideas, and 'mistakes', for its action on and in the process of representation is different from this: it is more internal, more interminable.

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<sup>88</sup> Emerling 2005: 20

<sup>89</sup> Fernie 1999

<sup>90</sup> Clark 1974

Rather, an ideology is a set of limits to discourse, a set of resistances, repetitions, kinds of circularity. It is that which closes speech against consciousness of itself as production, as process, as practice, as subsistence and contingency. And of necessity this work of deletion is never done: it would hardly make sense to think of it finished.<sup>91</sup>

Clark's notion of ideology exemplifies art historical thought in the 1970s, which focused on social art history, but also extended the capabilities of artwork into the realm of philosophical considerations, rather than focusing solely on historical considerations.<sup>92</sup>

Clark's extension of Marxist principles is indicative of the expansion of Marxist philosophies, as academics moved from what is known as orthodox Marxism to neo-Marxist approaches. Orthodox Marxism links the past and present with an economic base and social superstructures. Neo-Marxist approaches do not refer the social or cultural effects back to a single case stemming from the economic base. Marx argued that while all social forces are distinct, they remain connected through relations that can be reduced to economic forces; therefore, the production of a work creates the conditions for its consumption, supplying a need for the object. Marx writes:

production produces consumption, (1) by creating a material for it; (2) by determining the manner of consumption; (3) by creating the products initially posited as objects in the form of a need felt by the consumer. It thus produces the object of consumption, the manner of consumption and the motive of consumption.<sup>93</sup>

Thus, rather than focusing on individual artists creating discrete pieces, art history should include all the social relations concerning the production and consumption of art. Raymond Williams comments on this emphasis on consumption in lieu of practice, writing that one should first look to the nature of the practice and then to its contextual conditions.<sup>94</sup> For Williams, politics and art – as well as other

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<sup>91</sup> Clark 1985: 8

<sup>92</sup> Hatt and Klonk 2006: 127. Of Clark: "art is seen as both ideological and utopian, pointing beyond its historical conditions."

<sup>93</sup> Marx, Karl. Capital : a critical analysis of capitalist production. tr. from the 3d German ed., by Samuel Moore and Edward Aveling and ed. by Frederick Engels. New York : Humboldt, 1886.

<sup>94</sup> Williams, Raymond. Culture and society, 1780-1950. New York, Columbia University Press, 1958.



institutions of science, religion, and family – actively engage with each other. Therefore, any social history of art should analyze the composite of factors (i.e. production, patronage, consumption, exhibitions, trade, stylistic influences, iconography, semiotics, etc...) rather than separating them.

One of the most prominent art historians to utilize Marx's ideology in a neo-Marxist approach is Griselda Pollock. Building on the base/superstructure concept and taking in the revised concepts set forth by Williams and Terry Eagleton, Pollock strives towards a conceptualization of art that includes understanding social institutions and practices while focusing on the modes of production.<sup>95</sup> As Pollock argues that artistic creativity exists within its social context – contrary to past ideologies – the focus of analysis should be on its social production. Images are formed, to a large extent, by the rules governing their representational medium rather than by the subject depicted. Thus, all of the aforementioned composite factors can be combined to form a complete picture of social practice. Visual representation is coded, pictorially, rhetorically, and textually. It is the expression of social forces and is conditioned by those forces. In studying art the representation location is the framework upon which to study how the images are produced and for what purpose. Rather than the iconological focus, this approach highlights the role of cultural practices.

This shifting of thought from focusing on the works of art to a focus on the broader societal aspects was described by many art historians as a paradigm shift, who appropriated Thomas Kuhn's terminology as follows:

A paradigm defines the objectives shared within a scientific community, what it aims to research and explain, its procedures and boundaries. It is the disciplinary matrix. A paradigm shift occurs when the dominant mode of investigation and explanation is found to be unable to satisfactorily explain the phenomenon which it is that science's or discipline's job to analyse.<sup>96</sup>

For art history, the major paradigm shift to a contextual focus did not cause the former methodology or ideology to be discarded completely; rather, the

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<sup>95</sup> Pollock 1988

<sup>96</sup> Pollock 1988

establishment of a new ideology was necessary in order to fully understand the creation and reception of artistic works.<sup>97</sup>

Marxist philosophies and the social context became a concern in the discipline of geography as well during the 1980s and 1990s.<sup>98</sup> Similar to art history, cartographic historians have discussed the influences of society and the practice of cartography on the appearance of maps. Andrews argues that cartography is a closed system, that is, under no influence but its own.<sup>99</sup> Adhering to this would imply that literature art, or even engineering developments are not dependent on any factors other than a sole, discrete creator. Accordingly, Edney writes of cartography as an open system, as it is subject to the influences of technological, political, and social forces as well as “representational strategies” of text and image.<sup>100</sup> Maps can be evaluated in terms of both internal and external criticism, the former referring to the object itself and the latter to the context. Taking into account social formations, power structures, and economic relations necessitated further definitions concerning geographic studies so as to demonstrate awareness of the inherent power imbalance within even the academic realm. By the early nineties, cartographers were writing about the “regulated utility” of the discipline, as cartographers operated under universal organizational mandates, and that cartography had direct institutional, as well as societal, implications.<sup>101</sup> Maps were seen to reflect the society in which they were created, the mapmaker’s individual viewpoint, and the viewer’s interpretation.<sup>102</sup>

The production of maps was analyzed in new light, with Orr highlighting the role of a commercial map publisher as a producer of high quality, accurate, custom-designed maps at the best market price.<sup>103</sup> Cartography was seen as functioning within institutions – both private and public – which influence their appearance and circulation. As such, cartographic research and the tools used to

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<sup>97</sup> Pollock 1988

<sup>98</sup> Martin, 383.

<sup>99</sup> Andrews 2001

<sup>100</sup> Edney 2005a

<sup>101</sup> Chrisman, 233-240.

<sup>102</sup> Monmonier, Mark. Drawing the Line: Tales of Maps and Cartocontroversy. New York: Henry Holt and Company, 1995, 7-8.

<sup>103</sup> Orr 1987

progress the field (e.g. concerning spatial accuracy, projection systems, etc.), regardless of their effectiveness or efficiency, are subject to institutional ramifications.<sup>104</sup>

Within the discipline of the history of cartography, Harley once more pioneered work focusing on the social context as a factor in cartographic design. Citing print historians such as Eisenstein, Ong, Lefebvre and Martin, McLuhan, and Kernan,<sup>105</sup> Harley (1997, 164-66) adapted their ideas of printing as outside the influences of society or culture, writing:

the consequence of these tendencies [i.e., print logic] was that the technology of mapmaking "began to shape mental structures, imparting a sense of the world as a set of abstract ideas rather than immediate facts, a fixed point of view organizing all subject matter into an equivalent of perspective in painting, the visual homogenization of experience" (Kernan 1987, 51 in Edney 2005e: 99).

Harley argued that maps create and define the viewer's perception of the world. Cartography is ultimately social, as the map functions as a socially-constructed work whose expressions are the result of cultural processes; therefore, historians of cartography should examine maps within their larger social and cultural contexts.

The critical methodology prescribed by Harley was adopted by subsequent studies, as current historians of cartography have analyzed maps in terms of power-space relating to the state. Lefebvre writes of space as a social relationship: a product for use and consummation as well as a means of production: networks of raw material exchange, the productive forces – technology and knowledge, the social division of labor, and the state or superstructures of society.<sup>106</sup> Cosgrove argues that globes display and demarcate nationalism and expansive capitalism.<sup>107</sup> David Bussieret's *Monarchs, Ministers and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe* explores the proliferation of

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<sup>104</sup> Chrisman 1991

<sup>105</sup> Eisenstein 1979, Ong 1982, Lefebvre and Martin 1976, McLuhan 1962, and Kernan 1987, Harley 1997

<sup>106</sup> Lefebvre 1991

<sup>107</sup> Cosgrove 1989, 1999, 2001

maps during the seventeenth century,<sup>108</sup> a question that Denis Wood answers by highlighting the influences of the territorial state and print capitalism.<sup>109</sup> As the form, use and availability of maps changed, a national consciousness emerged which enabled maps to be used for the purposes of establishing, defining, and defending territories. Buisseret argues that this transformation of worldview, dependent upon cartographic vision, can be attributed predominantly to governmental activity.<sup>110</sup> Tom Conley's *The Self-Made Map: Cartographic Writing in Early Modern France* similarly highlights the importance of the state in the practice of cartography.<sup>111</sup> He argues that scientific and technological developments lead to increased value being placed on quantification and measurement. Sparke highlights the power dynamics of cartographic representations in Canadian history – connecting geographies of power, postcolonial theory, and the nation-state to create spatial theory.<sup>112</sup> Cosgrove and Daniels argue that maps – as opposed to art or literature – have remained under the influence of social elites and are therefore images of power rather than protest.<sup>113</sup> Analysis of maps as power-laden documents should focus on three themes: the political influences on cartography throughout history, map structures that reflect power relations, and how the emblems reflect political ideologies.<sup>114</sup> Herb examined the marking of territory and identity using cartography in Germany prior to re-unification.<sup>115</sup> In attempting to re-create national identity after World War II, the FRG responded to the division of Germany by ignoring and reducing the distinction between the two nations in their cartographic representations.

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<sup>108</sup> David Buisseret's (1992) *Monarchs, Ministers and Maps: The Emergence of Cartography as a Tool of Government in Early Modern Europe*

<sup>109</sup> Wood 1993

<sup>110</sup> Buisseret 1992: 4

<sup>111</sup> Tom Conley's (1996) *The Self-Made Map: Cartographic Writing in Early Modern France*

<sup>112</sup> Sparke 1998

<sup>113</sup> Cosgrove and Daniels 2001

<sup>114</sup> Cosgrove and Daniels 2001: 53. As has been previously emphasized, methodologies often focus on more than one general schema. Cosgrove and Daniels, which focusing on the broader social context, maintain that iconology is central to understanding representations of space, therefore applying Panofsky's symbolic prominence to a broader cultural context. Arguably, this addresses criticism of Panofsky's approach.

<sup>115</sup> Herb 2004

Conversely, the GDR attempted to highlight distinct nationality through the creation of territorial differentiation in globes, atlases, and educational maps.

While the social history of works has many advocates and followers, there are valid criticisms that need to be addressed. The first is that in focusing on the surrounding narrative, the illustration itself becomes secondary in importance. Alpers criticizes current art history for being too plot-focused, citing the causes as being: iconography, representational standards and the social history of art.<sup>116</sup> Panofsky's iconography necessitates referencing literary texts, causing the image to be of secondary importance. Gombrich's naturalistic standards imply that as representation being more realistic, the picture disappears; however, the implication of this philosophy is that the meaning exists outside of the image, "beyond of beneath the surface of the picture," once more diminishing the illustration's importance. The social history of art places the work in context, once again focusing on the image as representing something rather than it being of primary importance for representation. Fernie similarly warns that it is easy to overemphasize the historical sequence of events and undermine the role of the individual artist – transforming them from a dynamic role to a passive conduit for representation.<sup>117</sup> The result is that the examination migrates from that of the individual objects and studies to that of a social framework.

In addition, the expansion of Marxist ideology into its neo-Marxist evolution necessitates a redefinition of historical scholarship. In orthodox Marxism the past and present are linked by the economic base and superstructures. While neo-Marxist approaches do not refer effects back to a single cause, which avoids generalization and falsification and creates a more diverse, complex feel for the historical, cultural and social surrounds, what is lost is a temporal continuity. Hatt and Klonk describe art historical scholarship as comprising of two parts, the first that works of art are individually unique and the second that the discipline is responsible for tracing the changes that occur throughout history.<sup>118</sup> It is universally accepted that works of art should be analyzed within their historical

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<sup>116</sup> Alpers 1983

<sup>117</sup> Fernie 1999

<sup>118</sup> Hatt and Klonk 2006

context. As historical context is constantly in flux, it is necessary to examine the immediate surroundings in addition to previous and subsequent environments that may have influenced how the illustrations were created, viewed, and preserved for future studies. In this sense, the changes that occur throughout the history of art to produce a series of new, individual works have temporal continuity, it is just that the infinite complexities of influences necessitate a study that, due to finite requirements of breadth, can only acknowledge a small historical window.

Pollock argues for a re-assessment of how images are analyzed, arguing that art should be analyzed within the context of its social production; however, other factors should also be taken into account.<sup>119</sup> Images are formed, to a larger extent, by the rules governing their representational medium more so than by their subject pictured – accordingly, ideology is a ranking of both the meanings and means for using these meanings in a societal power discourse. Art history should utilize psychoanalytical approaches and an examination of sign systems to recognize firstly the role of class, race, and gender and secondly, the reasons and methods behind the object being produced. Pollock exemplifies what may be considered a trend in contemporary scholarship, which is the inclusion of many types of seemingly disparate data to create a composite environment within which artists operated and works are produced.

### **Semiotics**

Iconology focused on analyzing the meanings of various emblems used within paintings, arguing that meaning was created through the use of symbols, whose meanings were set. Semiotics, while originating with the study of language, analyzes the signs and symbols as they create meaning.<sup>120</sup> In 1921 Ludwig Wittgenstein's *Tractatus Logico-Philosophicus* was published, addressing the issue of how people make themselves understood linguistically, using words as signs to create “pictures” of reality. Wittgenstein argued that linguistic expression is like a geometric projection – the figure can be projected in multiple ways, each

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<sup>119</sup> Pollock 1988

<sup>120</sup> Therefore, instead of focusing on constructing meaning, semiotics examines how meaning is created. It can be argued that contemporary iconography is a type of sign system.

corresponding to a different language; however, the original figure, or meaning, remains unchanged. This does not imply that meaning is completely static. Rather, language and meanings change and there is not an overall, eternal meaning for any concept; however, despite this, there is still enough constancy in meaning for interpersonal comprehension. Meaning is also context dependent. There is no universal objective meaning.<sup>121</sup> Similarly, semiotics argues that these emblems represent concepts, but that the concepts represented acquire meaning through the context. Rather than focusing on either artist or viewer, semiotics analyzes the system of expressions and interpretations – the overall context in which the meaning can be created. Jonathan Culler writes: “Because all meaning depends on the codes and rules that govern what we can say or represent, the viewer in semiotics is simply the conduit through which that meaning flows, not a reader but a function.”<sup>122</sup> Semiotics can be attributed to the studies of Ferdinand de Saussure (1857-1913), who attempted to typify linguistic analysis as a ‘science which would study the life of signs within society.’<sup>123</sup> Saussure’s linguistics impacted his own discipline at the turn of the century; however, it was not until the 1960’s that his concepts gained prominence in the humanities.

Originally applied to the study of language, semiotics in art history is problematic, as visual and verbal signs are arguably different in nature. It can be argued that contemporary iconography is a type of sign system; however, semiotics challenged iconology. Panofsky argued that changes in representations – due to aesthetics, perspective, or otherwise – were created out of changing mind-world associations. Panofsky, and Cassirer before him, argued that humans were *animale symbolicum*, or animals capable of making symbols and that the direct relationship between sign and concept is crucial. Semiotics, as proposed by Saussure, argues that the symbols themselves are arbitrary; moreover, it is the symbols that make the humans or humanity. Additionally, it is the signs or

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<sup>121</sup> While Wittgenstein is not characteristically included in a historiography of semiotics, his work relates to the principles outlined by Saussure. Furthermore, recent scholars have acknowledged similarities in philosophy between Wittgenstein and Derrida, the latter of which can be considered a post-structuralist and is introduced in the next section.

<sup>122</sup> Culler, Jonathan. *The pursuit of signs : semiotics, literature, deconstruction*. Ithaca, N.Y. : Cornell University Press, 1981: 38

<sup>123</sup> Saussure, 1983[1916]: 15

symbols themselves that create a boundary/distinction between the mind and the world.

Semiotics does not imply that the meaning of signs or that studying iconography is futile. While originally directed at linguists, art historians have appropriated the ideology of semiotics to study and categorize visual signs. Charles Sanders Peirce's taxonomy of sign types functions in a way that can be used by art historians, outlining three basic categories: icon, index and symbol. The icon refers to an object – it is like a resemblance that is understood by the viewer as referring to a particular thing. In the iconic category, the image represents the object. The index does not refer to any specific object; rather, it implies the existence of something (i.e. a scar referring to an accident, or photography “since it reveals the presence of the subject when the photograph was taken”). In other words, the picture is related to the object through association. The symbol, similar to Saussure's *sign*, has a conventional meaning; however, Peirce emphasizes the possibility of alternate meanings in different users and these changes are subject to rules. Thus, their meanings are neither infinite nor arbitrary. While Saussure's signs had the same structure, Peirce's signs have differing structures, but all produce meaning in the same way. Thirdness, referring to their tripartite nature, is the process of mediation with three elements: object, or thing being represented; sign (representamen), the thing that refers to the object, for Peirce the icon, index or symbol; and interpretant, the sign or response in the interpreter's mind resulting from viewing the sign. The sign is therefore the intermediary between object and interpretant; Peirce's semeiosis is causal, concerned more with connections between his parts – the process of mediation – than with the inherent nature of the sign. Works of art are complex and the work itself consists of all three signs, some of which function within more than one category.

Saussurean semiotics were problematic to the study of images; however, Peircean principles allowed for visual signs to be categorized and differentiated within the visual field. Subsequent art historians have elaborated on Peirce's semiotics. Stephen Bann implemented Peirce's principles in the characterization of



styles. Bann analyzed a landscape image, arguing for both iconic and indexical signs, as the scene depicted an actual location while simultaneously emphasizing a woodland scene through the pigments used. Thus, the realism achieved by the artist focuses on both the artwork – the signs that are shown – and the medium – what is represented through that particular material – balancing the two to create a multiplicity of meanings.<sup>124</sup> Mieke Bal defines signs, not as things, but as events.<sup>125</sup> A sign acquires meaning upon viewing and this meaning depends on how it is viewed. This does not imply an infinite possibility of meanings, however, as there are limits to the representational codes. Therefore, a work of art should be understood as an effect comprised of all possible meanings. Bal argues for a plurality of readings whose meaning shifts depending on the viewer's choices. Works can be read by viewing for either "signs for the real" or "signs for the text." The first category argues for an image as representing a real event, reading it accordingly. The latter argues that art is constructed and artificial; therefore, rather than analyzing the small details as carrying their own meaning that may or may not contradict the overall illustration, the image as a whole should be read as a unified event, with each detail strengthening the entire narrative of the image. Each detail then is representative ("is a sign for") of the work. Bal argues that there is no distinction between verbal and visual signs, as the signification is universal in form, irregardless of the media. Therefore, Bal's *events* do not rely on their material form, instead focusing on the surrounding textuality, realism, and narrative. Krauss argues that art history, rather than focusing on denotation – or identifying what images represent – concentrates on connotation, the extended meanings of images.<sup>126</sup> Asserting that meanings are unstable, Krauss is a proponent of art as polysemic, with different elements meaning different things, depending in part of the context. This does not imply an infinite amount of readings, as the semiotic laws regulate possible interpretations; instead, the implication is that authorial intent may be different than viewer interpretation and scholars should focus on the meaning as it relates to the reader.

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<sup>124</sup> Bann, *Experimental Painting*, 1970, 134

<sup>125</sup> Mieke Bal *Reading Rembrandt* 1991

<sup>126</sup> Krauss 1985

Art historians generally use semiotics in conjunction with other methodologies, as semiotics alone is fundamentally problematic as a historical discipline. As it relies on meaning that is dependent on context, the discipline has trouble accommodating changes, as they cause the context – and subsequently the meaning – to alter. Semiotics is inherently synchronic, viewing history as a series of synchronic events or movements. Bann argues that the discipline is unable to address chronological changes.<sup>127</sup> Schapiro and Bann assert that viewers can only engage with a synchronic moment, as meaning is creating during the time of perception; therefore, studying history forces an analysis of one meaning or code created at a particular moment.<sup>128</sup> Krauss and Bal take more extreme views of semiotics. Krauss argues that pictures are “signs about signs” or meta-representational; therefore, using historical materials to understand images is restrictive.<sup>129</sup> Bal, on the other hand, argues that art only reflects the viewer’s interpretation and context merely increases the amount of signs to be analyzed.<sup>130</sup> Hatt and Klonk criticize these extreme positions, as they imply that art history is only concerned with the contemporary spectator; furthermore, this view reduces history to mere textual status and implies that understanding the past is a futile endeavor.<sup>131</sup> Not only do Bal and Kraus misunderstand viewer conception of images and visual signification, but they disable the discipline of art history.

Rather than immobilizing the discipline, semiotics necessitates a re-evaluation of representation, highlighting the role of the work itself. What is of fundamental importance is the concept of language. When applied to images, semiotics forces an evaluation of the context in which images are viewed, arguing that meaning is neither straightforward nor universal. Indeed, what may be argued to be most crucial in this new theory is the implication that this contextual language itself constitutes the observer’s worldview.<sup>132</sup> The implications for semiotics within the disciplines of cartography and the history of cartography are

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<sup>127</sup> Bann, ‘The Mythical Conception in the Name’ 1985: 177

<sup>128</sup> Schapiro and Bann

<sup>129</sup> Krauss

<sup>130</sup> Bal *Reading* 1991

<sup>131</sup> Hatt and Klonk 2006

<sup>132</sup> Emerling 2005: 38

crucial. For the former, this was marked by the advent of studies in cartographic communication. In the early 1960s, academic cartographers began analyzing the communicative framework of maps.<sup>133</sup> David Woodward produced a communication model framework detailing all stages of map production and use, merging form and content to address both the ideological and pragmatic considerations.<sup>134</sup> Keates' scholarship focused on the visual communication of maps, outlining the structure of stimulus, receptor, and response, arguing that cartographers need to be aware of the limitation of vision while understanding the implications of the types of visual images being used.<sup>135</sup> In 1976 Robinson and Petchenik coined the term "communication science," asserting that the transmission of information from maps to viewers adheres to basic communication rules of source-channel-recipient; as receivers decode the information using the same guidelines, there exists minimal distortion and it is the cartographer who must ameliorate communication efficiency.<sup>136</sup> The "communication paradigm" in cartography forces mapmakers to move beyond mere technological considerations to understand the communication process from the real world to a cartographer's conception to a map and finally to the map user's conception.<sup>137</sup>

Subsequent cartographers developed conceptual models to depict the communication process of reading maps. MacEachren created a conceptual model of map-space in the form of a cube.<sup>138</sup> Three orthogonal axes are labeled: human-map interaction, comprising a continuum from communication to fully interactive maps; user objectives, which vary between showing the "knowns" of communicative maps to the visualization maps' "revealed unknowns;" and the continuum between private and public maps, as there exist communicative variations between mass audiences who use static maps and individuals who utilize dynamic visualizations. Lloyd argued that map reading takes the form of

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<sup>133</sup> Edney 2005c, Petchenik and Keates 1982

<sup>134</sup> Woodward 1974

<sup>135</sup> Keates 1973

<sup>136</sup> Robinson and Petchenik 1976

<sup>137</sup> Robinson and Petchenik 1976

<sup>138</sup> MacEachren 1994

both unsupervised and reinforcement learning.<sup>139</sup> The former allows for the viewer to acquire knowledge without feedback; however, there is no way to know whether or not the information learned was interpreted correctly. Reinforced learning involves indirect feedback in order to convey whether or not the map was read correctly. Thus, while some scholars dismiss linguistics as useful for the discipline of cartography, many cartographers maintain the importance of understanding the language and communication of maps.<sup>140</sup> Cosgrove and Daniels argue that maps – themselves as symbols – hold as much force as their representations; the study of maps themselves has been generally neglected in the history of cartography.<sup>141</sup>

### **Post-structuralism/Post-modernism**

Post-structuralism is a broad term for the ideology that began in the 1960's in France, criticizing structuralism. Scholars termed post-structuralists oftentimes contradicted each other, so it is difficult to typify the movement; however, the general ideology argues that structuralism disregards the cultural importance to works and that meaning is itself a cultural phenomenon. Post-structuralism hinges on the concept of works being multifaceted in meaning. These meanings shift in terms of variables, generally centering on the reader, and can even be conflicting while still remaining valid. The centrality of the reader demonstrates the secondary importance of the author; illustrations gain meaning through reader perception rather than authorial intention.<sup>142</sup> This focus on the reader highlights the post-structural importance of “self” and self-perception in the creation of textual meaning. As individuals are said to be entities made up of and influenced by various institutions (e.g. profession, class, gender, race, etc...), some of whom are in conflict within the self, readers must study illustrations with self-perception in mind, realizing that their own interpretations influence their readings. By “destabilizing” or “decentering” the author in lieu of reader, a post-structuralist interpretation relies on other sources of information such as cultural traits,

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<sup>139</sup> Robert Lloyd 1996

<sup>140</sup> Edney 2005c: 9

<sup>141</sup> Cosgrove and Daniels 2001

<sup>142</sup> Barthes concept of the “death of the author” will be discussed later.

contemporary literature, and other readers; however, these sources are neither definitive nor authoritative.

Post-structuralism rejects the structuralist focus on binary opposition. Structuralism argued that works were structured in a hierarchical way through the pairing of conceptual opposites. This builds on Saussure's concepts in analyzing phenomena by contrasting the system as being composed of elements of binary opposition. Saussure argued that meaning only exists within the system of language and that meaning is found through the interrelationships within language. Signs are therefore relational, with meaning found in the similarities and differences between a sign and other signs. "Meaning is predicated on difference."<sup>143</sup> Applied to the study of visual texts, structuralism analyzes meaning using paired symbols (i.e. white/black, male/female) to understand context, exploring these concepts in light of semiotics. Heinrich Wölfflin established conceptual pairs to be used as tools for analysis: linear versus painterly, plane versus recession, etc.<sup>144</sup> Post-structuralism rejects the consistency of this approach, arguing instead that illustrations should be deconstructed, the act of which changes every time due to the infinite variables that are in constant flux. Instead, textual meaning can only be determined by first deconstructing the surrounding knowledge systems (and cultural assumptions) that influence the reader. Then the work itself can be studied.

The notion of deconstruction is attributed to Derrida, although his work relies on Heidegger's tradition of "Destruktion" and "Abbau." In translating these as "destruction" and "de-building," respectively, Derrida used these terms to argue that in reading and analyzing the illustration, the reader re-creates it; therefore, the original meaning cannot be known. Specifically in terms of art history, Derrida uses a metaphor in order to illustrate his philosophies. Rather than focusing on art as representative of perception, Derrida asserts that it is a trace of presence-absence, or memory, using Joseph-Benoît Suvée's *Butades, or the Origin of Drawing* (1791) as an example. This painting depicts Butades – the Corinthian

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<sup>143</sup> Emerling 2005: 36

<sup>144</sup> Wölfflin 1915

woman – who traces a shadow of her lover on the wall in order to ease their separation. Derrida takes this to suggest that art's mythic origin is memory and that space then becomes the opposite of vision; therefore, meaning in the spatial arts lies in the traces of what is absent and cannot be seen.<sup>145</sup> The implication of this concept is that art historians writing about art themselves destroy the original presence, as their writings become a self-reflective representation of the art itself.<sup>146</sup> This has many yet unexplored implications for the history of cartography. If representations of space should be seen as both autobiographical and mnemonic, then what do changing cartographic styles imply about cultural memory? Specifically pertaining to celestial cartography, if representations of the cosmos reflect memory rather than perception, then the icons and symbols used to express this memory gain increasing importance, as do the spaces between the icons, the constellations not pictured, and other notable absences in the images.

Despite the autobiographical nature of analysis, post-structuralism, unlike semiotics or structuralism, allows for historical study. As previously mentioned, a criticism of structuralism was its descriptive – or synchronic – tendency. Post-structuralism argues for a diachronic, and therefore historical, view of works. This trend can be seen in the post-structuralist authors whose studies of works focused on the surrounding historical contexts to generate meaning.<sup>147</sup> These features are characteristic of the contemporary approaches in the second half of the twentieth century. All share the convictions that artworks develop within a context – a social or political context for Marxist or social ideologies and a linguistic context for semiotics or post-structuralism – and that the personal perspective plays a crucial role in the projected meaning for historical analyses. The extent to which the reader influences historical documents is debatable. Gombrich argued that the function of images change depending on social context, with nothing happening in isolation. However, this does not imply correlation, as the past is a chaotic organization of details that must be examined carefully. In terms of scholarship:

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<sup>145</sup> Derrida 1990: 24

<sup>146</sup> Emerling 2005 (see also work of Walter Benjamin)

<sup>147</sup> Michel Foucault studied historical attitudes towards mental instability in his *Madness and Civilization* and Friedrich Nietzsche and Martin Heidegger both addressed historical themes in their writings, *On the Genealogy of Morals* and *Being and Time*, respectively.

The traditions of his [the scholar's] own culture, the bias of his teacher, the questions of the moment can all stimulate his curiosity and direct his questionings...Whether we know it or not, we always approach the past with some preconceived ideas, with a rudimentary theory we wish to test.<sup>148</sup>

Historical scholarship is then dependent upon the historian. Similarly, visual scholarship depends on the viewer. Barthes and Derrida argued that works were collections of signs whose meaning was developed through their viewing. Which not agreeing to the same extent, Foucault argued that authors are not static creators; instead, they are responsible for forming the work in the context of their own languages, ideologies, and social relations. It is not surprising, then, that both art historians and historians of cartography have relied heavily on Foucault's ideologies in recent studies.

Michel Foucault is arguably the key reference for historians of cartography analyzing the relationship between knowledge and power and critiquing historiography. Traditional historiography, according to Foucault, depicts events as related through single causes and effects, thus allowing for a logical, backwards reading of an overarching narrative. Rather, historical narratives are fragmented, discontinuous, singular events that can not be classified with events directly causing effects. History is ambiguous and historical origin is merely a construct. Of historiography, Foucault writes: "the quest for truth was not an objective and neutral activity but was intimately related to the 'will to power' of the truthseeker. Knowledge was thus a form of power, a way of presenting one's own values in the guise of scientific disinterestedness."<sup>149</sup> In terms of power relations, the product of the "victors," is what is preserved; therefore, the artistic and cartographic works in existence reflect the societal discourses of the more powerful. Foucault differentiated between "juridical power," which is centralized, specifically directed, and "imposed from above" and a "power/knowledge" that is conceptualized and manifested through knowledge, regardless of the authoritative structures, writing: "In reality, power in its exercise goes much further, passes

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<sup>148</sup> Gombrich "In Search of Cultural History" 1967

<sup>149</sup> Foucault, Michael. *Les mots et les choses; une archéologie des sciences humaines*. Paris: Gallimard 1966.

through much finer channels, and is much more ambiguous, since each individual has at his disposal a certain power, and for that very reason can also act as a vehicle for transmitting a wider power.”<sup>150</sup> Thus, even if there is a concept such as historical truth, historians cannot uncover it due to their own ideological and political interests.<sup>151</sup> The past must be seen as a narrative in constant flux that is always relative to the present.<sup>152</sup>

In reading and analyzing a work, the reader is re-creating it. In the visual arts, this translates to a questioning of whether or not the artist can be seen as the creative agent. Fernie argues that for the visual media, the “death of the author” does not function as well as it does for texts, as images’ meanings rely in part on their form; thus, the intention of the maker in choosing the form must be considered.<sup>153</sup> Form results from a purposeful endeavor. In order to explain the object, the maker’s intentions must be examined. A triangle of influences forms between the problem, circumstances, and the final object.<sup>154</sup> In order to conceptualize the object, it must be described using words; this conceptualization allows for an understanding of the artistic circumstances and artistic intention, as these concepts are inherent within the descriptive properties.<sup>155</sup> Foucault’s concept of “discourse analysis” argues that a discipline is composed of systems of connections between statements of knowledge. For art history, this was taken to mean that it encompassed not merely the study of individual pieces, but of the discipline in its totality.<sup>156</sup>

Similarly, the history of cartography has appropriated post-structuralist ideologies to study cartography and the discipline as a whole. Harley’s essays early in the 1980s misused Foucault’s concepts of power, arguably through an

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<sup>150</sup> Foucault 1980: 72

<sup>151</sup> Alpers 1983 elaborates on Foucault’s approach, as she finds the painting *Las Meninas* to contain within it its own representation, writing: “*Las Meninas* is produced not out of a single, classical notion of representation, as Foucault suggests, but rather out of specific pictorial traditions of representation.” Thus the image simultaneously maintains two traditions of representation in both an artistic and a social sense.

<sup>152</sup> This is similar to Walter Benjamin’s philosophy of history.

<sup>153</sup> Fernie 1999

<sup>154</sup> Baxandall 1985

<sup>155</sup> Fernie 1999

<sup>156</sup> Pollock 1988



inaccurate and incomplete reading of Foucault and Derrida, turning cartographers into “conduits” for usage by the “powerful in a society.”<sup>157</sup> This reduced the impact of the cartographer, almost to the point of having no impact at all. However, later in the decade his writings focused on the power/agency of the cartographer.<sup>158</sup> Alternately, geographers find the flexibility of time and space within the post-structural matrix to be attractive; now studies can focus on similarities in space without having to be completely dependent on temporal accordance. Gilbert advocates studies: “which do not attempt to reduce differences and fragmentations to a single overarching account, particularly where there is a concern to convey the spatial simultaneity of different experiences.”<sup>159</sup> Foucault’s power struggles play a key role in contemporary analyses, as Anthony Giddens conceives of social systems as “embedded” in space and time – the “authoritative resources” are state-controlled, involving the control and manipulation of information, one example being maps.<sup>160</sup> And despite criticism of his adoption of Foucauldian tenets, Harley utilized post-structuralist philosophies, rejecting any system of knowledge purported to be universal and arguing that meaning depends on semiotic context and the relationship between signs.

Furthermore, cartographic historians have begun to explore the linguistics of space, expanding on post-structural and semiotic writings. Harley’s interpretation of the linguistic model included three main concerns pertaining to maps and power: the social forces responsible for the regulation of map production – i.e. the social elites; the processes involved in determining and regulating content, both conscious and unconscious; and the subsequent social effects of “teaching” audiences to read maps in specific ways and as objective documents.<sup>161</sup> Wood’s *The Power of Maps* describes maps as complex supersigns – complex representations composed of different layers of signs that have both individual meanings and meanings in relation to other signs – that work to communicate and

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<sup>157</sup> Edney 2005e; Belyea 1992; Conley 1996; Gregory 1994; Wood 1993

<sup>158</sup> Edney 2005e: 4-5

<sup>159</sup> Gilbert 1995: 8

<sup>160</sup> Cited in Cosgrove and Daniels 2001: 53

<sup>161</sup> Harley 1988 – maps and empire, maps and the nation state, maps and property rights

persuade viewers.<sup>162</sup> Monmonier argues that maps have the power to divert attention, act as factual and objective documents, and create the illusion that the cartographer's bias and/or politics are not present.<sup>163</sup> Maps are not objective, value-neutral documents; rather, they communicate at a multitude of levels dependent upon the user and context. Pickles asserts that maps are multi-layered works: the map itself, its immediate context (caption, chapter, work in which it is included), the wider context (cartographer's opus, texts opus, socio-cultural context).<sup>164</sup> The map functions both as an embedded object and as an independent work and, as such, must always be situated beside the historical, geographical, and sociological analyses of production and use. As an object made with the purpose of expressing an idea, emphasizing an aspect of the world, and articulating linguistic codes graphically, the map is a "purposive cultural object with reasons behind its construction and values associated with its reading."<sup>165</sup>

Harley and Woodward's argument that rather than "reflections" of culture, maps should be considered manifestations of their societies is furthered linguistically by Casti, who argues that as imitative tools maps themselves are semiotic fields.<sup>166</sup> They include "geographical designators" which interact with other codes to communicate on a different level of semiosis. Following the writing of Charles Morris,<sup>167</sup> Casti adheres to the "sign-as-vehicle" principle, arguing that meaning is first formed, then developed through other sign juxtapositioning, and finally interpreted by the viewer.<sup>168</sup> Important in Casti's cartographic theory are four principles: the first is of cartographic semiosis, in that a map acts as a demonstration of how societies conceptualize of territory; the second is that maps are not descriptive, but operate self-referentially through prescriptive conventions; the third principle focuses on the discipline's foundation in scientific positivism, highlighting the structural and technical aspects of cartography; and finally that the

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<sup>162</sup> Wood 1992

<sup>163</sup> Monmonier 1995

<sup>164</sup> Pickles 2004

<sup>165</sup> Pickles 2004: 53

<sup>166</sup> Harley and Woodward 1987, Casti 2005

<sup>167</sup> Charles Morris 1946

<sup>168</sup> Casti 2005: 7

emphasis has shifted from cartographic representation to territorial implications.<sup>169</sup>

There are three systems simultaneously functioning in a map: the analogical, the digital, and the iconic, writing of the latter:

The icons do not show reality as it is; rather, they show how it appears within a particular theory of the world. It is through the action of icons that what is represented becomes conceptualized and is communicated through a dynamic process that offers a particular vision of the world.<sup>170</sup>

Casti attributes the ability for map readers to transfer geographical locations into cartographic space as the result of iconization; ultimately, instead of representing reality, cartographic visualization replaces it. This is an interesting reconstruction of Derrida's concept that representation was memory. Rather than focusing on the shadow, this highlights the role of the work as being the primary conveyor of meaning.

Similar to the social histories of art, post-structuralism calls into question the talent or genius of the creator in lieu of a textual or contextual focus. Using post-structural ideologies/tactics in studies of the Renaissance has not been critically approached and it a topic worthy of further consideration. The Renaissance is noted for its humanism and focus on the individual genius. Albrecht Dürer's self-portrait of 1500 has been cited as exemplifying the heightened role of the individual creator in Renaissance thought. The implications for this concept as multifaceted in this study: if the study of cartographic works leans towards an increased focus on social contexts and decreasing importance for the cartographer, then how does the role of genius and self-perception in the Renaissance work within the broader social context (e.g. was there an awareness of social forces and to what extent? Was the focus on the individual a subconscious assertion of power or a deliberate act of rebellion?); more

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<sup>169</sup> Casti 2005: 5 advocates the approach of "cartographic semiosis," arguing that "maps rely on meta-semiosis (or second-level semiosis), since their language is moulded on territorial language (or first-level semiosis)...(1) that the name given on the map is seen not as one sign among many others but as the one whereby all cartographic information is arranged; and (2) that semiosis – the process whereby information is produced and transmitted – takes place in the presence of an interpreter, who has a double function as a territorial agent and as someone who communicates within a given society."

<sup>170</sup> Casti 2005: 10

importantly, how can the specific pieces being analyzed be read in terms of having multiple authors, and therefore more frameworks for discourse and influences?

### **New Approach to Visualization**

Of current scholarship in the history of cartography, van Egmond finds the current papers to be lacking in new theory, writing: “In keeping with the humanities in general, research in the West seems to be pausing for breath after the theoretical frenzy of the 1980s and early 1990s.”<sup>171</sup> While there it may appear as though contemporary scholars have not transformed ideologies in the way that Foucault, Derrida, Hegel, and Kant did, there are currently many cartographic historians who are forming new conceptualizations of mapmaking and map reading that serve to advance the discipline. Indeed, it is a disservice to the discipline to think of scholarship as relatively static in nature. While confined by cartographic norms, expanding the notions of spatial organization allow for new studies of areal relationships and subsequent visualizations. The quantitative revolution was opening up and allowing for more conceptual formulations about human perception. Cartographic analysis expanded to include principles of optics; how visual cues such as value, hue, and color are perceived by the viewer.<sup>172</sup> This analysis of visual signs, which focus on projection systems, could potentially be informed by art historical debates pertaining to perception.<sup>173</sup>

Within each methodology there are criticisms. Being too biographical promotes the individual artist and disregards context. Focusing on the context reduces the artist and illustration to secondary importance. In analyzing pictorial meaning, many scholars are attempting to merge the aforementioned methodologies so as to neither overemphasize individual artistic genius nor ignore artistry in its broader social context. This trend has resulted in different schemas within which to analyze images. Wollheim argues that pictorial meaning derives

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<sup>171</sup> van Egmond 2006 ‘The 21<sup>st</sup> International Conference on the History of Cartography’: 91

<sup>172</sup> Keates, J.S. Cartographic Design and Production. New York: John Wiley and Sons, 1973, 3.

<sup>173</sup> The debates surrounding perspective systems throughout history and the implications for their societal contexts will be covered in Chapter 4. An interesting study would relate to how an alteration of one of the aforementioned factors would change how a map was perceived thematically, and whether or not this could be related to either the culture of the cartographer or that of the viewer.

from three parts: the artist's mental state, his subsequent painting style, and the reaction of a spectator to the work.<sup>174</sup> Panofsky classified meaning as being related to "materialized form," idea and content,<sup>175</sup> and Belton modifies the list slightly, emphasizing form, content and context, arguing that a work functions on these three levels, each of which comprises multiple sub-levels.<sup>176</sup> Form relates to the formal elements of the work such as the composition, colors used, medium, size, balance, composition, and contrast, excluding semantic references. Content is not as easily defined; however, it can be simplified to mean the meaning or significance. It was traditionally delineated by iconographical categories (i.e. history, megalography, mythology, religion, portraiture, etc...); however, Belton advocates organizing content into primary, secondary and tertiary groupings to avoid hierarchical schemes.<sup>177</sup> Primary content is the elements in the image (e.g. poses, facts, subjects). Secondary content is the conceptualization of these objects by the viewer. Understanding often comes with allegorical or iconological content, as well as through performative or paralinguistic shifts. Finally, tertiary content involves putting the objects into context. As post-modern ideology does not advocate a sense of closure or finality in any one content, Belton advises that tertiary content should be seen as one way of analyzing imagery amidst many. Finally, context refers to the circumstances surrounding the production and viewing of the piece: primary context refers to the artist, personal attitudes and beliefs as well as the education or training received; secondary context is the

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<sup>174</sup> Wollheim, R. (1991). *What the Spectator Sees. Visual Theory: Painting and Interpretation*. M. A. H. Norman Bryson, and Keith Moxey. New York, Harper Collins: 101-150, 103. Structuralism analyzes phenomena that are believed to be in binary opposition. Iconography is the in-depth analysis of the themes and subjects associated with specific symbols (icons, emblems). Hermeneutics refers to the methodology and theory behind textual analyses, specially relating to religious subjects. Semiotics is the study of signs or symbols comprising systems of communication (syntax, semantics, pragmatics).

<sup>175</sup> Panofsky 1940

<sup>176</sup> Belton 1996, 2006

<sup>177</sup> Panofsky 1940 defines content as the following: "the more proportion of emphasis on 'idea' and 'form' approaches a state of equilibrium, the more eloquently will the work reveal what is called 'content'. Content, as opposed to subject matter, may be described in the words of Peirce as that which a work betrays but does not parade. It is the basic attitude of a nation, a period, a class, a religious or philosophical persuasion – all this unconsciously qualified by one personality and condensed into one work. It is obvious that such an involuntary revelation will be obscured in proportion as either one of the two elements, idea or form, is voluntarily emphasized or suppressed."

surrounding religious, social, geographical and/or political context, among others; and tertiary context refers to the reception and further interpretation of the work, both in contemporary and subsequent times.

Specifically related to the history of cartography, Pickles questions how mapmakers have coded subjects to create identities that subsequently affect an understanding of the world, writing that historians of cartography attempt to analyze maps in terms of their contemporary geographical and social theories within the context of scientific and technological systems.<sup>178</sup> In terms of internal construction, the map's message is argued by Pickles to be threefold: graphical, mathematical, and linguistic. Casti, arguing for a semiotic emphasis, analyzes the three current themes in the history of cartography as: maps in the context of their social production; classifying and evaluating maps within their historical period; and the "dual nature" or maps, discovered through their communicative ability.<sup>179</sup> These have shifted the discipline's focus from the ability of a map to represent reality to discourses concerning territorial meaning and significance. Distinguishing between space and territory changes the focus of the discipline to one of ownership. Building semantically on to Harley's concept of maps as power documents, this still limits interpretations. This dissertation will demonstrate that maps function as documents of scholastic "power," giving force to debates surrounding contemporary discourses; specifically, Dürer's map can be read in the context of a Renaissance artist improving upon, but ultimately realizing the futility of, a perfect projection system.

Furthermore, scholarly investigations focusing on the creation of "territory" increasingly use the terms "visuality" and "visualization" to describe the communicative meaning of maps. As cartography began to expand with the use of aerial photography and increasingly accurate surveying methods, geographers in the middle of the twentieth century began shifting away from fundamentals of geographical thought towards geographic visualizations. Sauer found the map to be the ideal form of geographic representation for an unlimited number of spatial

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<sup>178</sup> Pickles 2004

<sup>179</sup> Casti 2005:1

phenomena, as he views the study of geography as one concerning terrestrial distance: areal differences, local patterns, and the spacing of various phenomena.<sup>180</sup> John K. Wright coined the term *geosophy* to describe the study of geographical knowledge, writing that geosophic maps are of two varieties: *cartosophic* maps presenting facts pertaining to different areas and a second group comparing facts that span across time and areal boundaries.<sup>181</sup> The purpose of these maps would be to visualize unknown information, as the modern *terra incognitae* does not pertain to physical space, rather conceptual space.<sup>182</sup> This extension of cartography into a mental sphere, arguably, can be seen as a shifting of cartography in conjunction with changing geographic thought. As this period marked the shift from qualitative to quantitative analysis and mapping the earth was perceived as a quantitative function, the cartographic imagination was able to thrive in the conceptual realm. Currently, it is argued that the former concern with cartographic space and map-communication models has transformed into debates surrounding differences in definitions of ‘visualization;’ a uniform theme of understanding spatial knowledge through interactive display exists.<sup>183</sup> Visualization is the process of making the image in the form of a visual presentation to communicate a message. Visuality is the condition, quality, or degree of being visible. This is what is represented, how it is seen, how viewers may interpret the image differently, as well as issues pertaining to how or why the image was created. At times these inquiries are reductionist, stressing technical procedure over aesthetics. It is yet another form of reductionism to deconstruct the icons used, various motifs, scale, dimension analysis, line of movement, or color application. However the image itself is analyzed, it is important to remember that pictures are dynamic objects involving visuality; as viewers observe the image, they actively engage in an imaginative discourse.

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<sup>180</sup> Sauer, Carl O. “Foreward to Historical Geography”. *Annals of the Association of American Geographers*; Mar41, Vol. 31 Issue, 1, p1, 24p, 6.

<sup>181</sup> Wright, John K. “Terra Incognitae: The Place of the Imagination in Geography”. *Annals of the Association of American Geographers*; Mar47, Vol. 37 Issue 1, p1, 15p, 13.

<sup>182</sup> Wright, 13. Additionally, Wright argues for a merging of disciplines, writing that a collaboration between the discipline of liberal arts and the field of science “might help raise the standards of geographical writing as a whole.”

<sup>183</sup> Hallisey’s (2005) ‘Cartographic Visualization: An Assessment and Epistemological Review’

The scholarly investigations done by historians – contextualizing, analyzing, comparing, and looking critically at pieces – represent an “iconological discourse” in which pictorial texts come to represent higher spheres of reflection through visuality. As Van Den Berg succinctly asserts:

In reality...pictorial representation comprises extremely nuanced configurations at various levels. Pictures contain clues to be traced, gaps to be filled, connections to be made, ambiguities to be negotiated, games to be played, puzzles to be solved, codes to be deciphered, meanings to be construed, conjectures to be tested, positions to be adopted, conclusions to be drawn — all of this by spectators bodily performing human acts of imaginative appropriation.<sup>184</sup>

An image, therefore, acts as a multi-faceted means of visual communication. The first is between the artist and picture, the second between the spectator and picture. Central to the analysis of illustrations, then, are the themes of visuality and visualization, both within the space of the map itself and of the space that the map represents.

This study is an amalgamation of several approaches, ultimately focusing on the concept of visualization in Renaissance terrestrial and celestial cartography. Referring back to Casti’s historiography of cartographic studies, which relates that map reading begins with viewing the “map-as-object,” then moves to “deconstruction,” and finally to “semiotics,” this study addresses each of these approaches to conclude, arguably, with a complete analysis covering each of the foci possible. First the social context of the maps are analyzed in terms of both their visual appearance and the means of production within the humanistic circles in the city of Nürnberg. Next, the maps are determined to represent a commercial endeavor during the Renaissance that can be seen to engage in the debates surrounding terrestrial and celestial reproductions during that time, being formed by antiquarian, Arabic, and medieval forms. Finally, the visual signs used in these maps are read self-referential, relating to other works by Dürer; however, more importantly, the maps can be seen to provide meaning independently of other referents. Dürer’s influence is demonstrated, both artistically and conceptually, as

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<sup>184</sup> Van Den Berg, D. J. (2004). What is an image and what is image power? Image and Narrative: Online Magazine of the Visual Narrative.



these illustrations can be seen as graphic arguments surrounding contemporary issues of perspective and projection. Finally, the maps are analyzed in terms of the context in which Renaissance viewers would have analyzed them as well as how they have been, and continue to be seen, by modern observers.

## NÜRNBERG'S HUMANISM AND PRINT CULTURE

By the beginning of the sixteenth century, Dürer had emerged as one of the foremost artists. Dürer was a prolific painter; however, he is praised the most highly for his mastery of the reproduction media, both relief and intaglio. Coined as the “heir to all the technical advances made in Germany,”<sup>185</sup> Dürer produced over two hundred woodcuts and one hundred line-engravings, in addition to working with drypoint etching and experimenting with iron etchings. Indeed, he focused much of his efforts on this graphic medium, due both to the expediency of manufacturing prints as well as the freedom from patronage or dependency on commissions. Unlike paintings – usually commissioned in the genres of either portraits or religious themes – prints were cheaply produced, sold for a variety of subject matter, and could be completed in a relatively short amount of time.<sup>186</sup> Recognizing the medium’s potential, Dürer turned from his focus on painting, writing: “From now on I shall concentrate on engraving. Had I done so all the time I should today be richer by a thousand guilders.”<sup>187</sup> Murray and Murray write:

For an artist like Dürer, who combined great rapidity of thought with teeming inventiveness, a medium of expression which allowed him to work out his ideas with speed and completeness was a necessity.<sup>188</sup>

In addition to quickly expressing visual information, Gutenberg’s invention of the printing press in 1453 facilitated tracing images back to the source, as the design could be attributed specifically to the engraver.<sup>189</sup> The implication of this is that authorship related directly to the artist, therefore allowing for more recognition and prestige among designers.

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<sup>185</sup> Murray, Peter and Linda. The Art of the Renaissance. Thames and Hudson: London, 1963: 190.

<sup>186</sup> Eisenstein (1983: 113) elaborates: “Instead of coupling the advent of printing with other innovations or regarding it as an example of some other developments, we must single it out as an event which was *sui generis* and to which conventional models of historical change cannot be applied. Although printing transformed the conditions under which texts were produced, distributed, and consumed, it did so not by discarding the products of scribal culture, but by reproducing them in greater quantities than ever before.”

<sup>187</sup> Panofsky, The Life and Art of Albrecht Dürer: 44.

<sup>188</sup> Murray, Peter and Linda. The Art of the Renaissance. Thames and Hudson: London, 1963: 192.

<sup>189</sup> Robinson, Arthur H. “Mapmaking and map printing: The evolution of a working relationship”. Five centuries of map printing. Ed. David Woodward. Chicago: University of Chicago Press, 1975: 1-24, 1.

Ames-Lewis characterizes Dürer as one of the most “self-aware” artists during the Renaissance, in that he did not hesitate to publicize his own intellectual and technical achievements.<sup>190</sup> Richly dressed in his self-portraits, Dürer’s visual works suggest an attempt to elevate his social position:

It [his self portrait] is a ‘statement about status, a badge of wealth, power and distinction’. The sophisticated Latin and the Italianate, humanistic lettering of the inscription – ‘I, Albrecht Dürer of Nuremberg made [*effingebam*] this image of myself with colours at the age of twenty-eight’ – indicates the intellectual level to which Dürer aspired. The use of the verb ‘effingere’, rather than the usual ‘pingere’, echoes the language of Dürer’s humanist friend Konrad Celtis in his epigrams in praise of the painter.<sup>191</sup>

Aspirations of social – and artistic – esteem were in many ways facilitated by the increasing dissemination of artistic works at the end of the fifteenth century, a trend due to the advances in printing technology. The ability to combine scholarship with printing workshops facilitated communication between different social and intellectual groups, fostering interchange of ideas.<sup>192</sup> With the medium of woodcuts Dürer recognized the commercial possibilities of printing, exploiting the easy dissemination of images for profit, prestige, and an acquisition of further scientific knowledge.

### Introduction to Woodcuts

Woodcut prints date from the beginning of the fifteenth or the end of the fourteenth century (i.e. *St. Christopher* of 1423). Woodcuts are one of the printmaking processes in the family of relief cuts.<sup>193</sup> This method uses a block of wood which has been cut along the grain and covers the surface area in white



Figure 4. Albrecht Dürer. Woodcut of the Southern Hemisphere of the Celestial Globe. 430 x 435 mm. Berlin, SMPK, Kupferstichkabinett (slg. Derthosa)

<sup>190</sup> Ames-Lewis, Francis. *The Intellectual Life of the Early Renaissance Artist*. Yale University Press; New Haven, 2000.

<sup>191</sup> Ames-Lewis, 241.

<sup>192</sup> Eisenstein 1983: 44

<sup>193</sup> The three groups of printing processes are relief, intaglio, and planographic.

ground. The composition of the piece then drawn in ink and the area around each line is removed separately. A woodcut operates on the principle that a block of wood covered in ink produces a solid black rectangle on a sheet of paper. Cutting a trench into the block of wood using a burin or gouge leaves this area free of ink; the resulting image will show the area of the trench as completely white. Thus, an image consisting of black and white shapes or spaces is possible using a variety of instruments so as to produce the illusion of tone. In a woodcut, then, the lines drawn have limitations as to how narrow they can be drawn; additionally, the spaces in between the lines have to be considered carefully. The creation of a woodcut, therefore, is not the conceptualization of a single line; rather it is an amalgam of separate spaces.<sup>194</sup> In the creation of a woodcut, deliberation begins with the image as a whole, with the entire illustration considered first. Once the individual elements have been selected, then the designer can add them to the image and begin to identify how to depict them in a way possible using the woodcut medium. The difficulty of this method can be seen in the blocks, such as this one of the star chart showing the southern hemisphere (Figure 4). Comparing Dürer's *Adam and Eve* as an oil painting, an engraving and a woodcut (Figures 5, 6 and 7, respectively), one can see the skill needed to depict tone instead of color in the latter images. Engravings were made on a copper plate, using a burin to scratch the surface; therefore, this medium required less consideration for the plate than did a woodcut for the block. Comparing the engraving and the woodcut, it is possible to see the composition alterations that had to occur in order to transfer the same elements to a different medium. Arguably one of the most difficult of the artistic media, woodcuts were not originally intended to be used as "artistic" pieces. Rather, their assistance in the dissemination of cheap prints advanced the book trade.

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<sup>194</sup> Ivins Jr., W. M. (1958). *How Prints Look*. Boston, Beacon Press, 5.



Figure 5. Albrecht Dürer. *Adam and Eve*. 1507. Oil on panel. Museo del Prado, Madrid, Spain.



Figure 6. Albrecht Dürer. *Adam and Eve*. 1504. Engraving. 252 x 194 mm. Staatliche Kunsthalle, Karlsruhe



Figure 7. Albrecht Dürer. *The Fall (Der Sündenfall)*. ca. 1516. Woodcut. *Kleine Passion*, 2. Woodcut. 128 x 98 mm. monogrammed

Prints were intended for many purposes: to convey religious ideology, to communicate intellectual principles, to serve as decorative aesthetic pieces, or to educate artists in the styles of their predecessors and contemporaries. Religious iconography developed for the popular audience at the beginning of the fifteenth century. It can be assumed that many of the first workshops responsible for producing woodcuts were either affiliated with or in close proximity to monasteries. By the second quarter of the fifteenth century block prints of religious figures were widely available, soon followed by images of an increasingly secular nature.<sup>195</sup> Although without text at the beginning, legends were soon added within the white spaces, originally being hand-written but later cut in the wood as well. All of these developments led to an increased circulation of satirical prints, commercial pamphlets, and calendars.

In addition to the aforementioned “vernacular” or “popular” visual images, copies of “great” paintings and many two-dimensional representations of three-dimensional sculptures were printed. Widely disseminated, Master ES’s engravings traveled from Germany to Florence during the middle of the fifteenth century, where they were copied and reproduced in various printing houses. Ames-Lewis argues that the most important printed works – in terms of communicating scientific and intellectual ideas in the Renaissance – were the engravings of

<sup>195</sup> Febvre and Martin 1976: 47

classical works, due to the fact that they allowed for the circulation of antiquarian artistic representations to a wide audience.<sup>196</sup> The *Apollo Belvedere* was reproduced two-dimensionally in print around the end of the fifteenth century, allowing for studies of the ideal human form for those who could not afford to go see the original or to buy a small three-dimensional model, which were not common until later in the Renaissance and were more expensive. In addition to the resources and possibilities these prints offered, Dürer's trips to Italy allowed him to view the originals. He copied many of these works – such as Mantegna's *Battle of the Sea-Gods* (Figure 8) – focusing mainly on how Italian painters utilized a linear tradition. These studies of certain acclaimed artists – specifically Pollaiuolo and Mantegna – served to inform and enhance his engagement with the woodcut medium and his theories on art.<sup>197</sup> His own works then engaged in contemporary debates on theoretical and visual ideals. *Adam and Eve* in particular is exemplary of his pictorial stand of the disputes concerning ideal proportions. Ames-Lewis



Figure 8. Albrecht Dürer. *Battle of the Sea-Gods*. 1494. Pen drawing copy after the Mantegna.

speculates: “It is no surprise that he engraved the image to ensure wide circulation of this exemplary artistic statement.”<sup>198</sup>

Assuming that Dürer used the woodcut medium as a vehicle for aesthetic and

visual debates pertaining to individual prints, due to the wide dissemination of texts during the late fifteenth and early sixteenth centuries, it can be argued that he used book illustrations for the same purposes.

<sup>196</sup> Ames-Lewis, 45-46.

<sup>197</sup> More than one century later, Vasari criticized Pontormo's prints as being too closely related to Dürer's originals - Ames-Lewis, 2000.

<sup>198</sup> Ames-Lewis, 253.

Text can be carved into the woodblock – written backwards so as to be read when reversed by the printing process. A block book is a book in which both picture and caption or text are printed from one finished woodblock. The origin of the printing press may have derived from technological considerations surrounding the block book. Before movable type, this method was employed for devotional, religious pictures and playing cards during the Middle Ages. The advantages of a block book are that everything can be printed from a single form. The disadvantages are that one mistake involves abandoning the complete page and that an image is only applicable to a single page in a specific book. Print historian Ivins wrote:

A print may be defined as an image made by a process that is capable of producing a number of exact duplicates....It can be reasonably argued that the great event of the fifteenth century was not the rediscovery of Greek or any other sort of ancient learning, but the discovery of mechanical ways to make pictorial records in duplicate, exactly, cheaply, and in vast quantities.<sup>199</sup>

Eisenstein criticizes Ivins' importance on "the exactly repeatable pictorial statement," as there existed previously methods to reproduce images exactly, writing: "Here as elsewhere, one must be wary of underrating as well as of overestimating the advantages of the new technology."<sup>200</sup> Rather, the emphasis should be placed on the ability for exact reproduction of text and image within the same work. It is interesting to note that block books were still in existence after the advent of the printing press; collaboration between movable type and woodcut illustrations provides an opportunity to re-use illustrations. Murray and Murray acknowledge that one possibility for the hesitancy to exploit the printing press' movable type was trade-unions and Guild rules of the later medieval period; regulations and rules of demarcations were strict and punishments severe.<sup>201</sup> Printers did not want to overstep their boundaries and take business from the illustrators. In 1470 in Augsburg an accord was forged that allowed for printers to

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<sup>199</sup> Ibid., 153-4.

<sup>200</sup> Eisenstein (1983:22)

<sup>201</sup> Murray, Peter and Linda. The Art of the Renaissance. Thames and Hudson: London, 1963: 183.

use woodcut illustrations for their printed texts, as long as the illustrations were the work of a professional cutter, or *Formschneider*.<sup>202</sup>

Indeed, the commercial nature of printing seems to have been a driving force behind many of the stylistic and thematic decisions concerning the printing industry, especially pertaining to books. Febvre and Martin assert that the invention of the printing press did not result in any radical or sudden changes for the publishing industry, contemporary literacy, or attitudes towards texts.<sup>203</sup> Rather, after some years concerns centered on the profits to be made with books, with energy being put towards finding works intended for mass consumption and the increasing need for standardization. Printing, from the time of Gutenberg, was an industry driven by profit. Even the scholars and humanists working with books and prints were influenced by and controlled to an extent by the commercial nature of printmaking. In the Middle Ages, monastic scriptoria had developed specialized tasks for bookmaking: some monks were illuminators and others copiers; however, they worked in close proximity to one another. At the beginning of the Renaissance separate workshops were set up, dividing copyists, illuminators, and rubricators so that the specific tasks were done in more of a production line fashion.<sup>204</sup> The beginning of the fifteenth century marked an unprecedented economic boom, resulting both in material wealth and the rise of literate humanism. Germany during the early sixteenth century, although not as politically developed as most of Western Europe, was an economic powerhouse. The Hanseatic League – although in a decline – coupled with increasing businesses of mining, metals, and banking established both industrial production and international trade for the German nation states.<sup>205</sup> German printing presses, until the Reformation, were unregulated by universities or other governing bodies.<sup>206</sup> Printmaking, as a business with international prospects, was controlled by wealthy capitalists. Print workshops matured into large-scale centers of production and in

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<sup>202</sup> Murray, Peter and Linda. *The Art of the Renaissance*. Thames and Hudson: London, 1963: 183.

<sup>203</sup> Febvre, Lucien and Martin, Henri-Jean *The Coming of the Book : The Impact of Printing 1450-1800*. Verso: London. 1976: 260

<sup>204</sup> Febvre and Martin 26.

<sup>205</sup> Kitchen, M. (1996). *The Cambridge Illustrated History of Germany*. Cambridge, Cambridge University Press, 82.

<sup>206</sup> Grafton 1999: 14.



the fifteen years since the first press, more than 200 towns established their own presses.<sup>207</sup>

One can assume the universal existence of the book in Europe by 1480, as presses set up specifically for books existed in over one hundred locations, approximately thirty in Germany. The close connections between Germany and Italy meant that there were many associations between presses in these nations. Although Germany is generally considered to be the leading nation of publishers during the fifteenth and sixteenth centuries, Italy also had important print centers started by German immigrants. Venice is considered to be the print capital of Italy, due in part to the city's intellectual nature and in part to its geographical location as central for trade routes and communication. Venice leads print publications in the years between 1480-1482, with 156 editions, followed by Augsburg with 67 and Nürnberg with 53, the latter of which was dominated by the Kobergers.<sup>208</sup> Although behind Italy in prestige pertaining to painting and sculpture, Germany excelled in woodcuts. Both artistically and technically, Germany came to dominate this manner of visual communication. By the early 16<sup>th</sup> century, maps in Italy were usually engraved on copper; however, north of the Alps, cartographers still used woodblock techniques.<sup>209</sup> Murray and Murray assert that the reason for an increased popularity and focus on woodcuts in the Northern countries versus Italy was due to patronage on a smaller scale.<sup>210</sup>

In total over 35,000 editions comprising approximately 20 million copies of 15,000 different texts were produced in Europe by the end of the fifteenth century. This is, in fact, a low estimate of the total production, as it only takes into account the surviving works.<sup>211</sup> An average print run can produce at most 500 copies and the phenomenal output of Europe before the sixteenth century is even more remarkable when considering the fact that the population density was lower than in modern times – less than 100 million – and literacy rates were far lower. Cartographic woodcuts were numerous as well during the beginning of the

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<sup>207</sup> Febvre and Martin, 186

<sup>208</sup> Febvre and Martin, 182-83

<sup>209</sup> Ritzlin, 1.

<sup>210</sup> Murray, 153.

<sup>211</sup> Febvre and Martin, 248-49

sixteenth century. Both globes and maps of the world were widely disseminated. Waldseemüller boasted to have printed one thousand copies of his 1507 map of the world.<sup>212</sup> That only one in existence today suggests that many more works were produced than is assumed.

Humanists put great effort into generating and publishing accurate translations of Antiquarian editions; therefore, there were many texts readily available. However, Renaissance humanists generally neglected medieval texts and scientific treatises.<sup>213</sup> Pertaining to scientific knowledge, the humanists were generally content to restore classical texts, editing and re-issuing them in new editions without the medieval editorial comments.<sup>214</sup> Antiquarian texts were continually re-issued. Following a five folio edition of Aristotle from 1495-1498, Aldus published basic astronomical works in 1499, the *Astronomici veteres*, which was available in both Greek and Latin. In addition to the printing of the classics, there was an increasing market for scientific works written in the vernacular, including astrological tables. Due to the somewhat limited market for these works, many remained in manuscript form, sometimes until years after the author's death.<sup>215</sup> Of the numerous scientific texts/incunabula, 57 percent were contemporary, with 124 works in German, dominated by practical astrology.<sup>216</sup> Febvre and Martin assert "printing does not seem to have played much part in developing scientific theory at the start, though it seems to have helped draw attention to technical matters."<sup>217</sup> This conclusion is drawn from the low number of reprints and/or revised editions for works such as Sir John Mandeville or Marco

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<sup>212</sup> Stevenson, Edward Luther. Terrestrial and Celestial Globes: Their history and construction including a consideration of their value as aids in the study of geography and astronomy. Vol. 1. New Haven: Yale University Press, 1921: 70-71.

<sup>213</sup> Febvre and Martin 1976: 276: "The humanists were in general content simply to reproduce the original text of Ptolemy or Theophrastus or Archimedes, as if all problems were solved by accurate editions of the authorities. Often their interest was as much in the literary qualities of the work as in its scientific value."

<sup>214</sup> Febvre and Martin 1976: 276

<sup>215</sup> "Johann Stoeffler, who died in 1531 at nearly 80, printed many astrological tables, but his own *Cosmographicae aliquot descriptiones* only appeared for the first time in 1537 at Marburg. Many similar examples could be quoted." Febvre and Martin 1976: 276-77

<sup>216</sup> Febvre and Martin 1976: 259

<sup>217</sup> Pertaining to geographical discoveries, the lack of re-prints concerning Columbus' accounts of the new world reveals a public largely unconcerned with the significance of the imperial conquests and the territories outside of Europe. Febvre and Martin 1976: 259

Polo's travel literature. Technical literature such as Alberti's *Ten Books on Architecture* of 1485 was in wide circulation, contributing to a new outlook on technology and the possibility for continued technical advancements. Contemporary scholars were could easily access texts on mechanics, medicine, natural history, geography, physics and astronomy.

In the early sixteenth century, astrology was not only a popular but also a rational subject of study. Practical astrology was written about and widely read – the first German astronomical calendars date from the beginning to the fifteenth century – with many Parisian merchants and lawyers owning astrolabes.<sup>218</sup> Speculation of catastrophes due to the planets aligned under Pisces in February of 1524 prompted almost 60 different tracts on the subject by prominent authors.<sup>219</sup> The northern European print culture fueled the popularization of cosmography to an increasingly-literate public. Grüninger's Strasbourg workshop produced large-scale woodcut maps at the turn of the sixteenth century, expanding its catalogue in the next twenty years to include Waldseemüller's *Cosmographia introduction*, both Latin and German editions of Ptolemy. Eisenstein argues that "mutational" elements occurred within the field of astronomy – with Regiomontanus – and the classical revival – with the printing press; however, she provides no further information detailing this claim.<sup>220</sup> Her point is therefore assumed to argue that the classical revival in the Renaissance transferred more quickly to astronomical studies due to the dissemination of information facilitated by printing technology. Publishing of scientific works proliferated in the sixteenth century to an even greater extent than is generally considered. One example is Copernicus's *De revolutionibus* which, despite being intellectually advanced for much of the public, had a print run of approximately 500 and was reprinted for a second edition with just as many copies.<sup>221</sup> Much of the astronomical background reading by future scientists – namely Copernicus – can be attributed to Regiomontanus and other

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<sup>218</sup> Febvre and Martin 1976: 277

<sup>219</sup> Febvre and Martin 1976: 277

<sup>220</sup> Eisenstein 1983: 114-15

<sup>221</sup> Gerald P. Tyson and Sylvia S. Wagonheim, "Introduction," *Print and Culture in the Renaissance* (Newark: University of Delaware Press, 1986): 8-16.

scholars in Nürnberg, who in 1474 produced a bibliography of works to be printed and subsequently utilized by sixteenth-century astronomers.<sup>222</sup>

### Nürnberg Print Culture and Humanists

Despite Germany's seeming indifference to cartography during the sixteenth century – apart from Ptolemy's reproductions, Germany produced mainly globes and separate maps. The Germanic wood-cut maps were copied in other countries and Nürnberg was prominent in the dissemination of geographical theory and practice.<sup>223</sup> Ideas surrounding the conceptualization of the structure of the universe during the late fourteenth and early fifteenth centuries were both created and disseminated in this city. As a center for metal handicrafts, precision instruments, efficient printing houses, as well as for wealth and humanistic scholarship, this city provided ideal conditions for working mathematicians, astronomers, and geographers – all of whom had established themselves in Nürnberg. Nikolaus of Kues (1401-1464) had probably compiled a map in addition to his cosmographical and astronomical scholarship. One of Kues' maps was acquired by either Behaim or Münzer – both of whom collected maps – as Behaim's globe locations correspond to those on the Cusanus map.<sup>224</sup> The map in Schedel's *Chronicle*, by Münzer, remains the first printed map of Germany. Behaim created his *Erdapfel* in 1492.<sup>225</sup> Schedel, Münzer and Behaim discussed cosmographical issues, some of which are addressed in the *Chronicle*.<sup>226</sup> Cartography in Nürnberg benefited from Behaim's creation of the *Erdapfel* and subsequent teaching on the construction of terrestrial spheres, with the artists in the city focusing further on contributions to the cartographic industry.<sup>227</sup>

The merging of mathematics and aesthetics in texts dealing with and referring to cartography is exemplified by Albrecht Dürer's collaboration with

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<sup>222</sup> Eisenstein (1983: 209)

<sup>223</sup> Tooley, R. V. (1949). *Maps and Map-Makers*. London, B.T. Batsofrd, 24-25.

<sup>224</sup> Rücker, Elisabeth. *Die Schedelsche Weltchronik*. Prestel-Verlag: München, 1974.

<sup>225</sup> Behaim was in Nürnberg from 1490-1493

<sup>226</sup> Rücker 77-79

<sup>227</sup> Stevenson, Edward Luther. Terrestrial and Celestial Globes: Their history and construction including a consideration of their value as aids in the study of geography and astronomy. Vol.1. New Haven: Yale University Press, 1921: 51.

Regiomontanus in the early part of the century. Regiomontanus – renown for his mathematical legacy – was responsible for much of the scientific interest within the humanist and printing circles.<sup>228</sup> Setting up a press specifically to publish maps and books, in Nürnberg in 1472 Regiomontanus was fascinated by astronomy, geography, and trigonometry.<sup>229</sup> The revival of astronomical texts during the middle of the fifteenth century reflects the dissemination of these works, made possible by the printing press. Ultimately, this illusion elevated the reputations of Renaissance astronomers above their predecessors; yet, Regiomontanus elaborated on, rather than contradicted, medieval astronomical theories.<sup>230</sup> Interested in collaborative work between academics and aficionados, Regiomontanus frequently held workshops to acquaint others with mathematical instruments for measuring locations on the earth's surface. One of the participants was the young Dürer.<sup>231</sup> Most of the painters and sculptors in the Renaissance were from the artisan class rather than a patrician or aristocratic status, with the youth being trained at a young age in a family workshop. Dürer was born in Nürnberg in 1471. As the son of a goldsmith, his schooling began as an apprentice to his father learning the craft, gaining proficiency in that field until the age of fifteen, at which point his artistic talent was recognized and his father allowed him to pursue his artistic interests rather than following in the family craft. In 1486 he began an apprenticeship with Michael Wolgemut at a workshop which produced all different types of art, as well as woodcut illustrations for books. Wolgemut was commissioned predominantly by Anton Koberger – head of the most productive and well-organized printing house during this period. Wolgemut and Pleydenwuff are the first German artists [*Tafelgemälden*] who created woodcuts, entering into the medium at an opportune time after Martin Schongauer and the Hausbuchmeister, whose copper plate engravings had already been met with commercial success.

Anton Koberger is arguably the most significant publisher of the period. Koberger originally began his career as a goldsmith. Between 1473 and 1513 he

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<sup>228</sup> Regiomontanus also examined the *Cosmographia* and *Geographia*.

<sup>229</sup> O'Conner, J. J. (2002). *The History of Cartography*, 1.

<sup>230</sup> North, John (Ed). *The Norton History of Astronomy and Cosmology*. WW. Norton and Company: New York, 1995.

<sup>231</sup> *Ibid.*, 1.

published over 240 books, the majority of them being high quality texts of the first importance.<sup>232</sup> His first published book, Boethius's *De consolazione philosophiae* (1473) contained commentaries by Thomas Aquinas. His subsequent works specialized in scholastic and theological philosophy, including works from: St. Augustine, Duns Scotus, Vincent de Beauvais, Guillaume Durand, St. Jerome, St. Ambrose, and St. Thomas Aquinas. Koberger also published the first German vernacular bible and numerous other works of canon law.<sup>233</sup> Febvre and Martin write:

Koberger was first and foremost a businessman and manufacturer, anxious to increase the profits from his investments. By 1509 he employed no fewer than 24 presses and about 100 pressmen, correctors, engravers and binders. His bindery, where his solid and standardized bindings were created, was a main feature of his organization...He became the indispensable entrepreneur, a broker between the lesser booksellers whose business was less expensive.<sup>234</sup>

As his business expanded beyond what his own workshop was able to produce, Koberger often enlisted other printers to help with the production of texts. His commercial network of agents for selling his works included the big print centers in the Germanic countries as well as other European centers of production, commercialism, and intellectual thought: Paris, Leyden, Antwerp, Venice, Florence, Warsaw, and Budapest. As a publisher mainly concerned with university textbooks, Anton Koberger did not publish many classical texts.<sup>235</sup> He primarily published scholarly documents.

There was a large market for scholarly publications, both intended to be read in universities and outside of them. The majority of tracts published in Germany during the first fifty years after the printing press addressed historical subjects, particularly those written in the vernacular.<sup>236</sup> The interest in these histories was nearly universal, with a readership consisting of courtiers, lawyers, merchants, soldiers, and even craftsman. Often, legendary histories were more

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<sup>232</sup> Febvre and Martin 1976: 124

<sup>233</sup> Febvre and Martin 1976: 124

<sup>234</sup> Febvre and Martin 1976: 124-25

<sup>235</sup> Febvre and Martin 1976: 124

<sup>236</sup> Febvre and Martin 1976: 283

popular than objective records and medieval tales of chivalry continued to be printed in numerous editions throughout the sixteenth century. Even more popular than histories, though, were chronicles.<sup>237</sup> Written in a medieval fashion, chronicles were compilations of memoirs, annalists, and histories. At the end of the fifteenth century Koberger hired Wolgemut – who worked as an engraver/woodcutter – to illustrate Biblical and allegorical references for his *Scatzebehalter*, which comprised 91 full-page illustrations. Koberger also arranged for the woodcuts of Hartmann Schedel's *Liber Chronicarum* (1493), which was printed in both Latin and German vernacular editions, being sold in Italy, France and as far away as Budapest and Cracow. The *Liber chronicarum* (Hartmann Schedel's *Weltchronik*, or the *Nürnberg Chronicle*.) tells a traditional tale of the four elements, the regular spherical movement of the planets, and other basic foundational principles taken from antiquarian philosophers. This work chronicles the history of the world in an ordered, logical fashion. Historical characters wear fifteenth-century German styles of dress and hair. The initial print run of 1500 copies sold out, as did the pirated Augsburg edition produced the following year, signifying a new, popular market for books.<sup>238</sup>

The *Chronicle* itself was an enormous endeavor. Of the 1,809 woodcuts, about 1/3 are original, with the others being used for repeated illustrations. The majority of the illustrations were done in Michael Wolgemut's workshop. The *Chronicle*'s woodcuts result from 645 individual wood blocks. Although the various woodcuts differ somewhat in terms of artistic quality, overall the illustrations in the *Chronicle* are exceptional in relation to other book illustrations of their time. The landscapes are some of the earliest woodcuts of this genre. This text was the biggest work to date, not only in Germany, but in all of Europe. The Latin edition was published on 12 July 1493, with the vernacular German edition a few months later on 23 December 1493. The official title of the works reads as *Chronica reads cum figuris*. Many of the woodcuts were provided by Koberger's press and are characteristic of his style, that of the *rundgotischen* [round Gothic]

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<sup>237</sup> Febvre and Martin 1976: 284

<sup>238</sup> Grafton 1992: 22

book type; the text is printed (Figure 9).<sup>239</sup> The significance of the *Chronicle* lies in its literary and historical development, as reflected in its illustrations. Much of the *Chronicle*'s attraction was due to the density and novelty of material.<sup>240</sup> Arranged after the seven ages of the world – whose exact dates were laboriously calculated according to an Antiquarian method of computation – the chronological summary classified the events of the world temporally.

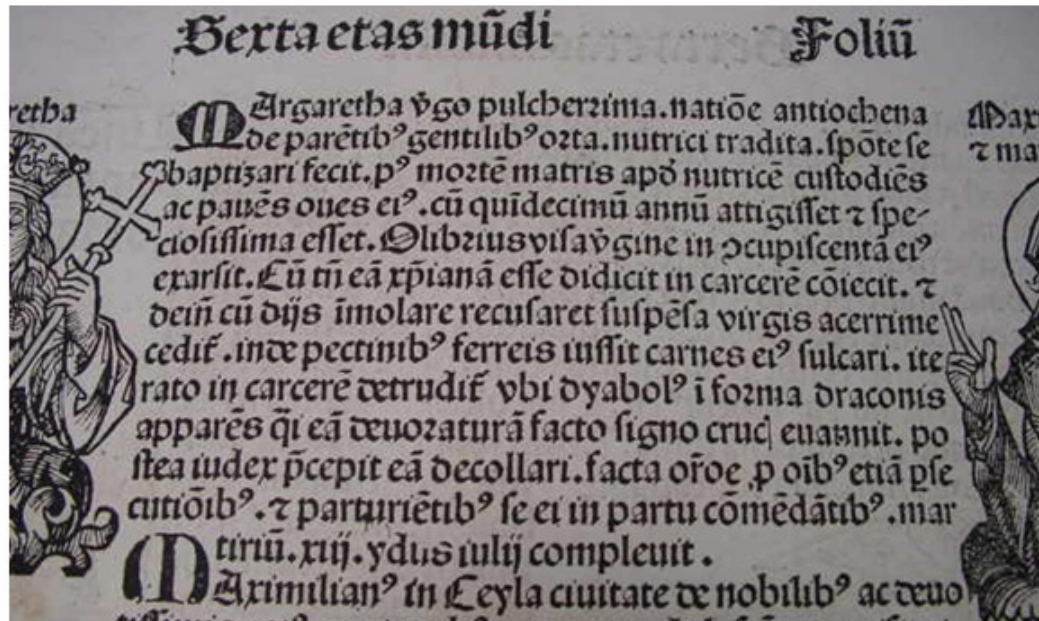


Figure 9. Hartmann Schedel. *Liber chronicarum* (The Nuremberg Chronicle). Detail. 1493. Germanisches Nationalmuseum, Nürnberg

The abundance of text serves to highlight the importance the images have for illustrating the concepts conveyed through the *Chronicle*. The *Chronicle* was, in its time, a wide-spanning compilation of knowledge of great literary and historical importance, both artistically and topographically. Until Dürer's large Apocalypse series, the *Chronicle* was the most important of Nürnberg's book illustrations. Sladeczek argues that the *Chronicle* should not be read as a composite, uniform statement of its time.<sup>241</sup> Rather, it reflects temporal influences ranging from Antiquity throughout the Middle Ages, taking from sources stemming from German mystical thought and the Italian Renaissance; despite the

<sup>239</sup> Sladeczek 71

<sup>240</sup> Sladeczek 73

<sup>241</sup> Sladeczek 75



diversity of source material, however, the compilation and illustrations reflect a distinct Frankish style – both in terms of culture and art.<sup>242</sup>

The conditions in Nürnberg were ideal for the creation of this work: Hartmann Schedel – the author – was by profession a doctor and possessed one of the most extensive, comprehensive libraries in the city which provided the



Figure 10. Albrecht Dürer. *Der heilige Sebaldus auf der Säule (Flugblatt mit der Ode des Conrad Celtis an den heiligen Sebaldus)*. 1501. Woodcut and printed text. 330 x 280 mm (with text). Wien (Albertina).

actively worked to promote the city's reputation as a center for arts and learning, commissioning a broadsheet which Dürer produced in 1501 (Figure 10). The image on the handbill represents Schreyer with St. Sebald's church and is accompanied with Latin verses praising Maximilian and the city of Nürnberg. Koberger was at the time the one of the most prominent printers in Europe and Wolgemut had one of the largest artistic production houses in Germany.<sup>243</sup> Pirckheimer, the patrician humanist, was in the center of most of the most active humanist circles in Germany during the final decades of the fifteenth century. The group was unusual in that it included both scholars and civic leaders, consisting of,

foundation for this work. The patronage and funding for the Chronicle was provided by Sebald Schreyer, the Kirchenmeister and asset manager for the church of St. Sebald. Together with his brother-in-law, Schreyer funded other cultural and artistic improvements with the sculptor Adam Kraft and the Nürnberg poet and humanist Conrad Celtis, with whom he worked in close collaboration for the Chronicle. Schreyer and Celtis

<sup>242</sup> Sladeczek 75

<sup>243</sup> Rücker, Elisabeth. *Die Schedelsche Weltchronik*. Prestel-Verlag: München, 1974.

among others: Lazarus Holzschuher, Hartmann Schedel, Sebald Schreyer, Anton Tucher, Lazarus Spengler, Christoph Scheurl, Karpas Nützel, Thomas Venatorius, Eobanus Hessus, and Camerarius, and Albrecht Dürer.<sup>244</sup> Panofsky writes:

The relationship between this full-blooded humanist and Dürer was one of complete confidence and intimacy, bred out of affection, fostered by a close community of interests...Pirckheimer initiated his friend into the Greek and Roman classics and kept him informed of the developments in contemporary philosophy and archeology: he patiently assisted him in his literary labors and would suggest amusing or cryptic subjects for prints. Dürer in turn provided illustrations for Pirckheimer's writings, hunted around for him in shops and artists' studios, and illuminated the books in his library, not to mention such favors as portraits, bookplates and emblematic designs.<sup>245</sup>

Within the city of Nürnberg, the humanists and thinkers were all in close geographical proximity. Many lived in the same neighborhood. In 1477 Dürer's father bought house Nr.27, which was near the castle and surrounded by the houses of the Nürnberg aristocratic families: the Begaim, Stromer, Kress, Haller, Scheurl, and Harsdörfer. Koberger, Dürer's godfather, lived in house Nr.3, and Michael Wolgemut lived on the same street.<sup>246</sup> Therefore, the Schedel *Weltchronik* was a scholarly – and neighborly – joint venture.<sup>247</sup>

### **Dürer's Involvement with Schedel's Chronicle**

Dürer was involved in the creation and production of several woodcuts for the *Chronicle* beginning around 1490.<sup>248</sup> Although the agreement between the investor and the illustrator was not finalized until 1491, the design was formulated and the production of woodcuts had already begun. The verification for Dürer's having

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<sup>244</sup> Dürer was granted the status of a *Genannter*, one of the members of the Great Council in Nürnberg, in 1509. Ames-Lewis (2000: 65) writes: "artists saw the undertaking of civic duties as a means of raising their social status, even though they might take time from their artistic activities."

<sup>245</sup> Panofsky, *The Life and Art of Albrecht Dürer*, 7.

<sup>246</sup> At the age of 38 (on 15 June 1509 – not sure how this exact date of purchase was calculated), Dürer was able to buy his house on the Zisselgasse, a large and prestigious building that had belonged to Regiomontanus.

<sup>247</sup> Rücker, Elisabeth. *Die Schedelsche Weltchronik*. Prestel-Verlag: München, 1974.

<sup>248</sup> Sladeczek asserts that the examples in his scholarship are only a few observations and that subsequent scholarship may uncover other collaborations and perhaps further involvement by Dürer.

worked in Wolgemut's workshop from the first of December 1486 until either the end of 1489 or April of 1490 is his writing, which also demonstrates his desire for involvement with an academic circle:

Sonderlich hatte mein Vater an mir Gefallen, dass ich fleißig in der Übung zu lernen war. Darum ließ mich mein Vater in die Schul gehen, und da ich schreiben und lesen gelernt, nahm er mich wieder aus der Schul und lernet mich das Goldschmiedehandwerk. Und da ich nun säuberlich arbeiten kunnt, trug mich meine Lust mehr zu der Malerei, dann zum Goldschmiedehandwerk. Das hielt ich meinem Vater für. Aber er was nit wol zufrieden, dann ihn reut die verlorene Zeit, die ich durch die Goldschmiedelehre zugebracht. Doch ließ er mir nach, und da man zählt mich mein Vater in die Lehrjahr Wolgemuth, drei Jahr lang zu dienen...Und also ich im 1490 Jahr hinwegzog, nach Ostern, darnach kam ich wieder als man zählt 1494 nach Pfingsten.<sup>249</sup>

The last two years of Dürer's training at Wolgemut's studio coincide with Wolgemut's first two years of work on the *Weltchronik*. All of the proofs for the woodcut illustrations were made in Wolgemut's workshop. Due to the temporal overlap of his apprenticeship and the printer's commission, Dürer's collaboration

should be seen, then, in the woodcuts existing in the first third of the text, rather than towards the center or end of the book.<sup>250</sup> In the absence of the decorative touches framing the world, Dürer's involvement might be uncertain; however, due to stylistic similarities between these and his other works, there is no question of his contribution.<sup>251</sup>

Additionally, there exists a proof of

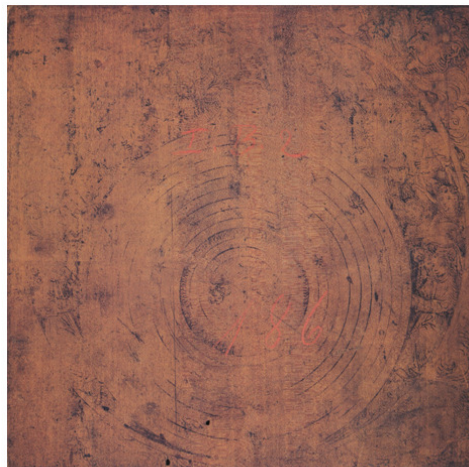


Figure 11. Hartmann Schedel. Proof of *Liber chronicarum* (*The Nuremberg Chronicle*). 1493. Woodblock. Germanisches Nationalmuseum, Nürnberg

<sup>249</sup> „Zitiert nach Lange/Fuhse, Dürers schriftlicher Nachlass (Halle 1895); vgl. a. Weisbach, Der junge Dürer, S.15. Durch diese Zusammenfassung der Dokumentation zur Schedelschen Weltchronik und den Aufzeichnungen aus dem Leben Albrecht Dürers wird erstmalig der Beweis für Dürers Mitarbeit an der Weltchronik erbracht.“ In Sladeczek 1968: 27.

<sup>250</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 44.

<sup>251</sup> Schoch 2002

one of the first test pages made for the *Weltchronik* in the year 1488-1489 (Figure 11). The poor quality of this woodcut is due to the fact that it was printed on both sides. Nevertheless, it is recognizable as a Ptolemaic representation of the world with the round earth featured as the central disk. Surrounding this are thirteen concentric circles, the elemental spheres (water, air, and a ring of fire), and the seven planetary spheres: the moon, to the right of the center in the form of a crescent; Mercury; Venus, on the left of the star; the sun; Mars; Jupiter; Saturn; the firmament with the signs of the zodiac; the crystal sky; and the outside ring of the “Primum mobile”. Embodying the creator’s elemental power in moving the entire bodies, the final circle surrounds everything with angels. This is similar to the sheet in Schedel’s *Weltchronik* and shows stylistic parallels to other sketches done by Dürer (Figure 12).<sup>252</sup> Comparing the two, one can see the extraordinary similarities. The men’s heads surrounded by the clouds in the blank spaces personifies the four winds.<sup>253</sup> The differences in sizes between this proof and the

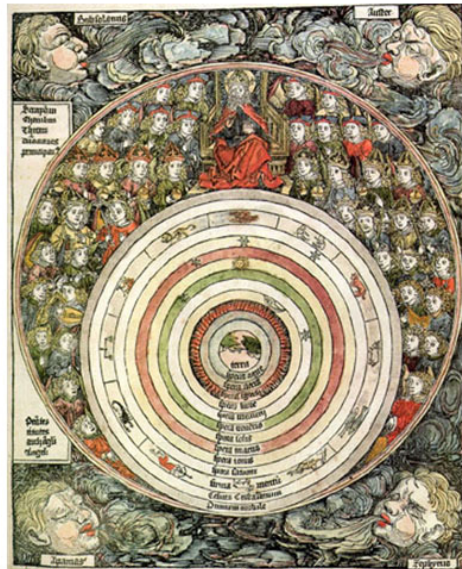


Figure 12. Hartmann Schedel. *Liber chronicarum* (The Nuremberg Chronicle). Detail. 1493. Germanisches Nationalmuseum, Nürnberg



Figure 13. Albrecht Dürer. *The Revelation of St John: 5. Opening the Fifth and Sixth Seals*. 1497-98. Woodcut, 39 x 28 cm. Staatliche Kunsthalle, Karlsruhe

<sup>252</sup> In his *Thronende Maria mit dem Kind und Engeln* from 1485 the two angels with lute and harp are similar, as are the style of dress and the form of the wings. The cross-hatch style of the shadow is likewise analogous on both the drawing and proof. The small heads of the angels their physiognomies correspond to Dürer’s work, depicting the contemporary style.

<sup>253</sup> Dückers et al. (1997). *Dürer, Holbein, Grünewald: Meisterzeichnungen der Deutschen Renaissance aus Berlin und Basel*. Verlag Gerd Hatje: Germany: 96.



*Weltchronik*, the former a square and the latter rectangular, suggests that the sketch dates earlier than 1489. There exist stylistic differences between the pieces as well. In the illustration, the angels surrounding the circle of heaven are characterized in terms of their various ranks, one of which is apparent through stylistic differences in their headdresses; these distinctions cannot be seen in the proof. Despite other particular differences – such as the placement of figures and their respective accessories – the organization and structure of the two pieces is similar, suggesting that the proof was used as a blueprint for the subsequent text.<sup>254</sup> Found in Dürer's possession, it is likely that this cut piece would have been a present from Koberger, who was Dürer's godfather, once the width of the print space had been decided and an appropriately sized print transferred to a woodblock.<sup>255</sup>

The final illustration for the *Weltchronik* of the seven days of creation (*Schöpfungstag*) demonstrates aesthetic qualities similar to Dürer's other works. Dürer's style can be seen in the sun and moon depictions in the *Weltchronik*. These are artistically more exceptional than the other illustrations in the text, which correspond to solar and lunar representations for his later *Apocalypse* series (Figure 13) – the facial proportions are similar, as are the alignment of light rays;

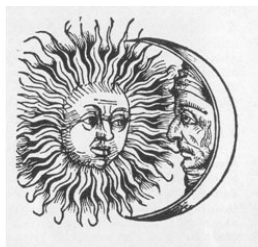


Figure 14. Hartmann Schedel. *Liber chronicarum* (The Nuremberg Chronicle). Detail. 1493. Germanisches Nationalmuseum, Nürnberg

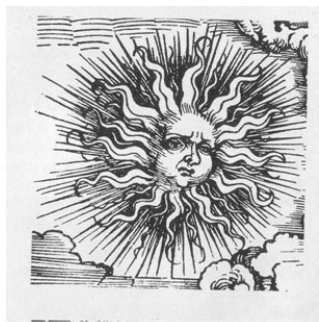


Figure 15. Albrecht Dürer. *The Revelation of St John: 5. Opening the Fifth and Sixth Seals*. Detail. 1497-98. Woodcut, 39 x 28 cm. Staatlich Kunsthalle, Karlsruhe



Figure 16. Albrecht Dürer. *The Revelation of St John: 5. Opening the Fifth and Sixth Seals*. Detail. 1497-98. Woodcut, 39 x 28 cm. Staatliche Kunsthalle, Karlsruhe

<sup>254</sup> The lower angel in the “Riss” touches the outer circle; directly overhead (above him) fly an angel with an instrument and two without any instruments. One row above it lay the “Bügelkronen” of the three angles, which are too similar to identify. Over them angels with toques [A woman's small, brimless, close-fitting hat. [Baretten]] are pictured. Dückers *et al.* (1997). *Dürer, Holbein, Grünewald: Meisterzeichnungen der Deutschen Renaissance aus Berlin und Basel*. Verlag Gerd Hatje: Germany: 96-98.

<sup>255</sup> Dückers *et al.* (1997). *Dürer, Holbein, Grünewald: Meisterzeichnungen der Deutschen Renaissance aus Berlin und Basel*. Verlag Gerd Hatje: Germany.

indeed, very little alterations were made in the construction of the respective emblems (Figures 14, 15 and 16).<sup>256</sup> Pertaining to the wind heads, the three-quarter position of the head and the spatial affect of the clouds give the image an added depth lacking in other illustrations (Figure 17).<sup>257</sup> The wind gods shown in the *Chronicle* can be compared to those in Dürer's *Apocalypse* series (Figure 18); the expressions, the facial shading, and the physiognomy are all represented in the same manner.<sup>258</sup> Furthermore, in 1511 Dürer produced a woodcut of the holy trinity in which the sky underneath the human figures is given depth through the representation of the four cardinal winds (Figure 19). In addition to representing the omnipresent nature of divinity, with light radiating from the head of God mirroring the streams of air flowing from the winds' mouths, the three-quarter angles of the middle two heads corresponds to the profile views of the outer representations to further create a pictorial depth.

Dürer's use of wind god iconography in his cartographic and religious illustrations serve both as a way of incorporating a sense of perspective into the images and as symbols which convey further meaning to viewers. In an illustration of Ptolemy's armillary sphere Dürer surrounded the sphere with wind gods (Figure 20). This representation is more simplistic artistically, with the simplicity of their lines corresponding to the simplicity of the sphere's depiction. The twelve wind gods appear as well in Dürer and Stabius' terrestrial map commissioned by Maximilian, labeled with only their Roman monikers. These heads are more



Figure 17. Hartmann Schedel. *Liber chronicarum* (*The Nuremberg Chronicle*). Detail. 1493. Germanisches Nationalmuseum. Nürnberg



Figure 18. Albrecht Dürer. *The Revelation of St John: 5. Opening the Fifth and Sixth Seals*. Detail. 1497-98. Woodcut, 39 x 28 cm. Staatliche Kunsthalle, Karlsruhe

<sup>256</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 44.

<sup>257</sup> (Sladeczek 32)

<sup>258</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 40, also speculated by Panofsky (1948).

elaborately drawn, adorned with feathers of different types that symbolize the character of the gods as either coarse or mild (Figures 21 and 22).<sup>259</sup> Wind-god iconography usually depicts two deities – Boreas and Zephyrus – although at times the other two cardinal gods – Eurus and Notus – are present, namely in cosmological representations.<sup>260</sup> Dürer's portrayal of Wind-gods is unusual both in number and representation. All of his figures are clean-shaven (Boreas is normally bearded) and have similar facial features, although their wings are of two distinct varieties. Waetzoldt draws a parallel between Dürer's anthropomorphism of the winds to Nicolaus Cusanus' integration of mathematical symbols with philosophical considerations.<sup>261</sup> He believed strongly in numerology, which finds esoteric or mystical relationships between numbers and the physical characteristics and actions of living things. Cusanus' writings included speculation on philosophical observations of the earth's rotation and gyroscopic behaviors.<sup>262</sup> In the terrestrial areas of late medieval maps angels inhabit liminal spaces, often "sharing cartographic space" with the cardinal winds.<sup>263</sup> Cosgrove asserts that not only were the winds associated with limits beyond the known world, into the cosmological sphere, but winds and angels came to represent eschatological emblems; in his examples, Cosgrove focuses on angels rather than winds: Gabriel's interaction with Adam and Eve, his



Figure 19. Albrecht Dürer. *Die Heilige Dreifaltigkeit* (The Trinity). 1511. Woodcut. 389 x 282 mm. Monogrammed and dated. British Museum, London

<sup>259</sup> Schoch 2002.

<sup>260</sup> Williams, S. (2001). *Taming the Winds*, 1.

<sup>261</sup> Waetzoldt, 211.

<sup>262</sup> Ibid., 211.

<sup>263</sup> Cosgrove 2001: 58

role in the Annunciation, the announcements of Angels throughout the new testament, and the Book of Revelation.<sup>264</sup> In the Book of Revelation, the text reads: “four angels standing on the four corners of the earth, holding the four winds of the earth.” Medieval cartographers attempted to reconcile this textual description of a rectangular earth with its known circular form.

Graphically, placing the circle within a square frame resolved the problem and opened liminal spaces in the architraves where wind heads, angels, spirits, or the four beasts described in Revelation could mediate the geometries of physical and metaphysical space.”<sup>265</sup> The geometry of cartography has undergone distinct visualizations. Seemingly, in an attempt to represent perfection in the shape of a circle, yet dealing with square-framed maps and terrestrial representations,

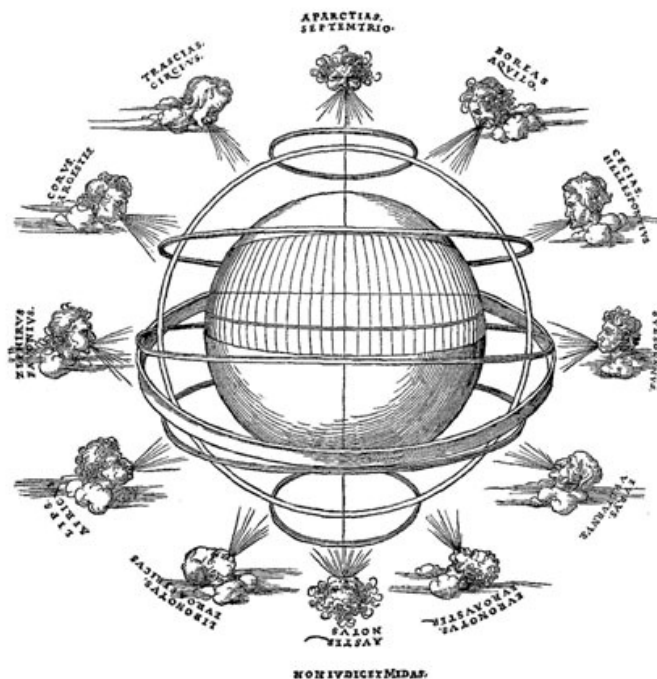


Figure 20. Albrecht Dürer. *Ptolemy's Armillary Sphere*. Woodblock

cartographers utilized wind or angel emblems to represent the outward cosmic nature of space, implying a circular realm surrounding that which was pictured.<sup>266</sup> Thus in these cartographic representations the liminal spaces and characters pictured therein represent for terrestrial geography a method of visualizing the unknown. Unlike Roman lines, which were demarcated boundaries – the geography presented in Revelation to John demonstrates an awareness of the relatively unknown status of earthly geography, of which less was known than celestial space.<sup>267</sup>

<sup>264</sup> Cosgrove 2001: 58

<sup>265</sup> Cosgrove 2001: 59

<sup>266</sup> Cosgrove 2001, Woodward in *History of Cartography* I: 307, 319, 328

<sup>267</sup> Cosgrove 2001: 59





Figure 21. Albrecht Dürer, *Die Weltkarte des Johannes Stabius*, 1515 Woodcut in four pieces, 645 x 850 mm



Figure 22. Albrecht Dürer, *Die Weltkarte des Johannes Stabius*, Detail, 1515 Woodcut in four pieces, 645 x 850 mm

The encyclopedic nature of the *Chronicle* presents the earth as geocentric, a fact which influenced both popular conception and cartographic representations well into the seventeenth century.<sup>268</sup> In order to appreciate the magnitude and influence of Schedel's *Chronicle*, one can compare it to other contemporary works. A few years prior the Cologne Bible appeared and one year after the *Chronicle* the Lübecker Bible was printed – both of whose illustrations are considered to be exceptional. However, the artistic quality of neither comes close to Dürer's representations for Schedel's work.<sup>269</sup> Sladeczek argues that this places the teachings and works of Dürer and the entire Wolgemut school in a new light; Dürer's involvement increased the technical and artistic regard of Wolgemut's workshop while the *Chronicle* itself benefits from this collaboration, as it engages with artistic genius, being influxed with more artistic meaning and significance.<sup>270</sup> Despite Dürer's evident artistic style in the pieces, the lucrative prospects of the *Weltchronik* encouraged copies and imitations. The *Liber Chronicarum* was copied in Augsburg by Schönsperger in three editions: 1496, 1497, and 1500.<sup>271</sup> The *Chronicle* had a large impact on subsequent works, both German and foreign. Schedel's ideas can be seen in Sebastian Münster's

<sup>268</sup> Snyder 1984

<sup>269</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965.

<sup>270</sup> Sladeczek 81

<sup>271</sup> Febvre and Martin 1976: 93

*Kosmographie* and continue even through to the *Schwäbische Stadtchronik* in 1738.<sup>272</sup> Textual influences and references traveled as far as Italy, with copies of the *Chronicle*'s illustrations being used in Luther's Bible – printed in September of 1522 – and in contemporary prints throughout Holland. Sladeczek asserts that the images were responsible for the contemporary conceptualization of geography, as people took the city maps as accurate representations of those places and modeled their urban geographical knowledge after these images.<sup>273</sup>

### **Dürer's Large-format Book Illustrations**

Dürer's large-format books, the *Apocalypse* (1498) and the *Life of the Virgin* (1511) series were modeled after the format of the block-book and influenced by his experience working with the *Weltchronik*. Schedel's *Weltchronik* served as a model for Dürer in several aspects.<sup>274</sup> The first is the size – as Dürer's *Grossen Bücher*, the *Apocalypse* series and his *Life of the Virgin* works were both unusually large; additionally, the *Apocalypse* was simultaneously printed in Latin and vernacular German editions.<sup>275</sup> The two works are also comparable in that they were not distributed through the publisher, but rather by the artist himself with the help of an agent.<sup>276</sup> Some scholars speculate that due to large, non-standard size, most print workshops were both unable to produce a blemish-free woodblock and did not have printing presses large enough for these works.<sup>277</sup> Woodcuts appealed to individualistic artists, as they were cheaply made and produced; therefore, original works could be produced regardless of whether or not they were commissioned by a wealthy patron. In producing these books in their entirety, from start to finish, Dürer had a complete lack of restrictions. Additionally, prints were affordable to almost the entire population and, while the contemporary "tastes" or market must be considered, for the most part woodcuts enabled a level of artistic self-expression not found anywhere else.

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<sup>272</sup> (Sladeczek 80)

<sup>273</sup> (Sladeczek 80)

<sup>274</sup> These works were produced first as prints and then later as books.

<sup>275</sup> Rücker 84

<sup>276</sup> Rücker 84

<sup>277</sup> Murray and Murray 1993

Dürer's *Apocalypse* series was revolutionary in many ways, not only artistically and commercially, but also in terms of its educational facilities. Dürer published his *Apocalypse* series simultaneously in Latin and vernacular German, increasing the commercial possibilities. There exists a continuation between Latin classics that were popular in the Renaissance and those that had been widely read, adapted, and translated during the Middle Ages. Key texts were Cato and Aesop, both of which were well-known in the vernacular texts/versions developed by the medieval scribes. By the turn of the century there were over 60 Latin editions of Cato, 36 in both German and Latin, and at least three in vernacular German.<sup>278</sup> Aesop's *Fables* were even more numerous, with more than 80 Latin editions, 15 High German, and one Low German translation. School in the sixteenth century taught Latin classic – Aesop and Cato – literature in addition to studying the moral sciences and logic. Of the books produced during the first half-century of printing, 77% were *incunabula* – written in Latin and 4-6 percent were in German.<sup>279</sup> In terms of theme, religious works dominated almost half, followed by literature at a rate of 30 percent, law approximately 10 percent, and scientific works roughly 10 percent.<sup>280</sup> Printing facilitated learning Latin and the dissemination of antiquarian knowledge. Febvre and Martin argue:

The crucial role of printing in relation to humanist studies up until the last years of the 15<sup>th</sup> century was not so much to give a wide circulation to those texts which had recently been rediscovered or re-edited free of medieval corruptions by the humanist scholars, as to make generally known, by multiplying the number of copies that were available, those texts which had been most commonly used in the middle ages as an introduction to classical literature.<sup>281</sup>

Men such as Johann Heynlin and Guillaume Fichet started printing presses so as to be able to print correct versions of ancient texts and to encourage a wider readership of classical writings. During the early sixteenth century, vernacular culture was becoming increasingly sophisticated and it can be argued that Dürer's engagement with bilingual works was a way of bridging the gap between humanist

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<sup>278</sup> Febvre and Martin 1976: 254-55

<sup>279</sup> Febvre and Martin 1976: 249

<sup>280</sup> Febvre and Martin 1976: 249

<sup>281</sup> Febvre and Martin 1976: 252-53

and popular audiences.<sup>282</sup> By publishing his large *Apocalypse* series simultaneously in Latin and German, Dürer attracted an increased audience, potentially bringing in more commercial opportunities.

Another reason for the bi-lingual production of these works was Dürer's self-promotion from a craftsman or artist to that of a master printer. As the sole responsible party for the works, all of the Latin text was attributed to him. Latin was typically not included in the curricula for painters. It was, however, essential for a learned man aspiring to a high social or intellectual status, growing in necessity as more classical texts were printed in Latin, not in the vernacular. Early Renaissance artists promoted a more diverse, interdisciplinary education. Lorenzo Ghiberti wrote that "painters and sculptors should study grammar, geometry, arithmetic, astronomy, philosophy, history, medicine, anatomy, perspective and "theoretical design."<sup>283</sup> Dürer himself advocated that instruction for artists need include "how to read and write well, and be also instructed in Latin so far as to understand certain writings." However, he was not well-versed in Latin, depending on his humanist friends – such as Celtis – to write the Latin inscriptions for his paintings. In publicizing his autonomy concerning this work, Dürer promoted himself as a true scholar as well as controlling the economical aspects of the endeavor.

Panofsky argued that during the first century of printing, the "cross-fertilization" of the print culture was not overtly affected by the master printer. Eisenstein, however, critiques this view on



Figure 23. Albrecht Dürer. *The Revelation of St John: 4. The Four Riders of the Apocalypse*. 1497-98. Woodcut. 399 x 286 mm. Kupferstichkabinett, Staatliche Kunsthalle, Karlsruhe

<sup>282</sup> David Hotchkiss Price, *Albrecht Dürer's Renaissance: Humanism, Reformation, and the Art of Faith* (Ann Arbor: The University of Michigan Press, 2003): 3.

<sup>283</sup> Ames-Lewis, Francis. *The Intellectual Life of the Early Renaissance Artist*. Yale University Press; New Haven, 2000: 30.

the basis that the master printer was responsible for translating, editing and other textual analyses which in turn facilitated discourses concerning theory and practice.<sup>284</sup> In this case, acting as a master printer by overseeing the entire process, it can be argued that Dürer was in complete control of his work, influenced only by elements of his choosing in terms of commercial prospects. Indeed, it seems that the economic factor guided many of his artistic decisions. In the large-format *Apocalypse* series the illustrations comprise full pages with the text printed on the back. By condensing the narrative, the story flows in such a way that illustrations are never repeated – not only does this increase focus on the images, but it reduces the amount of necessary pages from earlier works – which had as many as seventy-four illustrations – to fourteen. Murray and Murray describe this endeavor as: “a supreme work of art, the fruit of spontaneous genius, using all the resources of tradition yet treating the subject in a totally new way, immediately imposing itself by sheer beauty and power of imagination.”<sup>285</sup> It is interesting to note that other art historians have read Dürer’s image of the *Four Horsemen* as engaging in a spatio-temporal discourse (Figure 23); rather than showing each rider and accompanying plague as arriving separately, they are shown all at once, bringing about the end of the world in one catastrophic event.<sup>286</sup> Conversely, it can be argued that Dürer’s decision to depict all of the riders together stemmed from his desire to reduce that particular section of the narrative to one print.

It is important to recognize that



Figure 24. Hartmann Schedel. *Liber chronicarum* (The Nuremberg Chronicle). Detail. 1493. Germanisches Nationalmuseum, Nürnberg

<sup>284</sup> Eisenstein (1983: 137)

<sup>285</sup> Murray, Peter and Linda. *The Art of the Renaissance*. Thames and Hudson: London, 1963: 194.

<sup>286</sup> Cunningham, A. And O.P. Grell. (2000). *The Four Horsemen of the Apocalypse: Religion, War, Famine and Death in Reformation Europe*. Cambridge, Cambridge University Press.,

books are an amalgam of text and image. In the *Weltchronik*, the same woodblock is used to represent Athena, Carinthia, Prussia and Pavian (Figure 24). Repeating the same image for different features was a common practice at the time and it was accepted for distant places, which would not have been familiar to most readers. Although the text of this work is important, exemplified by its printing in both Latin and vernacular German editions, the images were arguably more important. A manuscript layout from this work shows that the illustrations were first placed, with the text added later. With this focus on the illustrations, it may seem incongruous to have so many repeated images. Eisenstein asserts that more so than to save money by not having to create new woodblocks for each representation of a person or city, the duplicates for cities and figures were used to represent signs or topics, rather than delimiting individual character.<sup>287</sup>

Febvre and Martin stress that the importance of book illustrations during this period was their diffusion of iconographic themes.<sup>288</sup> Gombrich argues that the function of a visual work is to convey a narration and the development of techniques rely on the influences of prestige elements and technological considerations in order to fulfill its social function.<sup>289</sup> In the case of Dürer's *Apocalypse* illustrations and his condensation of the biblical narrative, a third issue could be examined: the economic element. Sixteenth-century studies seem to focus either on an age of scientific inquiry or of eschatological concerns. Cunningham and Grell attribute these pervading fears to the contemporary political, social, economic, religious, and demographic crises. Politically and socially, the medieval feudal states were breaking up and new territories and dynasties were being built. As a consequence, a new money economy replaced the feudal system of exchanging services or goods, causing inflation. The Turkish Muslims gained control of Eastern Christianity after the fall of Constantinople in 1453, incessantly threatening further westward expansion. And demographically, the population was increasing dramatically for the first time since the advent of the plague in 1348.

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<sup>287</sup> Eisenstein (1983: 59-60)

<sup>288</sup> Febvre and Martin 1976: 94.

<sup>289</sup> Gombrich, E. *Style* in Preziosi, Donald. *The Art of Art History: A Critical Anthology*. Oxford University Press, Oxford, 1998: 155.



Not only did this cause a population shift from rural to urban areas, but sons could no longer expect to accede to the professions of their fathers, resulting in a more dynamic society with emigration across Europe. Migration across the continent, coupled with Christopher Columbus' discoveries of new worlds and new world views, in light of the aforementioned changes, were seen in terms of biblical significance.<sup>290</sup> The emphasis on the Bible – and of the uses of various iconological themes – highlights the impact of the printing press on contemporary worldviews. Not only was the Bible widely available in both affordable Latin and vernacular translations, but illustrated editions were also in wide circulation.<sup>291</sup> The printing press allowed for increased circulation to a broader audience. Cartographers had access to more recent maps, thus allowing for faster revisions, but the heightened commercial possibilities of mapmaking caused a new dynamic in map production and propagation.<sup>292</sup> Dürer's texts, both biblical and secular, were arguably created more out of commercial possibilities than ideological ones.<sup>293</sup>

Dürer's work with the woodcut medium throughout the late fifteenth century simultaneously exploited its commercial and artistic potential. Commercially, Dürer used the possibility of a woodcut image and a cheap method of representation. However, coupled with his artistry, this functioned to create for him an autonomous authoritative medium. Unlike text, which could be reproduced exactly by different printers, each woodblock created was a new artistic piece.<sup>294</sup> Although the design and cutting of blocks were normally done by different people, as the designers were generally higher paid and it would be a waste of both time and money to employ the former for the cutting work, Dürer cut many of his own blocks himself. At the beginning of his apprenticeship throughout his work in

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<sup>290</sup> Cunningham, A. And O.P. Grell. (2000). *The Four Horsemen of the Apocalypse: Religion, War, Famine and Death in Reformation Europe*. Cambridge, Cambridge University Press, 2.

<sup>291</sup> *Ibid.*, 3.

<sup>292</sup> Black, J. (1997). *Maps and History: Constructing Images of the Past*. New Haven, Yale University Press, 6.

<sup>293</sup> Bongard, W. (1978). *Dürer - Economic*. Dürer Today. Bonn-Bad Godesberg, Inter Nationes: 20-33, 24.

<sup>294</sup> Gerald P. Tyson and Sylvia S. Wagonheim, "Introduction," *Print and Culture in the Renaissance* (Newark: University of Delaware Press, 1986): 8-16: 12.

Wolgemut's studio, Dürer cut his own blocks. Dürer's unique woodcutting style can be seen in all of his early works, which uses the tonal differences between the light surfaces and the deep shadows to create depth. Evidence from his work in other print workshops, specifically in Strasbourg and Basel, suggest that he cut his own designs there as well.<sup>295</sup> It has been argued that despite a divorce between draftsmen and woodcutters, specifically in Wolgemut's studio in Nürnberg, it is inconceivable that Dürer would not have acquired a mastery over the technical aspects of the woodcut and that the artist would have most certainly cut his own designs.<sup>296</sup> It is arguable as to whether he oversaw the cutting of some of his later designs by other workmen. Some scholars write that once his cutting standards had been met, he allowed this to occur.<sup>297</sup> However, there exist apparent visual differences, for example, some of the Basel woodcuts of 1492 (Hieronymus in the Gehaeus).<sup>298</sup> This implies that the extent of Dürer's involvement in a work can be observed.

## Conclusion

The Renaissance was marked by a "propagandistic spirit," with printed pamphlets and illustrations functioning as a means of news, marketing, and information dissemination. Woodcut prints, unlike paintings, were not normally commissioned by patrons and could be quickly and cheaply produced for a mass audience. The commercial nature of this medium spread throughout Europe and by the turn of the sixteenth century there were presses in more than 200 towns with low estimates approximating that 20 million copies of 15,000 different books were printed. In addition to illustrated texts, single-page scientific documents were

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<sup>295</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 60.

<sup>296</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 59-60.

<sup>297</sup> Murray, Peter and Linda. *The Art of the Renaissance*. Thames and Hudson: London, 1963: 195-96.

<sup>298</sup> Sladeczek, Leonhard. *Albrecht Dürer Und Die Illustrationen Zur Schedelchronik. Studien zur Deutschen Kunstgeschichte*. Verlag Heitz GMBH/Editions P.H. Heitz: Baden-Baden/Strasbourg: 1965: 60.



widely disseminated. Dürer was aware of the financial potential of woodcuts, producing three major block book series – two of the Passion and one Apocalypse, monitoring the number of copies printed and their prices, subsequently hiring an agent to manage his foreign market in 1497.<sup>299</sup> In addition to the economic benefits of this new system, print technology widened academic circles to include artists such as Dürer who then used the medium in order to propound his opinions on visual discourses using single-page prints, both commissioned and independently motivated.

Through his foundation in Nürnberg and his travels to Italy, Dürer continually engaged with Renaissance debates surrounding artistic and scientific theories. Nürnberg's engagement with terrestrial and celestial cartography began with the work of Regiomontanus in 1474, with the publication of bibliography of astronomical works to be printed. Other local scholars included Nikolaus of Kues, whose maps were attained by Martin Behaim and Sebastian Münzer, both residents of the city. Together these cartographers worked with Hartmann Schedel in the formation of his *Weltchronik* in 1493. Dürer's collaboration with Regiomontanus, Behaim, and Schedel is well-documented through both his residence in this scholarly neighborhood and his apprenticeship with Wolgemut. The large market for scholarly publications, recognized by Koberger and Dürer both, enabled a new interest in contemporary art merged with historical and scientific studies. By using Dürer's artistic talent, the Nürnberg humanists and publishers were able to produce more impressive illustrations. Dürer, in turn, was able to experiment with the medium of woodcut and gain experience with printing, facilitating his own independent large-format books.

Simultaneously printed in Latin and vernacular German, Dürer's large-format series demonstrate his artistic and commercial independence and self-expression in producing works that would be accessible to a wide audience that included both scholars and lay-people. Furthermore, the Latin version established the artist as a scholar, rather than a mere craftsman. It is crucial to see Dürer's

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<sup>299</sup> Pettegree, A. (2002). *Europe in the Sixteenth Century*. London, Blackwell Publishers. Pettegree writes: "his prints became the cornerstone to his prosperity" 80.

cartographic works in light of the printing situation in Nürnberg in the late fifteenth and early sixteenth centuries. As an independent, ambitious artist, his foundation as a goldsmith and subsequent apprenticeship in Wolgemut's workshop introduced him to the business aspect of art. His association with Pirckheimer's humanistic circle gave him scholarly background and connections. Together this background facilitated Dürer's becoming both an artist and a scientist, working simultaneously on his commercial prints and block books, as well as collaboratively with Heinfogel and other cartographers. This commercial and artistic foundation can be seen in his work on terrestrial maps. Furthermore, his increasing engagement with scientific principles of perspective and projection can be noted throughout his maturation. As this chapter established his capabilities as a mathematician and cartographer, the next chapter demonstrates his engagements with geometrical theories that were recognized throughout Europe and ultimately lead to Maximilian's patronage of the artist.

## PATRONAGE AND TERRESTRIAL CARTOGRAPHY

As seen in the previous chapter, Schedel's *Weltchronik* was a piece of work informed by many disparate sources with far-reaching influence. Stylistic similarities between this work and other woodcuts by Dürer suggest that he worked on the *Weltchronik*, specifically the iconography of the winds that appears in his collaborative terrestrial map of 1515. This demonstrates the artistic license Dürer had in appropriating a scientific document in a way that its artistry is recognizably his. In thus combining scientific treatises and artistic elements, Dürer embodied humanistic qualities that signified him as the ideal type of "Renaissance man." His commissions by the Emperor Maximilian I resulted from his artistic competence and his intellectual bend. Sladeczek describes the *Weltchronik* as an amalgam of different elements and influences spanning both distance and time:

The world chronicle cannot be as comprehensive compilation a uniform statement over this time. In it are reflected rather infinitely different influences, which partly come soon from the antiquity, soon from the early Middle Ages, partly from the German Mystik and from the Italian Renaissance, so that neither of a temporal nor locally limited uniform order can be spoken here. The woodcut however is own plant from Frankish soil. We let report by him of the culture and the attitude of mind of the instant, since only Nürnbergs art began to unfold.<sup>300</sup>

As detailed in the previous section, this work was a product of its social, intellectual, and cultural climate, informed by scholars and artists of the time. These regional characteristics are apparent in its visual style.

Works of art function as historical documents. Not only are they assumed to relate significant or unique information about a person, society, nature or age, but they are analyzed in terms of being produced within a historical milieu, subject to the implications thereof. Within contemporary disciplinary scholarship, art historians attempt to reconstruct the forces or circumstances at play which serve to create the particular stylistics of a work in relation to the individual artist, school, or movement. Additionally, studies have focused on the production and reception of a piece and how these forces might have served to affect its representational

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<sup>300</sup> Sladeczek 74-75

style. One fundamental principle – which is often debated within the field – is that a change in the form signifies a change in intention or the collective mentality of the milieu. Cartographic works can be seen in the same light. It is commonly assumed, for example, that medieval T-O maps related to the way in which the Middle Ages visualized space. The Age of Exploration has been related in past scholarship to the increasing accuracy of terrestrial representations, as more of the world was known to European cartographers. This essay argues that Dürer's terrestrial representation, whose form is a modified Ptolemaic map, signifies a change in the conceptualization of space. The visualization of perspective, stemming from the contemporary tendency towards realism, by Dürer informed and updated this seminal work.

A major stylistic alteration occurred in the art produced during the fifteenth century that separated it from previous ages. This period was marked by an amalgam of artistic and cartographic styles, as images depicting real monuments placed them accurately in relation to the surrounding locale. Debates about the motivation behind the topographical realism of fifteenth century art either attribute this phenomenon to nominalist ideology, that reality is found through observation of the discrete, or Neoplatonism, the belief that mathematics and visual measurement were proof of the divine structure of the universe.<sup>301</sup> The fifteenth and sixteenth centuries saw an increasing focus on topographic accuracy, making mapmakers scholars of mathematics, geometry, geography, astronomy, anatomy, and physiognomy. It has been argued that the great accomplishment of this period was technical and that this culture of technologies and techniques enabled the early Renaissance scholars to develop new attitudes and ways of thinking.<sup>302</sup> Ivins attributes the progress of the early fifteenth century to three factors: the dissemination of printed pictures, Alberti's introduction to perspective drawing

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<sup>301</sup> Buisseret, 32.

<sup>302</sup> Ivins Jr., W. M. (1953). *Prints and Visual Communication*. Cambridge, Harvard University Press. "We have for so long been told about the philosophy, art, and literature, of classical antiquity, and have put them on such a pedestal for worship, that we have failed to observe the patent fact that philosophy, art, and literature can flourish in what are technologically very primitive societies, and that the classical peoples were actually in many ways of the greatest importance not only very ignorant but very unprogressive." (7)

(1435), and Nicolaus Cusanus' doctrine of relativity (1440).<sup>303</sup> Alberti argued for a “geometrical rationalization” for visually representing space, developing the first qualitative basic geometry. Nicolaus Cusanus shifted the essence of God's presence from being, as advocated by Thomas Aquinas, to sight, explaining that humans are:

like a cartographer living in a city with five gates, analogous to the five senses. Through these gates come messengers bearing different reports, and one of the most important of the gates controls the messengers of light and colour, who inform us about all things visible. Having received the reports, the intellect reduces them to a well-ordered and measured map, which is in itself a reflection of the Creator of the sensible world thus delineated.<sup>304</sup>

Certainly the time-measuring instruments such as astronomical tables, astrolobes, quadrants, and celestial charts, theories of applied mathematics, and the production of Martin Beheim's globe (Figure 25) all contributed to new ways of thought. The sixteenth century was an age of mensuration. Since the time of Aristotle, deconstructing object characteristics to dimension and weight had been the conceptual foundation for universal principles. Dürer wrote that “Through geometry thou canst prove much of thy work,” which reflects on the contemporary mathematical foci on theoretical and applied geometry.<sup>305</sup> Whereas medieval standards held disciplines to strict categories, the Renaissance sought to decompartmentalize fields, mixing and interpreting the world in new ways, accepting both synthesis as well as chaos. Antiquarian art focused on paintings based on empiricism. In the Renaissance, art came to imitate nature and the artist became a natural scientist.<sup>306</sup> Cartography became a scientific endeavor as universities became centers of mathematical and astronomical research, exposing scholars to translated Arabic texts, Greek science, and humanist



Figure 25. Martin Behaim. *Behaim Globe (Erdapfel)*. 1492. 50.7 cm diameter

<sup>303</sup> Ibid., 23. These philosophies will be discussed further in the paper.

<sup>304</sup> Waetzoldt, W. (1950). Dürer and his times. London, Phaidon 211.

<sup>305</sup> Waetzoldt, 211.

<sup>306</sup> Brown, 1.

readings; this movement gained momentum in the late fifteen century in Nürnberg.<sup>307</sup>

The High Renaissance has been typified by artistic characteristics of symmetry, harmony, and striving for an appropriation of the ideals found in the art of classical antiquity. However, broad generalizations are not entirely accurate, as differing artistic styles often exist parallel to one another. As one is introduced, it can be slowly incorporated into the other until a full transformation is completed. The fifteenth century saw the growth of literary classicism with scholars' laudations of classical works. By drawing parallels between contemporary and classical works, Renaissance artists strove to "reconstruct" Antiquarian styles to an even greater extent.<sup>308</sup> Renaissance Humanism derives from the term *humanitas* and describes "humane" studies, or those promoting the dignity of man. To the established canon of clerical and secular studies (law and medicine), philosophy, literature and language were added. Antiquarian authors were praised for their mastery of history, grammar, rhetoric, and poetry and Renaissance scholars strove to imitate this. In *Melencholia I* the figure of Melanchony is surrounded by various emblems of the liberal arts – geometry, mathematics, architectures, and astronomy – in a state of despair, which is implied by the bat (Figure 26). This state results from the creative artists' Platonic "divine frenzy." In comparison, *St. Jerome in His Study* is an appeal to other humanist scholars (Figure 27). The room's sophisticated interior abounds with symbolic imagery and a precise perspective system, with the shadows casting a depth of spatial recession, perfected by Dürer's mastery of tonal gradients in the engraving medium.<sup>309</sup> Of the two, Ames-Lewis pairs them to demonstrate the similarities and differences between artist and humanist – both held a similar status as intellectuals, yet there was a vast differences in the creative impulses behind the work of each.<sup>310</sup>

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<sup>307</sup> Crone, G.R. *Maps and Their Makers: An Introduction to the History of Cartography*. 5<sup>th</sup> Edition. Dawson: Kent, England. 1978, 58.

<sup>308</sup> Ames-Lewis, 2000: 207.

<sup>309</sup> Stokstad reads *St. Jerome in His Study* as a merging of Germanic and Italian styles, integrating the northern European naturalistic lighting with the Italian one-point perspective system.

<sup>310</sup> Ames-Lewis, 2000: 253-54.



### Artist's Intellectual Life and Patronage

Painting in the fourteenth and fifteenth century was, in many ways, a social relationship. It was a balance between the artist responsible for the product and the client who provided the means, intention, and publicity for the image, all of which worked within an overarching cultural and institutional framework. In terms of these cartographic works, influences derive from the artistic culture of the Renaissance as well as the institutional framework of woodcuts. Additionally, there are stylistic influences that can be traced directly to the patronage of Emperor Maximilian I. Dürer's engagement with the Emperor was part of a growing trend within the Renaissance to elevate the social status of the artist. By working under a powerful patron, Dürer was provided with the promise of a regular income. Additionally, Dürer worked in collaboration with leading scholars, thereby promoting his value through his involvement with an academic social network. This relationship between artist, patron and scholar can be seen in Dürer's woodcut *Celtes presents his work to Emperor Maximilian* (Figure 28). Executed by the artist, this illustration details Celtis offering a text to Maximilian, which serves to promote both the patron and the civil servant's statuses as intellectuals.

Over the course of the Renaissance, there was a movement from within the artistic community of sculptors and painters to be seen as more than craftsmen.<sup>312</sup> Their illustrations were produced with increasingly more intellectually difficult approaches – such as the perspective systems – and they began merging their fields with the humanities and literary studies so that, rather than serving as mere decorative or functional objects, as in previous centuries, the works produced became “works of art” in a modern sense of the term. Artists promoted their field as one of the liberal arts, alongside such disciplines as rhetoric and poetry. As artists' work gained



Figure 28. Albrecht Dürer. *Celtes presents his work to Emperor Maximilian*. Woodcut.

<sup>312</sup> Ames-Lewis, 2000: 2.



increasing independence, many painters were able to interact with courtiers and aristocrats in the manner of an academic or intellectual community. Analyzing the artistic progression from the fifteenth to sixteenth century, it is clear that the artists themselves became self-aware, confident with and proactive in promoting their intellectual capabilities through their artwork.<sup>313</sup> By 1515, painters were proficient in many intellectual disciplines and the discipline was considered to have risen from being a mechanical art to the status of a liberal art.<sup>314</sup>

It is clear from his self-portraits that a painter such as Dürer fully and self-consciously recognized his independent creativity; and he also exploited the technique of engraving more single-mindedly than did his predecessors to show as wide a public as possible the intellectually sophisticated qualities of his art.<sup>315</sup>

As artists began to develop a confidence in their abilities – both in terms of their artwork and their social status – they became more introspective about their creative and intellectual status. Dürer's nude self-portrait (Figure 29) is read by Ames-Lewis as a concern with his deteriorating physical condition. However, this degradation of the physical corpus is contrasted and complemented with an engagement with the highly complex intellectual representation within the *Melencolia I* engraving (refer to Figure 26), produced to reconcile the decay of his physical nature concurrent with his recognition of a growing mental capacity and his promotion of his own creative, artistic genius.<sup>316</sup> A tale is told that Leonardo,



Figure 29. Albrecht Dürer. *Self-Portrait in the Nude*. c. 1505. Brush and ink heightened with white on green tinted paper. 29 x 15 cm. Kunstsammlung, Weimar.

<sup>313</sup> Ames-Lewis, 272.

<sup>314</sup> "In the fifteenth century *artista* denoted a university-level student of the liberal arts. Not until after the end of the period surveyed in this book does it come to be used as a general term meaning a painter or a sculptor, as in Michelangelo's usage in, for example, the celebrated sonnet that opens 'Non ha l'ottimo artisa alcun concetto/c'un marmot solo in sé non circonscriba/col suo superchio...' Ames-Lewis, 1.

<sup>315</sup> Ames-Lewis, 279.

<sup>316</sup> "This is perhaps the earliest transparent indication of an artist's acceptance, and his wish to communicate his acceptance, of the implications of being 'born under Saturn'." Ames-Lewis, 273.

while doing work for his image of the disciples, was less than efficient. The Prior watched him in the morning as he would stand and look at the image for a short amount of time, add a few minor details, and then leave until the next morning. Complaining to the artist about his seeming lack of effort, Leonardo responded that it took him time to find a suitable face for a man as evil as Judas, but that if the Prior wanted him to finish the picture quickly, that he – Leonardo – would use the Prior's image as a blueprint. This story serves to illustrate the transition period in the Renaissance where artists were advocating their positions as artisans and philosophers, while their patrons still in some ways thought of them as workmen hired to produce a certain amount of work each day.<sup>317</sup>

Throughout most of the fifteenth century patrons usually commissioned religious images or pictures of practical significance. Mainly professional men of learning or clerics, it was the rare patron – such as the Medici – who requested images covering a wider disciplinary nature. Gradually, painters began getting commissions directed at smaller, learned audiences. These well-educated patrons wanted both aesthetic beauty and a density of content in their images. By the end of the fifteenth century secular education, which promoted study of Antiquarian literature, had created a demand for imaginative pictures wherein pagan mythology was juxtaposed with Christian allegory to create an image that could be “read” as well as visually enjoyed.<sup>318</sup> The patrons in the sixteenth century were more than willing to commission works that allowed artists to demonstrate their intellectual capabilities. Patrons gave artists more creative license, treating them with respect, as the artist was the one ultimately responsible for producing great works that would then, in turn, reflect on the patron. Baxandall argues that while clients usually adhered to default forms – e.g. altarpieces, stereotypical religious paintings – and were aware of the necessary requirements of the image, above all the commissions served as works that must be viewed and approved first and foremost

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<sup>317</sup> Murray, Peter and Linda. The Art of the Renaissance. Thames and Hudson: London, 1963: 238-39.

<sup>318</sup> Murray, 277-78.

by the patron.<sup>319</sup> The point to emphasize is that artists were dependent upon their commissions. The production of artwork in the fifteenth and sixteenth centuries was almost entirely dependent upon the whims of the patron. In France, the arts were stylistically fragmented, as each specific region had its own unique patronage; therefore, the resulting styles reflected their own areas with traces of styles from the regions with which they had the most communication.<sup>320</sup> It was not until the sixteenth century that the central monarchy in France united the arts so that the overarching national character outweighed that of the regions. Although every center of production and every patron had a different character – making generalization difficult – courts in Italy and Burgundy for the most part fostered and promoted visual representations promoting intellectual concepts.<sup>321</sup>

Dürer arguably advocated the social and intellectual status of artists to an obsessive degree.<sup>322</sup> As his wealth and social status were predominantly a result of his own independent production, he was not confined – to the extent that other Renaissance artists, namely Italians were – to the commercial economics of a print workshop or to the whims of a patron.<sup>323</sup> However, this is not to say that Dürer was free from larger commercial influences or issues of patronage. During the sixteenth century, an artisan was both an artist and a technologist, as many scientific instruments (telescope, camera obscura, microscope) were born out of mercantile or artisanal settings. Smith and Findlen find Dürer's Rhinoceros to exemplify the relationship between art, science, and commerce in early Renaissance Europe (Figure 30).<sup>324</sup> Arguing that in representing scientific observations artistically at a time when overseas expansion advocated mastering

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<sup>319</sup> It is important to understand that commissioned pieces were intended for the client's use and, as each individual's motive for distinct pieces differs, the context surrounding each creation is unique. Some pieces were motivated by a desire to possess art, an active piety, a civil consciousness, egotism, or an aesthetic urge. Baxandall, Michael. Die Wirklichkeit der Bilder: Malerei und Erfahrung im Italien der Renaissance. Übersetzt von Hans Günter Holl. Verlag Klaus Wagenbach: Berlin, 1999: 11.

<sup>320</sup> Murray, 162.

<sup>321</sup> Ames-Lewis, 9.

<sup>322</sup> Ames-Lewis, 8.

<sup>323</sup> Ames-Lewis, 8.

<sup>324</sup> Smith, P. H. and Paula Findlen. (2002). Introduction: Commerce and the Representation of Nature in Art and Science. Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe. P. H. Smith and P. Findlen. New York, Routledge: 1-28, 2-3.

nature through technology altered perceptions of nature in such a way that it became subject to political and commercial factors: investigation, familiarity, and understanding of nature directly affected patronage and commerce.<sup>325</sup> But however independent his art may have been, his work for Maximilian was dependent upon the emperor.



**Figure 30. Albrecht Dürer. *The Rhinoceros*. 1515. Woodcut. British Museum, London**

The collaboration of Dürer and Maximilian has come to represent an entire artistic cultural epoch for the Germanic speaking countries. Dürer's work for the Austrian emperor can be traced back to the year 1512, when the first correspondence occurred, and when Maximilian had an extended stay in Nürnberg. Dürer was either recommended for a meeting with the Emperor by Jakob Fugger – to whom he had already supplied a “modelli” for the epitaph of the Augsburg tomb in 1510 – or by Willibald Pirckheimer, who was already in contact with Maximilian. It is also conceivable that Maximilian was made aware of Dürer's abilities from the elector Friedrich. In 1512 Dürer worked at Augsburg with Schönsperger, who was Maximilian's official printer and it is probable that Dürer immediately began work in the same year on the largest woodcut produced at the

<sup>325</sup>Ibid., 2-3.

time, Maximilian's *Triumphal Arch*.<sup>326</sup> Throughout the rest of Maximilian's reign, Dürer was commissioned further works, some alone and some in collaboration with other scholars. While Dürer may have looked upon this as an opportunity for gainful employment and social prestige, his relationship with Maximilian was symbiotic, with the Emperor profiting in a similar manner from the appointment of a well-known, respected artist and art theorist to his own *Hofkunst*.

When Maximilian of Austria began his rule as the Roman-German emperor, Germany was a monarchy consisting of individual, rather heterogeneous territories. Forming the head of this union, the emperor often struggled in the eventful history of Europe with the Roman curia for state sovereignty and with the adjacent states for economic supremacy. The ideal that Maximilian planned for his own nation had already been attempted by Friedrich III. Both felt that imperial Germany would be a central power with international influence, acting as the true successor of the Antiquarian empire. By the nineteenth century, historians often underestimated Friedrich III, the emperor of the Austrian dynasty.<sup>327</sup> Although his imperial coronation took place in Rome and, for a time, he appeared to recognize the papal claim to power, he had begun a careful consolidation of border states during his reign. His quest for power was not only territorial; additionally, he began establishing policies towards a separation of church and state. When Maximilian ascended the throne he intensified this hegemonic policy and, for the first time in the history of the Roman-German Empire, pushed for a centralized state for the whole of Germany. It is important to realize that until Maximilian's promotion of the arts, from 1508 until his death in 1519, the imperial art collection had not yet been developed and publicized. In building a purposeful collection of art and literature, Maximilian was appealing to the broader public, purposefully creating a collection to represent his ideal of a central state.<sup>328</sup>

In the Renaissance there was a displacement of scholasticism which supplied the foundation for the development of a new historical consciousness, one

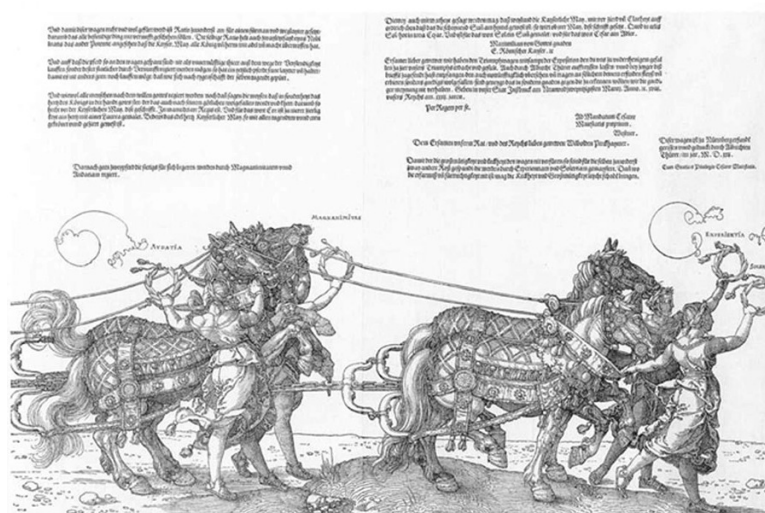
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<sup>326</sup> Müller, Mathias F., 'Albrecht Dürer und das Kunstleben am Kaiserhof Maximilians I.' In *Albrecht Dürer*. Herausgegeben von Klaus Albrecht Schröder und Maria Luise Sternath. Wissenschaftlich Buchgesellschaft: Germany, 2004: 89-102: 95.

<sup>327</sup> Müller, 2004: 89-102: 89.

<sup>328</sup> Müller, 2004: 89-102: 90.

which introduced the concept of historical progress and enabled a new conceptualization of the artistic profession. This movement emancipated the medium of woodcuts in relation to the other artistic pursuits. Emperor Maximilian I. recognized that woodcuts – which had previously served only as small-format religious or literary publications – now had the potential to become a means of advertising political and social opinions in a fast way. The emperor himself released the monumental first mass-medium document in which he and his family were represented as the ideal model for the new emperor of the Roman-German dynasty. The *Triumphal Procession* and *Triumphal Arch* must be seen in this context, not as mere wall decorations equating to wallpaper, but serving to consolidate the princely libraries, archives, and art galleries (Figure 31).<sup>329</sup> Febvre and Martin label the sixteenth century in terms of printing styles as a time of “ostentatious display” and this is clearly seen in Maximilian’s commissions.<sup>330</sup> The *Triumphal Chariot* is the seventh of eight woodblocks comprising the *Triumphal Procession*, which shows a chariot driven by “Reason,” accompanied by the personifications of the Virtues, and surrounded by emblems symbolizing the glorious deeds of the emperor (Figure 32).



**Figure 31. Albrecht Dürer. *Triumphal Carriage*. (7/8) 1522. Woodcuts, mounted in pairs, 7/8; 413 x 626 mm. Staatliche Kunsthalle, Karlsruhe**

<sup>329</sup> Müller, 89-102: 91-92.

<sup>330</sup> Febvre and Martin 1976: 95



This illustration was reprinted at least seven times in both Latin and German throughout the sixteenth century. The emperor used the political prominence of state acts, parliament, investitures and state collections in a clear dynastic sense – shown in the artwork – to hold/maintain the status of the elites. Maximilian even hurried to let a copy of his *Triumphal Chariot* transfer to Degenhart Pfeffinger von Salmanskirchen, who at that time was the advisor of the elector Friedrich III of Saxony. The function of the *Hofkunst* was – under Maximilian – thus clearly politically motivated and far-reaching in terms of personal influence for many people. In doing so it proceeded to create a representative image of his rule using two opposing media.<sup>331</sup> The imperishable material comprising his monumental grave contrasts with his favoring of the ephemeral paper art, the latter of which was used to establish a pictorial reportage within his repertoire. By doing so, he effectuated to the print medium a prestige and it, in turn, came to define/be characteristic of his style.

The artists were restricted in what they could produce by the humanists who worked with the patron – in this case, Maximilian I. In 1513 and 1514 Dürer was involved in the planning of Maximilian's great bronze tomb, which included three statues and two drafts for a large gallery of prints.<sup>332</sup>

In connection with this burial monument, however, Dürer was no independent artist allowed to independently supply concepts. Here as well was he subject the Emperor's stylistic subordination

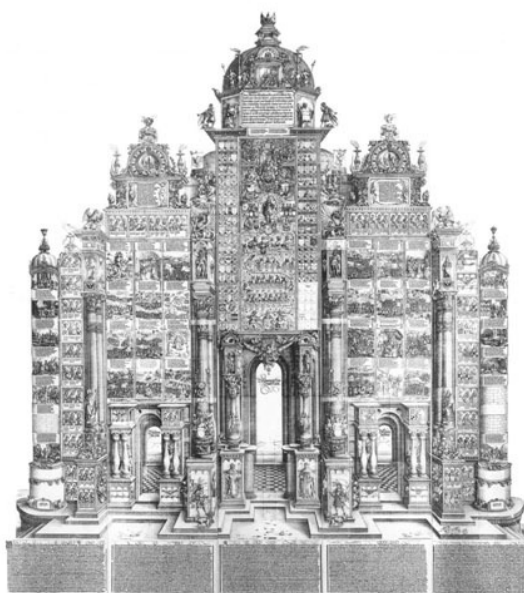


Figure 32. Albrecht Dürer. *Triumphal Arch*. 1515-17. Woodcut. 341 x 292 cm. Germanisches Nationalmuseum, Nürnberg

<sup>331</sup> Maximilian wrote „he who does not provide for his memory during his life will have no memory after his death and will be forgotten with the sound of his death-knell.“ in Panofsky *The Life and Art of Albrecht Dürer*: 174-75.

<sup>332</sup> Müller, Mathias F. „Albrecht Dürer und das Kunstleben am Kaiserhof Maximilians I.“ In *Albrecht Dürer*. Herausgegeben von Klaus Albrecht Schröder und Maria Luise Sternath. Wissenschaftlich Buchgesellschaft: Germany, 2004: 89-102: 99.

and could therefore only propose several drafts of figures. How much the program was determined by the humanists rather than by the artist who applied it is shown in Dürer's figure of Ottobert. In the humanistic environment of the emperor, the son of the Burgundian dukes' king Theopertus and the first duke of Habsburg symbolized the theory of inheritance connecting them to the Merowingern – who were the direct predecessors. This allowed the emperor's family genealogy to be traced back to the Trojans, as the Habsburg dynasty wanted to build a Pantheon of the Austrian rule – showing their members' genealogies – including all of the famous politicians and emperors of the Germanic empire. It is evident that other artists – including Dürer – submitted drafts of proposed pieces from which Maximilian was able to select and commission a final piece.<sup>333</sup>

Ultimately, while artists had some creative license, the patron did control different visual aspects of the works. One example of Maximilian's influence on Dürer's artwork – and on Renaissance cartography – was in his manipulation of textual styles. As a demonstration of his power, Maximilian began to establish an impressive library. Not only did he plan to possess as many texts as possible, but he wanted to be a patron for further literary endeavors. It is noteworthy that in creating and disseminating texts, he required a new typeface so as to distinguish his commissioned pieces from other patrons. Previous works were usually written in the style of *Carolingian* or *Caroline minuscule* script. Used between the years of 800-1200, this style had become the writing standard for Europe, enabling the Roman alphabet to be easily read throughout the diverse regions. Although legible, it was wide and tall, taking up a lot of manuscript space; additionally, it was extremely labor-intensive. Charlemagne's scribes were responsible for copying more than 7,000 manuscripts and it was due to the use of this script for many Roman texts that would have been otherwise lost that many Renaissance humanists mistakenly believed these to be modeled after Antiquarian styles. Thus it was seen as a more classical style, even after being surpassed in use by the Gothic approach. With the advent of the printing press, *Carolingian* evolved into a

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<sup>333</sup> Müller, Mathias F. ,Albrecht Dürer und das Kunstleben am Kaiserhof Maximilians I.' In Albrecht Dürer. Herausgegeben von Klaus Albrecht Schröder und Maria Luise Sternath. Wissenschaftlich Buchgesellschaft: Germany, 2004: 89-102: 99-100.



Gothic style, the general group of which is known as *Blackletter*. Gutenberg attempted to copy, as closely as possible, the style of handwritten texts. Therefore, a text such as *Textura* – and also *Bastarda* and *Rotunda* – is found in the printed books of the mid-fifteenth century. Dürer's Latin edition to his large-format *Apocalypse* uses the *Textura* font on the title page (Figure 33). His *Large Passion*

series of the same year combines *Textura* for the first-order heading with *Rotunda* for the authorial information (Figure 34). The *Schwabacher* font dates from approximately 1481. Found predominantly in



Figure 33. Albrecht Dürer. *Apocalypsis cum figuris* (Title page for the Latin edition of his *Large Apocalypse* series) 1511. Woodcut with xylographic text "Apocalypsis cu[m] figures." 185 x 184 mm. Staatliche Kunsthalle, Karlsruhe



Figure 34. Albrecht Dürer. *Der Schmerzensmann und der Landsknecht*. Title page for the *Large Passion* series. 1511. Woodcut. 197 x 192 mm. Graphische Sammlung Albertina, Vienna

southern Germany, this font used a superscript "e" to depict umlauts and different tildes and dashes indicating various abbreviations. Martin Luther's vernacular German bible used the *Schwabacher* font.

It is interesting, however, that Maximilian rejected both the dominantly humanistic typeface of *Antiqua* as well as the *Schwabacher* font. Instead, he hired Leonhard Wagner – a calligrapher – to design a new font that was an amalgam of traditional German types. This resulted in the *Fraktur* alphabet. The *Fraktur* script was based off the prototype of the Imperial Chancellery font and was subsequently used by Johann Schönsperger the Elder for his *Teuerdank* book, among other works.<sup>334</sup> Hieronymus Andreae, who printed the *Triumphwagen* and Dürer's theoretical works, was also working with a modified *Fraktur* type which he

<sup>334</sup> Febvre and Martin 1976: 188

designed specially and cut himself.<sup>335</sup> Stehno argues that the success of *Fraktur* was not due to Maximilian's promotion of it, but rather to Dürer's use of this font and its subsequent adoption in the publications of the Reformation.<sup>336</sup> Dürer's celestial and terrestrial maps use the *Fraktur* typeface (Figures 35 and 36).



Figure 35. Albrecht Dürer. *The Southern Hemisphere of the Celestial Globe*. Detail, *Fraktur* typeface. 1515. Woodcut. 430 x 435 mm. Graphische Sammlung, Stuttgart



Figure 36. Albrecht Dürer. *Die Weltkarte des Johannes Stabius*. Detail. 1515. Woodcut in four pieces. 645 x 850 mm

Although constrained by the aesthetic whims of the patron, commissions provided an opportunity for artists to re-create their own pictorial interpretation of art in a classical style. The terrestrial map, a contemporary representation of Ptolemy's cartography, serves this function. Ptolemy's terrestrial map belongs to the tradition of the *Tabulae antiquae*, despite the publication of "modern" works concurrent with its publication, which can be seen when comparing Ptolemy's representation to Cusanus' (Figures 37 and 38).<sup>337</sup> Dürer's depiction of the world uses Ptolemy's system elaborated in his *Geography* and the earthly circle, graticule, and names for the physical locations are in accordance with other sixteenth-century Ptolemaic *mappa mundi*. When compared to Ptolemy's Ulm edition, there is little that appears to have been changed and what differs is arguably of little importance.<sup>338</sup> Scholars of the twentieth century therefore conclude that rather than attempting to accurately portray a map of the world

<sup>335</sup> Febvre and Martin 1976: 188

<sup>336</sup> Stehno, Birgit. "History of Black Letter Fonts". METAE-News. No.4 March 2002.

<sup>337</sup> Scharfe 1997

<sup>338</sup> Schoch 2002: 428.

according to sixteenth century knowledge, this map was intended by Stabius as a visual discourse for theoretical objectives.<sup>339</sup> The classical past in the Renaissance was re-created by copying Antiquarian art, studying the visual records and theorizing on different factors at play. The theme of Stabius and Dürer's terrestrial map was to contest Ptolemaic authority, namely the graticule and projection system as outlined in his universal projection.<sup>340</sup>



Figure 37. Claudius Ptolemy. *The world according to Ptolemy*. 1492. Woodcut.



Figure 38. Nicolas Cusanus. *World Map*. 1491. Woodcut. Staatsbibliothek zu Berlin.

Stabius' engagement with different conceptualizations of projection systems was informed and influenced by Dürer's work with perspective and the transference of the empirical world on to a two-dimensional pictorial space. The map is a collaborative work in that both authors were well-versed on the matter – through their own writings or studies and through contact with Nürnberg's astronomical academic circle. It is possible to see the influences of each co-author in this Ptolemaic representation. However, it is Dürer's system of perspective which creates the overarching theme of the map. The wind-heads, coupled with the projection system, depict three-dimensionality and a sense of realism that was missing in Ptolemy's flat maps. Arguably, Dürer's terrestrial representation is his own conceptualization of the spherical earth as it would be best conveyed visually on a two-dimensional parchment. Ahead of his time, Dürer's projection of the globe was not understood by his contemporaries and without accompanying

<sup>339</sup> Schoch 2002, Diercke 1929

<sup>340</sup> Schoch 2002: Stabius had, at this time, been working in close contact with Nürnberg's cosmographic scholars, focusing especially on the questions of graticule and projection systems.

illustrations showing how the spherical globe could be projected in this way, this map was ultimately deemed by Stabius, the publisher, to lack commercial possibilities.

### **Perspective/Projection Systems**

Preziosi argues that “perspective is an artifact of privileging” and, indeed, many scholars and critics have found fault with previous studies highlighting the role of perspective in artwork and the implications of the various systems of representation.<sup>341</sup> In the Renaissance, space was represented using a linear perspective system. A perspective system not representative of visual reality, rather, is a convention used by artists to construct pictorial space. Panofsky is credited with first articulating the various spatial systems of different cultures, systems which arise from specific cultural beliefs, approaches to science, and methods of communication. The Western system of perspective – that of linear perspective – which started in the Renaissance is argued by Panofsky to have begun with a recognition of the mathematical construct of infinite, continuous space.<sup>342</sup>

Panofsky has been criticized – by Gombrich, Gibson, Doesschate, and Pirenne – for his use of the term “symbolic form” referring to perspective.<sup>343</sup> Critics find Panofsky’s implication that perspective has changed and evolved throughout history to trivialize the study of perspective, reducing it almost to a “system of conventions.”<sup>344</sup> Edgerton critiques these assertions, arguing that Panofsky’s indistinctness in defining the term “symbolic form” is unduly simplified and therefore misunderstood.<sup>345</sup> In order to fully understand Panofsky’s use of this term, it is necessary to understand the philosopher-historian from whom it originally derives, Ernst Cassirer.

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<sup>341</sup> Preziosi, Donald. *The Art of Art History: A Critical Anthology*. Oxford University Press, Oxford, 1998: 278.

<sup>342</sup> Panofsky, E. *Perspective as Symbolic Form*. Zone Books, New York: 1993.

<sup>343</sup> Edgerton 1975: 154-55

<sup>344</sup> Pirenne quoted in Edgerton 1975: 154-55

<sup>345</sup> Edgerton, 1975: 155

Cassirer's *Die Philosophie der symbolischen Formen* contains Kantian philosophies of conceiving and perceiving – the former of which relates to the intellect and the latter to intuition – both of which convert sensory information into knowledge. Cassirer aimed to apply Kant's philosophies of transcendentalism to more disciplines, engaging in the debates surrounding the “index of refraction” that existed between subjectivity and objectivity; which is a discourse surrounding human mental conceptualizations of the “real” world.<sup>346</sup> This “distortion” of the real world in the mind is responsible for creativity and the formation of the “symbolic forms” of each discipline, both in the humanities and the sciences.<sup>347</sup> Cassirer argued that the activities of the mind were objective. Therefore, he analyzed how it was possible that the universality of the mind was able to manifest itself in so many different forms. Conversely, Panofsky argued that experience was subjective and becomes objective through contemplation (aligns with Hegelian thought). Hatt and Klonk argue that Panofsky's weakness is that he himself advocates for an ideal: “Just as with Riegl and Wölfflin, what starts out as cultural relativism turns into the advocacy of an ideal inspired by Panofsky's own ethical convictions.”<sup>348</sup> For Panofsky, perspective is a “symbolic form,” implying that meaning is recognizable in its sign; Renaissance perspective introduced the concept of representational space. This allowed for “the objective coexistence of competing forms” but also confined the representation to one viewpoint, restricting subject-object relations.<sup>349</sup>

For both Panofsky and Cassirer, the term “symbolische Form” refers to the structure of the reality created by these forms, the ways of seeing formulated outside the influence of the empirical world.<sup>350</sup> By focusing on the different perspective systems in various cultures, Panofsky did not assert that each culture

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<sup>346</sup> Samuel Edgerton, *The Renaissance Rediscovery of Linear Perspective* (New York: Basic Books, 1975).

<sup>347</sup> Edgerton (1975: 156) writes: “Words, for example, are the symbolic forms for objects in verbal communication. Pictures are the symbolic forms for ideas in visual communication; myths, for unexplainable natural phenomena; and numbers for scientific concepts.”

<sup>348</sup> Hatt, Michael and Charlotte Klonk. *Art History: A critical introduction to its methods*. Manchester University Press: Manchester, 2006: 105-06.

<sup>349</sup> Hatt, and Klonk. 105.

<sup>350</sup> This is a precursor to Structuralism.

saw the world according to its artistic depictions but, rather, each perspective system was symbolic of that culture's unique *Weltanschauung*.

We see here...that aesthetic space and theoretical space in a given period indicate that the space one actually perceives (*Wahrnehmungsraum*) is formed by one and the same sensation...in the one case symbolized intuitively, in the other made logical in the intellect.<sup>351</sup>

Space is conceptualized in terms of the dual pictorial and societal influences. It is understood both as how it is represented visually – through pictures, maps, or other illustrations – and how it is described or explained – in scientific texts. Thus, in Panofsky's argument, how space is represented pictorially indicates how it is symbolized and conceptualized ideologically.

Space in antiquity was understood – and pictured – as discontinuous.<sup>352</sup> Space separates objects, rather than uniting them, representing a fluid where all objects existed without any indications of direction or depth. Although late Antiquarian artists represented landscapes as continuous, their depictions lacked a volumetric solidarity, inevitably portraying more of a spiritual or gaseous space rather than one consisting of solid matter. Space could not be represented as continuous or homogeneous during the Middle Ages due to Aristotelian beliefs in finite, discontinuous space. In the Aristotelian universe, everything was enclosed in one gigantic sphere; the planets and stars circled around the earth at the center – as concentric spheres rotating within the universal sphere, outside of which existed only a void. Space was therefore only in the areas between these objects. Philosophers speculated that everything was fixed in relation to the center of the total sphere, instead of in relation to other objects. Pictorial space was then conceptualized and represented as being uniform. Mediaeval artists were not concerned with the notion of relative space, but rather with the issue of representing an infinite Deity within a finite universe. The Middle Ages brought forward the concept of space as a decorative surface in an image. Artistically, God

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<sup>351</sup> Panofsky in Samuel Edgerton, *The Renaissance Rediscovery of Linear Perspective* (New York: Basic Books, 1975: 159.

<sup>352</sup> Edgerton, 1975: 158.



was placed in a mystical space, represented in gold, while the universal spheres were colored in blue. Edgerton writes:

As ingenuous as such a matter of pictorial protocol may seem to us today, it was of no minor theological concern to medieval Western Christendom. Ultimately, the Church tried to settle the issue in 1277 by banning the teaching of Aristotle altogether.<sup>353</sup>

By the late thirteenth century, the theoretical principles of Aristotelian space had been represented by what Panofsky deems “psychophysiological space,” which in art is the empirical space wherein objects are represented exactly as they are perceived, with objects farther away merely represented as smaller. This type of space adheres to neither mathematical structures nor theological presuppositions. Illustrations of this type show a lack of geometric perspective unity. Unlike the mystical space of previous centuries, this space allows for a factual representation of objects, immediately understood by the observer as evocative of reality. The “systematic space” of the Renaissance, which produced their system of mathematically ordered linear perspective, was infinite, isotropic, and homogeneous.

In the Romanesque era (11<sup>th</sup> and 12<sup>th</sup> centuries) space and object were unified in a single pattern. This flattening of the surface enabled the Renaissance conceptualization of “systematic space,” as a change in object necessitated a change in space and vice versa. Styles emerging in this era were pan-European, due to the relative mobility of populations. Space around objects in the Gothic period (12<sup>th</sup> until the mid-14<sup>th</sup> centuries) was discrete. Gothic art consisted of pictorial narratives, both of Christian and secular natures. However, the works became increasingly secular and the style focused more on naturalism and realism in the art towards the end of the fourteenth century. It was not until the fourteenth century that individual spaces were seen as homogeneous areas that could be continuous. This led to the International Gothic style, which focused on perspective as a rational system based on modeling. This focus on artistic models after the natural world is characteristic of the International Gothic style. Twin

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<sup>353</sup> Edgerton, 159-161.

strains of influence for Germanic artists resulted in part from the exchange of ideas between Italy and France, crossing through Germany, due to the Papal seat formerly existing in Avignon. The perspective system explored in Italian art combined with the pre-Eyckian realism movement in the Northern Countries, creating a new artistic style throughout Western Europe.

The break in tradition from a style accentuating decoration to one emphasizing realism existed at the beginning of the fifteenth century. Ghiberti and his contemporaries exemplify this movement, as the maturation of their art moves to focus on realism in details and later into studies of perspective. The new tradition of perspective can be seen when comparing Ghiberti with Donatello. Rather than using Ghiberti's method of pictorial perspective cast in low relief, Donatello relies on the dramatic expression and movement of the works. The master of combining perspective systems with realism was van Eyck, whose mastery was not due to scientific calculations, but rather to his empirical observations



Figure 39. Jan van Eyck. *Virgin and Child with Saints and Donor*. 1441. Oil on wood. The Frick Collection, New York, USA

(Figure 39):

The perspective of the Dresden *Virgin and Child with Saints* is equally based on a reality founded apparently on observation, although no church interior corresponding to this one has ever been identified, so that the reality must in large part be a creation of the painter's imagination, and derived from a use of architectural forms for symbolic purposes. What is complete is the sense of actuality, so that Jan van Eyck appears to be approaching the idea of the general through a heightened realization of the particular.<sup>354</sup>

<sup>354</sup> Murray, 1963: 82.



Although van Eyck was able to create realistic images without addressing the underlying mathematical principles, Renaissance artists focused on the geometry necessary in depicting visual space. The system of linear perspective can be seen to represent a movement towards more realistic depictions; however, it can also be taken as an increasing intellectualism in art.

In order for Renaissance linear perspective to emerge, the Middle Ages first had to create a perspective system – that of infinite space – that was antithetical to that of Antiquity, which focused on geometry. These two conceptualizations were merged in the fifteenth century. Linear perspective was a method of reconciling two principles. The first was the belief, originating in the Middle Ages, that God’s grace exists in the world through the laws of geometric optics. The second was the artistic push to illustrate what is seen empirically. The result was a form or a perspective system that artists used for visual constructions, a form that was created and sustained according to the cultural necessities – both visually and ideologically. Edgerton coins this as a “paradigm” in a Kuhnian sense:

...demoting a cultural constellation of related ideas; a realm in which science, art, philosophy, and religion all interact and prejudice one another to the extent that no scientific invention, work of art, or philosophical or religious concept can escape the influence of the paradigm as a whole.<sup>355</sup>

Thus, linear perspective in the Renaissance was the most convenient, or appropriate, system for representing “truth” pictorially. Additionally, and perhaps more importantly, was the growing status of the artist during the Renaissance. In order to learn geometry and perspective – as well as to demonstrate the intellectual strenuousness of creating a pictorial space – artists had to engage with the principles of optics. Linear perspective enabled artists to become more scientific in their craft. As realism in art was the focus of Renaissance works, studying the natural world and understanding the mathematical principles underlying empirical sight became necessary for creating better illustrations. Movable type – and the proliferation of printing presses in the fifteenth and sixteenth centuries – allowed

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<sup>355</sup> Edgerton, 162.

for a faster, wider spread of the system of linear perspective to a larger audience. Dürer's close connections with the printing circles of Europe, as well as his travels to Italy, enabled him to engage in the creation this new perspective system.

Leonardo's treatise on perspective was almost certainly read by Dürer, as wording similarities exist between works of the two men.<sup>356</sup> Da Vinci and Alberti's works are assumed to have come to Dürer from Luca Pacioli, as Alberti's works were not yet printed and Leonardo's ideas remained in his (Leonardo's) personal manuscripts.<sup>357</sup> Alberti's system of perspective used geometrical rules – taken from optical science – to represent the world so that it is visually accurate from one specific point. He asserted that perspective was responsible for naturalism in art and that dramatic groupings within images could better convey narratives. There was a difference in the training foci between art theorists and studio artists. Where da Vinci encouraged apprentices to learn perspective through studies of arithmetic and geometry, he did not advocate the broad scholastic curriculum suggested by Alberti.<sup>358</sup> Increasing, though, artists began to take advantage of opportunities to read and gain more of an understanding of a wider range of disciplines. Da Vinci used the term “*academia*” in relation to his artistic apprentices, implying an intellectual refinement from the former *bottega* of the quattrocento painters, the Italian artists during the fifteenth century. He advised artists to “first study science, then follow the practice born of that science,” recommending that “A youth should first learn perspective, then the proportion of things. Next he should learn from the hand of a good master, to gain familiarity with fine limbs.”<sup>359</sup> Through traveling and reading extensively, Dürer formed a personal interpretation of the Italian doctrine of art, one in which theories of proportion played a key role. Merging both Antiquarian aesthetic conventions

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<sup>356</sup> Ibid., 210.

<sup>357</sup> Waetzoldt, 210.

<sup>358</sup> There was increasing academic foci, however, at the universities – one of the fields of study related to perspective. “In 1447 Squarcione's Paduan contemporary Michele Savonarola wrote rhetorically of painting as a ‘studium’, probably referring obliquely to Squarcione's workshop: “Thus our city owes very much to the university. Nor do I belittle the university [*stadium*] of painting; it provides a particular embellishment for our city, as it is to be associated with the study of letters and the cultivated arts more than the other arts are, as it is a part of perspective, which deals with the projection of rays. And this is a part of philosophy...” Ames-Lewis, 2000: 34-35.

<sup>359</sup> Ames-Lewis, 59.

and contemporary natural scientific studies, Dürer believed that art was more than craftsmanship. Rather, it was a form of visually representing the world and must therefore be grounded by scientific and mathematic considerations.<sup>360</sup> Combining exact science (measurements with the compass and rule), humanistic scholarship (classical authors), and empirical observations would produce the best possible visual results.

In Renaissance space, images are ordered according to a fixed point, from which homogeneous and infinite space radiates outward, creating a flat projection plane, according to the vanishing axis principle. In this system, the previous artistic issues of form and depth were reconciled so that one did not have to be sacrificed in order to more accurately represent the other. Perspective was explained by Dürer to be a means of seeing through (*ein Durchsehung*) instead of merely clearly seeing objects. Arguably, the concept of space had become systemized and manageable.<sup>361</sup> Headley inquires into this transition from *Raumgefühl* – a sense of space – to *Weltgefühl* – a sense of the world – arguing that such a shift creates a consciousness of perspective necessitating practicality and application from the applied sciences and humanistic circles.<sup>362</sup> Dürer was familiar with both, deciding to share his knowledge through the publication of his own treatises on perspective, ideal human proportions, and the techniques of painting. His *Adam and Eve* shows the ideals of classical beauty, proportion, and harmony, with Adam styled after the Apollo Belvedere. Although artists at the beginning of the sixteenth century were schooled in geometry, they were usually only as advanced as abacus training and a brief introduction to Euclidean geometry, with problems utilizing numbers rather than diagrams.<sup>363</sup> In order to construct a geometrical perspective image, further skills needed to be learned. In Venice in 1506, Dürer wrote to Pirckheimer that he was to travel to Bologna in

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<sup>360</sup> Ibid., 210.

<sup>361</sup> Headley, J. M. (2000). "Geography and Empire in the Late Renaissance: Botero's Assignment, Western Universalism, and the Civilizing Process." *Renaissance Quarterly* 53(4): 1119-1155.

<sup>362</sup> Ibid. Also refer to Panofsky's assertion of this as the "modern view of space," etc...

<sup>363</sup> Ames-Lewis, 31.

order to learn the secret art of perspective.<sup>364</sup> His familiarity with psychological, medical, historical, and metaphysical ideas – that would later be formalized in his *Underweysung der Messung mit dem Zirckel un Richtscheyt* and *Vier Bücher von Menschlicher Proportion* – culminates in what Panofsky deems an “emblematic spirit.”<sup>365</sup> Panofsky describes emblems as:

images which refuse to be accepted as representations of mere things but demand to be interpreted as vehicles of concepts; they are tolerated by most modern critics, as a rule, only if incorporated in a work so rich in “atmosphere” that it can, after all, be “enjoyed” without a detailed explanation.<sup>366</sup>

Dürer’s theoretical books attempted to explain the necessity of the new art of the Renaissance, as the deficiencies in the artistic training in the fifteenth century were apparent in their images, abundant with mistakes and lacking in realism. For him, the superiority of contemporary art focused on the correct proportions of the human body and perspective systems, which could be furthered by studies of “measurement” mathematics.<sup>367</sup> At the beginning of the sixteenth century, he rejected the florid paintings filled with detail and variety, advocating rather simplicity in pictures. Gombrich elaborates: “There is little doubt...that for Dürer the recognition of the profound simplicity of nature was the consequence of a grasp of her mathematical structure.”<sup>368</sup>

Dürer’s philosophy of art was multifaceted. On the one hand, art was unteachable, mysterious, and inspired. On the other, it could be refined through a precise observation and imitation of the natural world. Merging this aspect of unrestrained fantasia with realistic detail necessitated a theoretical training that Dürer found to be lacking on contemporary artistic training. This was, in many ways, an ineffectual pursuit, as the application of theoretical principles was largely dependent upon the individual artist’s appropriation and transcendence of these

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<sup>364</sup> Hocke, Gustav René. *Die Welt als Labyrinth: Manierismus in der europäischen Kunst und Literatur*. Rowohlt, Passau, 1991: 157.

<sup>365</sup> Panofsky, 173.

<sup>366</sup> Ibid., 173.

<sup>367</sup> Gombrich, E.H. *The Heritage of Apelles: Studies in the art of the Renaissance*. Cornell University Press: Ithaca, 1976: 112-13.

<sup>368</sup> Gombrich, 1976: 131.

principles within their art – directly relating to their intellectual capabilities – and the futility of theory to explain the infinite complexity of the natural world.<sup>369</sup>

Dürer was aware of the artist's control over depictions of the natural world and the various projection systems that could be used. In his scientific-mathematical treatise, *Instruction in Measurement*, he recommended using a central perspective method for the two-dimensional transformation or reproduction of complex three-dimensional objects. Dürer has four woodcuts showing the possibility of this in different manners, all of which are equally suited to the purpose. His *Artist draws a recumbent woman using foreshortening* depicts the artist, whose eye is fixed using a sightvane (Figure 40). A glass grid is set vertically so as to correspond to the horizontal grid drawn on his tablet, thus enabling an accurate representation. In *Artist draws on to a glass using a sightvane* the drawing tablet is vertical (Figure 41). Therefore, there is no transformation from a vertical to a horizontal surface. His eye remains fixed as his image is analogous to looking out of a window. The aforementioned fixing of individual point locations is shown in the woodcut *Artist draws on a Lute* (Figure 42). Here the artist requires the help of another in order to accurately represent the lute. A string is fixed on to the wall behind the drawer, representing the point of origin for the one-point perspective system. The other end of the string is then placed at various points along the lute's form, which represent fixed locations; the image is completed by connecting the dots. In his *Artist draws on a Can* image, the artist is able to draw alone (Figure 43). By affixing the string on the wall behind the artist, it enables him to accurately represent the figure using a point of reference that is farther away. Not only does this image demonstrate the meticulous nature of creating realistic-looking representations, it highlights the role of the artist whose unseen presence dominates the image. The visual triangle determined by the painter depicted space as relative and the artist as having a sovereign eye, determining the viewer's 'point of view' and controlling the reality of his vision.<sup>370</sup>

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<sup>369</sup> Murray, 202.

<sup>370</sup> Illich, I. (2001). "Guarding the Eye in the Age of Show."

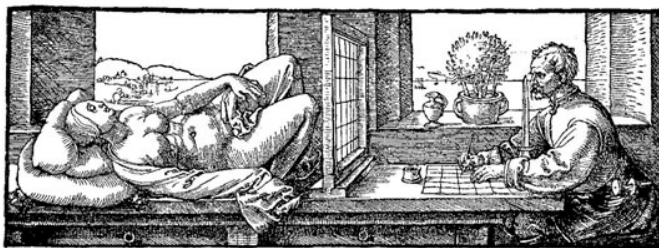


Figure 40. Albrecht Dürer. *Draughtsman Drawing a Recumbent Woman*. 1525. Woodcut, 8 x 22 cm. Graphische Sammlung Albertina, Vienna.



Figure 41. Albrecht Dürer. *Artist Uses a Sight vane*. 1525. Woodcut. Graphische Sammlung Albertina, Vienna

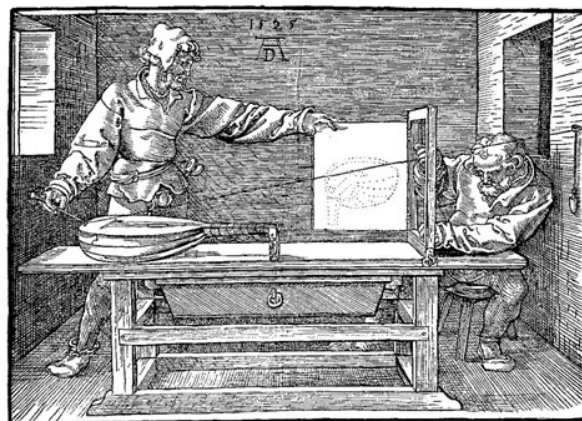


Figure 42. Albrecht Dürer. *Zeichners der Laute*. 1525. Woodcut. Graphische Sammlung Albertina, Vienna



Figure 43. Albrecht Dürer. *Zeichners der Kanne*. 1525. Woodcut. Graphische Sammlung Albertina, Vienna

Dürer's active participation in the formation of his terrestrial map's perspective system required him to display – in correct perspective view – a two-dimensional globe. The notion of perspective as it relates to pictorial space can be analyzed in conjunction with theories of projection. Just as the naturalism of the world is transferred onto a canvas, the three-dimensional globe needs to be represented on a two-dimensional cartographic plane. In order for Dürer to project the world onto his Ptolemaic representation, more than one thousand points for measurement must be exactly fixed with a drawing device, creating intersection

points for the graticule. While many scholars cite Dürer's map as amazing in its use of perspective, they ignore the implications of this being done to a Ptolemaic map. As will be discussed further in the next chapter, Ptolemy's writings were extremely popular during the fifteenth and sixteenth centuries. This was in part due to their scientific nature and in part due to the Renaissance fascination with antiquity. By using Ptolemy's map as a base upon which to project his own representation, Dürer created parallels between classicism and the Renaissance while, at the same time, visually depicting the intellectual distance between the two eras.<sup>371</sup>

The merging of artistic conventions relating to perspective and cartographic representations is a practice that is arguably timeless and universal. A contemporary example can be seen in maps of the early twentieth century. During this time, an emergent artistic principle concerned with representing multiple dimensions simultaneously was cubism. Connections can be drawn between cartography and cubism, as both distort spatial dimensions to aid viewers in comprehending the subject from multiple perspectives.<sup>372</sup> Cubists attempted to depict objects as they were perceived, rather than how they were seen, going against traditional visual depictions by breaking the surface into a series of planes that were then individually distorted and attached interconnectedly, as seen in Picasso's "Les Femmes d'Alger" (Figure 44).<sup>373</sup> Similarly, cartographer's attempts to display elevation



Figure 44. Pablo Picasso. *Les Femmes d'Alger*. June-July 1907. Oil on canvas 8' x 7'8" (243.9 x 233.7 cm.). Paris.

<sup>371</sup> As discussed, the medieval mind did not conceive of the temporal distance between their times and antiquity; alternately, the Renaissance was acutely aware of this distinction and actively tried to re-create their classical past. The next chapter will look in-depth at cartographic iconography, which follows along these same lines.

<sup>372</sup> Crosier, Scott. "Pablo Picasso: Cubism - A Revolution of Spatial Presentation in Artistic Expression (with parallels in cartography)". Copyright 2000-2004. <http://csiss.ncgia.ucsb.edu/classics/content/40>. Consulted 20 November 2004.

<sup>373</sup> Crosier, 2004



data, showing surfaces in relief, were an attempt to visually explore different perspectives.

The concept of cartographic space as it relates to social influences – both in its production and viewing – has been the focus of recent scholarship in other disciplines. In analyzing literary works and their reception by audiences, Gilles argues that representational spaces are passively experienced, dominated by the historical imagination.<sup>374</sup> Lefebvre contends that within spatial discourses there exists a social dimension; space is itself socially produced.<sup>375</sup> In order to fully understand it, space must be sorted into three categories: “spatial practice,” “representations of space,” and “representational spaces.”<sup>376</sup> The first refers to a societal practice of appropriating the concept of space. It is largely dependent upon the second category, which conceptualizes space and then informs decisions about space – for example the scientists, planners, or engineers who identify what space is and how it is used. This corresponds to how space is transformed into maps. The third category is space as it is experienced through its symbolic representation, the “imaginative” and “real” space of the philosophers, writers, and artists who describe it. In the Renaissance, before the advent of aerial photography, cartographic space was not a “representation of space,” as categorized by Lefebvre, but a “representational space.” This research argues that rather than passively experiencing this space, the scholars and cartographers of the Renaissance were actively creating ways in which space could be depicted so as to transform a three-dimensional world into the flat planes of their illustrations. One way in which this transformation can be seen is in the manufacture of globes during the late fifteenth century.

Cosgrove elaborates on Panofsky’s work dealing with pictorial perspective, arguing that in Western cosmography the representations of the globe were responsible for understanding and determining subsequent world views and

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<sup>374</sup> Gillies, John. “Introduction: Elizabethan Drama and the Cartographizations of Space.” *Playing the Globe: Genre and Geography in English Renaissance Drama*. Eds. John Gillies and Virginia Mason Vaughan. Madison: Fairleigh Dickinson University Press, 1998: 19-45: 25-26.

<sup>375</sup> Lefebvre, *The Production of Space*, 28.

<sup>376</sup> Lefebvre, *The Production of Space*, 28.



actions.<sup>377</sup> The conceptualizations of the globe throughout the history of Western society is representative of claims to objective knowledge, signified by an Apollonian eye – a one-point perspective system situated above the earth, assuming divinity for the observer, projecting rational considerations – and ultimately informing discourses of the self, a common humanity, interpersonal communication and commerce.<sup>378</sup> Apollo, the sun god, represents the regular movement of celestial figures, which in turn provides a metaphor for visual and aural harmony. Similarly, music and planetary form are often paired, creating the notion of the cosmic dream, or *somnium*, which is frequent in both the representation and conception of the globe. One basic tenant of humanity is the ability for rational, abstract thought. This ability's perfection is personified through mathematics – in one case, geometrical forms. Aristotle distinguished between the celestial spheres, which were stagnant and eternal, the mutable, and the elemental spheres. Plato, on the other hand, argued that perfection does not exist in the empirical realm, but that pure intelligence and perfection increases as one expands further to the scale of the cosmos. Cosgrove writes: “The Apollonian link between global vision, graphic representation, and the abstract intellectualism that characterizes humanity is forged through geometry.”<sup>379</sup>

Cosgrove argues that one of the motivations for cosmography was its ability to unite terrestrial and celestial space. Globe makers focused both on earthly sphere and celestial globes. An armillary sphere is modeled after the celestial sphere, which Eratosthenes invented in 255 B.C. The frame of this work consists of metal circles, representing the parallels, meridians, ecliptic and equator, that link the poles with a ball representing the earth in its center. These were used to demonstrate the rotation of stars around the earth, with the larger, more precise versions being used as observational instruments for the Greeks, particularly Ptolemy. After an increasing popularity in the late Middle Ages, armillary spheres were frequently depicted in Renaissance portraits as representative of the peak of knowledge and wisdom.

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<sup>377</sup> Cosgrove 2001, ix-x

<sup>378</sup> Cosgrove 2001.

<sup>379</sup> Cosgrove 2001: 27

Cosgrove writes:

From the late fifteenth century, European globe makers and illustrators implicitly ruptured the cosmic unity of material and celestial worlds by pairing distinct terrestrial and celestial globes. Thenceforth the full scope of cosmography would be represented by three global representations, with the armillary whose axes and circles are common to both earth and heavens as the mediating symbol of unity between celestial and terrestrial orbs, the icon of cosmography.<sup>380</sup>

It is therefore natural that Maximilian commissioned both terrestrial and celestial representations, as the composite symbolized the full cosmographical scope. Conformal map projections aim to represent the earth as a globe does – depicting its true shape. Stevenson argues that the construction of terrestrial globes at the conclusion of the fifteenth century demonstrates a concern for accurate representations of the earth that were not possible on a flat map. More importantly, it sparked a revival in the value of globes and globe making that continued on throughout the next century.<sup>381</sup> One of the leading contributors was one of the leaders of the Nürnberg astronomical circle, Conrad Celtis (1459-1508). In founding a school in Vienna in 1510, Maximilian I hired Celtis as an instructor. He gave lectures of mathematical geography, focusing on Ptolemy – which he read in the original Greek, then translated it into Latin and then into vernacular German – and he was the first scholar recorded who used globes as part of his astronomical and geographical teachings.<sup>382</sup> It has been speculated that Dürer's representations were made, in part, to address the issues surrounding the construction of globe-gores.<sup>383</sup> Not only do these woodcuts fit in to the early sixteenth century conceptualizations of geography and astronomy, showing Dürer's individual artistic style, they also relate contextually to the work done for Maximilian I.<sup>384</sup> As publisher, Stabius was responsible for the conception and subsequent supervision of the large woodcut commissions for the emperor. As a mathematician,

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<sup>380</sup> Cosgrove (2001: 10)

<sup>381</sup> Stevenson, Edward Luther. Terrestrial and Celestial Globes: Their history and construction including a consideration of their value as aids in the study of geography and astronomy. Vol. I. New Haven: Yale University Press, 1921: 53.

<sup>382</sup> Stevenson, 1921: 53-54.

<sup>383</sup> Stevenson, 1921: 88.

<sup>384</sup> Schoch 2002

cosmographer and poet, he acquired this position after the death of his friend and teacher Conrad Celtis, whom he met at the University of Ingolstadt in Vienna. Celtis' death in 1508 and Stabius' promotion resulted in him [Stabius] becoming one of the most influential scientific publishers of his time and Maximilian's constant companion.

The terrestrial map Dürer and Stabius produced for Maximilian in 1515, in large format measuring 645 mm by 850 mm, is generally acknowledged to be the first known printed perspective world map.<sup>385</sup> Dedicated to Cardinal Matthäus Lang, this terrestrial representation predates his celestial maps, as Lang is not yet referred to as the coadjutor to the Archbishop of Salzburg. Dürer's terrestrial representation, with the print commission from Maximilian and the dedication to Cardinal Lang, is argued by some scholars to represent the sanctioning of the spherical earth by lay and religious power.<sup>386</sup>

In the absence of the decorative touches framing the world, Dürer's involvement might be uncertain. However, due to stylistic similarities between these and his other works, seen in the wind gods iconography on both this map and on his work for the *Weltchronik*, there is no question of his contribution. This woodcut is comprised of four pieces, converging in the obvious vertical centerline and the horizontal latitude at a height of 15° south. The graticule is situated so as to show the complete old world, highlighting the known world and showing parts of Asia in such a way that it mirrors Ptolemy's tentative maps of the east. Ranging east to west from China and the Far East to the Atlantic coast spanning from

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<sup>385</sup> Schoch 2002: 425: "Die großformatige Weltkarte gab erstmals in gedruckter Form eine perspektivisch korrekte Darstellung der Erde in ihrer Kugelgestalt wieder und gilt deshalb als Meilenstein in der Geschichte der Kartographie."

<sup>386</sup> Schröder, Eberhard. *Dürer: Kunst und Geometrie*. Birkhäuser Verlag: Basel, 1980: „Dürer stand in persönlichem Kontakt und Gedankenaustausch mit den Mathematikern Werner und Stabius und wirkte bei der Gestaltung von Erd- und Himmelskarten für Stabius und Heinfogel nicht allein in Erfüllung künstlerischer Anliegen mit. In der hier wiedergegebenen Stabius-Dürer-Karte aus dem Jahre 1515 sind die Konturen der Erdteile Europa, Asien, und Afrika gleichfalls in einen Kreis eingespaßt. Dieser Kreis stellt – im Gegensatz zur Karte von 1470 – den Umriss der Erdkugel bei einer genäherten Parallelprojektion dar. Durch diesen Abbildungsvorgang werden der Nordpol als Schnittpunkt der Meridiane und der Äquator sowie die Breitenkreise als Ellipsen sichtbar. Sieht man von den zeitbedingten Ungenauigkeiten bei der Wiedergabe der Künstenlinien ab, so unterstützt vor allem die Darstellung des Gradnetzes die Anschaulichkeit des Bildes der Erdkugel. Mit Erteilung des Druckprivilegs durch Kaiser Maximilian und der Aufnahme des Wappens von dem Salzburger Kardinalerzbischof Land in der linken oberen Ecke der Karte war die Wiedergabe der Erde als Kugel durch weltliche und geistliche Macht sanktioniert.“ (16)

Europe to Africa, the center meridian bisects the Caspian Sea, the Persian Gulf, and the Indian Ocean. The map's center point lies to some extent west of the Hormuz straight. Represented on a  $23\frac{1}{3}^\circ$  forward incline, the entire northern Polar region is visible. The distortion of the map increases farther away from the center line. Despite increased terrestrial exploration, this map follows contemporary standards in failing to represent the extent of known geographical knowledge.<sup>387</sup> Despite being produced 27 years after Bartolomeu Diaz's circumnavigation of the Cape of Good Hope, 23 years after Columbus' first voyage to America, 17 years following Vasco da Gama's expedition to the Indian subcontinent and 15 years after Vespucci and Cabral's trip to the South American coast, world maps of the early sixteenth century barely registered these new discoveries pictorially.

In this representation, the Ptolemaic system is followed in terms of the shape of the earth, the lines of latitude and longitude, the cartographic middle points, and the naming of the physical geographical features. The intent of this map was neither to show the advances made in geographical discoveries, nor to create a better cartographic model for the physical world. Rather, the map's theme was a contestation of Ptolemaic authority, especially the projection system and graticule. Studies of Ptolemy were known to the Nürnberg humanists. In the forward to his translation of Ptolemy's first book of the *Geographica* – which was also dedicated to Cardinal Lang – Johannes Werner emphasized Stabius' encouragement.<sup>388</sup> Werner was the leading astronomer and mathematician in Nürnberg during the late fifteenth and early sixteenth centuries.<sup>389</sup> To his translation, Werner added a special disquisition on Ptolemy's much discussed third projection, whose difficulty was addressed in his seventh book.

Ptolemy's interests pertaining to geography included the relationship between the sun, moon and earth, the effects of climate, and how to accurately portray the earth's sphere in a form that could be read. His own treatise

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<sup>387</sup> Schoch 2002: 425.

<sup>388</sup> Stabius' close contact with the Nürnberg humanists is also due to the agency of Dürer's numerous royal commissions. Schoch 2002

<sup>389</sup> Dürer's personal and intellectual collaboration with Werner and Stabius throughout the fifteenth and sixteenth centuries is yet another indication that his terrestrial and celestial collaborations involved more contribution in terms of the projection and astronomical content than mere artistic or decorative additions.

*Geographike Syntaxis* – or *Geographia* – he called “the geographical guide to the making of maps.” In keeping with this theme, his lengthy introduction to cartography details the responsibilities of a cartographer and the materials with which to work. Although no original copies of this work have survived, some manuscript copies made around the eleventh century are still in existence. These *Geographia* have eight “Books,” the introduction to these volumes introduces the definition of *geography* as “a representation in pictures of the whole known world together with the phenomena which are contained therein.” The focus of geography is cartography and depicting the world “in its just proportions,” which is to scale, focusing on the themes of direction and distance and the representation of physical features using symbols that can be easily comprehended. Ptolemy stressed the importance of mathematics, writing “It is the great and exquisite accomplishment of mathematics to show all these things to the human intelligence.” The first book of the *Geographia* deals with theoretical principles concerning globe construction and map projections. In terms of the latter, Ptolemy argues that there are two possible methods, the first one is a globe and the second a planar map. The problem with a globe is the lack of detail. The problem with a flat map is the problem of distortion, the solution of which for Ptolemy was a conical projection. This projection uses equidistant circular parallels that result in converging, rectilinear meridians; as the distortion at certain areas can be extreme, Ptolemy advocated only showing one hemisphere per map. This projection was used for Ptolemy’s regional maps as well as the world map in the Bologna first edition of 1477. In this representation, the straight converging meridians which meet beyond the North Pole, the parallels are represented by curved, circular arcs, and the southern hemisphere is only partly depicted.

Ptolemy’s second projection is pseudoconic, with curved parallel gridlines and arched meridians that converge at the poles. This projection was used to the Germanus copy of Ptolemy (1470) and in the Ulm edition (1482), inspiring subsequent conic projections. The *Geographia*’s seventh book discusses a projection system in which the earth would maintain its circular outline when represented on a planar surface. This third universal projection system is similar to

an Azimuthal projection. This is a modified perspective view that maintains a true scale along the central meridian – which is represented by a straight line. A tapered scale continues along the Syene parallel, which the other gridlines curving concavely. Ptolemy wrote:

The belt of the known *oikoumene* should be displayed on a circle, how it appears to the eye, that through the ring looks at armillary sphere. The middle point of the map should lay there, where the circle of latitude of Syene perpendicularly cuts the plane of the sun's turning point, lying middle meridian This circle of latitude should together shape the horizontal plane.

Ptolemy's third projection is shown in Pirckheimer's Ptolemy edition, which was designed by Dürer and shows a literal interpretation of the text.<sup>390</sup> This adds to Dürer's work with projection systems detailed previously in this chapter.

Stabius and Dürer were not the first Renaissance scholars who attempted to display Ptolemy's map proportionately. Contemporaneous with the Behaim globe – approximately 1490 – a map was produced in Nürnberg with the author incorrectly understood as the *Deutscher Ptolemäus* (Figure 45).

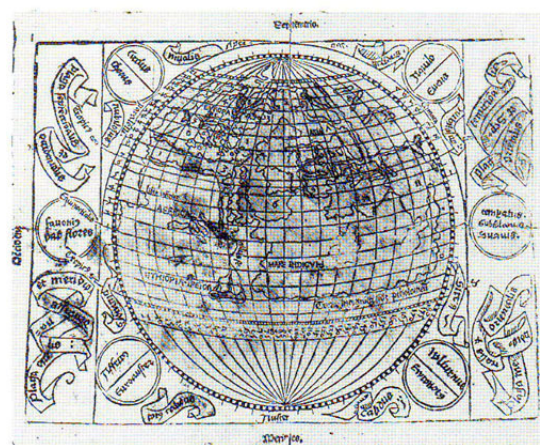


Figure 45. Unknown Author. *Weltkarte aus dem sog. "Deutschen Ptolemäus"*. Nürnberg, um 1490 (?)

This book was not merely a translated copy of Ptolemy, but rather a simplified edition of Ptolemaic works in vernacular German, a *Cosmographia in vulgari*. The woodcut representation of the earth in this bound book shows the earth in circular form, displaying a groundbreaking cartographic projection. The circular form chosen as representative of the earth is described in the text as follows: as Ptolemy rounded his world map in the east and west, so must the earth's shape be rounded on the north and south poles – the earth is then drawn in spherical form, because its shape must also conform to the surrounding sphere. This description implies a

<sup>390</sup> Schoch 2002

reliance on Ptolemy's third projection system and this map – and its geometric projection deficiencies can be considered to be a direct forerunner to Stabius' world map.<sup>391</sup>

The use of Ptolemy's map as a base for this new representation had multifaceted implications. The Ptolemaic system of cartography advocates cartographic perfection through increased knowledge of geographical information, as maps show human knowledge at the most basic level.<sup>392</sup> At a sublime level, the construction of maps relied on visual, abstract, and mathematical knowledge that was continually updated and remodeled during the sixteenth century. The print culture enables an increased circulation of images detailing terrestrial and architectural spaces at a variety of scales and projections; Ptolemy's eighth book describes a non-mathematical projection showing how the earth might look from space and scholars cited the connections between this pictorial linear perspective technique with that conceptualized by Brunelleschi (1425) and Alberti (1430s).<sup>393</sup> Ptolemy's *Geography* was, therefore, an authoritative work in the Renaissance pertaining to spatial discourse:

Ptolemy's maps – that is, the Renaissance Latin versions of Byzantine Greek ones – located the prime meridian in the Fortunate Isles (the Canaries), a place without evident political significance [for the images]...They were the most serious effort that could then be made to comprehend ancient and modern discoveries in one verbal and visual description.<sup>394</sup>

Although this implies an exaggerated objectivity to Ptolemy's maps, his system of regularized, universal space was, during the Renaissance, the most unbiased universal representation of the globe possible.

It is interesting to note that while Dürer and Stabius may have been contesting the Ptolemaic projection system, their own projection was not constructed mathematically, but rather visually. Weiss argued that Dürer and Stabius used an orthogonal horizontal projection – which is a mathematically exact

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<sup>391</sup> Part of the simplistic nature of this map is due to its small format. Schoch 2002: 428.

<sup>392</sup> Nutti 2003:38-39

<sup>393</sup> Cosgrove 2001

<sup>394</sup> Grafton 1992: 51-54

projection method with an infinitely distant central ray that pictures the globe on a plane, with the lines perpendicular to these center parallels continuing through the middle point of the earth or through the point of contact on the surface area of the circle.<sup>395</sup> This position was maintained for approximately fifty years until Diercke pointed out that Dürer's planisphere does not show a full half-circle; neither the prime meridian nor 180° line of longitude are pictured. The full 180° are missing nearly 10° on either side. The projection center is therefore a nearby visible point. The projection lines originate here, diverging then to form an optical cone. Thus the graticule was not constructed mathematically, centered exactly over the ellipse. Instead, it was modeled from an actual globe and show relatively shorter distances in the projection of more distant points.<sup>396</sup> The humanistic cosmographers focused their studies of Ptolemy's writings so as to perfect their projections of the earth; however, as the narrowness of the Ptolemaic *oikoumene* became apparent, it was necessary to extend or enlarge the map's scope. The display of the complete earth as a three-dimensional sphere covered by water and land had been presented in Martin Behaim's globe of 1492 and it was this representation that stood as an archetype for the Nürnberg scholars, including Stabius and Dürer's map.

## Conclusion

A map functions as a historical text that can be read in that context. In the Renaissance, arguably the biggest factor affecting cartography was the push towards realism, focusing on the one-point perspective drawing system. As Thomas Aquinas likened cartographers to messengers of God who accurately depict reality in a "well-ordered" space, it was the artistic advancements in geometry that informed the science of mapmaking. Ivins relates the progress of modern printing to the fifteenth century press, Alberti's introduction of perspective, and Cusanus' doctrine of relativity.<sup>397</sup> These three influences combined both artistic and scientific works, culminating in Dürer's collaborative terrestrial map. Dürer himself embodied by artistic and humanistic characteristics:

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<sup>395</sup> Weiss, E. 1888.

<sup>396</sup> Schoch 2002: 429

<sup>397</sup> Ivins 1953.



the “divine frenzy” and intangible inspiration, often leading to despair or discontent; coupled with the intellectual, calm, contemplative patience of the scholar. It was these qualities that attracted Maximilian I to Dürer. In the Emperor’s quest to establish a legacy of greatness traceable back to the Holy Roman Empire, he commissioned a terrestrial map that Dürer was to complete with Stabius as both collaborative author and printer.

It is important to recognize, however, that this was not Dürer’s first engagement with cartography, as he has already helped with works for Schedel’s *Weltchronik*, Behaim’s globe, and other Ptolemaic illustrations. Working as an artist, rather than a mere craftsman and demonstrating an autonomy and authority relatively unheard of prior to the Renaissance, Dürer took this commission as an opportunity to engage with his own theories of perspective, projection, and the Ptolemaic representation of the universe.

It is worthy of note that while both Dürer and Maximilian were eager to promote their works, recognizing the commercial possibilities of woodcut prints of scientific documents, Stabius, who was responsible for the printing of the map, never oversaw a single run or printed an edition.<sup>398</sup> As this work was commissioned by the Emperor and dedicated to a high-powered official, Lang, it can be argued that once completed, this representation did not have the commercial possibilities to make it worth printing. Its lack of marketability is due to its advanced perspective system, which could not be conceptualized by the majority of the Renaissance population. A perspective system is not a way of visualize the world. It is a convention for constructing pictorial space. Scholars have argued that the visualization of space, through artistic works or scientific texts, directly relates to its conceptualization. The one-point perspective system was a way in which artists used geometric principles to represent reality in its three dimensions onto a two-dimensional manuscript. Dürer logically applied this perspective system to the projection of the spherical earth. Initially using Ptolemy’s methodology, Dürer’s projection system applies not only to the

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<sup>398</sup> The history of the woodblock can be traced back to the eighteenth century, when it was transferred from Vienna to the Jesuit college in Graz (*Grazer Jesuitenkolleg*). It was first printed by Adam Bartsch. The Albertina Museum in Vienna purchased it at a later date. Schoch 2002: 425

spherical world, but to the related iconography of the wind-gods as well. This systematization of space related not only the antiquarian ideas of astrology and mythology, but also geographical principles. In first drafting his Ptolemaic representation of the world, Dürer was then able to further engage with systems of perspective, projection, and astrology to create what can be seen as the culmination of his artistic and scientific collaborations, his celestial maps.

## ICONOLOGY AND CELESTIAL CARTOGRAPHY

The height of celestial cartography began in the sixteenth century, corresponding to an increase in the production, dissemination, and proliferation of terrestrial mapping. The differences between the two themes, however, were marked. For terrestrial maps, cartographers utilized mathematical principles to depict the three-dimensional realm onto a two-dimensional parchment, representing topographic features in a way so as to clarify visually what could never been empirically verified. Therefore, this practice is more conceptual than pictorial. Celestial cartography, on the other hand, consisted of recording exact star positions with little or no symbolic representation of other features. Rather than recording topographic features using conventional emblems, celestial maps employ the same artistic and graphic principles in their depictions of constellation features. Similar to the terrestrial maps of this and later periods – adorned with symbols of gods, heroes, political figures, sea-serpents, and imaginary creatures – firmament maps abound with representations of constellation mythology. Although some scholars belittle the simplistic nature of star maps, finding them pictorial – similar to landscape images – rather than cartographic, there exist within celestial maps both theoretical and conceptual frameworks.

The history of cartography is fundamentally artistic in nature. Dürer's maps have been criticized by scholars as having a minimal impact on subsequent generations of cartographers. Historians of cartography, in following many of the delineations set by previous scholars – focusing on terrestrial cartography and leaving the scholarship of celestial maps to the astronomers and astronomical community – have generally ignored these works. Dürer's collaborative pieces are in many ways an amalgamation of celestial and terrestrial cartography, of science and art, and of multiple disciplines. It is not as important how his maps influenced subsequent cartographers. What is important are the signs and symbols contained within the maps that allow us to better understand conceptualizations of both terrestrial and celestial space during the Renaissance, specifically within the Nürnberg humanistic circle. The images are analyzed within the tradition of celestial cartography. Then, the constellation iconography is examined, finding

both antiquarian symbols and Islamic accuracy. Additionally, the perspective or view of these maps is unusual and the reasons for this will be examined. It is important to note that these images are collaborative works. Therefore, each of the three participants will be studied.

The creation of a celestial sphere enabled Dürer to truly appropriate Antiquarian ideals, as symbolized by the sphere and the concept of eternity. Although classical cultures refer to terrestrial globes occasionally, there are numerous statements about celestial globes constructed for both ornamental and practical uses. Renaissance Europe, facilitated by the invention of the printing press, marked a revival in the dissemination of antiquarian concepts, many of which pertained to astrology and astronomy. In the sixteenth century there was recognition of the historical distance between former eras and the current times. Therefore, the pictorial representations took different forms. Introducing the concept of a one-point perspective system, Renaissance artists were able to mathematically construct pictures of realistic-looking depth. Coupled with this trend, for Dürer, was an investigation of projection systems. Dürer's terrestrial map was a contestation of Ptolemaic authority, a modernization of antiquarian ideals so as to conform to the new discoveries of the Renaissance. His celestial maps can be read in a similar light, as visually engaging in a discourse surrounding pictorial space which relates ultimately to greater philosophical concepts. Dürer's firmament maps, representing the spherical heavens on a planar surface, can be read as the ultimate artistic challenge of depicting spherical perfection on a two-dimensional surface. His success in this endeavor truly marks him as one of the greatest artists, and cartographers, of the Renaissance and beyond.

### **History of Celestial Cartography and Constellation Iconography from Antiquity until the Renaissance**

Dürer's double-hemisphere star map is a conceptual model. Rather than picturing what is seen in the night sky from earth, his map was plotted so as to display the heavens in their entirety from an imaginary, abstract location above the north celestial pole. As the firmament was believed to be a sphere, the stars were then projected outwards from the pole, transferring the three-dimensional starry

globe onto a two-dimensional cartographic surface. This framework for depicting the firmament derived from both antiquarian and Islamic sources, requiring both a foundation in mathematical principles and an understanding of visual signs in order to convey spatial relationships. Chapman argues that it was the monotheism of Antiquity – which continued through until the Renaissance – that enabled an analytical examination of science:

...without the concept of a coherently-designed Universe, made from nothing by an intelligent Deity, and contemplated and studied by human beings who possessed a particular intelligence that enabled them to unravel its structures, science as a rational understanding of causes and effects in the world would never have come into being...it was in those cultures that developed the concept of a single divine mind that science as an analytical, mathematical and predictive interpretation of nature took an especially firm hold.<sup>399</sup>

The reason for this is that an overarching principle of omnipotent design allows for an exploratory – and explanatory – view of the universe.<sup>400</sup> Specifically pertaining to astronomy, the Greek philosophies of *logos* and *nous*, coupled with Jewish and Christian philosophers, were assimilated by Islam in the eighth century to produce a focus on scientific studies and increasingly accurate calculations of liturgical and astronomical calendars. With the advent of the medieval times and through the creation of universities, a systematic understanding of astronomy was required for studies towards the end of the period.<sup>401</sup>

Early celestial cartography can be argued to stem from a combination of the quest for scientific accuracy to demystify space and a form of artistic expression through the “elaborate” constellation symbols.<sup>402</sup> Celestial cartography was developed, in part, so as to better understand time, with celestial charts visualizing the relationship between heavenly movement and earthly activities: demonstrating the cyclical nature of time, the relationship between the seasons and human activities, the yearly movement of celestial bodies, and signifying a simple

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<sup>399</sup> Chapman, Allan. Gods in the Sky: Astronomy, Religion and Culture from the Ancients to the Renaissance. Channel 4 Books (Panmacmillan): London, 2001: vii.

<sup>400</sup> Chapman, viii.

<sup>401</sup> Chapman, viii-ix.

<sup>402</sup> Whitfield 1995: ix

testimony of faith.<sup>403</sup> Determining a reference co-ordinate system for celestial maps was difficult due to the absence of easily visible topography. A simple system was devised in which the sun's movement across the sky was taken as the foundation for measurement. Star positions could then be measured in reference to predetermined points in both altitude degrees and in clockwise azimuths around the horizon. By grouping together clusters of stars, a pattern was formed from which the path of the sun could be read. This course became the zodiac and the stars within it were grouped into twelve figures known as the zodiac constellations, with the sun intersecting one per month. The problem with these types of measurements was that they were only valid at the latitude in which they were calculated during that particular date and season. In order to have a reference for the entire year, one map would have to be made for each night. The determination of the ecliptic allowed for an "objective" framework, providing a set foundation upon which measurements could be made. The starting point for measuring celestial longitude – the first point of Aries – was where the ecliptic crossed the equator's plane.

The original eleven constellations were animals, as the word *zodiac* finds its roots in the Greek word *zoidiakos*, which means "animal." Libra, the scales, was added at a later date. Every one of these constellations is visible from any position on earth throughout the whole year. Astrology therefore played a key role in the formation of celestial cartography, as the zodiac charted the sun's movement and enabled a system of keeping time. Over the course of one year the sun completes one full zodiac path along the ecliptic. A calendar is a complex document recording chronological cycles that can be witnessed throughout the day – in terms of the hours, etc... – and over the course of the year. Calendars began charting lunar phenomena, delineating time by moon phases. Each lunar month began when the new moon appeared in the sky and a new year was marked by the spring equinox. Using these calculations, a month was twenty-nine days, twelve hours, forty-four minutes and three seconds long, with a total of 354 days (eight hours, forty-eight minutes and thirty-six seconds) in a year. The length of the solar

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<sup>403</sup> Synder 1984: 14

year means that there must be constant adjustments made to the lunar year in order to prevent the time gap from constantly increasing. Babylonians perfected the system as it is known today, which was appropriated in the fourth century B.C. by Greek and Roman civilizations.

Although it has been speculated that Thales, the founder of the Ionic School of Philosophers, constructed a celestial globe in order to represent his conception of the crystal sphere, a lack of evidence suggests otherwise.<sup>404</sup> While some cartographic historians argue that members of this school focus on ideological or theoretical concepts rather than physical models of the cosmos, the activities of Anaximander suggest otherwise. Focusing on geography, astronomy and the exact sciences, he is credited both with the first terrestrial world map and the introduction of the sundial to Greece.<sup>405</sup> However, it was not for another two centuries that scholarship concerning astronomy and astrology evolved both scientifically and artistically. The exact origin of constellation mythology is unknown, although thematic connections relate to creation myths, the seasons, and fertility. Many Greek myths have parallels in other cultures. However, surviving documents indicate that the rise of cosmic scholarship in a tradition that continued through the Renaissance began in Hellenistic Greece.

The Hellenistic period (323-30 B.C.) fostered increased scholarship in Alexandria pertaining to both literary disciplines and science, as academics employed Aristotle's model for scientific studies – gathering, classifying, and analyzing data – to advance the fields of architecture, medicine, geography, mathematics and astronomy. The classical age of Greece is noted for its literature, poetry, philosophy, art, and drama. The Hellenistic age (the fourth century BC) was responsible for spreading Greek culture and power throughout the known world. The Macedonians (Philip and Alexander) exported their culture, influencing the subsequent Romans, Christians, and Islam. In the Hellenistic courts poets and

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<sup>404</sup> Stevenson, Edward Luther. Terrestrial and Celestial Globes: Their history and construction including a consideration of their value as aids in the study of geography and astronomy. Vol.1. New Haven: Yale University Press, 1921: 14.

<sup>405</sup> Stevenson 1921: 14 writes of the Ionic School: "they were content, in the main, with mere philosophical or cosmical speculations."

scholars invented new constellations for the patrons, resulting in imaginary constellations making their way into astronomical depictions.

Alexandrian humanists studied Greek literature in a critical way, developing the field of literary criticism, creating canons, commentaries, and a distinct literary aesthetic. Within this tradition of didactic literature was a focus on aetiology, the branch of study analyzing the foundations for landforms, customs, and societies, using legends and myths as source material. The seemingly divergent traditions of literature and science were studied concurrently during the height of Alexandria's intellectual growth, exemplified by Eratosthenes' writings which demonstrate both scientific and poetic leanings.<sup>406</sup> At the age of 30 Eratosthenes was promoted by Ptolemy III (246-221 B.C.) to be the head librarian at the Library of Alexandria, forsaking his studies in philosophy for his post which he held for the next fifty years. One of his prose works was a compilation of myths concerning the constellations. The *Catasterismi* tells the origins of the forty-eight constellations accepted during the Hellenistic period, the beginnings of the Milky Way, and speculation on how the five planets were named.

Eratosthenes was not the only scholar to write a literary text concerning the heavens. Constellations were not originally mythologized and it was not until the sixth or fifth centuries B.C. that their assigned mythological figures were in common usage. Zodiac figures were mythologized even later. Eudoxos of Knidos's work illustrates the two seemingly discordant tendencies of Greek astronomical scholarship: his catalog of constellations highlights the rationality and Greek tendency to scientific classification; his inclusion of mythological names illustrates the importance of the "mythical imagination."<sup>407</sup> Although poetical astronomies are attributed to Cleostratus of Tenedos in the sixth century B.C., Sminthes in the fourth, and Alexander Aetolus in the third, the only surviving text is Aratus of Soloi's *Phaenomena* – which was a poetical rendition of Eudoxus of Cnidus' fourth-century prose. Eudoxus learned how to construct a star catalogue as well as a celestial globe, which he used not only to verify his own

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<sup>406</sup> Condos, Theony. *Star Myths of the Greeks and Romans: A Sourcebook*. Phanes Press:Grand Rapids, MI, 1997: 17.

<sup>407</sup> Panofsky and Saxl 1933



astronomical speculations, but also to visualize the constellations, providing a basis for his writings. Aratus' poem, composed of approximately 1150 verses detailing the constellations and their relative positions, has survived in its entirety. It was intended to organize the constellations in a descriptive manner so that readers could acquaint themselves with the night sky. Aratus' myths surrounding the constellations focus predominantly on advocating Stoic philosophies. Aratos' use of Eudoxos' catalog was purely poetic. He never added any of his own embellishments to the myths and, when unable to give more information, he wrote inasmuch.<sup>408</sup> Although the exact reasons for the ensuing popularity of this work are not definitively known, it was highly influential and was subsequently copied and translated by Greek and Roman authors: Cicero in the first century B.C., Germanicus Avienus in the fourth century A.D., and the anonymous *Aratus Latinus* in the eighth century A.D.<sup>409</sup>

Araus is therefore responsible for describing the firmament locations for the various constellation figures, with Eratosthenes as the first known author to compile the mythologies surrounding each figure. In terms of the specific mythologies, it is not known how much was invented for the *Catasterismi* and how much constellation mythology existed prior to this period. Condos writes:

With one exception (the myth related about the constellation Piscis Austrinus), the myths recounted in the *The Constellations* are familiar Greek myths that are well-attested in classical literature. What is unclear is when and how these myths became associated with a particular constellation. Either the linking of myth and constellation was a literary construct invented by Eratosthenes in his *Catasterismi*, or, more likely, it evolved slowly in popular imagination during the centuries between Homer and Hesoid and the Hellenistic age.<sup>410</sup>

Despite citing Hesoid as an authority about constellation mythology, his surviving works bear no traces of this and his *Astronomia* is long lost. In the mythology that has survived, references to the legends focuses solely on the tale itself and gives no

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<sup>408</sup> "not far from it [the Dragon] there revolves a figure that resembles a hard-working man, bent on his knees and spreading out his arms, but nobody knows what he is trying to do and thus they call him simply the 'Kneeling Man.'" in Panofsky and Saxl (1933: 232)

<sup>409</sup> Condos, 19.

<sup>410</sup> Condos, 23.

indication of when the constellations were first assigned their respective mythologies. Eratosthenes' instructive poem on mythology was a key component of the dissemination of mythological iconography in astronomical images. Hyginus, the Augustan poet who wrote *Fabulae* and originally a mythographer, followed Eratosthenes' tradition, transforming celestial representations into a space abound with mythological assemblages. Although some scholars argue that the mythic element in constellations plays a secondary role to their mnemonic role in measuring direction and time, with the focus of constellation patterns not on its iconography, but rather its conventionality in locating celestial regions, the relationship between mythological symbols and depictions of the stars proliferated.<sup>411</sup> Through this association of well-known mythological characters with constellation figures, artists began referencing non-astronomical depictions of, for example, Hercules or Eridanus, in their cosmological illustrations.

Originally scientific documents, astronomical treatises developed in turn to illustrated semi-mythologies, beginning with images of a whole celestial globe and then showing pictures detailing the individual constellations. Thus, "pictorial enthusiasm" overcame "scientific interest" in the cosmos, as often the stars at the base of the constellations were either omitted entirely or replaced by random assortments of points.<sup>412</sup> Astral or astronomical mythology directly relates to the relative positions and movements of constellations, such as the tales surrounding Orion's death –from the Scorpion's sting – his dogs, and his pursuit of Pleiades. While there is no apparent relation between the stars within constellations and their pictorial representations in that no spatial hierarchy or importance places two figures next to each other or assigns star groupings specific mythologies, constellations in close proximity can share similar themes or stories. An example of this can be seen in the northern constellation figures of Cassiopeia and Cepheus, located close to their daughter Andromeda, who was rescued from the sea monster Cetus by Perseus. Another formation of constellations grouped around a common

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<sup>411</sup> Whitfield 1995: 2-3: "It was astrology of course which played the major role in reinforcing these images, and centuries of such use made them permanent. But they became in time totally detached from any scientific or cultic basis, and served as purely conventional means to locate any region of the sky."

<sup>412</sup> Panofsky and Saxl 1933: 233

theme are those connected to Orion mythology: Scorpio, Canis Major, Canis Minor, Pleiades, and Lepus. There exists some amount of ambiguity pertaining to constellation mythology. Scorpius, for example, is said to be responsible for Orion's death, although conflicting sources attribute the cause of death to different reasons such as boastfulness or heroism on the part of Orion. Regardless of the true mythological background, star maps visualizing the constellations are recognizable throughout the centuries.

Artistically, constellation imagery can be traced to the Atlas Farnese, speculatively based on Hipparchus and dated between the second century B.C. and 150 A.D. (Figure 46). This marble globe portrays the five circles of heaven and the constellation figures; however, it does not show the individual stars that make up each constellation. This globe arguably used Aratos' poem as a reference due to the correlation between the mythologized and non-mythologized constellations (i.e., Orion and Perseus versus the Kneeling Man who had yet to become Hercules).<sup>413</sup> Globes from classical Greece show an from-space viewpoint – with the viewer seeing how the constellations would appear from some place in space in lieu of a point on the earth. Additionally, twenty-nine



Figure 46. Unknown Author. *Farnese Atlas*. Marble. 65 cm. diameter. Museo Archaeologico Nazionale Naples, Italy

illustrated manuscripts – including the Vaticanus Graecus 1291 and the Vaticanus Graecus 1097 – can be dated to approximately the ninth century. The supposed *sphaerae*, or illustrative representations of the sky, constructed by Anaximand, Eudoxus, and Thales of Miletus have since disappeared. Called “Aratea,” the prototypes for these illuminated manuscripts depicting the constellations were established by the end of the Roman Empire and were subsequently imitated by artists in the Byzantine, Islamic, and Carolingian traditions.

<sup>413</sup> Panofsky and Saxl 1933.

Star maps are not like modern constellation maps. Contemporary charts center the coordinate lines on the celestial equator and poles, originating from the north celestial pole near Polaris. Older star maps use the Greek system and center the coordinate lines on the ecliptic, with the sun and planets following along the zodiac path, with the northern celestial pole located between the tail of Ursa Minor and Draco. Classical Greeks believed that the Earth – as the center of the cosmos – was surrounded by “fixed” and “wandering” stars (Sirius or Vega versus the moon and planets, respectively). Ptolemy’s *Almagest* (written around 150 A.D.) consists of his own ideas introduced with those of Aristotle and other Greek astronomers. The *Almagest*, detailing 48 constellations with a total of 1,028 stars, gave each star’s place in the constellation, magnitude, and celestial latitude and longitude using a projection system centered on the ecliptic.

For Ptolemy, geography – representing the earth – was intrinsically linked to representing the heavens, as celestial parameters determined locations on earth. His *Geographia* addresses the relationship between the earth and heavens. His latitude and longitude are measured by the height of the celestial pole and lunar eclipses, respectively. Furthermore, he advocated measuring distances on earth through their relationship to heavenly circles.<sup>414</sup> Highlighting the importance of mathematics in his writing that “It is the great and exquisite accomplishment of mathematics to show all these things to the human intelligence,” Ptolemy found the terrestrial and celestial sphere to be intrinsically linked. He believed that it would be possible to map the earth with the same precision of celestial maps using the principles of astronomy and mathematics. This process would involve understanding the size and shape of the earth and the position of each location under the celestial parallels, the latter of which could be determined by the length of days and nights, the fixed stars seen overhead, and the stars which appear on the horizon each night. The *Geography* concerns the earthly sphere, in the words of Ptolemy “an imitation and description of the whole of the known world and all the things which are almost universally related to it.” Concentric planetary spheres are

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<sup>414</sup> Bennett, Jim. “Practical Geometry and Operative Knowledge”. *Configurations* 6.2 (1998) 195-222. Copyright © 1998 The Johns Hopkins University Press and the Society for Literature and Science. <http://muse.jhu.edu/journals/configurations/v006/6.2bennett.html>.

described in the *Almagest* and the *Planisphaerium*, both of which were available in Latin from the twelfth century. The *Almagest* outlines how to construct a celestial globe, as the visual display of this information was argued to have great value. The *Planisphaerium* describes a stereographic projection. Ptolemy's ecliptic coordinate system was used throughout the sixteenth century. In this method, stars are positioned in terms of how far north or south they are from the ecliptic.

Arabic scientific literature was founded on Greek sources. However, during the twelfth and thirteenth centuries Europe turned to Arabic sources for knowledge of the Greek natural sciences. Ptolemy's works continued to interest Arabic scholars throughout the eighth century. Calif al-Mansur is credited as the first ruler to focus on the astronomical sciences and during his reign the works of Ptolemy were translated into Arabic.<sup>415</sup> Scholars constructed celestial globes and armillary spheres according to Ptolemy's direction. In Al-Sufi's astronomical text, the *Book of Fixed Stars*, his constellation figures are shown both as they would appear from the earth and from outside of the celestial sphere (Figure 47). Pertaining to his star catalogue written commentaries remarked on the constellation names and figures. Alterations occurred in the constellation names when faced by difficulties in

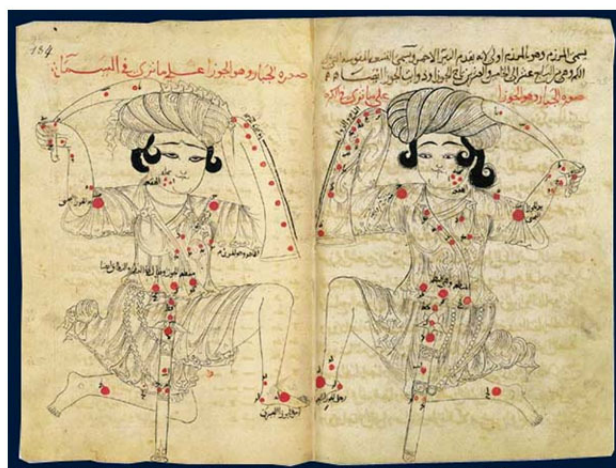


Figure 47. Al Sufi. *Orion. Book of Fixed Stars*. Bodleian Library, Oxford, Manuscript Marsh 144

translations: Andromeda was renamed “The Chained Lady,” Orion was called “The Giant,” and Cassiopeia became “The Lady in the Chair.” The Arabs understood and used Greek astronomical concepts, preserving and developing the figures of the constellations.<sup>416</sup> However, as

they neither understood nor valued the mythological meanings, their focus was the scientific precision of the constellations. The result of the Arabic emblems

<sup>415</sup> Stevenson, 1921: 27.

<sup>416</sup> “As we have learned from the dome of Kuseir Amra, the Arabs were acquainted with Greek astronomical ideas as early as the eighth century.” Panofsky and Saxl 1933: 239

retaining astronomical position was that classical knowledge was assimilated in a non-classical pictorial tradition.

Whereas the Carolingian artists referenced classical styles and mythological meanings, the Arabic texts focused on scientific, spatial accuracy.<sup>417</sup>

This interest in precision was motivated by astrological factors, navigational purposes and religious objectives. The



Figure 48. Al Sufi. *Hercules. Book of Fixed Stars*. Bodleian Library, Oxford, Manuscript Marsh 144

constellations provided a tool for precisely orienting viewers in the direction of Mecca. Additionally, studies in astrology allowed for scholars to calculate exact prayer times and to calculate the society's lunar calendar.<sup>418</sup> As Arabian artists would have been unfamiliar with the mythology behind the image, they would have assumed any decorative aspects to be merely aesthetic. To them, the importance of the image lay in the astronomical precision. In the figure of Hercules (Figure 48), although the icons are incorrect, the pose accurately reflects the constellation figures – even more so than in the Carolingian representations – and the stars are classified by size and referenced.<sup>419</sup>

Many subsequent manuscripts in Europe modeled themselves after Arabic sources. In the Christian occident, astrology had further devotees and opponents, however they existed predominantly in secret. Occasional enrichment contributed from Arabic scholarship, especially during the time of the Crusades, sustained astrological teachings. In the tenth century, the scholar Gerbert D'Aurillac was

<sup>417</sup> Panofsky and Saxl 1933: 239. "Thus, when the time came, in the thirteenth century, for the West to take over the Arabic illustrations, it again assimilated classical conceptions, but this time from a totally different angle. The Carolingian assimilation had been an absorption of figures which while classical both in style and in mythological meaning were already fairly devoid of scientific exactness. The assimilation of the Arabic types, on the contrary, was an absorption of knowledge which was classical in subject and method but was hidden behind entirely non-classical images most of which bore unintelligible Arabic names."

<sup>418</sup> Schorn, Ronald A. *Planetary Astronomy: From Ancient Times to the Third Millennium*. Texas A&M University Press: College Station, 1998, 13.

<sup>419</sup> Panofsky and Saxl 1933.

elected as Pope Sylvester II (reign: 999-1003), bringing Arabic concepts and writings to the West. He stressed the spherical shape of the earth and the universe and approved – to a large extent – the cosmology of Aristotle. As Christianity's influence extended further south in Spain to Córdoba, Toledo, and Seville – predominantly Muslim centers – more Arabic manuscripts were translated into Latin. Gerhard of Cremona (1114-1187) of Toledo made extensive translations of Euclid, Apollonios, Ptolemy, and others. Furthermore, isolated works describing the cosmos were written by Wilhelm von Conches (approx. 1080-1154) and Bernard Silvestris (12<sup>th</sup> century). Through the course of the dissemination of scientific works, there were increasing numbers of popular works about astrology, taking from ancient Egyptian and oriental sources.

In the twelfth century astrology, remarked upon in philosophical papers and teachings as well as theological writings, was seen as a topic of serious research. Dominant scholars consulted their astrologers for information concerning politics, war, public projects, and personal matters. The heads of upper-class families provided horoscopes for their children as well as for themselves. The people read astrological yearbooks and went to respectable astrologers and star-gazing charlatans for advice concerning love, money, and personal health. Even domestic animals were diagnosed and treated with the help and influence of star constellations. Forecasts were also given for events. In 1186 it was predicted that the number of planets in the balance (that from the astrologer was brought into connection with the element of air) were aligned so that terrible disasters concerning air – storms and gales – would devastate entire areas of the earth. Despite the prediction not coming to pass, subsequent astrologers highlighted various Islamic war victories as being the elemental disasters predicted.<sup>420</sup>

Although not in accordance with Christian beliefs, the idea of the stars determining personal characteristics and individual destinies was a compelling notion, drawing in scholars and theologians such as William of Auvergne (Guilielmus Parisiensis) and Thomas Aquinas. Numerous theological scholars

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<sup>420</sup> Lyons, Albert S. (2004) *Der Blick in die Zukunft: Das große Buch vom Wahrsagen*. Dumont: Köln. 53-55

wrote on the topic. Some of them, such as John of Salisbury in the twelfth century, condemned astrology, believing that it replaced faith. Other scholars rejected astrology due to logical lay reasons. Albertus Magnus (approx. 1200-1280), however, took no objections to the birthday horoscope, which he found to be an example of the applied sciences, and didn't find it contradictory to Christian theology. His opinion was that the stars affected the body and the will. The soul was not under astrological influence, as it had the strength to retain free will and was able to work against or fight the heavenly bodies. Thomas Aquinas (1225-1274) approved of the foundational astrological beliefs, finding them in accordance with orthodox Christian beliefs concerning the cosmos. He found the stars to be the method of communication between angels and the terrestrial realm, utilized in order to implement God's plans. But while he believed that everything that happened on earth was caused by the heavenly bodies, he was of the opinion that the human spirit could control the stars.

The debates surrounding heavenly determination of earthly events facilitated the production of synoptical tables, which show the planets with their corresponding personality characteristics. These played a role in the secular iconography of the late Middle Ages, as the realism that characterized fifteenth-century art in the north attempted to unify the symbols, in addition to making them seem more intuitive. Thus, many professions were discarded and the pictorial space was unified.<sup>421</sup> In addition, many artists were altering the non-classical figures – e.g., those in Michael Scotus's astronomical manuscripts – with representations that looked more classical. Panofsky and Saxl write:

It is as if, thanks to the humanistic movement of the fifteenth century, some Northern artists had suddenly become aware that it was incongruous to represent a classical deity, such as Mercury or Mars, in so non-classical a manner as was usual in late mediaeval illustrations.<sup>422</sup>

By the late (High) Middle Ages, Catholics charted the stars to determine their daily lives and occupations and calendars often depicted a human body, whose various parts were under zodiac influences.

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<sup>421</sup> Panofsky and Saxl 1933

<sup>422</sup> Panofsky and Saxl (1933: 247)



These astrological beliefs created a sense of power for the planets, elevating them to a divine status. The planetary deities, similar to powerful gods, ruled the firmament, affecting the earth as well. Unlike the constellations, described by Tasso as “la plebe degli dei” or the lower class of divinity, the planets determined the character, physical appearance, profession, and even the destiny of a child, as one astrological text predetermining: “Man is a child of his planet.”<sup>423</sup> The first appearance of planetary deities in their illustrative, decorative cycles was encyclopedic, rather than mythological or astrological. The Middle Ages associated the planets with: the seven liberal arts, the trivium of grammar, rhetoric, and dialectic (logic) and the quadrivium of geometry, astronomy, music, and arithmetic. The composite encompassed the intellectual base for scholars rather than knowledge associated with professional, occupational or servile skills; the Apostles and Prophets; the Cardinal Virtues; and the Labors of the Months, which were the agricultural duties associated with each cycle (i.e. January for feasting, February for resting, pruning in March, etc...), the totality of which demonstrates the harmonies of the universe (Figure 49). Medieval illustrated calendars showed, therefore, the seasonal progression due in part to celestial influences, which determined the cycles of planting, harvesting, and cold-weather survival. The planets were applied to all fields as a way of ordering knowledge. Bodin’s theories on political geography later in the sixteenth century applied planetary knowledge, stressing the importance of visual representations for knowledge systems. In the high Middle Ages, unlike the

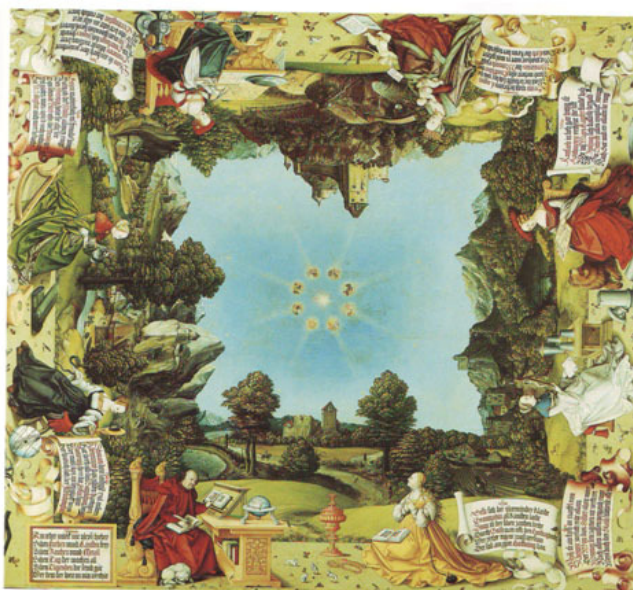


Figure 49. Martin Schaffner. *Planetary influences*. 1533. Hessische Museum, Kassel

etc...), the totality of which demonstrates the harmonies of the universe (Figure 49). Medieval illustrated calendars showed, therefore, the seasonal progression due in part to celestial influences, which determined the cycles of planting, harvesting, and cold-weather survival. The planets were applied to all fields as a way of ordering knowledge. Bodin’s theories on political geography later in the sixteenth century applied planetary knowledge, stressing the importance of visual representations for knowledge systems. In the high Middle Ages, unlike the

<sup>423</sup> In Panofsky and Saxl 1933: 242.

previous periods, the ancient figures were transformed by the illuminators to an almost unrecognizable degree. Thus, the classical subject matter was divorced from its classical form.<sup>424</sup> The height of this classical decomposition occurred during the middle of the thirteenth century, exemplified by the representations of Hercules looking Arabic, wearing a skull cap and Arabian gown (refer to Figure 48). His club is pictured as a scimitar. Arab astronomic illustrators did not deconstruct or transform the representations other than orientalizing their costume. Therefore, their transformations did not evolve and change in the way that the mediaeval European depictions did.<sup>425</sup>

Aratus' *Phaenomena* was referenced in the early Middle Ages for descriptions of constellations and mythological figures. The *Aratea* is an illuminated Carolingian meteorological and astronomical text from the year 818



Figure 50. Aratus. *Northern Heavens* (from a Carolingian manuscript). 818 A.D. Bayerische Staatsbibliothek, Munich

with 39 illustrations that include 43 constellations – the stars in gold leaf, the planets and the seasons shown as animals, heroes and gods (Figure 50). As accompanying illustrations to Aratus' poem, the constellations are not accurate in relation to each other and the coordinate system is arbitrary. The images are not consistent in terms of

projection, as some figures are shown facing the reader and others give a rear-view [i.e., the figures are reversed from the left/right directions]. Both the star positions and magnitudes are inaccurate. The Carolingian Renaissance peaked with the rulers Charlemagne and Louis the Pious in the eighth and ninth centuries, showing an increase in the arts, literature, liturgical and scriptural studies. A common

<sup>424</sup> Panofsky and Saxl 1933: 237. (i.e. Hercules: Farnese Globe = Kneeling Man, Carolingian manuscripts = mythological dress w/lion's skin and club (as in the classical models), High Middle Ages (12<sup>th</sup> century) = Romanesque, Gothic figure (looks mediaeval rather than classical).)

<sup>425</sup> Bull 2005: Between 1420 and 1500 there is little artistic development pertaining to the iconography planetary deities.

language and writing style were implemented with Medieval Latin and Carolingian minuscule, respectively. Carolingian art, occurring from roughly 780-900 A.D., is marked by a northern European appropriation of classical Roman art due to the patronization of northern European kings. Classical forms were combined with Germanic styles in a Pre-Romanesque style that predates Gothic art. Charlemagne wanted to rival Rome's Lateran, seeking the *renovation* (revival) of Roman culture, linking the artistic achievements of the past with contemporary times. In subsequent periods, Carolingian illuminators' re-creations of Antiquarian celestial prototypes were carefully reproduced, with the stars continuing to be placed capriciously. However, the designs changed due to intellectual and stylistic evolutions.<sup>426</sup> While this was not a universal change in symbols, this "pseudo-Renaissance" can be seen as a precursor to the full revival of classical forms in the sixteenth century.<sup>427</sup>

Astronomical texts, which did not include celestial maps or star catalogues, represented the emblems in such a unique manner that it is difficult, if not impossible, to chart the pictorial evolution from classical or Arabic sources. Unlike the constellations, which were connected to the Arabic tradition from the earlier classical depictions and subsequent European derivations, the planets used in Arabic texts did not come from classical prototypes.<sup>428</sup> Arabic figures of the planets come, rather, from ancient Babylon. Planet worship originated in Babylon, moving westward during the fourth century B.C., and Plato makes no mention of the planets (calling Saturn merely Phainon, "the glaring star"). The Babylonian gods (e.g., Nebo and Marduk, corresponding to Hermes/Mercury and Zeus/Jupiter)

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<sup>426</sup> Panofsky and Saxl (1933:247) write that the Carolingian manuscripts "at that time were practically the only sources upon which they could draw for their classical prototypes."

<sup>427</sup> "The process we have observed in these many instances can be expressed in general formula. Wherever a mythological subject was connected with antiquity by a representational tradition, its types either sank into oblivion or, through assimilation to Romanesque and Gothic forms, became unrecognizable. While this went on, they were supplanted by non-classical types, either derived from the East or freely invented on the basis of the textual tradition. Then, beginning in the second half of the quattrocento, imitation of the antique gradually reintroduced the classical types – a process that, in Germany, had been prefigured by modest attempts to revive the pseudo-classical Carolingian types." (Panofsky and Saxl 1933: 263)

<sup>428</sup> "The Arabian planets...were so incomprehensible to the Western mediaeval illuminators that they did not attempt to copy or imitate them." Panofsky and Saxl 1933: 242. "Michael Scotus (died 1234), the court astrologer of the Emperor Frederic II, first gave a thorough description of these new images."

appeared in the thirteenth and fourteenth centuries and completely displaced the Carolingian *Aratea* types. Being old Babylonian concepts/figures, the western illustrators were unfamiliar with their iconography and when used, they were given European figures, becoming “new mediaeval elaborations of ancient Oriental conceptions.”<sup>429</sup> In the middle of the fourteenth century in the Cod. Monac. lat. 10268, Jupiter is portrayed as a learned gentleman, Venus as a young lady holding a rose, and Mercury as a bishop. All of these depictions are similar to Arabic texts, which picture Venus as a flower-carrying woman, Jupiter as a distinguished gentleman, and Mercury with a book and/or halo.

Typically, the planetary deities were depicted either as driving in chariots along their celestial paths or standing around a circle. In both representations their connections to the zodiac are visualized as well. Perhaps the most difficult concept for modern viewers to grasp is the personal connections between viewers and the pictured figures.<sup>430</sup> It is understandable, due to the vernacular nature of the mythology and the discipline of astrology in general, that the works that have survived focus much of their scholarship on a more simplistic level. The *Aratus* was non-technical and distinctly novice. The *Poetica Astronomica* focused even less on astronomy. Rather than describing how the constellation figures appear, Hyginus’ work narrates their legends. The illustrated copies of his manuscript from the fifteenth century by Erhard Ratdolt (1482), using the Ptolemaic constellations, neither depict the number or location of the stars accurately. Although Draco was portrayed as a mythical dragon in medieval representations, when constellation accuracy became emphasized, his form changed into a large-headed dragon-snake (Figures 51 and 52). These two texts form a literary basis for astronomy founded on mythology and poetry. Alternately, the writings of Ptolemy focus on the scientific aspects of the firmament. Both of these traditions continued throughout the Middle Ages and into the era of printing.

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<sup>429</sup> Panofsky and Saxl 1933: 245

<sup>430</sup> Bull 2005: 25-26



Figure 51. Gaius Julius Hyginus. *The constellation of Draco* (from *De Siberibus Tractatus*). c.1450. 9.25 x 6 in. Italy

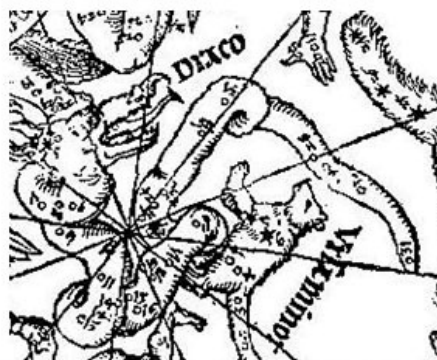


Figure 52. Albrecht Dürer. *The Northern Hemisphere of the Celestial Globe*. Detail, rotated 180°. 1515. Woodcut. 433 x 432 mm. Graphische Sammlung, Stuttgart

In the medieval world, the required reading and fundamental astronomy text was Johannes de Sacrobosco's *De sphaera* (*On the Heavens*), the popularity of which continued throughout the Renaissance.<sup>431</sup> Based on both Ptolemaic and Arabic writings, it was a key reference until well into the seventeenth century. Italy produced the first print run in 1472, with 24 subsequent editions over the next three decades. Conrad Heinfogel translated this work into vernacular German in 1539, which was a considerable feat, as it is not easily translatable: the equator, now called the *Aequator* in German, was renamed to *Ebenrechter*, which translates roughly to an adjustment or calculation of a plane; the ecliptic, or *Ekliptik*, was called the *Zeychentrager*, or "sign carrier" (i.e. *Zeichentrager*); colures, which are celestial circles that intersect each other at the poles with the most common being the equinoctial and solstitial colures, were called *Waldt-Ochsen-Kreyß* or the wood oxen's circle; and an astrolabe was described as a *Sternslebs* or the lives of the

<sup>431</sup> Johannes de Sacrobosco is also known as John of Holywood and it is believed that he originally came from Yorkshire, England.



stars.<sup>432</sup> *De sphaera* exemplifies the merging of medieval and Renaissance astronomical thought, demonstrating the proliferation of old concepts at a time when new astronomical discoveries were being made. Heinfogel's translations demonstrate the popularity of this work and its demand within the newly literate scholarly circles, which were not yet able to read the original Latin, even when the information was somewhat dated. One reason for its popularity may have been the relatively simplistic writing style.<sup>433</sup> This work covered the following: the meaning of a sphere, the zodiac and equinoxes; how to divide the globe and position the tropics and equator; when the various zodiac signs were visible; and the earth's position in a geocentric universe. Even in the sixteenth century manuscript copies of this work showed illustrations of a universe with the earth at the center, despite having access to more accurate star charts such as Dürer's or Apian's (Figure 53).

Due to the commercial possibilities of books on astrological and astronomical themes, counterfeit and falsified books emerged, allegedly written by Aristotle. One particularly influential work in Germany was the pseudo-



Figure 53. Johannes de Sacrobosco. Universal schema of the planets and zodiac (from *De sphaera*). ca. sixteenth century. Manuscript on vellum, 6 x 4"

Aristotelian *Geheimnis der Geheimnisse* or *Mystery of Mysteries*. Egyptian Gods

<sup>432</sup> A colure is defined as a celestial circle that intersects other celestial circles at the poles. An equinoctial colure is a celestial circle that passes through an equinoctial point or the celestial equator. A solstitial colure is a celestial circle that is situated so as to be perpendicular to an equinoctial colure. Weiss, Edmund, 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln,' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

<sup>433</sup> Synder 1984

such as Thot were also “responsible” for treatises on the occult, alchemy, and astrology. The Renaissance experienced further awakening of astrology, in part due to increasing interest in the occult. At the same time, however, there were marked reactions against occult and astrological practices. Up through the seventeenth century criticism grew, but only a few scholars rejected astrology completely. Some opponents replaced the scorned/condemned teachings with their own dogmatic, mythological views, while the occult remained an attitude that was sometimes open-minded, showing the difficulty – at times – of stringently categorizing human beliefs and behaviors.

Johannes Müller (1436-1476), also known as Regiomontanus, wrote of the connections between astronomy and astrology. He published new mathematical calculations of the known Alfonsin tables and, together with his teacher and colleague in Vienna Georg Purbach, made observations of different natural phenomena such as comets and eclipses. He developed calendars and ephemerides (tables giving the coordinates of a celestial body at a number of specific times during a given period), sketched instruments of measurement, and extended the possible applications of trigonometry to the practice of cartography. Regiomontanus used astronomy to determine terrestrial locations. Both his astronomical calendar, *Ephemerides*, and his treatise on triangulation which references Arabic sources for instructions on globe-construction, *De triangulis*, were published in Nürnberg in approximately 1470.<sup>434</sup> He was invited to Rome by Pope Sixtus IV, helping to revise the astronomical calendar. At the same time he was practicing astrology, he perfected the astrological theories of Ptolemy – updating and explicating the *Almagest*, wrote his own treatises such as the *Epitome* (1460) which outlined theories of planetary motion serious astronomers, held lectures throughout Europe, and added to the complex mathematical system of astrological house organization. He began an improved translation of the *Geography*; however, he died before its completion and it was finished by

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<sup>434</sup> Crone, G. R. (1978). *Maps and Their Makers: An Introduction to the History of Cartography*. Kent, Dawson, 58.

Johannes Werner and Willibald Pirckheimer, who printed his notes with the final copy.

In Nürnberg there was a growing interest in the representation of space among the humanists in Pirckheimer's circle, facilitated by communication with the wider European community. Throughout the sixteenth century, when the printing and dissemination of astrological and astronomical works proliferated, the city of Nürnberg was principally responsible for these developments. As a center for metal handicrafts, precision instruments, efficient printing and wealth with ideal conditions for working mathematicians, astronomers, and geographers, Nürnberg attracted academics – all of whom had established themselves in the city during the late fifteenth century.<sup>435</sup> There is currently a debate surrounding the formation of popular cosmological assumptions as due to societal influences versus scholarly readings. Grant attributes beliefs about cosmology among the general population to result primarily from scholarly readings.<sup>436</sup> Cosgrove finds the evidence of the Renaissance to point to the emergence of a cultural division between written authority and visualizations, utilizing scientific principles of optics and geometry.<sup>437</sup> Even when the works of Ptolemy were being contested and his terrestrial representation was known to be inaccurate, it remained an iconic force in sixteenth century cartography. The visual nature of the Ptolemaic grid allowed for the fixing of locational coordinates. More importantly, it applied to cartography the aesthetic principle of geometric harmony that was promoted in art. The coordinate system enabled a comprehension of space that constantly maintained a visual relationship between the entire surface to which the viewer could relate.<sup>438</sup> From the Renaissance focus on ordered space there emerged perspective drawings, scientific diagrams, and celestial maps.<sup>439</sup> Thus, even when the Ptolemaic conception of the world had fundamentally changed, this

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<sup>435</sup> Kirchvogel, Adolf and Peter Strieder "Umwelt: Neue Vorstellungen Von Himmel Und Erde" in Albrecht Dürer 1471-1971 | Schirmherr des Albrecht Dürer-Jahres 1971. Ed. Dr. Gustav Heinemann. Prestel-Verlag: München, 1971: 169-178.

<sup>436</sup> Grant, Planets, Stars, and Orbs

<sup>437</sup> Cosgrove 2001: 77

<sup>438</sup> Edgerton 1975: 114

<sup>439</sup> Whitfield 1995: ix



dissemination of knowledge took longer to saturate the general populace due, in part, to the force of the visual texts.

### **Dürer's Celestial Maps**

Dürer's star maps correspond to a type that can be traced back through an Arabian tradition to Antiquity. Regiomontanus established Nürnberg as a center for mathematical, astronomical, and geographical scholarship. The authors fall back directly on the scientific works in the Nürnberg humanistic circle, centered on Conrad Celtis, however, their work was also influenced by intellectuals throughout Europe. Whitfield writes of these maps:

it is clear that they were the printed culmination of half a century of thought and experiment among a group of intellectuals centered on Vienna and Nürnberg...The moment had plainly arrived when spherical geometry, Ptolemaic coordinates and the visual example of Islamic instruments should all combine to produce the two-dimensional planispheric star map...<sup>440</sup>

A planisphere is a circular map that is centered either on an ecliptic or equatorial pole. The titles of these works, therefore, do not refer to the northern and southern hemispheres. Rather they refer to the north and south half of the ecliptic. Usually covering only one hemisphere, a planisphere centers on either the north or south celestial pole with the zodiacal signs – seen by observers on both hemispheres – surrounding the edges of both maps. Together, planispheres from the northern and southern hemispheres represent a complete celestial sphere.

These two celestial planispheres can be seen as a representation of over two thousand years of intellectual thought. The constellation and celestial iconography inherited from Antiquity, Greek geometrical studies, and the Islamic scholarship focusing on spatial accuracy for charting the heavens all culminated in this work, aided by the aesthetic mastery of Dürer. Throughout the beginning of the sixteenth century, Dürer developed more and more into an erudite artist, both through his own studies and through his contact with other contemporary scholars, bishops, patricians, noblemen, and scientists. It is in these star maps, collaborative

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<sup>440</sup> Whitfield 1995: 76.

works with Stabius and Heinfogel, that Dürer's participation in the scholarly circles throughout Europe can best be seen.<sup>441</sup> Not much information is available pertaining to Conrad Heinfogel.<sup>442</sup> It is speculated that he was born around 1470 in Nürnberg. Working with Johann Werner to produce astronomical observations, Heinfogel was Bernhard Walther's pupil. He published several geographical works and was in contact with Stabius and Dürer as early as 1502, later becoming the chaplain and mathematician for Maximilian. The celestial maps of 1515 stylistically match Ptolemy's descriptions of the constellations and their accurate star placement distinguishes them from other maps of the period. The extent of Heinfogel's astronomical contribution is unknown, although he would have been aware of the revisions of Ptolemy's star placements found in the eleventh century Alfonsine Tables. The fact that the Regiomontanus-Walther coordinate revisions were not used suggests that Walther's astronomical advancements, some of which were collaborations with Regiomontanus, were not known to Heinfogel. Despite buying Walther's house and acquiring his scientific library and observatory, Dürer was not aware of or able to implement these developments until their publication in 1522.<sup>443</sup>

The celestial maps were drawn in reference to a codex. Weiss first identified the codex used, which shows the coordinates for the Ptolemaic constellations.<sup>444</sup> This incorrect version, found in the Alfonsine Tables, was circulating around Europe and was reproduced in Peter Lichtenstein's version of the *Almagest*, printed in Venice in 1515, although there exist other discrepancies between exact locations. Lichtenstein's eleventh star reads at 296°0', rather than the correct 290°10' of the Alfonsine Table. This is reduced on the celestial map further, in supposed accordance to "true" Ptolemaic measurements, to 286°0'. Therefore, the Alfonsine tables seem to have directly referenced the ninth-century Arabic manuscript from Kalif Almamon. The two other transcripts of the Latin

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<sup>441</sup> Schoch 2002

<sup>442</sup> Other possible spellings are Konrad rather than Conrad and Heynfogel for Heinfogel.

<sup>443</sup> Synder 1984: 5.

<sup>444</sup> Weiss, Edmung. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

translation probably used sources based on the writings of Gherardo Bruno at the end of the twelfth century, which were produced on the behest of Friedrich Barbarossa and modeled after an Arabic codex.<sup>445</sup> Ptolemy's listings in the *Almagest* for the star altitudes north and south of the ecliptic needed to be updated, shifting the celestial longitudes one degree west every seven years. The Alfonsine tables updated this to the year 1252. Dürer, Stabius and Heinfogel further updated these calculations so that the longitudinal positions were up-to-date and accurate. Therefore, the aim of these maps was not to merely copy the form of an existing celestial map, but to produce a scientific document for an academic audience.<sup>446</sup>

In addition to updating the longitudinal coordinates, these maps set to remedy other discrepancies in Ptolemy's texts. This is exemplified in the figure of the Southern Fish, namely the star Formalhaut. Best observed in September, this star lies to the south of the constellation Aquarius and is noticeable for its brightness, but it is not visible to latitudes above 50°N. The Southern Fish,



Figure 54. Albrecht Dürer. *The Northern Hemisphere of the Celestial Globe*. Detail. 1515. Woodcut. 433 x 432 mm. Graphische Sammlung, Stuttgart.

mythologized as the parent of the zodiac pair Pisces, is located in an area whose overall theme relates to water symbols and was associated with the rainy season (Figure 54): the whale (Cetus), the water-bearer (Aquarius), the goat-fish (Capricorn), the fishes (Pisces), and the dolphin (Delphinus). The first century

<sup>445</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

<sup>446</sup> Whitfield 1995

astrologer Aratus wrote of this constellation “Below *Aegoceros* (Capricorn) before the blasts of the South wind swims a Fish, facing *Cetus* (the Whale), alone and apart from the former Fishes; and him men call the Southern Fish.”<sup>447</sup> Manilius wrote of its nature:

whoever at this hour takes hold of life will spend his years about sea-shore and river-bank: he will capture fish as they swim poised in the hidden depths; he will cast his greedy eyes into the midst of the waters, craving to gather pellucid stones and, immersed himself, will bring them forth together with the homes of protective shell wherein they lurk. No peril is left for man to brave: profit is sought by shipwreck, and the diver who has plunged into the depths becomes, like the booty, the object of recovery.<sup>448</sup>

The Formalhaut is the only star of note within the constellation. However, it ranks as the seventeenth brightest star in the sky and as one of the four “royal” stars signifying the cardinal directions and marking the antiquarian equinoxes and solstices as the ‘watcher of the South’ associated with the winter solstice.<sup>449</sup>

Attributed by Ptolemy with an influence equal to that of Mercury or Venus, Formalhaut is associated with fortune and power but also has the potential for substantial disaster.<sup>450</sup> This star appears twice in Ptolemy’s catalog: the first location is in the constellation of Aquarius, the forty-second star; and the second time as a star located in the throat of the Southern Fish (*Piscis Notius*). In this second reference, Ptolemy detailed the star’s placement without giving an indication of its ranking, position or size and without counting it with the other stars in the constellation. In order to accurately place this star in reference to the codex used – in the fish’s throat – its head must be bent backwards unnaturally. Both artistic sensibility and literary references made this impossible, as the associated myths calls for water from Aquarius’ bucket to flow into the fish’s

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<sup>447</sup> Aratus, *Phainomena*, (3rd century BC), Harvard Heinemann, Loeb Classical Library; 385 (Loeb p.237).

<sup>448</sup> Manilius, 394-409, (Loeb p.333)

<sup>449</sup> The other three are the Aldebaran in Taurus who is the “Guardian of the East” and associated with the spring equinox, Scorpio’s Anatares as the “Watcher of the West” and associated with the autumn equinox, and Leo’s Regulus who is the “Watcher of the North” and signifies the summer solstice.

<sup>450</sup> Ptolemy, *Tetrabiblos*, (1st cent. AD), trans. Robbins, published by Harvard Heinemann, Loeb classical library, London. I.9 (Loeb p.57).

throat, with the placement of the fish at Aquarius' feet. Some copyists and translators ignored Ptolemy's description, lining up all of the stars in the figure so that they were in accordance with the Formalhaut as the first star; other scholars combined the two stars together. In Dürer's map of the northern hemisphere, rather than in the throat of the Southern Fish, Formalhaut is the last star in the formation of Aquarius' stream of water, marked as a star of the first magnitude (Figure 55).

Some scholars argue that this collaborative star map was an attempt to remedy the inaccurate star placement in celestial cartography of the previous centuries.<sup>451</sup> The map of the northern hemisphere has a polar stereographic projection whose display is centered on the double-lined circle of the ecliptic rather than on the celestial equator. The unspecified northern pole lies therefore  $23\frac{1}{3}^{\circ}$  outside the middle point of the circle. The circular projection plane is divided into twelve sections every  $30^{\circ}$  starting with *Alpha arietis*, the star jutting out from the horn of Aries.<sup>452</sup> Whereas the starting point for Ptolemy's longitudes was the spring equinox, beginning with the horn of Aries derives from Alnath's (Elnath) Arabic star chart detailing the parallels of latitude. In these sky maps, this star forms the eye of Aries.<sup>453</sup> Dürer used this reference, but he placed the star in the blank space between the head and the right horn, causing a reduction of all the



Figure 55. Albrecht Dürer. *The Northern Hemisphere of the Celestial Globe*. Detail. 1515. Woodcut. 433 x 432 mm. Graphische Sammlung, Stuttgart.

<sup>451</sup> Kanas (2006: 71). Kanas incorrectly writes that these maps do not show the magnitudes of the stars.

<sup>452</sup> In modern star maps the locations are delineated with the tags of "RA" and "Dec." "RA" signifies the "Right Ascension," which is measured from 0-24 hours, beginning with the first point of Aries (0 and 24 hours are the same point). In order to convert this to degrees, the RA must be multiplied by 15. "Dec" stands for the declination, which increases in visibility the closer it is to  $90^{\circ}$ . Therefore, on a celestial sphere, places are represented in terms of their direction, rather than their position.

<sup>453</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

Ptolemaic lengths of around  $10^{\circ}15'$ . Strictly speaking, the ecliptic lengths are then unable to be measured, as they are not lengths in the usual sense of the word.

In the 1515 maps, each  $30^{\circ}$  section shows a zodiacal constellation and a radial line, which enables a coordinate system of celestial longitude. In the Ptolemaic tradition the twelve signs of the Zodiac are displayed on the northern hemisphere and are to be read counter-clockwise. That is, the map is shown in an exterior view – it is pictured as seen from space rather than from the earth. The anthropomorphic star images are therefore shown from their back view. Rather than showing the viewpoint typical of celestial maps, these representations are more globe-like in style. Celestial globes were representations of the heavens, or visible sky, on an artificial sphere that showed the star positions and constellation forms. They differ from terrestrial spheres in that it would be impractical, if not impossible, to create an orb depicting the heavens as they appear from the earth, so celestial globes show space as it would be seen by looking inwards. Therefore, the constellations are shown in reverse. The observer of a celestial globe looked from a viewpoint beyond the universe.<sup>454</sup>

In order to project a globe's three-dimensionality into a two-dimensional surface, Dürer proposed using a globe-biangle.<sup>455</sup> In a Euclidean polygon, the minimum number of possible sides is three; a biangle, however, can be drawn as a closed figure on a sphere with only two sides. Each side is a semicircle with a length of  $180^{\circ}$ . Two of these sides form a great circle, with the intersection of two great circles forming a pair of congruent biangles. Dürer's celestial depictions exhibit planar facets and are similar to maps with constant scale edges.<sup>456</sup> Ultimately, Dürer's cartography appears to be part of a larger movement in his search for the ideals of representation. Dürer advocated an accurate depiction of

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<sup>454</sup> One of the purposes of celestial globes during the fifteenth century was to select an opportune travel time. Crane, N. (2003). *Mercator: The Man who Mapped the Planet*. New York, Henry Holt and Company, 79-80.

<sup>455</sup> Wallis, H. M. and A. Robinson (1987). *Cartographic Innovations: An International handbook of Mapping Terms to 1900*. St. Albans, Map Collector Publications Ltd, 26. The term "bi-angle" seems to refer to spherical geometry. This differs from Euclidean plane geometry as two points define two line segments (one short and one long) to form a "great circle" and that antipodal points define an infinite number of line segments so that a "biangle" can be drawn.

<sup>456</sup> Clark, C. S. (2003). *Visual Calculus or Perceptual Fribble? World Maps with Constant Scale Edges: A Novel Projection Method, Well Suited to our Era*. ISPRS Meetings, Houston.

cartography that culminated with his *Instruction in mensuration with compass and triangle*, insisting that German painters should master the elements of perspective to ameliorate their topographical renditions.<sup>457</sup>

Each individual star is placed and numbered according to the catalog in Ptolemy's books 8 and 9 of the *Almagest*. Different symbols – white and black stars, as well as small circles – classify the stars according to their brightness. Rather than Ptolemy's six classifications, only three are used. Stars of the first magnitudes are drawn as large, hexagonal stars (no fill); second-sized stars are hexagons as well, but are somewhat smaller and are filled in with black. Stars of the third size have the same symbols as the second-sized stars. Stars of the fourth and fifth sizes (and the few sixth sizes – as Ptolemy designated that far), look like small rings (o). The exact principles for understanding the standards used cannot be determined without knowing the exact codex used, because errors occur from both the copyist and the translator; the mistakes are many and hard to recognize. Whatever codex was used caused a distortion in the entire southern sky.<sup>458</sup>

In the map of the northern hemisphere, the sources for the information are acknowledged in the form of half-figures, representing four distinguished and important Antiquarian and Arabic astronomers and poets, dressed in their assumed national dress, all holding celestial globes: *Ptolemeus Aegyptius* is for the humanists the undisputed authority on astronomy, *Aratus Cilix* is the Greek author of the oldest astronomical poem describing the stars, *M. Mamlius Romanus* (Marcus Manilius) is the Roman author of the astronomical didactic poem the *astronomicon*, and *Azolphi Arabus* (Al-Sufi) the Arabic astronomer who corrected and updated Ptolemy's star catalogue in tenth-century Baghdad. The choice of Marcus Mamlius is the least obvious of the four, reflecting a subtle reference to the maps' publisher, Regiomontanus.<sup>459</sup> Mamlius' work concerning astrology was relatively new at the beginning of the sixteenth century, as his astrology treatises – in Latin hexameters – were published first in Regiomontanus' print house in 1473-

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<sup>457</sup> Buisseret, 37.

<sup>458</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

<sup>459</sup> Synder 1984: 55

74. Mamilius' writings arguably do not introduce any new astronomical information. Therefore, his inclusion on the map reflects Regiomontanus' choice of publishing his works and highlights the importance of the Renaissance astronomer on the introduction and continuation of Antiquarian scientific findings.<sup>460</sup> Synder argues:

Here, as elsewhere in the mapping of the heavens, artists and scientists and cartographers would take the opportunity provided by their creations to further other issues. If Dürer chose to include a reference to a work published in his own city by a well-known individual, and do so out of a desire to enhance his own work with allusion to another popular local effort, then it is perhaps understandable that later other local heroes, kings, consorts, and favorites would be immortalized in the sky, through inclusion in the maps themselves and in the borders of those maps and charts.<sup>461</sup>

Another motivation for the inclusion of Manilius might hearken to a trend in Italian art of the late-fifteenth century. The seven planetary deities were better suited to an encyclopedic tradition than to an astrological one. However, Manilius' *Astronomica* first connected each zodiacal sign to an Olympian deity: Aquarius – Juno; Pisces – Neptune; Aries – Minerva; Taurus – Venus; Gemini – Apollo; Cancer – Mercury; Leo – Jupiter; Virgo – Ceres; Libra – Vulcan; Scorpio – Mars; Sagittarius – Diana; Capricorn – Vesta.<sup>462</sup> Thus, in Italian art many of the gods are represented with the appropriate astrological iconography. In the Sala dei Venti and the Sala dei Mesi in Mantua and Ferrara, respectively, the month of April is symbolized by Venus, whose children are marked with the sign of Taurus. By associating the planets with deities, it was easier to confer upon them attributes. Thus the reference to Manilius can be read as an indebtedness to the poet for his connections between artistic iconography and scientific empiricism.

The importance of iconology, both relating to the cosmic depictions and to subsequent interpretations of the representations, is often times overlooked by scholars in a non-art historical tradition. However, iconographic misunderstanding

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<sup>460</sup> Synder 1984.

<sup>461</sup> Synder 1984: 55

<sup>462</sup> Bull 2005: 28



indicates the necessity of art historical research in cartographic studies. One such example is Peters' comments pertaining to the astronomers' costume:

Remark also, the head-gear of the four astronomers in the corners! Those of Manilius and of Al Sufi may be right; but that Ptolemy should have worn a beaver-hat, or Aratus what looks almost like a derby, one cannot well imagine!<sup>463</sup>

The astonishing headgear of Aratus and Ptolemy can be found in other woodcuts



Figure 56. Albrecht Dürer. *The Seven-Headed Beast and the Beast with Lamb's Horns*. 1496-98. Woodcut. 39 x 28 cm

by Dürer such as his *The Beast with the Lamb's Horn* from his *Apocalypse* series (Figure 56). In this image the people shown below the beast range from no headgear to hats similar to those in the maps to crowns signifying royalty. Without adding unnecessary speculation pertaining to the symbolic connotations of the headgear chosen by Dürer for his astronomers, it is sufficient to say that the credibility of these works as scientific documents should not be diminished due

to one scholars' uninformed observation.

In a similar vein, the companion piece, the Southern Hemisphere, can be read as important in terms of the subtle elements of its dedication and emblems, rather than focusing solely on spatial accuracy. Projected using the same system, this map shows distinctly fewer stars and constellations, due to the knowledge gaps of the old world. Further discoveries produced new observations of the southern firmament, however, these were not incorporated. What is crucial pertaining to this map is the information it contains about the collaborators and patrons. In the blank spaces of the southern sheet, Cardinal Lang's emblem is shown on the upper left; to the right is the dedication surrounded by a laurel wreath. The lower left shows the coat of arms for the three authors with a listing of

<sup>463</sup> Dr. C.H.F. Peters, in *Publications*, Astronomical Society of the Pacific 2: 134

their names and roles, and on the lower right – within a cloud border – is the announcement detailing Stabius' royal privilege for publication.

Much of the information on Stabius comes from Tannstätter, who was his student. Johann Stabius was born in Steyr, in upper Austria, and became one of the most well-known humanists of the sixteenth century. Maximilian I gave him the title *Collegium poëtarum et mathematicorum* for the University of Vienna in 1501, where he was a professor of mathematics. Due to his breadth of scholarship and versatile education he was praised by his contemporaries. Therefore, it is natural that Maximilian appointed him to be the personal mathematician and historian for the empire. Stabius was the Emperor's steady companion for many years, advising him on all of his large literary enterprises. Cuspinianus wrote a lengthy forward to his life, which does not even begin to detail all of his literary achievements, as his entire historiographic and poetic works are mentioned only in the concluding sentence of a three-page document.<sup>464</sup> Similarly, his mathematical achievements are not covered in full, failing to note his geographical works such as the map he produced for the archduke of Austria.

However, this text does show the regard his contemporaries had for Stabius concerning mathematical and astronomical works. He was certainly the first scholar of the fifteenth century to master and subsequently teach various projection systems.<sup>465</sup>

Prior to the celestial maps of 1515, Stabius and Dürer had collaborated on other astrological works. The woodcut *Urania*, produced



Figure 57. Albrecht Dürer. *Urania* (?), *Das Universum Haltend: Werkstatt Albrecht Dürers Johannes Stabius: Pro(g)nosticon...ad annos domini: M:D iii & iii: Nürnberg: Johann Weissenburger. 1503. München, Bayerische Staatsbibliothek.*

<sup>464</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

<sup>465</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

around 1503 in Albrecht Dürer's workshop, shows the influence of the positions of the planets in the zodiac on earth. This representation of Urania depicts the planet sitting on a celestial sphere with the Ptolemaic zodiac in the background (Figure 57). The earth is at the center, here the lower right corner, with the seven planets orbiting around it in the order of: the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn. Urania holds in her left hand a celestial sphere detailed with the zodiac circle and meridian and equatorial lines. Her right hand holds a cross-staff, which is the focus of her gaze. While this image may only bear a thematic resemblance to the original woodcut, it exemplifies the connection between astronomy and astrology in scientific works. The *Prognosticum* (*Pro(g)nosticon...ad annos domini*) contained weather forecasts, predicted natural catastrophes, political events, and even the occurrence of comets. Between 1501 and 1506 twenty-six such forecasts came to pass in Germany.<sup>466</sup> Horoscopes and the rise in predictive cosmographies arose out of fears of the Plague, wars, and religious upheavals, all of which combined to focus on the celestial realm – and a correct interpretation of it – as reflecting earthly qualities in a metaphoric or allegorical sense.<sup>467</sup> Throughout the centuries, astrologers have studied the science, but have been largely motivated by political factors. Babylonian and medieval kings, clergy, and military figures have all relied upon astrological advice in personal and public matters.<sup>468</sup> Planetary astrology by the fifteenth century had become an intellectual, practical endeavor.<sup>469</sup> The spherical nature of the universe, which medieval and Renaissance scholars interpreted as unchanging in fundamental properties, came to represent a perfect, almost omnipotent presence.<sup>470</sup>

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<sup>466</sup> From the Index in *Albrecht Dürer 1471-1971 [Schirmherr des Albrecht Dürer-Jahres 1971]*. Ed. Dr. Gustav Heinemann. Prestel-Verlag: München, 1971

<sup>467</sup> North, John (Ed). *The Norton History of Astronomy and Cosmology*. WW. Norton and Company: New York, 1995.

<sup>468</sup> North, John (Ed). *The Norton History of Astronomy and Cosmology*. WW. Norton and Company: New York, 1995.

<sup>469</sup> Schorn, Ronald A. *Planetary Astronomy: From Ancient Times to the Third Millennium*. Texas A&M University Press: College Station, 1998.

<sup>470</sup> Brashear, Ronald and Daniel Lewis. *Star Struck: One Thousand Years of the Art and Science of Astronomy*. Huntington Library: San Marino, 2001, 14.

The impact of astrology, as it applied to personal life, continued to remain a force throughout the early-sixteenth century. As previously mentioned, astrological studies could link contemporary individuals to Antiquarian heroes and deities based on the astral and planetary arrangement of the individual's horoscope. As the planets were associated with Olympian Gods who ruled over them, the planets were subsequently shown in relation to the zodiac signs which they controlled: Saturn with Aquarius and Capricorn, Jupiter with Pisces and Sagittarius, Mars with Aries and Scorpio, Venus with Taurus and Libra, Mercury with Gemini and Virgo, the Sun – or Apollo – with Leo, and the Moon –

or Luna – with Cancer. It was not uncommon for wealthy patrons to commission works depicting the firmament as it would have appeared on the day of their birth. Agostino Chigi filled his Villa Farnesina with frescoes of mythological themes, the two central hexagonal ceiling panels showing the meridian constellations above Sienna at the hour in which he was born.<sup>471</sup> Both an appeal of understanding or predicting private milestones and a desire to connect him with Antiquarian deities influenced Maximilian's commission of a personal horoscope.

In 1512, when Stabius stayed with Dürer in Nürnberg, he produced three independent astrological works under Maximilian's patronage. The first is a folio called an *Opus mirandum* and the second is a horoscope for Maximilian, the *Horoscopium item universale in lineis columnaribus* (Figure 58). Both of these works bear the coats of arms for Austria and Burgundy on the edges. The first is

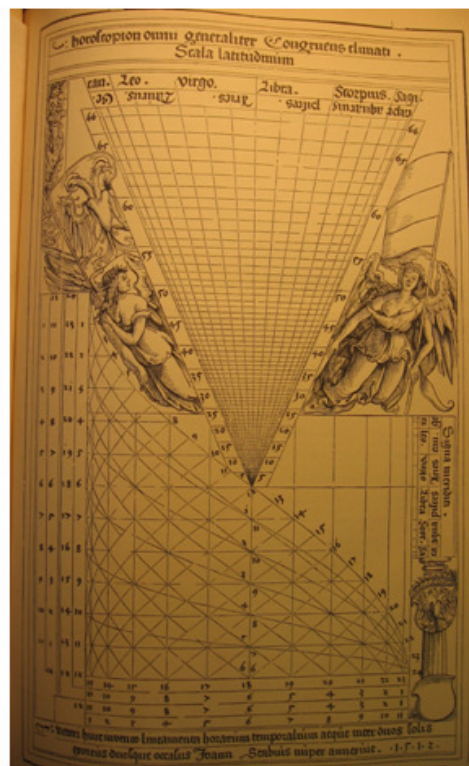


Figure 58. Johannes Stabius. *Horoskopion für Kaiser Maximilian I.* In E. Weiss: *Albrecht Dürers geographische, astronomische und astrologische Tafeln.* In: *Jb.d. kunsthst. Signd. allerhöchsten Kaiserhauses* 7, 1888

<sup>471</sup> The mythological figures are taken from Hyginus's *Poetica astronomica*.

dedicated to Maximilian, as it bears an inscription to him and has remained in the imperial collection and it is speculated that the horoscope was dedicated to him as well. It appears that Stabius constructed this horoscope primarily for astrological purposes, namely for ease of computing the Nativity, because at this time the Nativity was computed pertaining to the hours in the day or the hours of importance rather than a more simplistic format detailing only the time of day (i.e., morning, afternoon, evening).<sup>472</sup> These two woodcuts relate to a third, *Beherrscher des Schützen*, whose composition and design is similar. All three horoscopes showed strong support in the tenth house, where intelligence and luck lie, therefore describing and predicting Maximilian's academic nature and fortunate life.<sup>473</sup>

Maximilian's predicted House of Death lies in close proximity to the tenth house and near the powerful sign of the sun, implying that his death will be gentler. Arguably more importantly, the presence of Saturn is also found, implying that the emperor's life will be threatened with forces relating to this influence around the time of 1518. Specifically, after the solar eclipse in the morning hours of June 8, 1518, the emperor would fall sick and be unable to recover. Astrologers during the Renaissance claimed that they were able to foresee the exact day of death, in addition to other milestones in the individual's life.



Figure 59. Albrecht Dürer. *Melencolia I*. 1514. Engraving. 239 x 189 mm. Kupferstichkabinett, Staatliche Kunsthalle, Karlsruhe

<sup>472</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

<sup>473</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.



However, there was so much flexibility in terms of approaches and such a multitude of explanations for errors in predictions that they were never wrong. In the stars it was possible to find proof of everything.<sup>474</sup>

The flexibility of astrology, then, lends itself to an increased function. In this case, Stabius' horoscope can be seen especially in terms of a work commissioned by and produced for a specific patron: Maximilian. The implications of the horoscope and the overarching influence of Saturn on the life of the Emperor can be analyzed in light

of the same societal context and iconological connotations found in Dürer's *Melancholia I* (Figure 59). The title of this work refers to one of the four humors, the concept of which was developed in Antiquity and related to the four basic fluids of the body, also analogous with the four times of day, the four seasons, and the four phases of life. Although ideal humans had all four humors in perfect balance, after the Fall of Man and the introduction of sin it was inevitable that one of the four would be dominant in an individual and



Figure 60. Albrecht Dürer. *Philosophy*

subsequently determine their personality. Associated with the earth, autumn or winter, the rough wind Boreas, evening, and old age, the melancholy humor was sometimes represented as the worst possible ailment. Dürer previously depicted the four humors in a representation for Conrad Celtis (Figure 60). In his depiction focusing on *Melancholia*, however, he depicted the humor in a different light. Whereas medieval representations had shown a lazy housewife or a slugging being, Dürer visualized this personification as superior in terms of both

<sup>474</sup> Weiss, Edmund. 'Albrecht Dürer's Geographische, Astronomische und Astrologische Tafeln.' in *Jahrbuch der Kunsthistorischen Sammlungen des Allerhöchsten Kaiserhauses*. Wien 1888. Volume 7.

intelligence and imagination. Surrounding her figure are emblems and tools for scientific research and creative work. Astronomy is symbolized by the peacock feather, as the brightly-colored plumage of this bird was an Antiquarian symbol of the celestial sky. Additionally, the book, compass and pot of ink represent pure geometry, with the field of applied geometry being indicated with the magic square and the pair of scales with which one could measure time and space. Perspective and stereography were referenced with the truncated rhomboid. Panofsky argues that the function of this image was therefore: “an intellectualization of melancholy on the one hand, and a humanization of geometry on the other.”<sup>475</sup> Related to the concept of intellectualizing what was a more subjective field and humanizing an objective one was the notion that the melancholy humor was associated with Saturn, who ranked as the highest planetary deity.

As both the highest and oldest of the planets and the ruler of Antiquity, Saturn denoted wealth and power. Aristotle wrote that: “All truly outstanding men, whether distinguished in philosophy, in statecraft, in poetry or in the arts, are melancholics – some of them even to such an extent that they suffer from ailments induced by the black gall.” Thus, the ailment of melancholy indicated a sublime condition. Capable of bestowing great riches, power, and wisdom, these gifts came at a cost. Saturn was also associated with misery, sorrow, disablement and death. Saturn, however, represented the “Mind” and intellectualization of the world and those under his influence were those “whose minds are bent to contemplate and to investigate the highest and most secret things,” of whom Plato was counted.<sup>476</sup> By representing Maximilian under the influence of Saturn, Stabius compared him with the lonely figure in Dürer’s engraving. Capable of wealth and power, yet burdened with the ailments related to a superior intellect, the connotations associated with this image were comparable to those projected by the emperor himself as an individual man attempting to unite and re-create a great nation.

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<sup>475</sup> Panofsky *The Life and Art of Albrecht Dürer*: 162.

<sup>476</sup> Panofsky *The Life and Art of Albrecht Dürer*: 167.

Maximilian's support of the humanities and promotion of great works of art may have provided the actual production of the celestial maps in 1515. However, the motivation for them began as early as the conclusion of the fifteenth century, during which the three authors were all collaborating with the academic circles throughout Western Europe in the creation of astronomical images. Harley writes: "Our confidence in a map document may be increased (or diminished) when it exhibits the proven characteristics of a larger group."<sup>477</sup> Dürer's celestial maps of 1515 can be seen in a tradition of star maps that began the previous century, continuing on throughout the modern era. Whitfield attributes these two celestial maps as being the beginning of the modern genre of celestial cartography as well as being almost the final representations of this type before the Copernican revolution.<sup>478</sup>

Dürer's maps were influenced by two celestial maps from the fifteenth century, found in the Codex Vindabonensis 515 – sometimes called the



Figure 61. Author Unknown. *Vienna Manuscript*, ca. 1440. Österreichische Nationalbibliothek, Vienna

Vienna maps or manuscript – datable to approximately 1440, which was commissioned by Viennese scholars who themselves supplied the source material (Figure 61). Panofsky believes the author to be Hans von Kulmbach – due to similar illustrations in his *Quatuor libri amorum* – as responsible for the

<sup>477</sup> Harley (2001: 42)

<sup>478</sup> Whitfield 1995



allegorical and mythological decorations of the map, which exhibit the traits different from the standard prototype.<sup>479</sup> This map is said to reference a 1424 map owned by Regiomontanus that has since been lost. It is speculated that the cod.Vind 5415 is a fairly accurate copy of Regiomontanus' early fifteenth century map, probably circulated sometime after Regiomontanus completed his studies in Vienna.<sup>480</sup> Current scholarship assumes that the cod.Vind 5415 was a collaborative work involving Martin Bylica.<sup>481</sup> A scholar at Cracow University, Bylica had previously commissioned the first metal celestial globe based on an Islamic model. The Vienna maps show the stars according to the Ptolemaic catalogue. The constellation figure names are given in Arabic. As a manuscript map, it was not intended for popular prints. Rather, it was circulated among scientists throughout Europe in order to inform and influence subsequent studies.

Voss was the first scholar to point to Heinfogel's collaborative map of 1503 as being based on the Vienna manuscript and in turn influencing the celestial maps of 1515.<sup>482</sup> There are, however, two maps produced, one showing the northern hemisphere and one showing the southern. Made in Nürnberg in 1502 and 1503, respectively, the authors are recorded as being Heinfogel, the Friesian doctor Theodor Ulsen, and Sebastian Sperantius (Figures 62 and 63).<sup>483</sup> Sperantius came from Dinkelsbühl and as a member of his family had already studied in Ingolstadt, where he registered himself in 1493. On the recommendation of this school, he was appointed to head on the Lorenz School in Nürnberg in 1499. From 1503 until 1506 he was a university lecturer in Ingolstadt until his promotion as the secretary to Matthäus Lang (1468-1540). He published a calendar in 1506 in Nürnberg, but his most impressive work is perhaps the sundial which he helped to design. Situated in the east choir of the Lorenzkirche in Nürnberg, it displayed the "Nürnberger Stunden." The motivation for the creation of this timepiece originated

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<sup>479</sup> From the Index in *Albrecht Dürer 1471-1971 [Schirmherr des Albrecht Dürer-Jahres 1971]*. Ed. Dr. Gustav Heinemann. Prestel-Verlag: München, 1971.

<sup>480</sup> Voss 1944

<sup>481</sup> Whitfield 1995: 76.

<sup>482</sup> Dürer's maps are based "directly" on Heinfogel's 1503 map; however, the positions of the stars are modernized, reflecting either 1499 or 1500 (and are therefore different from both the 1424 and the 1503 maps. W. Voss in *Jahrbuch der Preussischen Kunstsammlungen*, Vol.64, pages 89-150.

<sup>483</sup> Sebastian Sperantius is also known as Sebastian Spreng.

with Johannes Werner (1468-152). Johannes Stabius (approximately 1460-1522) supplied the sketch and Sperantius drew the sundial in 1502.



Figure 62. Conrad Heinfogel. *Die Karte des Nördlichen Sternenhimmels*: *Nürnberger Astronom* mit Bezeichnungen von Albrecht Dürer. 1503. Nürnberg, Germanisches Nationalmuseum

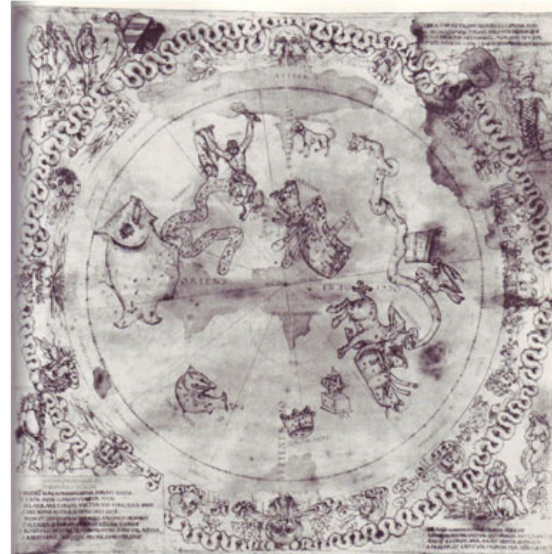


Figure 63. Conrad Heinfogel. *Die Karte des Südlichen Sternenhimmels*: *Nürnberger Astronom*. 1503. Nürnberg, Germanisches Nationalmuseum

The design of *Karte des Nördlichen Sternenhimmels* from the *Nürnberger Astronom* – measuring 67.4 cm by 67.2 cm – is partially attributed to Dürer. On this map the twelve zodiac constellations are shown, with each corner representing one of the elements. In the upper left corner, symbolizing fire, are Apollo and Mars; the wind is represented with Saturn and Venus; next to the earth symbol stands Jupiter and Pluto with Cerberus and the Erinys, who is one of the furies and one of the avenging deity who sometimes represents conscience personified; and the water is symbolized with Mercury. The Moon is drawn in a brown pen on parchment with partial silver and gold inscriptions in red *Antiqua* typeface. Depending on the situation, the Ptolemaic numbers are either in red or black pen. Dürer's hand has been proven in the representations of Apollo's raven and Jupiter's eagle, drawn in black pen, and added to the map at a later date. Dürer's interest and participation is not limited to the lifelike drawings of the constellations and the decorative forms on the map; rather, his mathematical-scientific interests also apply to the projection methods.<sup>484</sup>

<sup>484</sup> Schoch 2002.

In the *Karte des südlichen Sternhimmels*, measuring 66.9 by 67 cm, sixteen wind heads surround the constellations, with the four cardinal directions represented between these figures. In the upper-left corner a man is pictured holding the coat of arms for the city of Nürnberg and to his left are the fates, labeled with their names. Conrad Heinfogel's coat of arms is in the upper-right corner with the figure of Vanity (*Vanitas*) beside it, both of which are located under a Latin inscription praising Nürnberg and Heinfogel. These star maps show that the Nürnberg humanist circle was aware of the diverse repertoire of ancient gods and goddesses, as well as their symbolic connotations.<sup>485</sup> In the lower-left corner the Latin epigram about the winds [a short, often satirical poem dealing concisely with a single subject and usually ending with a witty or ingenious turn of thought] by Dietrich Ulsenius is depicted to the lower right of the figure of Sebastian Sperantius, who sits and looks up at the star goddess Urania. In the left hand he holds an armillary sphere and to his right an astrolabe hangs on a tree. The caption implies that the scholar pictured relates to Sperantius, who commissioned this work. On the lower-right corner there is a four hexameter verse in Latin, which is in brown. The Ptolemaic numbers, in *Antiqua*, are either in black or red. The verses are in brown with the initial letters in red. Heinfogel's coat of arms is colored in opaque paints.

The star maps of 1503 are seen as direct models for the sketches of Johann Stabius and Dürer. The star positions were modified from Heinfogel's according to the catalogue of the Reichenbach monastery for the year 1499 or one such used in 1500, which Regiomontanus had attached to his star listings for 1424. Comparing the earlier and later maps, Dürer's show an artistry missing in Heinfogel's representations. Rather than treating the manuscript as a flat surface, Dürer depicts the constellation figures as moving in a dynamic, three-dimensional space. The representation of Libra especially exemplifies this depiction (Figure 64). Instead of ropes connecting the weights to the trays represented as straight lines, Dürer's figure seems to be floating in weightlessness, due to the absence of matter in the trays themselves (Figure 65). Additionally, the figure of Virgo not only follows

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<sup>485</sup> Anzelewsky 1983: 37-38

along the tradition of a classical representation in Dürer's woodcut, but her stance and the position of her feet suggest a movement or dynamism missing in the earlier copy. Dürer's celestial maps indicate the star positions in a more legible manner, therefore aiding their comprehension. Indeed, the intended circulation of the maps is also evidenced in the fact that, unlike the world map which was never printed during Stabius' lifetime, the star maps were printed multiple times. Dürer gave away *die 2 thail imagines* on August 5<sup>th</sup> 1520 during his stay in Antwerp to the theological advisor to Karl V., Agostino Scarpinello.<sup>486</sup>

It is speculated that the 1515 maps were originally intended to be dedicated to the imperial secretary Jacob de Pannissis. However, upon their publication they bear a dedication to Cardinal Lang instead.<sup>487</sup> Both the

celestial and terrestrial maps were dedicated to Cardinal Matthäus Lang von Wellenburg. Lang was one of the most powerful and eccentric political personalities in the realm. Born in 1468 in Augsburg to the mayor holding the highest position in the empire, Lang's political career ascended quickly to a powerful position. He studied with Stabius at the University of Ingolstadt, specializing in law, and continued his studies in Tübingen and Vienna. He was appointed to a position in the royal office in 1493, advancing to become Maximilian's chamber secretary – *Kammersekretär* – and governor –



Figure 64. Conrad Heinfogel. *Die Karte des Nördlichen Sternenhimmels: Nürnberger Astronom mit Bezeichnungen von Albrecht Dürer*. Detail. 1503. Nürnberg, Germanisches Nationalmuseum

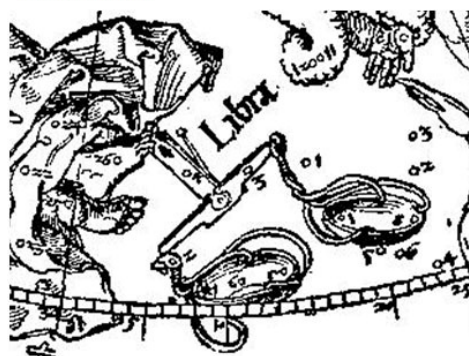


Figure 65. Albrecht Dürer. *The Northern Hemisphere of the Celestial Globe*. Detail. 1515. Woodcut. 433 x 432 mm. Graphische Sammlung, Stuttgart

<sup>486</sup> Schoch 2002, Rupprich *Dürer. Schriftlicher Nachlaß*. Bd.2 Berlin 1956

<sup>487</sup> From the Index in *Albrecht Dürer 1471-1971 [Schirmherr des Albrecht Dürer-Jahres 1971]*. Ed. Dr. Gustav Heinemann. Prestel-Verlag: München, 1971.

*Generalstatthalter* – in Italy. His political and diplomatic achievements in governmental matters involving the curia, France, and the Habsburg marriage alliances were rewarded with lucrative benefices [A landed estate granted in feudal tenure/A church office endowed with fixed capital assets that provide a living/The revenue from such assets].<sup>488</sup> In 1500 he was appointed provost to the Cathedral in Augsburg, in 1505 to Bishop of Gurk, in 1513 to Cardinal of the Roman “Titelkirche” s. Angelo, and in 1515 to coadjutor and archbishop of Salzburg, where he excelled as one of the strictest fighters against the Reformation. It is not known whether the Cardinal’s dedication by Stabius was the result of a special interest in cosmography or a personal or professional obligation.<sup>489</sup>

Holden cites Bayer’s *Uranometrai* (1603), Flamsteed’s *Atlas Geolestis* (1729), Argelander’s *Uranometrai Nova* (1843) and Heis’ *Altas Coelestis Novus* (1872) as having copied Dürer’s constellation figures, writing: “It is a matter of congratulation that designs which are designed to be so permanent should have come down to us from the hands of so consummate a master.”<sup>490</sup> Barton, however, argues that the complete lack of mention of Dürer’s cartography in astronomical literature up until the middle of the twentieth century and the little or no evidence of subsequent cartographers referencing the maps as points to conclude that Dürer’s influence – in the fields of cartography and astronomy – was extremely slight, further questioning Bayer’s borrowing from Dürer, as Bayer makes no reference to the Renaissance artist.<sup>491</sup> Dürer’s map certainly influenced subsequent Renaissance cartographers and it can be assumed that this influence continued on until the modern era.

An established astronomer by the time of his map’s publication in 1540, Peter Apian – or Petrus Apianus (1495-1552) - copied Dürer’s figures almost exactly (Figure 66).<sup>492</sup> Apian’s map differed from Dürer’s only slightly: for Coma

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<sup>488</sup> Schoch 2002

<sup>489</sup> Schoch 2002: 435: [“Es muß offenbleiben, ob ein besonderes Interesse des Kardinals an der Kosmographie oder eine persönliche Verpflichtung Stabius dazu bewog, ihm mehrere seiner wissenschaftlichen Arbeiten zu widmen.“

<sup>490</sup> Holden (cited in Allen’s *Star-Names and Their Meanings*)

<sup>491</sup> Barton 1947

<sup>492</sup> “In the year 1540 Petrus Apianus or Peter Apian, as he is also known, produced a spectacular book entitled *Astronomicum Caesareum*. It was a celebration of Ptolemaic astronomy designed for



Berenices the name Crines Berenices was added (without a constellation figure); Cepheus was given a robe and altered headgear; and Bootes is shown with three dogs – as opposed to two. The star numbers are absent, replaced in some cases with star names. Apian also combined both hemispheres onto the same map, increasing the distortion of the southern hemisphere. Another German cartographer whose work is strikingly similar to Dürer's 1515 maps is Johannes Honter (1498-1549). Honter's maps of 1541 are similar to Dürer's, but he reverses the view so that the firmament appears as it does on earth (Figures 67 and 68).

This decision reflects his profession as a terrestrial cartographer and signifies the sky as imaginative, in contrast to an empirical earth. Honter depicted the zodiacal circle on both the northern and southern hemisphere perimeters so that the viewer would not have to rely on the companion map for orientation. Additionally, Honter's constellation figures wear Renaissance clothing, as opposed to Dürer's classically-dressed figures. Synder finds the similarities between these maps to demonstrate the “artistic freedom” artists had in developing constellation manuscript models.<sup>493</sup>

However, the lack of star magnitudes or numbers on Apian's and Honter's maps suggests that they had different functions. Dürer's focused on the accuracy of his celestial coordinates as they were projected onto his depiction of the firmament. Apian's, as part of a larger astronomical text, was concerned only with showing the relationship of the zodiac to the respective constellations.



Figure 66. Petrus Apianus. *The celestial sky* (from *Astronomicum Caesareum*). 1540. 12 x 18 in. Ingolstadt

the Emperor Charles V and his brother Ferdinand. The book was so well received that Apianus, then Professor of Mathematics at the University of Ingolstadt, rose to the rank of hereditary nobility soon after its publication.” Lister, Raymond. *Old Maps and Globes*. Bell & Hyman: London, 1979: 65.

<sup>493</sup> Synder 1984: 61

Honter's small-format maps, measuring approximately half the size of Dürer's, arguably have less of a focus on scientific dissemination and more of a leaning towards popular circulation.



Figure 67. Johannes Honter. *Imagines Constellationum Borealiū*. 1532.



Figure 68. Johannes Honter. *Imagines Constellationum Australiū*. 1532.

### Iconology: Classical, Contemporary, and Scientific

The importance of the celestial maps of 1515 lies not only in the accuracy of their star placement and use of a meticulous projection system, but also in their mythological and scientific iconography. One area of study for cartographic historians that has been largely overlooked, according to modern scholars, is the implications of the map's symbolic content.<sup>494</sup> As previously mentioned, emblems or symbols are illustrations that can be interpreted to relate to broader concepts. One of the most widely recognized images in terms of the symbolic content is Jan van Eyck's 1434 painting *Giovanni Arnolfini and His Wife Giovanna Cenami* (Figure 69). In this detailed image, the various objects have been read to imply many connotations. The candle represents the bridal candle, which is also a devotional candle with the broader allusion to God's omniscient eye. The theme of marriage – represented by the dog symbolizing faithfulness, the shoes representing the sanctity of marriage, and the fruit on the window ledge as an emblem for

<sup>494</sup> Cosgrove and Daniels (2001)

fertility – are correlated with a religious premise – the fruit additionally representing the fall from Paradise and the mirror depicts ten scenes from the life of Christ (Figure 70).



Figure 69. Jan van Eyck. *Portrait of Giovanni Arnolfini and his Wife*. 1434. Oil on oak, 82 x 60 cm. National Gallery, London



Figure 70. Jan van Eyck. *Portrait of Giovanni Arnolfini and his Wife*. Detail. 1434. Oil on oak, 82 x 60 cm. National Gallery, London

Symbolic content of the fifteenth century surpass that of previous periods due in part to an increasing realism in artwork. Van Eyck can be seen pushing the bounds of representation. Images are unable to show reality in its entirety, as it has an infinite nature and, similar to cartographic issues of generalization at different scales, artwork is unable to show the infinite nature of the world and must generalize or approximate objects. Most artwork depicts items in a way so as to suggest their realism, without having to represent all of the details. Even paintings renowned for their realism and detail, such as Holbein's *The Ambassadors* (Figure 71) do not represent every element, leaving it up to the viewer to draw a connection between the associated feature and its manifestation in reality, only denoting as much information as needed to confirm the symbol as "realistic" (e.g., Figure 72 – fur on jacket). Van Eyck's realism tended towards reconstruction



rather than representation, with every symbol in the image part of an immense, multi-tiered metaphorical structure.<sup>495</sup>



Figure 71. Hans Holbein the Younger. *Jean de Dinteville and Georges de Selve (The Ambassadors)*. 1533. Oil on oak, 207 x 209 cm. National Gallery, London



Figure 72. Hans Holbein the Younger. *Jean de Dinteville and Georges de Selve (The Ambassadors)*. Detail. 1533. Oil on oak, 207 x 209 cm. National Gallery, London

Popular audiences would have been aware of allusions to layers of meaning, as sermons frequently used the fourfold interpretation of scripture: literal, moral, allegorical, and mystical.<sup>496</sup> Although some scholars argue that the popularity of mythological art during the Renaissance was its simplicity of content matter, writing:

Much of the time, however, the appeal of mythological art resided in the fact that it had no particular function at all. Christian art could be quite emotionally demanding, and it was used for the serious business of securing your place in heaven through the intercession of the Virgin and saints; mythologies were easy on the eye and allowed you to relax.<sup>497</sup>

This view is antithetical to the merging of classical or mythological and Christian themes in the Renaissance. Fifteenth-century humanism was responsible for

<sup>495</sup> Robert Hughes, introduction to *The Complete Paintings of the Van Eyck*

<sup>496</sup> Hale, J. R. (2000). *Renaissance Europe: 1480-1520*. London, Blackwell Publishers, 199.

<sup>497</sup> Bull 2005: 382-83. Bull argues that the lack of borrowings in integrations between classical and Christian iconography are due to the vast differences in overall pictorial composition. Individual figures can be substituted and interchanged; however larger areas or representations only work when the themes are compatible.

images with increasingly complex content, exemplified by the patronage of non-religious pictures and early mythologies. However, the preceding traditional of religious imagery continued to have an impact on illustrations. Although argued that Renaissance foci on Antiquarian scholarship existed in parallel with Christian studies, with little or no differentiation between the philosophies or ideologies in the texts, this phenomenon allies more with the medieval period.<sup>498</sup>

Artists of the Middle Ages appropriated antiquarian concepts and forms in their drawings, as they perceived no historical distance between the two periods. In the Renaissance, however, as artists attempted to “recreate” classical works and imitation their forms or figures, reconciliation between Antiquity and modernity had to be reached. This is exemplified by all disciplines, as medieval authors writing religious texts would utilize antiquarian philosophers – not recognizing the fundamental differences in ideology. However, Renaissance authors felt the need to justify their comparisons.<sup>499</sup> Unlike mediaeval artists who used religious and classical iconography interchangeably, Dürer felt the need to explain “his reestablishment of the classical proportions in Christian pictures:

The pagan people attributed the utmost beauty to their heathen god ‘Abblo,’ he says. “Thus we shall use it for Christ the Lord who is the most beautiful man, and just as they represented Venus as the most beautiful woman, we shall chastely display the same features in the image of the holy Virgin, mother of God.”<sup>500</sup>

The difference between the depiction of classical content and form in the Middle Ages and the Renaissance was not due to an increased knowledge during the later period. Rather, the Middle Ages divorced form from content, enabling a Venus to represent Eve. In the Middle Ages, antiquity was thought of as historic, but not so historically removed that the culture was discordant with their own. It was not disharmonic for the mediaeval mind to combine classical forms with mediaeval

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<sup>498</sup> Murray, Peter and Linda. *The Art of the Renaissance*. Thames and Hudson: London, 1963: 10-11.

<sup>499</sup> Panofsky and Saxl 1933: 274-75 “While Thomas Aquinas could make use of Aristotle without discussing or even realizing the difficulty of harmonizing two mental attitudes fundamentally different from each other, Marsilio Ficino felt obliged to write a *Theologia Platonica* in which he endeavored to prove the compatibility of Platonic philosophy with Christian theology.”

<sup>500</sup> Panofsky and Saxl 1933: 274-75

subjects – and vice versa – as understanding classical subject and form together without a contemporary reference would have been futile for the mediaeval mind. It was only in depriving classical form with classical meaning that mediaeval artists could appropriate the icons. In the Renaissance, however, classical forms and subject matter were re-unified. Both artist and observer were able to visualize classical forms and understand the classical subjects, therefore reintegrating antiquity without the aid of contemporary meaning. This tension in Renaissance mentality, resulting from the introduction of Antiquarian forms and philosophies into a tradition focusing on medieval religious content, was a factor in the evolution of subsequent art and philosophy.

Characterizing Renaissance thinking, this tension was simultaneously a hindrance and a solution. Of the former, it created a divide between the past and present, complicating iconography and representations to an extent where amalgamation was possible only after being adequately justified. On the other hand, antiquity was seen as representing the ideal merging of harmony, beauty, happiness – of life and spirituality peacefully co-existing. Termed “classicism,” this notion associated antiquity with nirvana, a realm of ideal beauty, worldly paradise, personal freedom, and complete happiness. One of the effects of classicism on artwork was in the depictions of the human form. In the Middle Ages humanity and human traits had theological and moralistic correlations, transcending beauty, ugliness, love, pain, jealousy, and cruelty from emotions or physical characteristics into spiritual, inorganic forms. Unlike antiquity, which saw physicality as indicative of functionality, beauty representing a corporeal and mental equilibrium, love functioning as pleasure, and suffering relating to tangible depravity – the mediaeval mind could not integrate the equilibrium of body and soul. The body was merely a shell housing an immortal soul. Thus, all natural processes became quasi-moralistic and their artistic representations were semi-iconographical.<sup>501</sup> The effect on viewers, then, was not an impression of the

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<sup>501</sup> Panofsky and Saxl 1933: 270-71 – contrast the mediaeval focus on spirituality as distinct from corporality versus the antiquarian concept of “organic equilibrium”

natural or even their own personal response to the image. Instead, the figures represented spiritual principles, guidelines, and motivations.

The implication of divorcing human form from spiritual connotations in the Renaissance did not diminish the iconology of the representations; rather, that the symbolic content had changed. In representations of classical mythological and zodiacal subjects throughout history, the emblems were altered, both due to either the inability or the unwillingness to maintain the original meaning or form of the classical prototypes. Constellation iconography was described by Greek and Roman authors, whose texts appeared with accompanying illustrations. As previously discussed, throughout history various cultures portrayed constellation figures differently. It can be argued that the classical motifs employed by celestial cartographers during the Renaissance were conscious attempts to link maps to Antiquity – with the mythological emblems adding further significance to the symbols.<sup>502</sup>

The integration of classical emblems in Renaissance cartography introduced a new element of fantasy and intellectual creativity to maps. Inherent in principles surrounding classical art during the Renaissance was the disjunction between realism and imagination. Antiquarian culture was acknowledged as proficient in its imitation of nature – exemplified in the study of human form – and therefore Renaissance imitation of classical art was a worthwhile pursuit. However, classical subject matter was predominantly imaginary. Gods who were also demons, mythical creatures, and fantastical monsters were frequently written about and depicted visually. Thus:

There was therefore an inescapable tension between classicism as naturalism and mythology as unreality. If art did not deal with the same subjects at which the ancients had excelled, it was not truly classical; if it did, it was not really natural.<sup>503</sup>

In order to reconcile this tension the Renaissance cultivated a category amalgamating the two, of images that were suitably naturalistic in their physicality, but whose true nature was grounded in an imaginative realm.

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<sup>502</sup> Whitfield 1995: 3

<sup>503</sup> (Bull 2005: 391)

Mythological art was influenced by medium, function, and the existing prototypes off of which to base representations; however, there was also an element of imagination or *phantasia* in the depictions, as the visual nature of the gods were not definitively known to the Greeks. Pertaining to the representations of artists such as Praxiteles and Phidias, Philostratus writes in the *Life of Apollonius of Tyana*: “Imagination [*phantasia*] wrought these works, a wiser and subtler artist by far than imitation [*mimesis*]; for imitation can only create as its handiwork what it has seen, but imagination equally what it has not seen.”<sup>504</sup> Unlike previous negative viewpoints that *fantasia* creates images of non-existent things, following from imagination to hybrids to idols (e.g. centaurs, tritons, or sphinxes), in the Renaissance *fantasia* held a more positive connotation, implying the artist’s intellectual capability to produce creative symbols.<sup>505</sup> Cennino Cennini wrote that through *fantasia* a painter was able to conceive of what is not seen, therefore producing images of this type was giving visible form to products of the artistic imagination.<sup>506</sup> Ultimately, the return of classical deities and mythology did not imply an acceptance in paganism; rather an increase in fictive symbolic content.

As one either draws from life or from the imagination, celestial maps can be seen as an amalgam of the two. Renaissance firmament maps demonstrate a constant interaction between scientific “factual” information – the accurate placement of star positions based on classical and contemporary star catalogs – and artistic representation of constellation figures.<sup>507</sup> The positioning of the stars is naturalism – the accuracy of the maps is directly related to how realistic they appear. However, both the projection systems used and the emblems depicting the mythological elements belong to the realm of *fantasia*. It is easy to underestimate the magnitude of depicting the constellation figures. There was no complete reference detailing the literary mythologies or how the figures should appear. In applying classical figures to his celestial maps, Dürer allowed for an increased symbolic content. Ultimately, his scientific representations and the elements of

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<sup>504</sup> Bull 2005: 387.

<sup>505</sup> Bull 2005: 389

<sup>506</sup> Bull 2005: 389

<sup>507</sup> Synder 1984: 20

imaginative creativity in these works is a fulfillment of the challenge during the Renaissance to integrate classicism and modernity.

The hidden meanings within ancient signs had been studied as early as 1419, when Horapollo's *Hieroglyphica* was brought to Florence by Cristoforo Buondelmonti. Later gaining popularity among the humanistic circles throughout Europe, a printed version appeared in Venice in 1505 and Pirckheimer was commissioned by Maximilian to produce a Latin translation in 1512. This two-volume work addresses the meanings of 189 Egyptian hieroglyphs as ideographic, magical symbols, covering the symbolism and allegorical associations of animals during the times of the Romans as well (Figure 73). Horapollo's works exemplify the trend beginning in late antiquity

to find similarities between Egyptian and Greek mythology, which by the Renaissance had evolved into studies linking Biblical and classical histories. The stories of Deucalion and Noah or Hercules and Samson suggested a euhemerist tradition, arguing that mythological deities evolved out of heroic tales and that gods are no more than dead heroes. This tradition was further extended to connections that were

more tenuous as well, relating characters such as Moses and Bacchus.<sup>508</sup>

Some of the confusion pertaining to myths, deities, and other personalities was understandable due to the literature available during the fifteenth and sixteenth centuries. Rather than studying Ovid's *Metamorphoses*, as during the Middle Ages, Italian schools taught Virgil. Although Ovid was a topic of lectures during the fourteenth century, by the fifteenth century his works were available only in



*Comment & par quelles figures ilz signi-  
fioient laage & les ans du temps.*

Figure 73. Jacques Kerver. *Horapollo's Delli segni hieroglyphici*. 1553. Paris

<sup>508</sup> Bull 2005: 29-30

pen-illustrated vernacular editions that remained in manuscript form.<sup>509</sup> Mythological teachings most often used Boethius' *De consolazione philosophiae* or Herman Torrentinus's *Elucidarius*, whose encyclopedia of names provided a convenient reference for Antiquarian proper names. By the fifteenth century, most mythological texts were only in Latin and, with the exception of Hercules and Bacchus, the Greek gods were associated only with planets. Prior to Ulisse Aldrovandi's *Delle statue antiche* (1556), there were no Roman collection gazetteers or comprehensive reference materials citing mythological heroes or facts.<sup>510</sup> In many ways, the greatest challenge for Renaissance scholars was not uncovering the classical past, but understanding how the gods and heroes related to themselves, each other, and ancient society. Panofsky and Saxl distinguish between a "representational" tradition in which the artist had visual prototypes of the emblems and a "literary" or "textual" tradition where the subjects are only described in literature, so that the artist must himself conceive of a form (that then has no relation to specific classical visual themes).<sup>511</sup> Ultimately, the dissemination of information concerning Antiquarian mythology during the Renaissance was visual. This was a monumental task as the Classical statues and reliefs from which many iconographical references were based were not clearly demarcated. Indeed, many antiquarians and artists of the sixteenth century had only Classical models and prints after models for guides, resulting in a lot of confusion and mixing of classical and non-classical artifacts. The official connoisseur of Antiquarian artifacts in Rome, Raphael was described by classicists in the seventeenth-century as "an angel compared with other painters" but "an ass compared with the ancients."<sup>512</sup>

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<sup>509</sup> Giovanni del Virgilio addressed the *Metamorphoses* through lecture in Bologna during the fourteenth century. Bull 2005

<sup>510</sup> Bull 2005: 9

<sup>511</sup> Panofsky and Saxl (1933)

<sup>512</sup> Bull 2005: 7-9 writes: "Although there were continuities in literature, language and custom, the religion that bound these things together had been obliterated by Christianity. The challenge of the Renaissance was not the recovery of the past, but finding the spark that had given it life. The lamp still burning was a fantasy; the flame had to be rekindled. This involved more than just reclothing the gods and heroes of antiquity with their antique forms; it meant finding new homes for them, and giving them new identities, and inventing new ways for them to relate to each other. Just



In understanding Renaissance cartography – and artwork in general – it is necessary to conceptualize the fusion between classical and Christian elements. Some academics claim that Renaissance mythological iconography did not compete with Christian art, finding a lack of congruity in symbols for Christian and Antiquarian art and attributing this discordance to the institutional associations of Christian symbolism.<sup>513</sup> Mythological art could depict themes of fertility and sexuality. However, other art historians contend that art during the Renaissance was fundamentally inspired by and representational of Christian foundations and meaning, despite claims of classicism.<sup>514</sup> Christian themes had dramatic possibilities for artistic representation. It is perhaps the marketability of these highly symbolic themes, merging Christian and classical iconography, that in some ways influenced Dürer's artwork.

One of Dürer's engravings in particular can be read as a merging of the two eras in a manner that is reflected in Nürnberg cartography. Similar to the wind god heads and other symbols used throughout Dürer's artistic career in various images, the women in his engraving *Vier nackte Frauen* bear stylistic similarities to those pictured in the upper-left corner of Heinfogel's northern hemisphere map of the early sixteenth century (Figure 74). Scholars have come up with many possible readings for this image.<sup>515</sup> In this image four nude females are standing in a circle looking

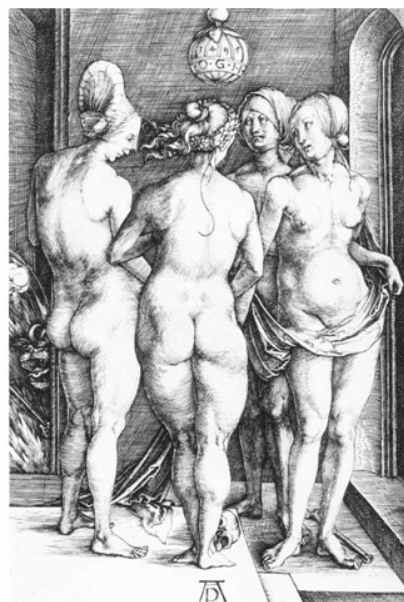


Figure 74. Dürer. *The Four Witches (Vier nackte Frauen)*. 1497. Engraving, 190 x 131 mm. Germanisches Nationalmuseum, Nuremberg

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working out who was who sometimes proved difficult. Classical reliefs and statues rarely came with labels attached, and even if they did, confusion could persist for centuries.”

<sup>513</sup> Bull 2005: 380-81

<sup>514</sup> Murray, Peter and Linda. *The Art of the Renaissance*. Thames and Hudson: London, 1963: 10.

<sup>515</sup> It is worthy of note that the German title for this work is “Vier nackte Frauen,” which translates to “Four naked women;” as opposed to the common English translation of “The Four Witches.” The German title allows for a wider breadth of interpretations, as it does not label the women as witches, leaving the iconographical references open to more analyses. It is argued here that the English title misrepresents Dürer's intent for his work. Not only does it promote one interpretation, but it disregards any others. Therefore, in this analysis the German title will be used.



inward. They stand on a multi-level floor with an open space on the left and a door on the right. The figure of a devil is looking in on the figures from the left side. The configuration and forms of the women derive from the classical grouping of the Three Graces. Above the women is a circular object engraved with the letters “OGH” and the year 1491. “OGH” could mean: *Ordo Graciarum Horarumque*, or Order of the Graces and Hours, *Oh Gott hüte*, oh God forbid, *Obsidium Generis Humani*, ambush against the human race; or to *Orcus-Gehenna-Hades*, which relates to the Kabbalah tradition. Of the latter, the image can be read as a desire to reconcile the Kabbalah and Christian traditions.<sup>516</sup> Of the 1491, Some scholars argue that this is the date of the engraving. If this were the case, then this engraving is the only one dated prior to 1503. Some speculation assumes that this refers to an actual event associated with witchcraft that had previously occurred; Nagler and Flechsig argue that it refers to a future event, which would date the engraving as even earlier.<sup>517</sup> The apocalyptic nature surrounding the suggested date arises from its placement on the sphere, which has been interpreted as the apple of the Eris, a pomegranate, and a mandrake fruit, all three of which have greater iconological connotations. Eris’ apple is known as the *Apple of Discord*, which was used as a prize for the woman Paris thought the most beautiful: Hera, Athena, or Aphrodite. This icon would give Dürer’s image connotations of the myth of Troy, with possibly a moralistic bent. If the fruit were a pomegranate, then the image would bear weight with both classical mythology connecting pomegranates to the myth of Proserpina, which introduces fertility connotations.<sup>518</sup> The mandrake was associated with Aphrodite in classical mythology. Ultimately, this image exemplifies the ambiguity and – more importantly – the possibilities inherent within an iconological reading of the image, which simultaneously shows classical, heathen, and Renaissance pictorial denotations.

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<sup>516</sup> Anzelewsky 1983

<sup>517</sup> Nagler, G.K. *Neues allgemeines Künstler-Lexikon*, Bd. 1-22, München 1835-1852. Flechsig, Eduard. *Albrecht Dürer, sein Leben u. seine künstlerische Entwicklung*, Bd. 1-2, Berlin 1928-1931.

<sup>518</sup> It is worthy of note that Maximilian’s personal emblem was the pomegranate. While this work pre-dates both Dürer’s work for the emperor and Maximilian’s succession of the throne, it is an interesting emblematic choice for the emperor and there may exist ties between the associated symbolisms of both.

One interpretation of the image finds the apple of Eris to imply that the women pictured are the goddesses fighting for Paris' prize; thus the image symbolizes discord and the death resulting from it.<sup>519</sup> Joachim von Sandrat concluded that the representation of the devil on the left side of the image categorized the woman as witches.<sup>520</sup> Pope Innocent VIII's encyclical *Summis Desiderantes* of 1484 vividly described witchcraft. Jacob Sprenger published his *Malleus maleficarum* (Hammer for witches) two years later in Cologne, outlining how to hunt witches and the different disguises they might employ. At least sixteen subsequent editions were published in Germany, including one in Nurnberg in 1494.<sup>521</sup> Thausing argues that the engraving is a mythological interpretation of Sprenger's work.<sup>522</sup> Panofsky argued for a mythological reading depicting a pregnant woman whose child was killed by three witches.<sup>523</sup> Karel van Mander argued that the plate represented the Graces, Barthel Beham offered the image as a Vanitas-Allegorie, depicting the transience of feminine beauty – represented by the varying ages of the woman.<sup>524</sup> Rupprich found the image to represent the three Graces with Venus, finding compositional similarities between the positions of the woman and other common depictions of Venus in the fifteenth century.<sup>525</sup>

As discussed previously in this dissertation, deity iconography was well-known in the late fifteenth century. In Boccaccio's *Genealogia decorum*, the fates – Alecto, Megaera, and Tisiphone – are Proserpina's companions. Therefore, this image represents the Queen of the Underworld with the three Fates (or Graces) with further astrological connotations.<sup>526</sup> Anzelewsky finds this engraving to be

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<sup>519</sup> Add source

<sup>520</sup> Von Sandrat, Joachim. *Joachim von Sandrats Academie der Bau- Bild- u. Malerey-Künste von 1675*, hrsg.v.A.R. Peltzer, München 1925.

<sup>521</sup> Anzelewsky 1983

<sup>522</sup> Thausing, Moritz. *Dürer: Geschichte s. Lebens u.s. Kunst*, Bd. 1-2, Leipzig 1884.

<sup>523</sup> Panofsky

<sup>524</sup> Van Mander, Carel. *Das Leben d. Niederländischen u. Deutschen Maler, Textabdruck nach d. Ausgabe v. 1617*, Übersetzung u. Anmerkungen v. Hanns Floerke, Bd. 1-2, München , Leipzig 1906.

<sup>525</sup> Anzelewsky, Fedja. Dürer-Studien: Untersuchungen zu den ikonographischen und geistesgeschichtlichen Grundlagen seiner Werke zwischen den beiden Italienreisen. Deutscher Verlag für Kunstwissenschaft: Berlin, 1983.

<sup>526</sup> Anzelewsky 1983.

iconographically similar to the Erinyes in the upper-left corner of Heinfogel's 1503 map.<sup>527</sup> The women in Dürer's engraving – and the women in Heinfogel's map – then symbolize the queens of the four cardinal directions: from the east Pharoatochter, represents the humans (*ante legem*); from the south the queen of Babylon, who puts laws of faith; from the west is Sunamitis, who represents the beliefs of the pagans or gentiles; and the queen of Christ coming from the north, representing Israel. Standing in the shape of a cross with each symbolic of the direction whence they came, the three veiled women are the married queens and the fourth is Venus, the northern queen.<sup>528</sup>

Gombrich asserts that the goal of art shifted once problems were identified, with the aim becoming the perfection of visual systems such as perspective and human form; however, there remained a religious element.<sup>529</sup> By merging Christian and classical iconography in firmament maps, Dürer was able to show how his inherent religious beliefs were in accordance with both antiquarian ideals and scientific advancements. As mentioned concerning perspective, Medieval space was decorative. In the Renaissance images incorporated perspective systems into their art. Panofsky and Saxl argue that the temporal distance between classical and Renaissance thought is analogous to the spatial distance between objects, which necessitated the creation of a system of perspective.<sup>530</sup> Dürer's celestial map can be read in this light, particularly in terms of his constellation figures. Rather than showing celestial space as merely decorative, as in previous representations, Dürer's figures exist within a system of perspective that results from the projection system used. His figures conform to this space, rather than defining it. Mythological art tended to ignore both color and perspective, which some scholars see as a limitation due to its symbolic and literary marginality.<sup>531</sup> Dürer's figures,

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<sup>527</sup> The aforementioned Renaissance justification for merging antiquarian and Christian elements applies here with Dürer's categorizing of Venus as similar to Mary, the mother of Jesus. Many of the fifteenth and sixteenth century humanists equated Proserpina and Venus to Mary and Dürer wrote: "Vnd wy sy prawcht haben Venus als das schönste Weib, also woll wir dy selb tzirlich gestalt krewschlich darlegen der allerreinsten Jungfrau Maria, der mutter gottes."

<sup>528</sup> Anzelewsky 1983

<sup>529</sup> Gombrich, E.H. *The Heritage of Apelles: Studies in the art of the Renaissance*. Cornell University Press: Ithaca, 1976: 129.

<sup>530</sup> Panofsky and Saxl 1933

<sup>531</sup> Bull 2005: 386-87

however, portray his mastery of form in a way that emphasizes the maps as scientific documents whose artistic genius neither overshadows nor undermines their scholastic nature.

### **Celestial Globes and Spherical Representations**

Marsilio Ficino emphasized the interest in celestial cartography due to its connection to the human body, writing:

Only men can laugh and shed tears, because in them the mental emotion rules the body..., from which we learn that our body, compared to that of other animals, contains a minimum of earth...and a maximum of subtle elements so that it is capable of being the receptacle of the celestial soul.<sup>532</sup>

Thus the body, rather than being a mere receptacle as in the Middle Ages, became a manifestation of the soul, a connection to it, a necessary part in the unity of body and soul. Dürer's celestial maps can be seen as an amalgamation of corporal form and celestial perspective. They are two-dimensional representations of three-dimensional objects visualized in such a way that the three-dimensionality is apparent in the image. These are manuscript spheres that ultimately compare spherical perfection and the ideal human form in a way that can never be manifested in reality.

Modern cartography, which originated in the Renaissance, is founded upon the coordinate system of latitudinal and longitudinal grids. Cartographers adapted Ptolemy's instructions to diagram both the earth and the heavens and the field of cosmography – the visualization of the earth and the firmament – was born. This discipline argued that the universal had a fixed, closed spherical form centered on the earthly, water, air and fire spheres, which would fluctuate. From the time of Aristotle, the celestial sphere was conceptualized as perfectly circular. Spheres have long been seen as symbolic of perfection, universality, and totality. Greek thought, namely Pythagoras and Plato, believed in the perfection of forms and mathematical constructs. Some scholars have argued that a map differs from a

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<sup>532</sup> Panofsky and Saxl 1933: 272 “even this moderate attempt to do justice to both the “pagan” vitalism and to “Christian” spiritualism meant an unmistakable alienation from the moral system of the Middle Ages.

picture in that the map's coordinate system gives it a structure that relates every part of the map mathematically to both itself and reality.<sup>533</sup> As seen in the meticulous nature of Dürer's perspective systems, however, artwork can be just as mathematically and precisely structured.

Dürer's celestial cartography is structured around the mathematical construct of the spherical celestial realm. In engaging with this iconography, Dürer drew parallels between spherical perfection, the constellation figures adhering to this projection system, and eventually to the perfection of the human form. However, just as a map of the spherical earth contains distortions of some sort and is thus never completely accurate, Dürer ultimately found it impossible to perfectly depict the human form. Compared to Da Vinci, whose quest to quantify ideal proportions begins with mathematical relationships between body, limbs, and features in a grid-like pattern with the artist's ratios of squared proportions enclosed in a circle in his image, *The human proportions according to Vitruvius* (Figure 75), Dürer's representations do not signify this extent of mathematical rationality.<sup>534</sup> His typology of perfection differed from da Vinci's in his divergence from mathematico-philosophical supposition in a movement towards individual relativism,

arguing that a universal standard was unobtainable and that perfect depended on each unique situation (figure 76).<sup>535</sup>

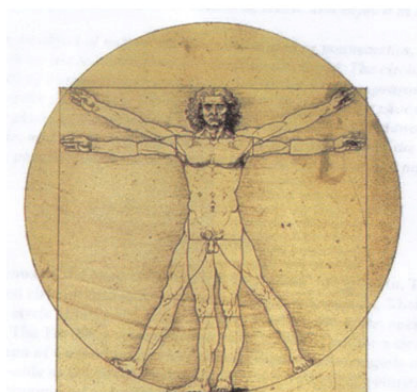


Figure 75. Leonardo da Vinci. *Vitruvian Man*. 1492. Pen, ink, watercolour and metalpoint on paper. 343 x 245 mm. Gallerie dell'Accademia, Venice

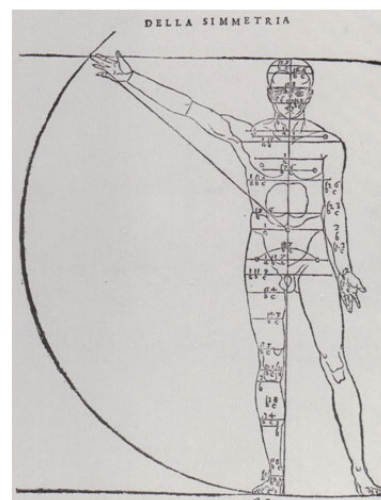


Figure 76. Albrecht Dürer, *Study (The Measured Man)*. c.1505-1510. pencil sketch

<sup>533</sup> Whitfield 1995: 75-76.

<sup>534</sup> Borel, France. *The Seduction of Venus: Artists and Models* (New York: Rizzoli, 1990), p. 82.

<sup>535</sup> Borel, p. 83. nb: Whereas da Vinci believed that perfection could be discerned through a mathematical, proportional relationship, Dürer thought that human physical perfect was subjective, individual and relative; therefore, finding an "ideal" human who was universally perfect is impossible.

Dürer's philosophy concerning the ideal proportions as they may exist conceptually and as they are found in reality can be contrasted with some scholars' readings of the realism and perspective systems of the Renaissance. Hughes' interpretation of van Eyck's realism is similar to Cosgrove's focus on the Apollonian gaze. Hughes argues that the painter's style re-created an omniscient view, showing absolute knowledge: "Jan van Eyck's attitude to nature was medieval in that he seems to have regarded each created thing as a symbol of the workings of God's mind, and the universe as an immense structure of metaphors."<sup>536</sup> Cosgrove's notion of the Apollonian gaze similarly places the viewer in the position of seeing everything at once, as a god looking down on the universe, writing: "Cosmography became the discourse that brought together celestial and geographic exploration, represented space and scale, and theorized the place of humans within nature."<sup>537</sup> Cosgrove finds this perspective system to elevate the viewer, which in turn reflects on the notion of the Renaissance scholar and artist as being almost Christ-like. While earlier representations may point to the conclusion that Dürer pictured himself as a Christ figure, such as his self portrait of 1500 (Figure 77), his later



Figure 77. Albrecht Dürer. *Self-Portrait in a Fur-Collared Robe*. 1500. Oil on lime panel. 67,1 x 48,7 cm. Alte Pinakothek, Munich

representations show the futility of the artist to represent the world perfectly.<sup>538</sup> Furthermore, as an artist only capable of representing the world imperfectly, Dürer's system of perspective – rather than elevating the viewer to the status of

<sup>536</sup> Robert Hughes, introduction to *The Complete Paintings of the Van Eyck*

<sup>537</sup> Cosgrove 2001: 116

<sup>538</sup> This can be seen in Dürer's later, nude self-portrait. Additionally, his self portrait of 1500 can be read as highlighting his individuality and promoting his status as an artist, without taking it to the point of being completely parallel with representation of deities.

Apollo – creates a visualization where the perfection of deities can be conceptualized by humans through his representation of spherical space on a two-dimensional manuscript.

A biomorphic form is a nonrepresentational pattern or structure whose shape or appearance is depicted or transformed so as to resemble a living organism. In antiquity constellations were seen as biomorphic, as real beings – gods, heroes, and other creatures – whose heavenly realm was a complete world unto itself.<sup>539</sup> As such, these constellation figures can be seen in classical poses so as to relate them to the antiquarian and Renaissance engagement with the theories of ideal proportions. Whitfield argues that prior to the Renaissance, cultures which promoted astronomy focused neither on scientific diagrams nor on the visualization of philosophical concepts.<sup>540</sup> While this may be contested, it can be noted that Arabic cartography highlighted constellation accuracy, while medieval maps preferred iconographical representations over star positions; Dürer's figures were the first to consciously merge the two. His genius is demonstrated in his skill in creating visually appealing classical constellation figures existing within a standard perspective or projection system while retaining the accurate star locations. The Christian element in his representations connotes the divine element within the firmament.

## Conclusion

Celestial maps differ from terrestrial ones in that they visualize both conceptual and theoretical frameworks. The former is defined as how the map is perceived by the viewer, relating to the twentieth century notions of visualization and cartographic comprehension. The theoretical framework is the underlying structure to which the cartographer adheres so as to create a uniform surface. The conceptual background for these maps can be observed in their constellation iconography, as the classical figures are antiquarian in nature; however the accuracy of star placement refers to an Arabic tradition. Conceptually, then,

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<sup>539</sup> Samuel Edgerton, *The Renaissance Rediscovery of Linear Perspective* (New York: Basic Books, 1975), 156-57.

<sup>540</sup> Whitfield 1995: 61.

Renaissance viewers were able to use these both as thematically understood astrological illustrations and as scientifically precise mappings of the firmament. The theoretical framework of the maps relates to Dürer's own principles of visual symbols. In the represented area, the importance is not the locational space, but rather the theoretical space. Artistic theory during the Renaissance focused on realism and a one-point perspective system. Dürer's representations of a spherical shape on a two-dimensional manuscript, maintaining the vision's realism as well as accuracy in the projection system used marks these maps as arguably the most under-acknowledged successes in Renaissance cartography.

The celestial planispheres can be seen as the culmination of over fifty years of intellectual thought from scholars in Vienna, Nürnberg, and beyond. The Ptolemaic co-ordinates for the longitudinal positions were updated, producing a scientific document intended to be used by an elite audience. Labeling the star positions legibly suggests that they were intended to be used and, unlike the terrestrial map, these star charts went through several print runs, being disseminated both in Nürnberg and abroad. Dürer's mastery of perspective can be seen in the constellation figures, as they relate to the star's actual positions; however, they embody a dynamism suggestive of firmament three-dimensional space. Coupled with the scientific nature of these representations, however, is the iconological basis. Dürer's involvement with multi-layered symbolism is exemplified in his sixteenth century works, namely *Melancholia I*. Relating to broader concepts, Dürer's classical iconography credits his maps with the same prestige with which antiquarian texts were held. These representations can be seen as images representative of *fantasia*, which was both factual and artistic, and was also influenced by a Christian themes.

Dürer's combining of classical and Christian iconography in his *fantasia* representations ultimately argues for his religious beliefs in accordance with Renaissance scientific advancements. As a fusion of corporal form and celestial perspective, his projection of the firmament sphere onto a manuscript argues for the futility of artistic depictions of the divine perfection of the natural world.



## CONCLUSION

This dissertation carefully scrutinizes three collaborative cartographic works produced by Albrecht Dürer in the early sixteenth century: *The Eastern Hemisphere of the Terrestrial Globe*, *The Northern Hemisphere of the Celestial Globe* and *The Southern Hemisphere of the Celestial Globe*. Dürer and Johannes Stabius, the court astronomer for the Emperor Maximilian I, worked on the terrestrial map. The firmament maps' authorship is attributed to Dürer, Stabius, and Conrad Heinfogel. The function of the maps as collaborative works extends beyond the authors themselves, as the social and cultural environments specifically in Nürnberg and throughout Europe informed the locational and stylistic visualizations. The artistic trends of realism in art, stemming from the Northern Countries, and the one-point perspective system, originating in Italy, can be seen in the terrestrial representation.

Historiographies on cartography over the past twenty years have broadened in scope to encompass the disciplines of the history of science, art history, literary studies, and geography. I examined the fields of art history and cartography, specifically, in order to better understand the methods scholars use in analyzing maps. While each specific methodology has strengths and weaknesses, using this study as a guide I advocate a holistic approach that draws from multiple methodologies so as to examine maps from as many different angles as possible. In so doing, it became apparent that historians focusing on the more scientific aspects of cartography often neglected the artistic aspects, while historians of art focused instead on visual principles. These distinct disciplinary approaches lead to unique conclusions. On the side of science, scholars generally acknowledged the "artistic" nature of Dürer's maps, but gave no distinct laudation to the science. His terrestrial map was seen as a Ptolemaic reproduction in print, showing little new information or relevancy. His firmament maps were applauded for their artistry, but for the most part passed over in lieu of Apian's or Bayer's more extensive celestial atlases. Through the course of researching these three specific works, the theme for this dissertation became my amalgamation of scientific and artistic forces co-existing in Dürer's maps. Particularly, Dürer's maps can be seen as

exercises in the newly-introduced one-point perspective system, as he actively merged the scientific nature of projecting the globe on to a two-dimensional surface and the artistic theories of mathematically-produced perspective drawings.

Focusing on Dürer allowed me to examine the artistic trends he used to create what contemporaries considered a scientific document. Although frequently analyzed as an artist, many scholars have not mentioned Dürer's cartography. It seems that neither Maximilian nor Dürer printed the terrestrial map; consequently, the first prints did not appear until the eighteenth century. Conversely, the celestial maps were distributed by Dürer on his travels and there are multiple existing copies in archives throughout Europe. Despite this, however, Lister's overview of celestial cartography begins with Apian, as do a number of other canonical works detailing the history of celestial cartography.<sup>541</sup> Dürer's renown throughout Europe as a practical and a theoretical artist inspired this research, as I argued that his reputation justifies a closer examination of the impact of his works on subsequent cartographic visualizations. The artistic and scientific nature of his works demonstrates an innovativeness that makes them more than worthy of future consideration in historiographies of cartography.

In order to begin this study, I reconstructed the intellectual, social and economic conditions surrounding the production of Dürer's maps. Born and raised in Nürnberg, Dürer worked with the leading printers and scientists of the late fifteenth century. The city itself was famed for its production of illustrated texts, both vernacular and scientific. After his apprenticeship, during which he worked with Schedel and Koberger on the *Weltchronik*, Dürer traveled around Europe. His travels took him to Italy, where he first learned about the one-point perspective systems. After returning to Nürnberg and producing several of his own illuminated manuscripts, Dürer returned to Italy a second time for the specific purpose of learning perspective systems. The Italians attempted to devise a mathematical system to aid artists in accurately depicting the real world in their illustrations. In Dürer's terrestrial map, he used the principles of one-point perspective in the map's projection system. With an actual globe as a model, Dürer's utilization of

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<sup>541</sup> Lister, Raymond. Old Maps and Globes. Bell & Hyman: London, 1979: 65.

perspective resulted in a projection system that – upon first glance – seemed to re-iterate Ptolemy’s third projection system. This projection, described in Ptolemy’s eighth book, was non-mathematical. In using Ptolemy as a guide, Dürer highlighted his own cartographic and mathematic capabilities. Renaissance scholars considered Ptolemy to be the seminal scholar on geographical representations. With the print medium’s ease of dissemination and Maximilian’s desire to promote himself as a patron of academia, Dürer created a work with a broad audience base that could also promote himself as a leading thinker on geometrical issues. His motivations for these works were therefore commercial as well as ideological. Unfortunately, Dürer’s projection system differed too subtly from Ptolemy’s; therefore, contemporary audiences did not recognize the distinctions between the two. By categorizing Dürer’s terrestrial map as a Ptolemaic reproduction, subsequent cartographic historians and historians of science largely ignored the work. I analyzed Dürer’s work in light of the one-point perspective system, demonstrating that his understanding of perspective led to a new way of projecting the globe. The artist’s studies in perspective culminated in his celestial planispheres, which projected artistically-acclaimed constellation figures onto a scientifically accurate star map.

Part of the force of these celestial representations lies in their iconological implications. Casti argues that rather than being representations of reality, icons visualize a theory of reality, concluding that cartographic conceptualization results from the viewer interpreting the map’s icons.<sup>542</sup> In merging classical and Christian emblems within a perspective system, the theoretical foundations of the maps are arguably the imperfections and distortions of any projection system as compared to the reality of spherical perfection. One art historical method is to examine the relationship between art and cultures, as individual works are always confined by the nature of their media. In this case, the medium of woodcutting – depending on tonal variation to show depth and not allowing for close proximity of lines – highlights the role of form versus color. As monochromatic documents, geometric

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<sup>542</sup> Casti 2005: 10

form is emphasized. Furthermore, any representations of form are subject to the imperfections of artistic replication.

In conclusion, these Renaissance maps can be seen as representations subject to many influences. Relying on commercial prospects, advocating recognition and prestige for the authors and patron, and representing iconological concepts establish these works as frameworks within which visual debates can be studied. The methodology created a context in which the signs were both self- and culturally-referential. Pertaining to Renaissance society, the firmament was seen as both divine and powerful. Subsequent representations utilized these denotations.

Johann Schöner's celestial globe (1533) was the first printed celestial globe and was subsequently represented artistically by Holbein in *The Ambassadors* as a symbol of learning and power (Figures 78). As an ideal "Renaissance man," Dürer did not stand by a celestial globe in order to symbolize his genius; he created one. And in doing so, he realized and visually conveyed the powerlessness of humanity within the infinite universe.



Figure 78. Hans Holbein the Younger. *Jean de Dinteville and Georges de Selve ('The Ambassadors')*. Detail. 1533. Oil on oak, 207 x 209 cm. National Gallery, London

I began this dissertation by analyzing the various approaches taken by historians of science and art historians when examining maps. The various methodologies can be combined to create a more holistic approach to examining maps, one in which scholars consider a wider variety of influences. Dürer's maps have survived in large part due to his fame as an artist, being catalogued among his woodcuts and commissioned pieces for the Emperor. This dissertation sought to analyze the scientific nature of these pieces in terms of their projection systems and accuracy of star placement. Simultaneously, I brought to light the influences of the artistic trends of the Renaissance – namely the one-point perspective system

and a return to classical iconography – that informed and defined how maps looked during the sixteenth century.

### **Research Implications**

The implications of this dissertation are not limited to Dürer's cartographic works. As the methodology outlined in this dissertation promotes approaching historical cartographic works from a variety of different aspects – the social and historical surroundings, the individual cartographer, the pictorial emblems used within the map, and the cultural context that would have informed viewers – it can be applied to other studies in the discipline. Pertaining specifically to this dissertation, Dürer's maps were shown to have been influenced by classical icons and Arabic map sources. As his images focused on perspective and projection systems so that viewers would conceptualize certain notions of pictorial space, all previous cartographic works can be read in the same fashion. Arabic celestial maps can be read in terms of their emphasis on the accuracy of star placement. As the religious aspect inspired constellation precision, it would be interesting to study how their constellation figures relate to other religious images of the time. An increasing number of studies in the discipline of the history of cartography are focusing on non-Western maps. Much of the trend has been to show the influence of Arabic cartography during the Middle Ages on subsequent European maps; however, it would be enlightening to examine how the Greek cartography influenced Arabic maps. While contemporary scholars seek to remove the centrality of Western Europe in historiographies they often fault in either separating the cultures completely, which leads to the mistaken conclusion that the two cultures had no communication, or they overemphasize the role of Eastern societies on Western maps. Rather than being a linear impact, both temporally and spatially, the two cultures of West and East were in steady communication with influences of each appearing in the other's cartographic works. Specifically relating to this dissertation, an interesting study would compare the perspective systems of Arabic celestial cartography with Mediaeval representations of the heavens, the Ptolemaic illustrations in the respective cultures, and the relationship

that may exist between the terrestrial representation of T-O maps – which are often taken as religious documents – and the celestial maps of Arabic scholars whose emphasis on the religious center points the viewer in the direction of Mecca rather than centering the sky as it would look with Mecca in the desired position. Perhaps there exists a connection between the terrestrial representations of an “idealized” world with the religion’s hub at Jerusalem in the center of the map and the firmament maps that demonstrate how to orient one’s self. The former treats the earth’s tangible space as conceptual and the latter treats the intangible nature of the heavens as fixed.

Further exploring the issues of perspective and the semiotics of historical cartography prior to the sixteenth century would then further inform studies of Renaissance cartography and beyond. Although Dürer’s terrestrial map was not printed for centuries after its completion, his star maps were distributed in Germany and the Northern Countries. As previously discussed in this dissertation, Dürer’s celestial maps are generally not addressed in collections of celestial charts or atlases, due in part to the nature of their dissemination in the form of prints rather than books.<sup>543</sup> Future research could analyze sixteenth and seventeenth century star charts in terms of artistic influences to see whether or not stylistic similarities appear between Dürer’s charts and those following.

The research implications of this dissertation function not only to highlight the role of these particular works within their temporal context, but to provide a methodology which can be applied to other studies in the history of cartography. Using theoretical approaches from a variety of disciplines in order to focus on visualization, which is the encoding of a message using pictorial symbols and visuality, relating to viewer interpretation and the reasons behind the image’s creation, the emblems in maps can be seen as simplifications of reality. Pictorially representing the infinite nature of the world entails cartographic generalization. This necessitates an increased focus on the artist or cartographer, as the ways in

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<sup>543</sup> It is interesting that in the Linda Hall Library exhibition, the curator’s focus on Honter’s maps, while admitting that Dürer’s were more accurate and, unlike Honter’s which were approximately 30 degrees off, could be used by astronomers to locate existing stars or to map new ones.

which he or she generalizes the world and the visual systems of projection and perspective play a key role in both the visualization and visibility of the work.

### Future Research

One example of a future research direction enabled by this dissertation would be the study of Leonardo da Vinci's maps. One of the first artists to utilize atmospheric perspective in his landscapes, da Vinci's artistic innovations reflect his scientific theories and are well documented in his proofs and drawings. His map of Imola (Figure 79) is accurately drawn to scale. Da Vinci emphasizes the



Figure 79. Leonardo da Vinci. *Town plan of Imola*. c. 1502. Pencil, chalk, pen and wash on paper. 440 x 602 mm

projection necessary by giving the map a circular outline. It may be possible to find connections between this map and some of the work that da Vinci produced concerning the perfection of human form and other issues with perspective. In addition to city maps, da Vinci also produced an "octant" map which divided the earth into eight equilateral spherical triangles (Figure 80). The hemispheres are separated and quartered, with the quarters connecting along the equator and meridians at 90°. It would be interesting to compare this map to other works by da Vinci in terms of form, theme, and style. Not only would this bring issues pertaining to the artist to light, but it would serve to further inform studies of cartography in Italy during the early sixteenth century.



Figure 80. Leonardo Da Vinci. *Mappa Mundi*. 1514

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