Visual Rhetoric in Medical Illustrations and the Implications in Medical Practices

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Several studies of visual rhetoric and its relationship to scientific visuals have been widely discussed by figures such as Sonja Foss, who explored visual rhetoric theory, and Rachel Hajar, who traces the historical changes of medical illustrations. However, the rhetorical strategies used in medical drawings and how they impacted the representation of the human body are yet to be analyzed. In this essay, I explore this gap by analyzing the historical changes in the visual artifacts, applying Kenny T. Fountain's concepts of trained vision and Mary Rosner's theory of the larger contexts. Specifically, this essay explores the rhetorical craft of "The Wound Man" during the Medieval periods, the illustrations of Andreas Vesalius in the 19th century, and a three-dimensional model of human anatomy in an online video by AnatomyZone in the 21st century using the visual rhetoric theory as a method. The changes in technology and increased medical knowledge influenced how visual rhetorical strategies can be used to portray the human body. Examining medical drawings in this way can reveal how rhetorics function in the field of science and provide insights into the interplay of art and science.

In medical manuscripts, the communication of medical information significantly depends on both the available knowledge and the rhetorical methods used to construct the language. Scientific writers in the field use rhetorical strategies in their texts that allow for elaborate and convincing delivery of the complex information to medical students, whose experiences are solely dependent on their acquisition and interpretations of such information. Visual information in a medical context—such as a detailed sketch of the myofibrils, a diagram of the endomembrane system—relies on a different rhetorical approach: *visual rhetoric.*

In this case, effective medical communications take on an illustrative path. According to visual rhetoric theory, the ways in which visual artifacts (from statistical graphs and models to detailed drawings) are presented contain rhetorical attributes used to communicate an idea or message (Fox). Essentially, visual rhetoric involves using the components of an image as a way of argument that informs or communicates a message to the audience.

In an analysis of three different artifacts from different time periods, I will specifically address the ways in which elements are arranged in a human anatomy illustration and in three-dimensional diagrams and how these

arrangements change progressively over time. Specifically, I explore the ways in which the elements interact with the main subject (for example, the specific body part or the full human body) and with each other and how this interaction contributes to the artifact's message. Using visual rhetorical analysis, I break down the key components of a human anatomy illustration and explain how the organization of a medical image can impact its meaning and purposes. Essentially, the cultural and technological changes in rhetorical strategies used in visual communication over time lead to varied representations of the human body and more accurate medical diagrams that improve the medical knowledge and significantly enhance the educational experience of emerging medical students.

The theory of visual rhetoric can further be elaborated in a way that explains the rhetorical approach in analyzing medical images. In "Framing the Study of Visual Rhetoric: Toward a Transformation of Rhetorical Theory" of *Defining Visual Rhetorics*, Sonja Foss asserts that a rhetorical analysis of visual artifacts significantly relies on understanding visuals from their superficial aesthetics, such as inferring the arguments, emotions, and ideas behind the artistic constructions of colors, lines, and textures (Foss 306). In other words, a rhetorical approach to analyzing visual information significantly relies on the constructions being used to persuade or to inform the audience, whose perceptions and understandings are the consequences. Therefore, medical illustrations can also be looked at through a rhetorical lens that analytically illuminates the purposeful construction of the message through visual means. With modern scientific drawings, they, too, contain artistic appeals but consequently elicit a rhetorical response from one specific audience—the medical students and practitioners who reference them. Utilized in every form of visual messaging, visual rhetoric remains an important tool for artists to manipulate the audience's perception in order to produce a certain rhetorical effect and impact the audience's understanding of an artwork.

In addition to Foss's concepts of visual rhetoric, there are several components to consider about the rhetorical argument in an image, especially in the ways that shape how medical students, both those in the past and present, think about the human body. Mary Rosner believes that we should consider the larger contexts (in addition to physical aesthetics) of scientific images—particularly the "procedures," the audience's assigned role, and the "political, social and cultural values"—in order to understand how these elements of visual rhetoric influence audience's perception and comprehension of scientific information (399-400). All of these elements, when applied to anatomical illustrations, strongly influence how medical students think about the human body, and they should be examined when assessing illustrations' rhetorical purposes, which is to uncover and provide scientific truths and insights to medical students of the biological processes of the human body.

The first step in understanding the rhetorical strategies used in the following artifacts is to learn and understand how visual rhetoric, when used in medical drawings, fundamentally

trains medical students and practitioners to look at the human body. In the essay "Anatomy Education and the Observational-Embodied Look," T. Kenny Fountain enlightens his readers about the importance of the haptic (one's sense of touch) experience in anatomy education and how observational-embodied learning enhances students' learning experience. About visual anatomy, he argues that medical images which are "schematized," "idealized," and "exaggerated" affect "how students visually conceive of the anatomical body" (Fountain 54). He further elaborates on this influence, stating that the contemporary visuals "exert a persuasive and ontological force" because of their "scientifically aesthetically beautiful" and realistic qualities that, to medical students, "[offer] a guide" on how they *should* view the human body (Fountain 54). Such qualities of contemporary visuals that train the visions of medical students and practitioners are also applicable to the historical illustrations containing rhetorical undertones that shaped the field of medical illustrations. Medical drawings, because of their persuasive, generalized, and idealized characteristics that ascribe to a common representation of the human body, influence not only how medical students look at the body but also how they understand it. We can now get a basic understanding of how visual rhetoric functions in medical drawings through Rosner's and Fountain's research. Recall that in Rosner's essay, she emphasizes the importance of an image's larger context and the political and cultural values that affect the content of the image and why the image was made. By understanding a drawing's contextual and rhetorical significance, we can then analyze how a medical illustration trains the eyes of medical students in ways that shape medical knowledge at the time.

Changes in medical illustration throughout history can be attributed to several cultural factors that influenced medical knowledge. Rachel Hajar establishes the historical trajectory of medical illustrations and their cultural influences, starting with Greek physicians like Galen, who believed the heart was the core of human emotions (85), to anatomists like Leonardo Da Vinci and Andreas Vesalius, who brought insights and accuracy to the field of anatomy (90), and finally to the monumental twentieth-century anatomists such as Frank Netter and Max Brodel, who was deemed "father of modern medical illustrations" (89). These noted changes demonstrate the importance of the visualization of the human body and how human anatomy illustrations impacted the medical field over time. Although Hajar synthesizes a coherent and convincing argument of medical illustration and its significance, she did not acknowledge and evaluate the ways in which these images contain rhetorical characteristics that bring about the information to students practicing medicine or how the ways these drawings are made affect their intended meanings.

In this analysis, I am particularly interested in the arrangements of the elements within a medical illustration and how its organization creates meaning. It is also important to acknowledge the delivery system of information that exists among the illustrations, the accompanying texts and labels, and the medical

novice and practitioners—as audience—and their methods as a consequence. Therefore, I will explore and assess what and how the rhetorical strategies involved in making an illustration at a specific time period influence its meanings and its intended purposes and consider the possible implications of using these strategies.

Human anatomy illustrations are good for this specific rhetorical research because of their drastic evolution throughout centuries, dating back to the medieval years. As time progresses, societal changes, human inventions, and technology contribute to an accessible number of materials and means that artists and anatomists can use to improve illustrative medical concepts. Using visual rhetoric theory as a method, I focus on three different human anatomy related artifacts throughout different periods: the "Wound Man" by Pseudo Galen[1] in 1491, the illustrations of Andreas Vesalius in the 16th Century, and finally a 3D video rendering of Muscle Anatomy by AnatomyZone from YouTube in the 21st century. I have selected these artifacts to target the same type of audience—medical students—to maintain consistency of my main argument that will essentially assess the potential impacts they have on the medical practitioners. Using Rosner's theory of the "larger context" and Fountain's concept of trained vision, I will analyze how these illustrations are put together and evaluate their values on the success of the illustrations. By studying visual rhetoric presented in human anatomy drawings, we can draw out the characteristics of an effective medical observation, evaluate the efficacy of the drawings, and assess the implications these drawings demonstrate on visual rhetoric and the representations of the human body overall.

Although human anatomy drawings have appeared throughout early civilization periods, during the medieval period around the 14th and 15th century, medical illustrations with a specific approach towards health and medicine primarily focused on treating the injuries of the body. In addition, medieval medical practices were heavily influenced by the works of the Greek physicians Galen and Hippocrates, who believed that the health of the human body is balanced or maintained by the four bodily humors—*blood, phlegm, yellow bile and black bile* (Bovey). Other forms of medieval medical practices involve bloodletting and urine examination to diagnose illnesses (Bovey). These beliefs continued to dominate many medical practices during this time, and consequently influence the creation of many medical diagrams. As a result, medical illustrations were primarily used to treat injuries, especially soldiers wounded in battles.

1. "Pseudo-Galen" is not the Greek physician Galen. Rather, Pseudo Galen is a term generally used to establish the historical contexts of drawings and manuscripts that ascribe to the medieval teachings of Galen himself (Agostino).

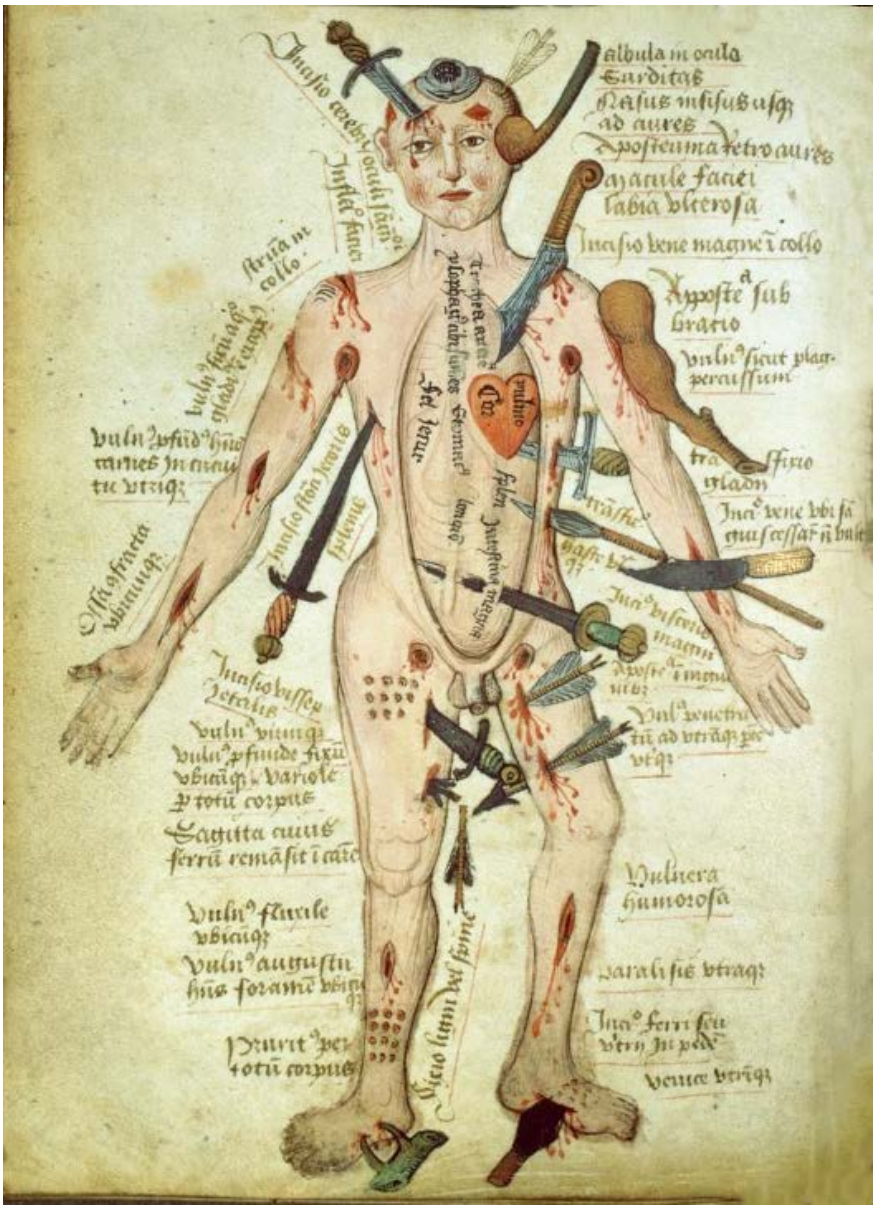

Figure 1. "The Wound Man" by Pseudo Galen, *Fasciculus Medicinae*; *Wellcome Collection* , wellcomecollection.org/works/tp6fppqz.

The "Wound Man" (figure 1) is a medical diagram that first appeared in the 1491 printed Venetian medical manuscript *Fasciculus Medicinae* in Europe (Wellcome Collection). Along with the "Wound Man," other illustrations, including the "Zodiac Man," the "Disease Man," and the "Pregnant Woman," were also incorporated into this medical text. During the Middle Ages, medical books were exclusive to the educated—mainly medieval physicians who documented injuries of the human body and, through visual rhetorical strategies, created illustrations such as the "Wound Man" for pedagogic purposes and references for treating the body. The "Man" is displayed in standard anatomical position with the body standing up straight, palms facing forward, and feet apart and facing forward as well, while several weapons penetrate different parts of his body. In a comprehensive glance, the thoracic—or the chest portion—and abdominopelvic cavity are given more emphasis with more swords, cleavers, spears, arrows, and knives impaling the Man's body. To the left of the thoracic cavity on the Man's body lay the simplified version of the heart with a sword piercing from the left side of his rib cage into the bottom of the heart. At each pierce of the weapons, the illustrator displayed open wounds and ruptures on the skin surrounded by blood, which can be seen throughout the body. With a closer look, the ways in which these injuries were illustrated exhibit many of the medieval medicine beliefs that influenced how practitioners trained their vision to consider the human body.

In all of these injuries, the illustrator attempted to draw the student's attention towards the severity of the injuries through the arrangement of the weapons that puncture the body and emphasize the ways in which these injuries are fatal. At a closer look, many of these violent and fatal injuries are highlighted in the ventral cavity—that is the cranial, thoracic, and abdominopelvic cavities. Within the thoracic cavity, only the heart is shown, and the other organs are not drawn out. This evidence suggests a lack of medical knowledge about the human body—in part due to how infrequently dissections were performed during this period (Charlier et al.). The organization of large weapons—the longswords in the abdomen and the upper right side of the chest, the dagger in the head, the spear in the left side of the body—draws the attention of medical novices to these potentially fatal areas that require greater examination. These graphic imageries created by the addition of the blood splatter at the wound site resulted in a realistic depiction of the ways men were injured on the battlefront. The arrangement of the weapons on the body and their penetration through the skin, the organs, and the limbs are purposefully done to tell a certain narrative about this wounded man and the pains and battles that he had faced. This visual rhetorical strategy presents the body in its most vulnerable, damaged state and lends medical practitioners the power and responsibility to heal and save this wounded man. Created in the medieval beliefs about the human body and health, this illustration exhibits many of those attitudes and a limited knowledge about the body through the ways the body is visually depicted.

The rhetorical purpose of illustrating the human body in an injured, vulnerable state is present in the ways the "Wound Man" was

drawn. The locations of the injuries, the severity of the scars and ruptures of the skin, and the various ways in which the weapons penetrate the body serve to guide medical novices' eyes in a logical maze to certain body parts, each requiring a different treatment. Additionally, the injuries serve to educate medical students of the common ways people in war can be wounded (from a skin puncture wound to a deep wound inside the body) and how each wound must be treated. The inclusion of the facial expression provides a human connection to medical students observing the diagram and thereby helps the students to form a personal bond, which on an ethical level is relevant to the treatment of patients in a surgical or medical setting. These depictions of injuries and medieval beliefs about health and the human body, with religious, political, and cultural influences, train medical practitioners to view the body as a temple. Although no longer used in modern medical textbooks, the "Wound Man" and similar works facilitated a movement toward the better Greek portrayal of the human body.

At the turn of the early 16th century, human dissections became more prominent, and, as a result, human anatomy became an established and more respected field of science. The previous erroneous beliefs of the Greek physician Galen on the human body and health were later disproved with the revolutionizing anatomical findings of Andreas Vesalius (Hajar 90), a Belgian physician whose best works on human anatomical diagram later became known as *De Humani Corporis Fabrica Libri Septem* and the accompanying volume *De Humani Corporis Fabrica Librorum Epitome* (both will be referenced as the *Fabrica* and the *Epitome,* respectively, in this essay). Vesalius' anatomical works were based on human cadavers rather than animals from which Galenic anatomy was derived (Dominiczak 1687). While maintaining a profession on the teaching of anatomy and surgery, Vesalius began to publish his anatomical diagrams to supplement his teachings (Dominiczak 1687). The most notable and well-known works of Vesalius are the *Fabrica* and the *Epitome*—published in 1543—which contained over 600 engraved illustrations portraying the intricate muscular, nervous, and skeletal systems as well as the brain, the abdomen, and the thoracic regions; these monumental illustrations are evident "of the benefits of collaboration between science and the arts" (Dominiczak 1687). This evidence suggests that human dissections contributed to improved medical knowledge of the human body, allowing medical diagrams to become increasingly technical and accurate.

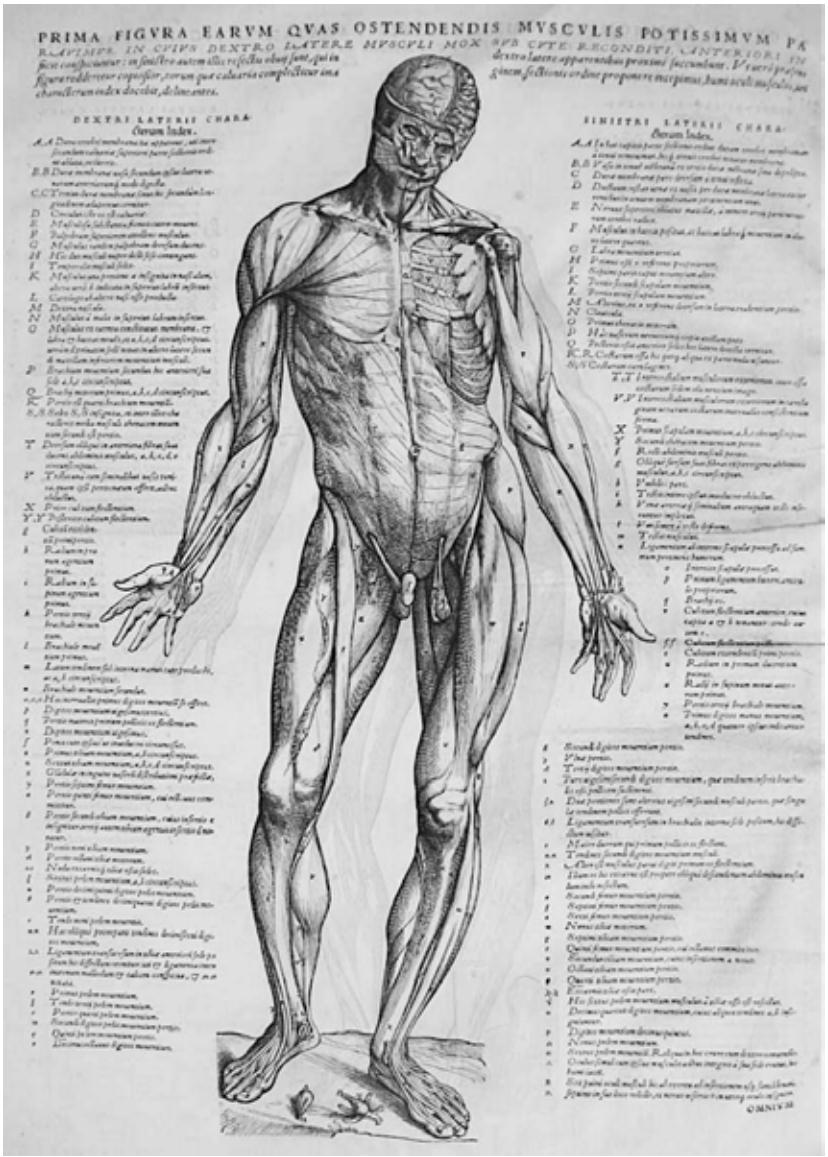

Figure 2. The muscular system illustrated by Andreas Vesalius, *De Humani Corporis Fabrica Librorum Epitome;* University of Glasgow, *Vesalius*, http://special.lib.gla.ac.uk/exhibns/month/sep2002.htm

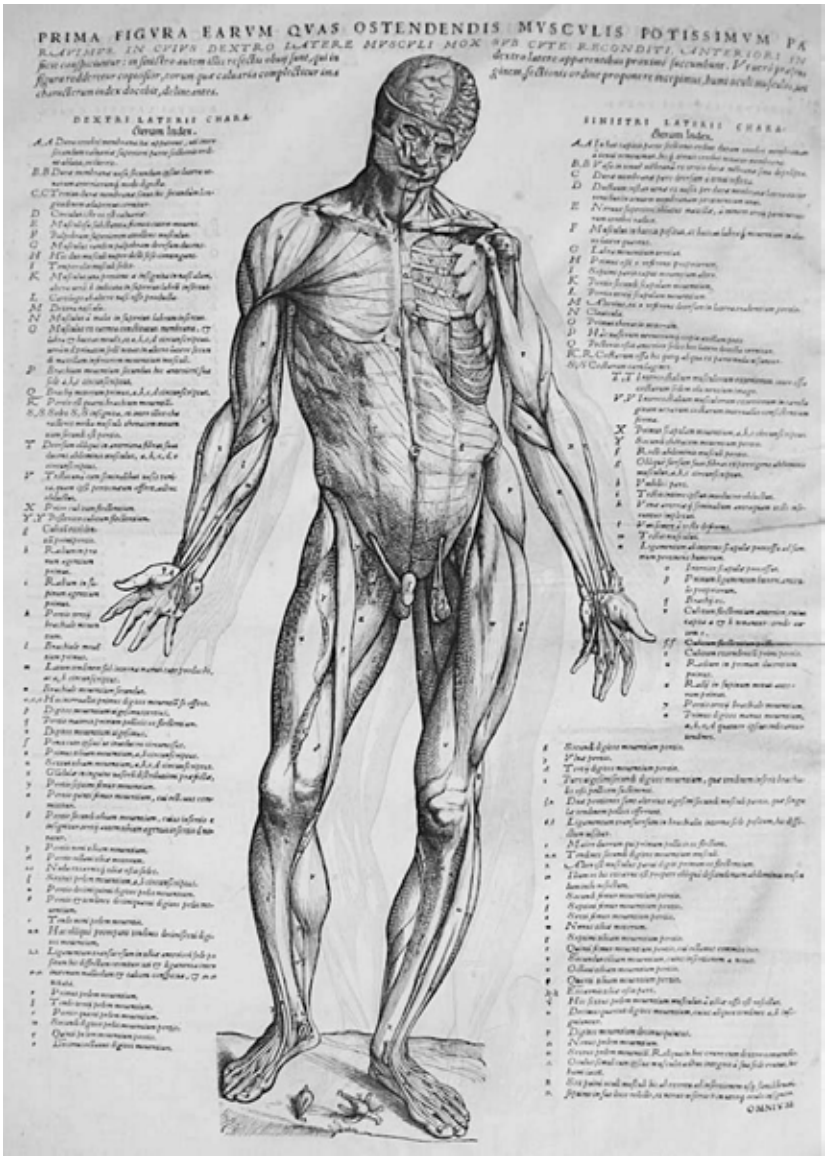

Figure 3. The deep layers within the muscular system illustrated by Andreas Vesalius, *De Humani Corporis Fabrica Librorum Epitome;* University of Glasgow, *Vesalius*, http://special.lib.gla.ac.uk/exhibns/month/sep2002.htm

The preceding illustrations were intended for both students and anatomists studying medicine to visually dissect and observe the complexity of the human body in preparation for actual dissection. It is important to note that figure 2 and figure 3 are in chronological order as they appeared in the *Epitome*, and the main point of organizing the pages this way is to lead the students' methodical progression into the body layer by layer until the complete skeleton is exposed. For example, in figure 2, Vesalius illustrated the first and second layers of muscle in vivid detail of the male body. Each muscle fiber can be seen tucked away into other muscle fibers while simultaneously woven into the rib cage and other structural bones in the body. The left side of the body highlights the superficial muscles, while the right side reveals the deep muscles connected to the bones and nerves. As importantly, two columns of texts correspond to the two layers as shown to accommodate the reader's visual comprehension of the body.

These methods of cataloging the body in such a detail-oriented manner suggest a more technical and somewhat mechanical approach to the human body, in contrast to what the "Wound Man" demonstrated. Arranging the muscular system in layers allows medical students to look at the human body in a scientific way that is both easy to observe—in the absence of a live observation of a human body—and conceivable with the organized labeling of each muscle group and bones through the texts being used (Fountain 54-55). Similarly, in figure 3, Vesalius drew the third layer of muscles and some of the previously covered bones in figure 2. In addition, the mandible (jawbone), clavicle (collar bone), the humerus (the forearm bone), and the complete rib cage are exposed, while the previous layers of muscles (figure 2) have been peeled away. The resulting effect is a more in-depth look at the body's supportive skeletal system interacting with a portion of the deep muscles wrapping around certain bones. Consequently, the body is understood to be a multilayer system of intricate arrangements of organs and tissues that result in physical functions essential to life. As a result, the physicality of the human body is enhanced through Vesalius' works with increased accuracy and details that provide for a more accurate understanding of the human body and how it works.

While illustrating serves as a means for Vesalius to record his anatomical findings and publicize his teachings, he also manipulated the visual rhetorical strategy to emphasize the attractive features of the human body. Through the arrangements of muscles and bones and the complexity that the individual systems work together, Vesalius highlighted the beauty of the human body and emphasized the importance of anatomical observation through human dissections. This stylized physique accentuates the body's beauty standards that influence European artists during the Renaissance. The cultural values associated with a better appreciation of fine arts and the human body during the Renaissance ultimately influenced Vesalius' works. The elaborate illustration of the human body and the cataloging of the individual body parts add to the realism and the aesthetics, as well as contribute to a more scientifically accurate

representation of the human body. These factors of enhanced aesthetics and realism provide a much more fleshed out approach to studying the human body and help medical students to see the body more accurately as well as in an idealized structure. The compartmentalization combined with the realistic illustration of the body serve to also represent the human body in a complete and artistically appealing sense that appeals to medical practitioners who used Vesalius' illustrations to deepen their knowledge of the human body.

The development of human anatomy illustrations continued with enhanced knowledge as well as advanced technologies. Henry Gray, a British anatomist in the 19th century, became prominent with his published book *Gray's Anatomy, Descriptive and Surgical*, which earned him his election to the Royal Society ("Henry Gray"). After Henry Gray's monumental work, in the 20th century, Max Brödel was another important figure within the medical illustration field. Essentially, Brödel's realistic illustrations, such as his contributions in Harvey Cushing's "Surgical Experiences with Pituitary Disorders," contributed to greater medical knowledge for the field of neurosurgery (Patel et al. 185). The works of both of these influential anatomists have continued to educate today's generation of medical students, with information being more accessible due to technological advancement in the 21st century. Medical students today can access traditional textbook information and virtual knowledge released on the internet, which provides vast amounts of information that can be accessed on smart devices with a swipe or touch of a button. Medical illustrations have also changed due to increasing medical knowledge and becoming digital, most commonly in three-dimensional imaging and animation.

The following 3-D medical diagram was created by AnatomyZone in the form of an instructional video released on YouTube in which the creator comments throughout the video. The public website called AnatomyZone was created by Peter de Souza and Jack Hurley, both medical doctors. AnatomyZone was "founded on the idea that anatomy should be interactive, 3 dimensional and fun!" and asserts that all anatomy videos released are free for the public (de Souza and Hurley). Although freely accessible for all types of viewers, the contents produced by AnatomyZone specifically appeal to medical students who are studying anatomy and want to supplement their education. Using YouTube as a platform to reach millions of people, de Souza and Hurley have released over 187 videos and accrued over 53,319,965 views, 25,000 registered users on their website, and 604,000 subscribers.

Figure 4. The biceps brachii and adjacent muscles, "Biceps Brachii | Muscle Anatomy" by Peter de Souza and Jack Hurley; *YouTube*, 28 Feb. 2018, https://www.youtube.com/watch?v=MWuF57uNC0M

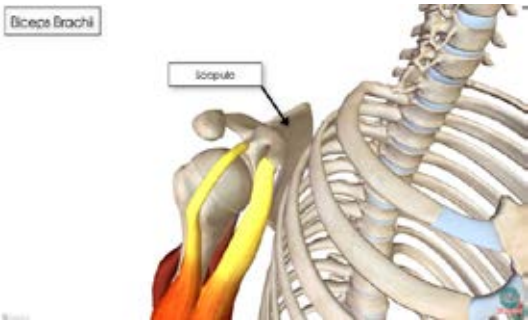

Figure 5. The scapula bone and biceps brachii, "Biceps Brachii | Muscle Anatomy" by Peter de Souza and Jack Hurley; *YouTube*, 28 Feb. 2018, https://www.youtube.com/watch?v=MWuF57uNC0M

The following video that I have selected to discuss exhibits many advanced rhetorical techniques made possible by the use of technology. In the "Biceps Brachii | Muscle Anatomy" video, Jack Hurley, as the instructor, first introduces the term "biceps brachii" and breaks down the structure of the biceps in relation to other bones and muscles. In this video, since the bicep is the main subject, only the upper right portion of the human body is shown. The muscle biceps brachii is highlighted in red and yellow, brighter than any of the colors of the parts surrounding it, in order to draw the attention of viewers to the subject matter (figure 4). The video then hovers over to the top of the biceps brachii as Hurley explains the muscle's extension from the scapula (figure 5). The movement from perspective to perspective within the video arranged to be in sync with the acoustic commentary serves to improve visual comprehension by targeting both the visual sense and the aural sense, and, at the same time, contains a comprehensive approach to observing the body through virtual reality. This transition results in a portion of the shoulder muscle disappearing to reveal the tucked away superior strands of biceps brachii that attach to the scapula bone. At each perspective of the diagram, visual effects are used to hide certain portions of the diagram, as evident in the disappearance of muscle groups in order to reveal the contents beneath. Labels and arrows throughout the video pop up as Hurley mentions various terms and explains the structure and function of the biceps brachii. As Hurley continues to elaborate on the origin of the muscle from the coracoid process at the time mark 1:07, the previously white 3-D bones became transparent and reveal the "coracoid" labeled bone protrusion underneath.

Figure 6. The musculocutaneous nerves near the biceps brachii, "Biceps Brachii | Muscle Anatomy" by Peter de Souza and Jack Hurley; *YouTube*, 28 Feb. 2018, https://www.youtube.com/watch?v=MWuF57uNC0M

The video also demonstrates the complexity of arrangement using animation of small details woven into the 3-D diagram. At the time mark 3:38, the video introduces another element on the bottom left-hand side of the video:

a gray box with a 3-D animated male model in two different perspectives. Hurley, at this moment, explains the action of the biceps as the animation of the man raises his arms, demonstrating the flexion of the elbow. Then at the mark 4:08, the gray box now shows the supinating of the forearm, but this time a skeletal body can be seen on top of the man, paralleling the twisting of the forearms. This addition serves to aid the viewer's visual comprehension of the specific action of the muscle and the related structures that work with the muscles to produce that action. The collective result from arranging a human figure with the movements of the forearm containing the muscles and animation of the muscle contractions is that the viewers get a complete visual understanding of how the action works. Therefore, the complexity lies in the ways Hurley uses technology to pair additional images and visual aids to make the information easier to digest for medical students. Hurley then addresses the specific nerve supply to the biceps as the video zooms in on the biceps and the humerus bone beneath it. In figure 6, each individual strand of nerve (the Musculocutaneous Nerve) can be observed in a bundle, stemming from the "lateral cord of the brachial plexus" that surrounds the humerus bone. With increasing complexity of information, the diagram continues to be manipulated by visual effects while Hurley talks more about the muscle. The complexity is evident in how visual effects are used to indicate the locations of the nerves relative to the muscle. Each strand of the nerves is shown as well as how they wrap around the bones and on top of each other. This organization of the nerves mirrors the realistic nature of the nerves in the human body and provides an accurate observation for medical students learning about the complete anatomy of the biceps.

The rhetorical concern of 3-D visual arrangement arises in these modern types of illustration. 2-D illustrations mostly lack the visual effects advantage that a video of a 3-D illustration has. In a video, the creator has more power in delivering the information to the viewers given the control of how he or she wants to arrange the elements and determine their behavior in the video, most of which a 2-D illustration is limited to an immotile and flat surface with little room to manipulate. The visual effects draw the viewers' attention to certain parts of the video and isolate their perception to what is being shown (as explained above of the use of transparent effects), thereby influencing their understanding of the materials. The use of visual effects consequently facilitates the acquisition of complex medical information required of medical students to understand through the use of effective arrangements and compositions of the body parts. The evolutionary advantage of this type of illustration is that medical practitioners can see another dimension of the human body, one that can be manipulated through technologies so that certain body parts are emphasized for various learning purposes. Equally important, the use of a voiceover in a video format allows the creator/author to easily deliver the learning content to medical students and practitioners by integrating auditory cues with visual information. Therefore, the visual rhetorical strategies used in making a 3-D model are

supplemented by audio as a way to train medical students how to observe the human body in a more complex manner that a 2-D drawing alone cannot offer.

The degree to which the above illustrations are effective at medical communication relies on the rhetorical methods used. The advances in medical knowledge and technology allowed medical illustrations to transition from traditional pencil-and-paper drawings to contemporary 3-D diagrams. The rhetorical arrangements present in all three artifacts, therefore, are influenced by the technical skills applied. First, when Galenic medical beliefs influenced the medical practices during the Medieval period (Bovey), the "Wound Man" presents a narrative of the patient in both the arrangements of weapons and the humanity that exists in the simplified drawing style of the face and body. However, the drawing was anatomically flawed and misrepresented the body. Vesalius's illustrations, on the other hand, improved greatly in terms of anatomical accuracy. Since the illustrations were recorded from human dissections, the arrangements of the muscular system in layers provide both a methodical approach to performing dissections and the correctly constructed human body and provides an accurate study, making them a reliable resource for medical students to use in preparation for a real medical setting. In addition, with technological advancements, the use of computerized visual effects in Hurley's "Biceps" video makes it easy for modern medical students to get a complete look at the outer and inner biceps structures. The voice narration also serves to facilitate the intake of information for medical students while watching the video. Each new and improved technology allows for not only a more descriptive visualization of the human body but also a critical level from which the body can be understood. The effectiveness of the rhetorical strategy used in these illustrations is attributed to the technical skills as well as the political and cultural values that changed over time. It makes sense to infer that increased technical skills result in accurate medical diagrams that contribute to enhanced medical knowledge of the human body.

Studying these illustrations and analyzing the visual rhetorical strategies used in making them effective within the medical field shows us the changes in the ways visual rhetoric has been used in the representation of the human body. These noted changes suggest that human anatomy illustrations adopted different rhetorical approaches as time progressed and technology became more advanced. Advancing technologies and changing cultural and political values collectively influenced the illustration styles highlighted in each artifact discussed in this essay. While visual rhetoric is not exclusive to the use of illustrations, its theories and methods are constantly advancing and adapting to new and inventive visual media that are utilized to better suit the needs of medical students and practitioners who will use these visual aids to supplement their understanding of the human body and their practices in the medical world.

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Works Cited

Agostino. "Who Was Pseudo-Galen?" *Medicine, Ancient and Modern Blog*, 12 Apr. 2015,www.medicineancientandmodern.com/2015/04/12/who-was-pseudo-galen/.

Bovey, Alixe. "Medicine in the Middle Ages." *The British Library*, 30 Apr. 2015, https://www.bl.uk/the-middle-ages/articles/medicine-diagnosis-and-treatment-in-the-middle-ages

Charlier, Philippe, et al. "A Glimpse into the Early Origins of Medieval Anatomy through the Oldest Conserved Human Dissection (Western Europe, 13(th) c. A.D.)." *Archives of Medical Science*, vol. 10, no. 2, 2014, pp. 366-73. doi:10.5114/aoms.2013.33331

de Souza, Peter, and John Hurley. *AnatomyZone*, http://anatomyzone.com/

Dominiczak, Marek H. "Andreas Vesalius: His Science, Teaching, and Exceptional Books." *Clinical Chemistry*, vol. 59, no. 11, 2013, pp. 1687-1689, doi:10.1373/clinchem.2012.199968

Foss, Sonja. "Framing the Study of Visual Rhetoric: Toward a Transformation of Rhetorical Theory." *Defining Visual Rhetorics*, edited by Marguerite H. Helmers and Charles A. Hill, Lawrence Erlbaum Associates, 2004, pp. 303-313.

Fountain, T. Kenny. "Anatomy Education and the Observational-Embodied Look." *Medicine Studies*, vol. 2, no. 1, 2010, pp. 49–69., doi:10.1007/s12376-010-0040-6.

Fox, Randy. "Visual Rhetoric: An Introduction for Students of Visual Communication." *AIGA Colorado*. 9 Jan. 2013, colorado.aiga.org/2013/01/visual-rhetoric-an-introduction-for-students-of-visual-communication/.

Hajar, Rachel. "Medical Illustration: Art in Medical Education." *Heart Views*, vol. 12, no. 2, 2011, pp. 83-91. doi:10.4103/1995-705X.86023.

"Henry Gray (1826/7-61)." *Brought to Life: Exploring the History of Medicine*, Science Museum, broughttolife.sciencemuseum.org.uk/broughttolife/people/henrygray.

Patel Smruti K., et al. "Max Brödel: His Art, Legacy, and Contributions to Neurosurgery Through Medical Illustration." *Journal of Neurosurgery*, vol 115, no. 1, 2011, pp. 182-90. doi:10.3171/2011.1.JNS101094

Rosner, Mary. "Theories of Visual Rhetoric: Looking at the Human Genome." *Journal of Technical Writing and Communication*, vol. 31, no. 4, 2001, pp. 391–413. doi:10.2190/bx7b-nvrj-kf3k-bybl.