SHAPING BETTER PHYSICIANS?:
THE ROLE OF THE VISUAL ARTS IN MEDICAL EDUCATION

A Thesis
submitted to the Faculty of
The School of Continuing Studies
and of
The Graduate School of Arts and Sciences
in partial fulfillment of the requirements for the
degree of
Doctor of Liberal Studies

By

W. Taylor Johnson, M.F.A.

Georgetown University
Washington, D.C.
March 29, 2010
SHAPING BETTER PHYSICIANS?:
THE ROLE OF THE VISUAL ARTS IN MEDICAL EDUCATION

W. Taylor Johnson, M.F.A.

Chair: Diane Apostolos-Cappadona, Ph.D.

ABSTRACT

Within the medical community, the physical diagnosis is understood as a “perishable” skill that steadily diminishes after physicians complete their medical training and enter clinical practice, particularly as technological resources have become increasingly sophisticated and accessible. Further, medical curricula are now perceived as too narrowly focused on the practical science of medicine at the expense of those cultural values that inform and support ethical behavior. It is my contention that integration of the visual arts into medical curricula not only enhances the quality and durability of diagnostic skills but also proves essential to a physician’s approach to those ethical questions encountered daily in clinical practice.

A survey of the literature reveals that U.S. medical schools generally place value on the integration of the humanities into medical education. Following the introduction of the study of literature and literary methodology into medical school curricula in the early 1970s, the potential value of introducing other humanities-based disciplines was explored and began to proliferate. Surveys conducted by researchers at Tulane in 2001 and 2002 found widespread exposure to a variety of the arts in U.S. medical education.
Studies at Yale in 2001, and Harvard in 2008, provide compelling evidence to support the value of the visual arts in particular in medical education.

In November 2009, I distributed a survey to U.S. medical schools to gauge the extent to which they have considered the potential value of visual-arts related instruction, the availability of such offerings, and any outcome assessments. The survey results reveal no general consensus. While students and faculty involved in such initiatives generally recognize value added, others remain skeptical, in part due to a lack of data demonstrating that the exclusion of such initiatives would prove detrimental to medical education. Obstacles cited include rigid medical curricula and lack of resources. As few schools have formally evaluated outcomes of such initiatives, many of the observations remain purely anecdotal.

In light of these facts, the intent of this study is to demonstrate the value and importance of humanism in medical education, and suggest ways by which visual arts-related educational initiatives may be implemented.
For My Twin Pillars:
Ruth Rebecca Embrey Johnson
and
Vicente Artur Carneiro
My pursuit of the Doctor of Liberal Studies (DLS) degree at Georgetown University has been one of the most challenging – and most rewarding – journeys I have ever embarked upon. Having reached my destination with the completion of this manuscript, there are countless individuals whose support, advice, encouragement, and constant enthusiasm have been instrumental along the way, and to whom I will be forever grateful.

I would be remiss if I did not acknowledge first and foremost Phyllis O’Callaghan, Ph.D., former Associate Dean and Director of the Graduate Liberal Studies Program at Georgetown University. Dr. O’Callaghan’s advice and words of wisdom were truly uplifting, energizing, and inspirational; her long-standing commitment and dedication to an interdisciplinary, human-values based approach to liberal studies at Georgetown University is noteworthy and commendable. Thank you, Dr. O’Callaghan, for having faith in me and my abilities. I hope, with all humility, I have made you proud.

As faculty advisor for the DLS when I first entered the program in 2006, Chester L. Gillis, Ph.D., Professor of Theology and Dean of Georgetown College, provided steadfast guidance and support; thank you, Dr. Gillis, for helping guide my path.

Special thanks go to Terrence P. Reynolds, Ph.D., Associate Professor and Chair of Theology, who served as my DLS faculty advisor during my later years in the program. Dr. Reynolds’ door was always open, and he was always welcoming. His sincere, genuine interest and personal investment in the success of the DLS students in
his charge is abiding and palpable. Much of the credit for my success in the DLS program rests with Dr. Reynolds, for which I can never thank him enough.

Those who instructed me in my foundational and elective coursework provided many of the necessary tools that allowed me to forge ahead with my research, and to broaden the scope of my vision and understanding. In addition to Drs. Reynolds and Apostolos-Cappadona in their capacity as course instructors – and whom I have acknowledged herewith in other capacities – my thanks go to: Ronald M. Johnson, Ph.D., Professor Emeritus of History; Francis J. Ambrosio, Ph.D., Associate Professor of Philosophy; Michael Duggan, Ph.D., Library Assistant, U.S. Supreme Court, and Adjunct Instructor, Liberal Studies Program; Anthony J. Tambasco, Ph.D., Professor of Theology, and Associate Dean, Graduate Liberal Studies Program; James Collins, Ph.D., Professor of History; Edward J. Ingebretsen, Ph.D., Professor English; and Frederick J. Ruf, Ph.D., Associate Professor of Theology.

I owe a special debt of gratitude to Anne Ridder, Assistant Dean for the Graduate Liberal Studies Program, for her administrative and technical support over the last four years – not to mention her abundant warmth and encouragement. Thanks also to Marti Patchell, Special Assistant to Edmund D. Pellegrino, MD, at Georgetown University’s Kennedy Institute of Ethics and Center for Clinical Bioethics, for her consistent enthusiasm and heartfelt support. I would also like to thank the various librarians at the U.S. Library of Congress – as well as Georgetown University’s Lauinger Memorial Library, Dahlgren Memorial Library, and Woodstock Theological Center Library – for
assisting me with finding the various resources necessary to complete my research. Thank you for your patience and understanding!

Thanks go to Joel T. Katz, M.D., Director of the Medicine Residency Program at Brigham and Women’s Hospital and Assistant Professor of Medicine at Harvard Medical School, and to Paul Rodenhauser, M.D., Professor Emeritus of Psychiatry and Neurology, Tulane University School of Medicine, New Orleans, for their permission to reprint data from their research in this manuscript – as well as for their comments and words of encouragement. My appreciation is also extended to Rita Charon, M.D., Ph.D., Professor of Clinical Medicine and Director of the Program in Narrative Medicine at the College of Physicians and Surgeons of Columbia University in New York City, for her words of encouragement during my data gathering for this research project.

I would like to thank Eric Avery, M.D., Clinical Associate Professor of Psychiatry and Behavioral Sciences and Associate Member of The Institute for the Medical Humanities at The University of Texas Medical Branch in Galveston, Texas, for allowing me to reprint his photographs in this manuscript and for recommending additional resources, and for his words of support and encouragement in my research efforts advocating expansion of the medical humanities. Thanks also to Betty Edwards, Ph.D., Professor Emeritus of Art at California State University in Long Beach, and the Penguin Group U.S.A., for granting permission to reprint illustrative materials from The New Drawing on the Right Side of the Brain.
A very special thank you is extended to artist/photographer Joel-Peter Witkin for his permission to reprint a number of his photographs in this manuscript, and for his best wishes on the success of my research.

I would like to thank Marc D. Schwartz, Ph.D., Associate Professor of Oncology, and Leader of the Cancer Control Program at Georgetown University’s Lombardi Comprehensive Cancer Center, for serving on my committee, and for his assistance with the design of my survey and subsequent data analysis.

I feel particularly honored and blessed to have had as a senior member of my thesis committee Edmund D. Pellegrino, M.D., John Carroll Emeritus Professor of Medicine and Medical Ethics, Senior Research Scholar, Kennedy Institute of Ethics, Center for Clinical Bioethics, Georgetown University. I first met Dr. Pellegrino thirty years ago – when I entered The Catholic University of America as an undergraduate student – in his capacity as University President. I have long admired Dr. Pellegrino, and am truly thankful that he agreed to serve on my committee without hesitation. His detailed and prompt feedback was insightful and thought provoking, and inspired me to challenge my own pre-conceptions and explore beyond the limits of my personal intellectual comfort zone. I will forever hold the highest respect and admiration for Dr. Pellegrino, and extend herewith my sincerest thanks and appreciation.

Abundant thanks and deep gratitude is reserved for my Doktormutter, Diane Apostolos-Cappadona, Ph.D., Adjunct Professor, Prince Alwaleed Bin-Talal Center for Muslim-Christian Understanding, and Core Faculty for Visual Culture in Graduate
Liberal Studies, Georgetown University, for serving as my mentor and thesis advisor. Words cannot express how grateful I am to have had the opportunity to work with this exceptionally gifted scholar. Her insight, guidance, and insistence on quality fostered the ideal environment for me to perform to the best of my abilities. Further, her warm and caring spirit helped me traverse the many bumps and obstacles that arose along my path. I also feel quite fortunate that as I arrive at the end of this long and arduous journey, I have found a friend. Merci beaucoup, toujours!

I also wish to thank those members of my family, friends, and colleagues who have offered their support and words of encouragement over the past four years. There are too many of you to name here, but know that you are remembered and appreciated.

I wish to acknowledge my guiding light, St. Francis of Assisi. As I embarked upon my personal journey to complete my doctoral degree, I kept his words always before me to illuminate my path: Start by doing what's necessary; then do what's possible; and suddenly you are doing the impossible.

A truly gifted, talented, and inspired artist in every sense of the word, Vicente Artur Carneiro has been my most steadfast inspiration for the past twenty years. I thank him for his patience, support, and understanding, and for always expressing his belief in my ability to succeed and excel. Eu te amo, para sempre, meu carinho...

Lastly, I wish to thank my late mother, Ruth Rebecca Embrey Johnson, who went to her rest before my doctoral studies were completed, and to whom – along with Vicente Artur Carneiro – this manuscript is lovingly dedicated. She instilled in me that no wish
was unfathomable, no goal unreachable, and no dream unattainable. For as long as I can remember, her belief in me was unwavering, her respect unquestionable, and her love my greatest joy. Thanks to her enduring love, Charlie Brown finally kicked that football...
If I were to prescribe one process in the training of men
which is fundamental to success in any direction,
it would be thoroughgoing training in the habit of accurate observation.
It is a habit which every one of us should be seeking ever more to perfect.

– Eugene G. Grace

A man, to be greatly good, must imagine intensely and comprehensively;
he must put himself in the place of another and many others;
the pains and pleasures of his species must become his own.
The great instrument of moral good is the imagination.

– Percy Bysshe Shelley
TABLE OF CONTENTS

COPYRIGHT PAGE ........................................................................................................... ii

ABSTRACT ......................................................................................................................... iii

DEDICATION ....................................................................................................................... v

ACKNOWLEDGEMENTS ..................................................................................................... vi

EPIGRAPH ............................................................................................................................ xii

INTRODUCTION .................................................................................................................. 1

CHAPTER I. THE CURRENT STATUS OF THE VISUAL ARTS IN CONTEMPORARY U. S. MEDICAL SCHOOL CURRICULA.................................................................................................................. 9
   Training the Eye: The Harvard Study................................................................. 15
   The Humanities and Medicine: “Teaching” Human Values.............. 21
   Focus on the Visual Arts and Medical Education........................... 43
   Visual Arts and Medical Education Today: Survey Results........ 58

CHAPTER II. CONCURRENT HISTORICAL DEVELOPMENTS IN THE SCIENCES AND THE ARTS ................................................................................................................................. 73
   The Renaissance: Man as the Measure of All Things ................. 73
   The Scientific Revolution and The Mechanization of the Natural World ............................................................. 98
   The Severance of Man from God During the Enlightenment .... 106
   Postmodern Distrust in Theories and Ideologies ....................... 116

CHAPTER III. FORMULATION OF THE MODERN MEDICAL CURRICULUM ......................... 126
   The Roots of Western Medicine................................................................. 127
   The Spread of Rational Medicine............................................................. 133
   Medicine in the New World................................................................. 140
   U.S. Medical Education: Flexner and Beyond........................... 147
   U.S. Medical Education in the Era of Managed Care ............... 151

CHAPTER IV. VISUAL ARTS EDUCATION TO DEVELOP “BETTER” PHYSICIANS ............. 158
   The Breasts of Night: Sculpture, Human Anatomy, and Physical Diagnosis ....................................................................... 161
   The Eye of the Beholder: The Portrait and Observational Diagnosis .................................................................................. 166
   St. Anthony’s Fire: Learning Empathy through Paintings ....... 172
CHAPTER V. INTEGRATING VISUAL ARTS EDUCATION INTO MEDICAL SCHOOL CURRICULA

Summary of Findings and Curricular Proposals ........................................ 224
Where Does It Hurt?: Improving Diagnostic Skills .................................. 236
The Paragon of Animals: Human Anatomy ............................................. 245
The Kindness of Strangers: Behavioral Psychology .................................... 249
Walk beside Me: Ethics and Doctoring ....................................................... 252

APPENDICES ................................................................................................. 258

APPENDIX A: FIGURES AND TABLES .......................................................... 258

APPENDIX B: ILLUSTRATIONS ................................................................. 278

APPENDIX C: PERMISSIONS ....................................................................... 335

BIBLIOGRAPHY ............................................................................................. 345
INTRODUCTION

Ask a young child to draw a tree, and they will likely separate three crayons from their array of colors: the trunk and branches will invariably be rendered in a solid shade of chocolate brown, the leaves and grass a verdant, vivid green, and the sky the requisite celestial pastel blue.

Look carefully at a real tree trunk in nature; how often do you actually see the color brown? A California Sequoia Redwood may come close, with its hues of rusty sienna and umber; a birch or beech tree, by contrast – with its ashen gray bark – contains little if any color recognizable as brown at all. More than likely, you will see a variety of colors, depending upon the type of tree; in most cases, you will rarely find a color even remotely similar to the brown chosen by the child from their box of crayons.

Ask a young child to draw an ocean or a lake, or falling rain, or water running from a faucet; they will inevitably select a bright blue, or possibly an aqua. Unless the child has been exposed to the vibrant emerald-sapphire seas of the tropics, or the hauntingly beautiful cerulean glacial lakes of the Canadian Rockies, it is unlikely that the child sees vivid blue or aqua water on a daily basis – particularly falling from the skies, or flowing from a faucet or in their drinking glass.

From an early age, the child has acquired a visual language, and is therefore not truly drawing what is actually seen in nature – whether it is a visualized impression of a tree or lake in the mind’s eye, or an actual tree or lake in front of them. The child has learned: water and the sky are blue, tree trunks are brown, grass and leaves are green, and
For most people, the basic precepts of this visual language learned in childhood remain with them into adulthood and throughout their lives. Ask the average adult to draw a tree – someone without visual arts training beyond what is typically taught in K-12 – and the colors selected would, in all probability, not be that much different from those chosen by a child. More than likely, the adult will be hesitant to even consider the task, voicing the oft-heard aphorism: “I can’t even draw a straight line.” By comparison, most young children will take to the task immediately, having not yet been conditioned to be self-conscious about the accuracy and adeptness of their rendering skills.

Page through a book on 19th century landscape painting – or visit a gallery or museum with a collection of landscapes – and examine the images closely. In the works of Hudson River School artists such as Thomas Cole, Albert Bierstadt, and Frederic Church, one may immediately perceive vibrant blue waterfalls and rivers winding through majestic purple mountains and sylvan green forests. Upon closer examination, one would likely notice a plethora of colors are actually used to paint the rivers.

---


2 “At least part, and perhaps much of what we see is changed, interpreted, or conceptualized in ways that depend on the person’s training, mind-set, and past experiences. We tend to see what we expect to see or what we decide we have seen. This expectation or decision, however, often is not a conscious process. Instead, the brain frequently does the expecting and the deciding, without our conscious awareness, and then alters or rearranges – or even simply disregards – the raw data of vision that hits the retina.” From: Betty Edwards, The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence. 2nd rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999): xxv.
mountains and foliage. The immediate impression may be of the colors “blue” and “green,” but the actual palette of colors employed by the artist is much richer and more diverse, with the interplay of different colors used to create an overall visual effect.

These modest examples help to illustrate that the visual perceptions of artists are commonly considered to be different from that of most people. Whether inherent or learned, seeing is essential not only to visual artists, but also to those engaged in other endeavors as well; physicians, for example, rely on their powers of observation as a crucial diagnostic tool. Is the visual awareness and acumen of the physician comparable to that of the visual artist, and can one learn to enhance visual awareness from the other? Can a physician’s diagnostic skills be improved through honing their visual awareness abilities by way of a curriculum that incorporates the visual arts? Can the integration of the visual arts into medical school curricula help to shape better physicians – more empathetic³ and ethical⁴ – in clinical⁵ practice?


⁵ “Involving or concerned with the direct observation and treatment of living patients; of, relating to, based on, or characterized by observable and diagnosable symptoms of disease; applying objective or standardized methods (as interviews and personality or intelligence tests) to the description, evaluation, and modification of human behavior,” s.v. “clinical.” http://www.merriam-webster.com/medical/clinical (accessed January 10, 2010).
With these and other related questions in mind, this research project focuses on the following:

• an analysis of the extent to which medical schools in the United States have considered or implemented visual arts education into their preclinical curriculums in an attempt to improve clinical diagnostic skills and promote humanism\(^6\) – specifically empathy and ethical behavior – in clinical practice;

• an exploration of the historical interaction between science and the humanities,\(^7\) with particular focus on the unique interplay between – as well as concurrent/complementary developments in – medicine and the arts;

• an investigation into the roots of medicine as it is currently taught and practiced in the Western hemisphere, and the development of the contemporary medical curriculum in the U.S.;

• providing examples of how the visual arts can be utilized to improve visual awareness and competency in medical students – thus enhancing the quality and durability of diagnostic skills – and foster humanism and empathy in physicians in their approach to ethical questions encountered daily in clinical practice; and

• proposing approaches to the integration of visual arts education into the curricula of U.S. medical schools in an effort to shape better physicians through the improvement of visual awareness and diagnostic skills, and the enhancement of humanism, empathy, and ethical behavior in clinical practice.

I have purposely chosen to address both the enhancement of physical diagnosis skills as well as the development of humanism and empathy – rather than one or the other – as the


\(^7\) “The branches of learning (as philosophy, arts, or languages) that investigate human constructs and concerns as opposed to natural processes (as in physics or chemistry) and social relations (as in anthropology or economics),” s.v. “humanities.” http://www.merriam-webster.com/dictionary/humanities (accessed January 10, 2010). Humanities also implies study of the human condition employing analytical or theoretical approaches.
value gained through the role of the visual arts in medical education is interrelated to both. This research project could easily have focused on a discussion of a single artist and the interface between their art and the study of medicine, such as Leonardo da Vinci or contemporary photographer Joel-Peter Witkin. At an even more focused and detailed level of inquiry, this project could have concentrated on one specific work, such as Michelangelo’s sculpture of Night from the Medici Chapel in Florence, Italy, or Matthias Grünewald’s Isenheim Altarpiece. Each of these artists and their works—as well as those of many others—will be discussed in this thesis. Within the context of studying human values from a liberal studies perspective, I deemed it appropriate not too focus the topic too narrowly, which would be more in line with a specific discipline-based doctor of philosophy (Ph.D.) course of study. The intention of this research endeavor is to broadly explore the interface between the visual arts and medical education for the purpose of identifying any potential value added with regard to enhanced diagnostic skills and improved humanism and empathy in clinical practice. In an effort to understand the complexity of issues related to this endeavor, a historical perspective of the interrelationship between medicine and the visual arts has been provided as an appropriate foundation for providing the necessary context for this study.

I should also clarify that by medical education, I am not summarily limiting such initiatives to the undergraduate training of medical students. The role of the visual arts in medical education is the primary focus of my research; this is geared specifically to
undergraduate medical education, but by no means excludes residency training and continuing medical education for physicians already established in clinical practice.

This inquiry raises a number of pertinent, intriguing, and complex questions. The worlds of medicine and art each have their own unique languages, their own paradigms and semiotic circles; how can one reconcile these perceived conflicts through the integration of visual arts and medical education? Medical curricula are notoriously rigorous, and have been developed and refined over many years, presently comprised of what is deemed absolutely essential for the future practicing physician; does the current curriculum of most U.S. medical schools focus too narrowly on facts and knowledge? Is there room for a more comprehensive approach as might be offered through the integration of visual arts education, and what value is placed on such an approach? Is it possible that a synthesis of empiricism and rationalism can be achieved by this educational interaction between medicine and art? Can such a synthesis help to shape better physicians – physicians who are more empathetic and ethical?

---

8 “A general philosophical theory of signs and symbols that deals especially with their function in both artificially constructed and natural languages and comprises syntactics, semantics, and pragmatics,” s.v. “semiotic.” http://www.merriam-webster.com/dictionary/semiotic (accessed November 12, 2009).

9 A semiotic circle can be defined as a contained system of signs, symbols, and language or communication (e.g., scientific language, artistic language, etc.).

10 “A former school of medical practice founded on experience without the aid of science or theory; the practice of relying on observation and experiment especially in the natural sciences; a theory that all knowledge originates in experience,” s.v. “empiricism.” http://www.merriamwebster.com/dictionary/empiricism (accessed January 30, 2010).

11 “Reliance on reason as the basis for establishment of truth; a theory that reason is in itself a source of knowledge superior to and independent of sense perceptions; a view that reason and experience rather than the nonrational are the fundamental criteria in the solution of problems,” s.v. “rationalism.” http://www.merriam-webster.com/dictionary/rationalism (accessed January 30, 2010).
It is also of importance and significance to clarify what this research project will not attempt to do. This project is not intended to explore or provide an iconography\textsuperscript{12} or iconology\textsuperscript{13} of the visual arts in relation to medicine, medical education, or the medical sciences. This study is also not intended to address the applicability of art therapy or art appreciation within the context of medical education. Rather, it is primarily focused on assessing what potential value may be derived through the integration of visual arts education into medical education, for the specific purpose of improving visual awareness and diagnostic skills, and enhancing humanism through increased empathy and ethical behavior of physicians in clinical practice.

My life partner, who is a professional artist, once related a story of a visit he and a friend took to Venice, Italy. Strolling along the city’s labyrinth of meandering canals, he fixated on a spot where water was lapping gently at the stone foundation of a building near the base of a bridge. He was transfixed by the complexity of texture and color; the darkly hued water, reflecting the dappled sunlight, contrasted with the corroded and crumbling stone and mortar – he was also captivated by impressions and sensations that cannot be readily verbalized. He immediately took out his sketchbook in an effort to make a visual record of what had captured his eye, and to jot down brief notes that would jar his visual memory for future recall. Witnessing his complete immersion in the

\textsuperscript{12}“Pictorial material relating to or illustrating a subject; the traditional or conventional images or symbols associated with a subject; the imagery of symbolism of a work of art, an artist, or a body of art,” s.v. “iconography.” http://www.merriam-webster.com/dictionary/iconography (accessed February 10, 2010).

moment, his friend asked: “What is it that you see? I don’t see it. Teach me how to see what you see…”
A sharp contrast can be made between science and art if one attends to the way they reach their truths. Scientists tend to make distinctions, refine divisions, use sharp and steady definitions, whereas the artists are inclined to encompass, unify, merge, bridge, combine. But if truth means, as it does, the conveying of the intent of an entire situation, of its general import or meaning as well as of the structure and interrelation of its parts, then art must be said to convey truth as surely as science does.

– Paul Weiss

In order to expound upon the means by which visual arts education might be utilized to improve diagnostic skills and promote humanism in physicians, it is important to evaluate the following: the extent to which medical schools in the United States have considered the issue; to what degree they have incorporated the visual arts – if at all – into the education of medical students; if the end result of such an approach is viewed as having “value added;” and, if any perceived or assumed “value added” outcomes have been formally assessed.

Before proceeding further with this investigation, it is necessary to clarify what is meant by “art,” and by the “visual arts” in particular. According to the Stanford Encyclopedia of Philosophy: “The definition of art is controversial in contemporary philosophy. Whether art can be defined has also been a matter of controversy. The philosophical usefulness of a definition of art has also been debated.” In The World of
Art, American philosopher Paul Weiss notes: “Aristotle’s definition of art, ‘a capacity to make, involving a true course of reasoning,’ is one of the oldest, most pithy and most influential that we have.”¹ For Aristotle, art was a means of providing an imitation of life and of the natural world. From the Latin “ars” – meaning “craft” or “skill” – the term “art” has classically been used in reference to a specific skill, such as “the art of medicine,” emphasizing technical aptitude over aesthetics.

Following the European Renaissance in the mid-17th century, an aesthetic understanding of art was emphasized, thus separating the fine arts – such as sculpture and painting – from the utilitarian applied and decorative arts – such as architecture, crafts, textiles, and design.² This understanding of art persisted well until the end of the 19th century. By the early 20th century – in great part in reaction to the devastation of the First World War – a variety of movements in the visual arts – such as Dadaism,³


² This is not to imply that the fine arts lacked skill, or that the applied and decorative arts lacked aesthetic value – rather, it is intended to demonstrate that “skill” no longer fully defined the meaning of “art,” and that aesthetic value was integrated into the definition and understanding of the arts, particularly of what came to be designated as the “fine arts.”

³ “An early twentieth century art movement which ridiculed contemporary culture and traditional art forms. The movement was formed to prove the bankruptcy of existing style of artistic expression rather than to promote a particular style itself. It was born as a consequence of the collapse during World War I of social and moral values which had developed to that time. Dada artists produced works which were nihilistic or reflected a cynical attitude toward social values, and, at the same time, irrational – absurd and playful, emotive and intuitive, and often cryptic. Less a style than a zeitgeist, Dadaists typically produced art objects in unconventional forms produced by unconventional methods. Several artists employed the chance results of accident as a means of production, for instance.” s.v. “Dada.” http://www.artlex.com/ArtLex/d/dada.html (accessed January 15, 2010).
Constructivism, Cubism, and Surrealism radically redefined the definition of fine art, removing it almost entirely from the realm of naturalistic representation and classical concepts and understandings of beauty.

Following the general upheaval resulting from the Second World War in Europe, the capital of the art world shifted from Paris to New York. With an evolving emphasis on commercialism, movements such as Conceptualism, Abstract Expressionism, and

---

4 “A modern art movement developed in 1917 by the Russian sculptor Vladimir Tatlin (1880-1938). The aim was to construct abstract sculpture suitable for an industrialized society, and the work pioneered the use of modern technology and materials such as wood, glass, plastics and steel.” s.v. “Constructivism.” http://www.artlex.com/ArtLex/Con.html (accessed January 15, 2010).

5 “One of the most influential art movements (1907-1914) of the twentieth century, Cubism was begun by Pablo Picasso (Spanish, 1882-1973) and Georges Braque (French, 1882-1963) in 1907. In Cubism the subject matter is broken up, analyzed, and reassembled in an abstracted form.” s.v. “Cubism.” http://www.artlex.com/ArtLex/c/cubism.html (accessed January 15, 2010).

6 “A twentieth century avant-garde art movement that originated in the nihilistic ideas of the Dadaist and French literary figures, especially those of its founder, French writer André Breton (1896-1966). At first a Dadaist, he wrote three manifestos about Surrealism — in 1924, 1930, and 1934, and opened a studio for "surrealist research." Influenced by the theories of the pioneer of psychoanalysis, Sigmund Freud (German, 1856-1939), the images found in surrealist works are as confusing and startling as those of dreams. Surrealist works can have a realistic, though irrational style, precisely describing dreamlike fantasies… Or, it could have a more abstract style.” s.v. “Surrealism or surrealist art.” http://www.artlex.com/ArtLex/s/surrealism.html (accessed January 15, 2010).

7 “Art that is intended to convey an idea or a concept to the perceiver, rejecting the creation or appreciation of a traditional art object such as a painting or a sculpture as a precious commodity. Conceptual Art emerged as an art movement in the 1960s… Concept art resulted in an art object being replaced by an analysis of it. Exponents of Conceptual Art said that artistic production should serve artistic knowledge and that the art object is not an end in itself.” s.v. “Conceptual art.” http://www.artlex.com/ArtLex/c/conceptualart.html (accessed January 15, 2010).

8 “A painting movement in which artists typically applied paint rapidly, and with force to their huge canvases in an effort to show feelings and emotions, painting gesturally, non-geometrically, sometimes applying paint with large brushes, sometimes dripping or even throwing it onto canvas. Their work is characterized by a strong dependence on what appears to be accident and chance, but which is actually highly planned. Some Abstract Expressionist artists were concerned with adopting a peaceful and mystical approach to a purely abstract image. Usually there was no effort to represent subject matter. Not all work was abstract, nor was all work expressive, but it was generally believed that the spontaneity of the artists' approach to their work would draw from and release the creativity of their unconscious minds. The
Pop Art\(^9\) dominated the American art scene. Toward the end of the 20th century, postmodernists thinkers sought to re-emphasize the aesthetic nature of art.

In light of these evolving understandings of the term, art can be broadly defined as an object, such as a painting or sculpture – or an experience, such as a performance – created by an individual, an artist – that stimulates the viewer, provokes contemplation, and holds aesthetic value.

In *The Nine Basic Arts*, Paul Weiss divides the arts into three triads: the spatial arts, comprised of architecture, sculpture and painting; the temporal arts, comprised of musicry,\(^{10}\) story, and poetry; and the dynamic arts, comprised of music, theater, and the dance.\(^{11}\) Using Weiss’ triads, the spatial and dynamic arts could be considered as comprising the visual arts. Thus, the visual arts can be broadly defined as creative works that are predominantly visual in nature, including: painting, drawing, printmaking, sculpture, photography, and film. A relatively fluid term, this may also be expanded to include architecture, performing arts, ceramics, and textiles. Chapter IV will provide further elaboration, by citing specific examples of those visual arts with particular

---

\(^{9}\) An art movement and style that had its origins in England in the 1950s and made its way to the United States during the 1960s. Pop artists have focused attention upon familiar images of the popular culture such as billboards, comic strips, magazine advertisements, and supermarket products.” s.v. “Pop art.” http://www.artlex.com/ArtLex/p/popart.html (accessed January 15, 2010).


\(^{11}\) Weiss, *Nine Basic Arts*, 118.
relevance and applicability to improving diagnostic skills and enhancing humanism within the context of medical education. Chapter II will include a discussion of humanism, liberal arts\footnote{“College or university studies (as language, philosophy, literature, abstract science) intended to provide chiefly general knowledge and to develop general intellectual capacities (as reason and judgment) as opposed to professional or vocational skills,” s.v. “liberal arts.” http://www.merriam-webster.com/dictionary/liberalarts (accessed January 14, 2010).} education, and the broader humanities, of which the visual arts are a defining component.

The term “art” is often contrasted, or associated, with the word “science;” for example, most U.S. colleges and universities have a school or curriculum identified as “arts and sciences.” Therefore, an understanding of the term “science” – and, more specifically, of “medicine” – is likewise warranted within the context of this research project.

From the Latin “scientia” – meaning “knowledge” – the term “science,” as defined by Merriam-Webster, denotes “knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method,”\footnote{Scientific method is commonly defined as a process incorporating a variety of techniques to acquire, substantiate, and validate new knowledge dependent upon empirical, observable phenomena subjected to reason.} or “a system or method reconciling practical ends with scientific laws.”\footnote{Merriam-Webster Online Dictionary, s.v. “science.” http://www.merriam-webster.com/dictionary/science (accessed February 10, 2010).} In relation to medicine, medical education, and the practice of medicine, “natural science” is defined as “any of the sciences that deal with matter, energy, and

these include anatomy, biology, physiology, and biochemistry, for example. Further, “behavioral science” is defined as “a branch of science that deals primarily with human action and often seeks to generalize about human behavior in society;”\footnote{Merriam-Webster Online Dictionary, s.v. “behavioral science.” http://www.merriam-webster.com/dictionary/behavioral%20science (accessed February 10, 2010).} these include psychology and psychiatry, for example.

Medicine – which directly relates to and involves many of the natural and behavioral sciences – is in turn defined as “the science and art dealing with the maintenance of health and the prevention, alleviation, or cure of disease.”\footnote{Merriam-Webster Online Dictionary: MedlinePlus, s.v. “medicine.” http://www2.merriam-webster.com/cgi-bin/mwmednlm?book=Medical&va=medicine (accessed February 9, 2010).} Chapter II will provide further discussion on science in general and the impact of the development of the scientific method, while Chapter III will discuss the roots of Western medicine, and the formulation of the contemporary understanding of medicine and medical education in the U.S.

With the preceding clarification of the meaning of the terms and concepts “art,” “visual arts,” “science,” and “medicine” within the overall context of this research project, it is now appropriate to proceed with evaluating the issues outlined in the opening paragraph of this chapter.

Training the Eye: The Harvard Study

In July 2008, Dr. Joel T. Katz, director of the Medicine Residency Program at Brigham and Women’s Hospital and Assistant Professor of Medicine at Harvard Medical School, published along with his colleagues (S. Naghshineh, et al.) an article in the *Journal of General Internal Medicine* claiming that the diagnostic skills of medical students can potentially be improved through education involving the visual arts, specifically through the teaching of “visual literacy.”

Despite evidence of substantial inadequacy in physical examination skills among medical students, residents, and practicing physicians, the teaching and confidence level in such skills has diminished among trainees and faculty. The result is a decline in the use of fundamental bedside procedures, such as inspection, which are often replaced by expensive laboratory tests and radiological studies. These trends suggest broad opportunities to improve patient care with the implementation of better physical examination teaching methods. One potential solution is the teaching of “visual literacy,” i.e., the ability to find meaning in imagery, which in medical parlance translates into the ability to reason physiology and pathophysiology from visual clues. Educators have confirmed that visual literacy can be developed, and limited efforts to introduce similar teaching methods into clinical training have been promising.

---

18 Physical diagnosis is defined as an examination performed by a physician on a patient in an effort to identify signs of disease. Combined with information on a patient’s medical history and consideration of the patient’s symptoms, the examination will assist the doctor in arriving at a diagnosis and a potential course of treatment.


The goal of Katz’s preclinical\textsuperscript{21} elective course, *Training the Eye: Improving the Art of Physical Diagnosis* (see fig. A.1), is to help medical students learn to see more carefully in an effort to improve their skills in diagnosing illness in a clinical\textsuperscript{22} setting.

Clinical habits are formed early in training, and therefore we designed a novel pre-clinical course to enhance medical student’s diagnostic acumen by expanding their visual skills through the (1) close observation and guided discussion of visual art, (2) exploration of core artistic concepts, and (3) opportunity to apply these skills to the clinical assessment of patients with a broad range of disorders.\textsuperscript{23}

Katz and his colleagues demonstrated that following completion of the course, “intervention students had a 38% increase in observations”\textsuperscript{24} while “observations by a control group of students who did not take the class did not change”\textsuperscript{25} (see figs. A.2a-c).

\textsuperscript{21} In medical education, preclinical education can be defined as a multidisciplinary basic science didactic and problem-based curriculum focusing on the systems and function of the human body, intended to provide the student with a foundation for the clinical study of medicine. Education in ethics, physical diagnosis, patient behavior, and the physician/patient relationship are usually included, in addition to the basic sciences, which are the fundamental sciences relevant to medicine and biomedical research, including, but not necessarily limited to: anatomy, biochemistry, biophysics, biostatistics, cytology, embryology, epidemiology, genetics, histology, immunology, medical physics, microbiology, neuroscience, nutrition, pathology, pharmacology, physiology, and toxicology. In a typical four-year U.S. medical school curriculum, the preclinical portion usually represents the first two years of study.

\textsuperscript{22} In medical education, clinical education can be defined as the period of study conducted in a clinical setting, involving direct observation and interaction with patients, intended to expose the student to observable and diagnosable symptoms of disease. This usually includes clerkships in areas such as surgery, pediatrics, family medicine, and obstetrics/gynecology, as well as internships and ambulatory care. In a typical four-year U.S. medical school curriculum, the clinical portion usually represents the last two years of study.

\textsuperscript{23} Naghshineh et al., “Formal Art Observation Training,” 991-97.

\textsuperscript{24} Naghshineh et al., “Formal Art Observation Training,” 991-97.

Further, the study revealed that higher scores were achieved by the intervention students commensurate with the number of sessions attended\(^{26}\) (see fig. A.2d).

Our qualitative and quantitative findings suggest that observation skills, including those directly relevant to clinical medicine, can be successfully acquired through active, structured study of works of art and medical imagery.\(^{27}\)

Motivated in part by the Harvard study, it is my contention that at a time when there is “a consensus in medicine that [doctors’ physical exam] skills are waning,”\(^{28}\) the integration of exposure to the visual arts into the preclinical curriculum of medical schools is not only potentially beneficial, but warranted and necessary. I further contend that the integration of the visual arts into medical curricula not only enhances the quality and potential durability of diagnostic skills, but also proves essential to a physician’s approach to those ethical questions encountered daily in clinical practice.

The latter contention proves challenging to substantiate. The Harvard study notes that “long-term follow-up was not done, precluding the assessment of sustained learning,” and that “clinical outcomes were not measured, so there is no direct evidence that these skills can be transferred into improved patient care.”\(^{29}\) The availability of

\(^{26}\)"Students who attended 8 or 9 sessions had a greater increase in their mean change score, compared to those who attended 7 or fewer sessions.” Naghshineh et al., “Formal Art Observation Training,” 991-97.

\(^{27}\)Naghshineh et al., “Formal Art Observation Training,” 991-97.

\(^{28}\)“There is some contention within the medical community that physical diagnosis skills are ‘perishable’ and tend to wane once students leave medical school and enter clinical practice. However, there is general consensus that the physical diagnosis skills among medical students have diminished considerably and steadily in recent years.” Kowalczyk, “Monet? Gauguin?”

courses and curricular enhancements focusing on the visual arts at U.S. medical schools is relatively recent, further complicating efforts to measure potential improvements in patient care in a clinical setting. Individuals who have participated in such curricula have not been in clinical practice for an adequate length of time to gauge the efficacy and durability of any skills acquired through the formal integration of visual arts education into their medical training. Further, it is difficult to quantitatively and qualitatively analyze how visual arts training may have a positive, meaningful impact on how a physician approaches ethical questions in clinical practice.

As previously noted, the Katz article cites studies providing “evidence of substantial inadequacy in physical examination skills among medical students, residents, and practicing physicians,” as well as studies demonstrating “the teaching and confidence level in such skills has diminished among trainees and faculty.” According to a 1999 article in *The New York Times*:

---


31 Naghshineh et al., “Formal Art Observation Training,” 991-97. Anderson (et al.) note: “The time is right for internists who teach medical students to reevaluate and improve their teaching of physical
Medical educators worry that a generation of young doctors dazzled by L.E.D. displays and computer printouts is turning away from the hands-on skills that, once forgotten, may never be retrieved. In recent years, studies have confirmed that the concerns are well founded. Many American doctors are no longer very skillful at what is called “physical diagnosis,” or the art of interpreting abnormalities in the physical examination.\textsuperscript{32}

Several studies support these claims regarding the importance of physical diagnosis skills, and their progressive degradation, primarily due to improvements in diagnostic

---

\textsuperscript{32} The Zuger article in \textit{The New York Times} elaborates as follows, citing specific studies to support the contention that physical diagnosis skills have diminished: “When doctors no longer routinely examine healthy patients, they lose their innate sense of what is normal in the human body, and become increasingly unable to distinguish what is abnormal when a patient gets sick. Recent studies confirm that this may well be happening. A 1992 study at Duke University Medical Center in Durham, N.C., one of the most prestigious places to study internal medicine in the country, showed that residents there were only about 50 percent accurate in identifying the heart murmurs and other physical examination abnormalities that appear when a patient has a damaged heart valve. In 1994, 200 medical students and residents at Philadelphia-area hospitals were asked to listen to tape recordings of the characteristic sounds heard through the stethoscope in patients with a variety of lung diseases. They too scored about 50 percent overall. In a paper published in the Archives of Internal Medicine last month, three experienced Seattle doctors were asked to figure out if a few dozen patients had pneumonia without looking at the patients' chest X-rays. Even the best missed a third of the cases. Even the simple determination of blood pressure is turning into a lost art. A study from Milwaukee presented at a meeting of the American Society of Hypertension in New York last month found that a year after a special course in how to take blood pressure, 95 of 100 medical students were doing it incorrectly. Educators are startled by and unhappy with these trends, particularly since the physical examination can also be a technique for effectively controlling health care costs.” Abigail Zuger, “Are Doctors Losing Touch With Hands-On Medicine?,” \textit{The New York Times} (July 13, 1999), F1. http://proquest.umi.com/pqdweb?index=0&did=43099121&SrchMode=2&sid=1&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1261061800&clientId=5604 (accessed December 8, 2009).
technologies, including: D. A. Nardone (et al.), *Physical Examination: A Revered Skill Under Scrutiny*, claiming “the challenge for tomorrow is to determine the operating characteristics of physical examination techniques and the clinical utility of physical findings;” 33 S. Mangione and S. J. Peitzman, *Physical Diagnosis in the 1990s: Art or Artifact?*, who claim “physical diagnosis occupies an uncertain place [in] medicine;” 34 and A. J. Peixoto, *Birth, Death, and Resurrection of the Physical Examination: Clinical and Academic Perspectives on Bedside Diagnosis*, purporting “physicians have lost bedside skills in recent years, with increasing use of technology at the expense of time spent with the patient.” 35 The multiplicity of studies citing problems and concerns with

---

33 “Clinicians in the 1980s rely on the physical examination to a lesser degree than their predecessors in making diagnostic and therapeutic decisions. The major criticisms are that the physical examination lacks sensitivity for many common diseases and has not been subjected to the same scientific scrutiny afforded laboratory testing. On the positive side, the physical examination is a series of diagnostic maneuvers that permit physicians to test hypotheses generated during history taking, to determine disease severity, and to lessen clinical uncertainty. Furthermore, the physical examination fosters the development of personalized medical care and a bond of mutual trust between patient and doctor. The challenge for tomorrow is to determine the operating characteristics of physical examination techniques and the clinical utility of physical findings. For preclinical students, emphasis should be directed at basic examination principles and sequencing. Many model programs have used patient instructors and other innovative techniques. Clinical students and postgraduate trainees need emphasis on interpretation of physical findings and their integration into the clinical context. There is no substitute for bedside teaching at this level.” (Abstract excerpt). D. A. Nardone, L. M. Lucas, and D. M. Palac, “Physical Examination: A Revered Skill Under Scrutiny,” *Southern Medical Journal* 81, no. 6 (June 1988): 770-73.

34 “This essay will review some evidence that physical examination skills are declining (while reliance on technologic diagnosis continues to expand) and consider why that is so, why it is not good, and what can be done about it.” (p. 490). S. Mangione and S. J. Peitzman, “Physical Diagnosis in the 1990s: Art or Artifact?,” *Journal of General Internal Medicine* 11, no. 8 (August 1996): 490-93.

35 “The physical examination has a historically prominent role in medical practice, being an important tool in diagnosis and in developing rapport with patients. Yet, physicians have lost bedside skills in recent years, with increasing use of technology at the expense of time spent with the patient. This is concerning, especially in the present era of cost-containment in health care. Approaches to improve bedside diagnosis skills include increased emphasis on instruction in physical examination during medical school and postgraduate training, and careful scrutiny of physical examination techniques, with formal evaluation of their accuracy and reproducibility. Only through education and research will the physical examination recover its central role in the clinical encounter.” (Abstract excerpt). A. J. Peixoto, “Birth, Death, and
physical diagnosis skills – not limited to the few provided as examples herewith – is noteworthy, clearly demonstrating that the problem has been long-standing and has worsened over the last few decades, as clinicians rely more heavily on improved diagnostic tools, and requires effective intervention at the level of undergraduate medical education.

The Humanities and Medicine: “Teaching” Human Values

In 1959, English writer and scientist Charles Percy Snow published an essay entitled: *The Two Cultures and the Scientific Revolution.* A follow-up essay was published in 1964: *The Two Cultures: And a Second Look.* Stating “by training I was a scientist; by vocation I was a writer,” Snow contends:

I believe the intellectual life of the whole of western society is increasingly being split into two polar groups… Literary intellectuals at one pole – at the other scientists… Between the two a gulf of mutual incomprehension – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can’t find much common ground… The non-scientists have a rooted impression that the scientists are shallowly optimistic, unaware of man’s condition. On the other hand, the scientists believe that the literary intellectuals are totally lacking in foresight,

---


peculiarly unconcerned with their brother men, in a deep sense anti-intellectual, anxious to restrict both art and thought to the existential moment.  

Snow cites the Scientific Revolution, “roughly [dated] from the middle of the eighteenth century to the early twentieth,” as the cause for the separation between the sciences and the arts [N.B. the impact of the Scientific Revolution will be discussed in more detail in Chapter II].

English oncologist Michael Baum, Professor Emeritus of Surgery and Visiting Professor in Medical Humanities, University College, London, opens his 2002 article Teaching the Humanities to Medical Students by referencing this dichotomy:

Science and the arts are the twin pillars which support the cultural heritage of the west, yet little progress has been made since CP Snow’s seminal essays in 1959 demonstrated the separation of these two cultures. The polarization of these two bodies of knowledge is perpetuated by our educational system to the impoverishment of all. Even the best educated among our political and academic leaders have lost close on 50% of their cultural inheritance, and the renaissance man has all but disappeared from modern society.

Snow and Baum, both British, reference western society and culture as a whole. Snow addresses the educational systems not just of Britain, but also of other western countries in his essays. Baum’s observations – addressed in a lecture at the Royal College of Physicians in London – are equally applicable to the undergraduate medical curricula at U.S. medical schools. As with Snow and Baum, some of the literature reviewed and

39 Snow, The Two Cultures and the Scientific Revolution, 4-6.


referenced within this thesis draws on research conducted by scholars outside of the U.S., particularly in Great Britain. Such literature is referenced within the context of its applicability to western medical education in general, and is therefore relevant when considering, exploring, and examining the role of the arts in medical education in the U.S. For example, Baum contends:

There is a real danger of losing the humanity in the practice of medicine if subjects conventionally within the faculties of arts and humanities are ignored. I believe that the teaching of arts and humanities, in addition to ensuring that doctors practise [sic] in an ethical and humane way, will enhance their understanding of science and improve their communication skills, thus making them into better doctors.  

Georgetown University John Carroll Emeritus Professor of Medicine and Medical Ethics, Edmund D. Pellegrino, M.D., has long promoted and advocated for the importance of the humanities and liberal arts as an essential component of medical education:

Students learn the skills of critical analysis, reasoning, decision making, and judgment through the humanities. Commentators have often noted that these skills are a necessary part of medical education. Edmund Pellegrino has frequently and persuasively argued for the role of the humanities in medical education. Pellegrino regards the humanities as vehicles for the liberal arts. Why are the liberal arts important for the medical student? Pellegrino says that the liberal arts are ‘a set of skills which truly set us free, and without which we cannot consciously be free men in any other domain. The freedom to which I refer is freedom from the tyranny of the opinions, ideas, words and productions of other men.’

---

42 Baum, “Teaching the Humanities,” 246.

Author of “more than 24 books and 550 published works in medical science, philosophy and ethics,” Dr. Pellegrino states: “Despite being labeled a bioethicist, I really am not one; I am a physician who likes to reflect on the moral obligations of being a physician, and I continue to identify myself that way.” Among the vast body of Dr. Pellegrino’s published works, the following serve as but a few noteworthy examples relevant to the role of the humanities in the education of physicians: *Humanities and Human Values in Medical Education;* \(^{45}\) *Humanism and the Physician;* \(^{46}\) *The Human Person, the Physician, and the Physician’s Ethics;* \(^{47}\) *Medical Humanism: The Liberal Arts and the Humanities;* \(^{48}\) *Medicine and the Liberal Arts: The Bridge of Ethics;* \(^{49}\) *Medicine, History, and the Idea of Man;* \(^{50}\) *Physician and Philosopher: The Philosophical Foundation of Medicine;* \(^{51}\)

---


Contemporary emphasis on the importance of the humanities in medical education can be traced to 1967, when the humanities comprised one of the four founding departments of the College of Medicine at Penn State – the first humanities department at a U.S. medical school – currently chaired by Daniel Shapiro, Ph.D. In 1972, the field of literature and medicine was introduced as part of the curriculum at many U.S. medical schools. In the article *Literature and Medicine: Contributions to Clinical Practice*, Rita Charon (et al.), Professor of Clinical Medicine at the College of Physicians and Surgeons of Columbia University in New York, and Director of the Program in Narrative Medicine, asserts:

---


Using literary methods and texts, literary scholars have been teaching medical students and physicians how to listen more fully to patients’ narratives of illness and how to better comprehend illness and treatment from patients’ points of view. These skills help physicians to interview patients, to establish therapeutic alliances with patients and their families, to arrive at accurate diagnoses, and to choose and work toward appropriate clinical goals.  

Charon and her colleagues elaborate upon the goals achieved through medical students’ study of literature, and how such studies “strengthen the human competencies of doctoring.”

Pointing out “the relation between literature and science has fueled impassioned debate since the Victorian era,” literature and medicine is noted as “the most quickly growing area of the medical humanities,” with “approximately one third of U.S. medical schools [teaching] literature to their students” as of 1994.

Perhaps more fundamental to ethics than individual literary texts are literature’s methods. Where does the moral sense reside if not in the creative faculties? Attunement to the right and the good is attained by imaginatively rendering, for oneself, the situations of others. Literary scholars writing in the tradition of ethical criticism examine the moral consequences of serious reading, and their findings speak to the medical ethicist.

---

57 Charon et al., “Literature and Medicine,” 599.

58 “Five broad goals are met by including the study of literature in medical education: 1) Literary accounts of illness can teach physicians concrete and powerful lessons about the lives of sick people; 2) great works of fiction about medicine enable physicians to recognize the power and implications of what they do; 3) through the study of narrative, the physician can better understand patients’ stories of sickness and his or her own personal stake in medical practice; 4) literary study contributes to physicians’ expertise in narrative ethics; and 5) literary theory offers new perspectives on the work and the genres of medicine.” Charon et al., “Literature and Medicine,” 599.


60 Charon et al., “Literature and Medicine,” 600.

The Charon article provides multiple references to outcome studies pertaining to literature and medicine courses, demonstrating that “such courses improve students’ understanding of patients’ experiences, enrich students’ capacities for dealing with ethical problems, or deepen students’ self-knowledge in clinically relevant ways.”

The number of important scholarly works and resources that elaborate upon the relationship between literature, narrative, medicine, and medical education is considerable. A few noteworthy examples include: Rita Charon, who observes that “many of us have been struck by the parallels between acts of reading and acts of healing,” in *Narrative Medicine: Honoring the Stories of Illness*; Charon comments in *The Patient-Physician Relationship. Narrative Medicine: A Model for Empathy, Reflection, Profession, and Trust*, that “the effective practice of medicine requires

---


63 “A scientifically competent medicine alone cannot help a patient grapple with the loss of health and find meaning in illness and dying. Along with their growing scientific expertise, doctors need the expertise to listen to their patients, to understand as best they can the ordeals of illness, to honor the meanings of their patients’ narratives of illness, and to be moved by what they behold so that they can act on their patients’ behalf.” (p. 3). “I use the term *narrative medicine* to mean medicine practiced with these narrative skills of recognizing, absorbing, interpreting, and being moved by the stories of illness.” (p. 4). “If doctors seem divided from their patients and from themselves, they also seem divided from their students… The personal mentorship and role modeling that was once the hallmark of medical education have been eroded by time and money pressures. The competitive – and deficit – environment of most teaching hospitals leaves little room for dutiful raising of young professionals or the nurturing of those in full career.” (p. 7). “Even if medical educators cannot require a student to respond to a patient’s suffering with compassion, they might be able to equip students with compassion’s *prerequisites*: the ability to perceive the suffering, to bring interpretive rigor to what they perceive, to handle the inevitable oscillations between identification and detachment, to see events of illness from multiple points of view, to envision the ramifications of illness, and to be moved by it to action.” (p. 8). “Many of us have been struck by the parallels between acts of reading and acts of healing… a reading theory of the clinical encompasses the dynamics of the relationship between two people, the teller and the listener, but also conceptualizes the narrative itself as a dynamic partner in their intercourse, able of its own to alter what happens between them…” (p. 108). Rita Charon, *Narrative Medicine: Honoring the Stories of Illness* (Oxford; New York: Oxford University Press, 2006).
narrative competence, that is, the ability to acknowledge, absorb, interpret, and act on the stories and plights of others”; Anne Hunsaker Hawkins and Marilyn Chandler McEntyre, editors, *Teaching Literature and Medicine*, claiming “the more closely the relations between literature and medicine are scrutinized, the better the deep structures of both are understood”; Bruce Clarke and Wendell Aycock, editors, *The Body and the Text: Comparative Essays in Literature and Medicine*, who “survey the institutional interconnections of literature and medicine, discuss the application of literary training to medical education, and assess the current status of literary theory in relation to medical

---

64 “Medicine practiced with narrative competence, called narrative medicine, is proposed as a model for humane and effective medical practice. Adopting methods such as close reading of literature and reflective writing allows narrative medicine to examine and illuminate 4 of medicine’s central narrative situations: physician and patient, physician and self, physician and colleagues, and physicians and society. With narrative competence, physicians can reach and join their patients in illness, recognize their own personal journeys through medicine, acknowledge kinship with and duties toward other health care professionals, and inaugurate consequential discourse with the public about health care. By bridging the divides that separate physicians from patients, themselves, colleagues, and society, narrative medicine offers fresh opportunities for respectful, empathic, and nourishing medical care.” (Abstract excerpt). Rita Charon, “The Patient-Physician Relationship. Narrative Medicine: A Model for Empathy, Reflection, Profession, and Trust,” *Journal of the American Medical Association* 286, no. 15 (October 17, 2001): 1897-902. http://0-jama.ama-assn.org.library.lausys.georgetown.edu/cgi/content/full/286/15/1897 (accessed November 9, 2009).

65 “Literature and medicine has emerged from its disciplinary prologue. No longer an intellectual surprise and therefore no longer able to get along by virtue of novelty, the field now propels itself through honest cognitive work that leads to clinical and creative discoveries unavailable except through the disposition of literary methods onto medical texts and practices, on the one hand, and the transposition of the diagnostic gaze onto literary texts and traditions, on the other. The more closely the relations between literature and medicine are scrutinized, the better the deep structures of both are understood. Teaching literature to doctors and medical students fulfills embarrassingly instrumental goals at the same time that it allows wild conceptual play. Instrumentally, training in such literary concepts as genre, narrative stance, reader response, subtext, metatext, and imagery can provide medical students and doctors with skills that their elders did not have, never got, and did without.” (p. 29). “Conceptually, medicine offers the scholar a family of narratives generated by illness – the sickness itself as inscribed on and in the body, the patient’s autobiographical account, the account as transformed by the doctor’s cataloging mind (trained to be both arrogant and afraid of chaos) and written down, and the course of the illness itself – that exposes uncanny and telling relations among language, soma, self, and time.” (p. 30). Anne Hunsaker Hawkins and Marilyn Chandler McEntyre, eds., *Teaching Literature and Medicine*, (New York: Modern Language Association, 2000).
training and practice”; Arthur Kleinman, arguing in *The Illness Narratives: Suffering, Healing, and the Human Condition*, that “the interpretation of narratives of illness experience… is a core task in the work of doctoring, although the skill has atrophied in biomedical training”; S. M. Radwan and B. H. Adelson, who investigate how “great
works of literature serve as the springboard for exploring issues of clinical medical ethics” in *The Use of Literary Classics in Teaching Medical Ethics to Physicians*;\(^{68}\) Valerie Raoul (et al.), editors, *Unfitting Stories: Narrative Approaches to Disease, Disability, and Trauma*, in which it is claimed narrative “demands multidisciplinary, cross-disciplinary, transdisciplinary, and interdisciplinary collaboration to enable a sharing of perspectives that can lead to new insights”;\(^{69}\) Jerry Vannatta, Ronald Schleifer, from their professional care givers and, paradoxically, to the relinquishment by the practitioner of that aspect of the healer's art that is most ancient, most powerful, and most existentially rewarding.” (p. xiv). Arthur Kleinman, *The Illness Narratives: Suffering, Healing, and the Human Condition*, (New York: Basic Books, 1988).

\(^{68}\) “The ‘Great Books Course in Medical Ethics’ offered by the Department of Medicine of Evanston Hospital in Evanston, Illinois, is described. The course, a series of monthly seminars for attending staff and medical house staff, is intended as a forum in which great works of literature serve as the springboard for exploring issues of clinical medical ethics. It is taught by an experienced Great Books discussion leader, assisted by an ethicist, a philosopher, and a clinical nephrologist. Participants in the seminars have found them beneficial in enhancing their analytical skills for addressing ethical problems. The course is extracurricular; evaluation is nonstructured and based on participant feedback, which is discussed in the article.” (Abstract excerpt). S. M. Radwany and B. H. Adelson, “The Use of Literary Classics in Teaching Medical Ethics to Physicians,” *Journal of the American Medical Association* 257, no. 12 (March 27, 1987): 1629-31.

\(^{69}\) “Whereas there were relatively few published stories of ill health or suffering twenty-five years ago, in English or other languages, a person visiting any library or bookstore today will discover a wide range of narratives that can be divided into several categories, including accounts of disease, disability, and trauma. These accounts have attracted attention from a wide range of professional disciplinary perspectives. In the health sciences, such stories are used by practitioners and researchers who wish to go beyond biomedical perceptions of disease in order to understand the patient’s experience of illness. Bioethicists invoke personal stories as an alternative to universal principles in their attempts to understand ethical dilemmas from the perspective of patients and their families. Adopting a broader focus, qualitative researchers in the social sciences solicit and analyze oral stories in order to document the social determinants of health, and to provide data that will influence policy making in the health care system. Therapists use storytelling as a healing tool in private, one-on-one encounters with patients. In the humanities, both written and visual representations of disease, disability, and trauma have been analyzed by literary scholars and historians, as well as by researchers in cultural studies and gender studies who are interested in how artistic expression and form relate to the body that produces those representations. Narrative is used as an object or means of inquiry from political science to psychology, from social work to applied ethics, yet the ways in which we receive, produce, analyze, and deploy the term, as well as the stories involved, vary considerably from one discipline to another. This is an area which demands multidisciplinary, cross-disciplinary, transdisciplinary, and interdisciplinary collaboration to enable a sharing of perspectives that can lead to new insights. Like experiences of disease, disability, and trauma,

---

this type of inquiry challenges our assumptions about what can or should be studied, how, and by whom. It focuses us, literally, to think of our research in new terms, and to assess where our approach is situated in relation to debates about research between and across the disciplines.” (p. 3-4). Valerie Raoul, Connie Canam, Angela D. Henderson, and Carla Paterson, eds., *Unfitting Stories: Narrative Approaches to Disease, Disability, and Trauma*, (Waterloo, Ont.: Wilfrid Laurier University Press, 2007).

70 “Literature and medicine have been inextricably intertwined since the time of the Greeks. Often, as in Mary Wollstonecraft Shelley's classic novel, *Frankenstein*, literature has been concerned with the idea that science and technology threaten medicine's humanistic heart. In the case of the DVD *Medicine and Humanistic Understanding: The Significance of Literature in Medical Practice*, we find technology in the service of literature and medical humanism, and it is a remarkably successful experiment, which enhances, enlivens, and inspirits the once-predictable academic text.” (p. 328). Johanna Shapiro, “Medicine and Humanistic Understanding: The Significance of Literature in Medical Practices.” *Literature and Medicine* 24, no. 2 (2005) 328-331. Review of Vannatta, Jerry, Ronald Schleifer, and Sheila Crow. *Medicine and Humanistic Understanding: The Significance of Literature in Medical Practice*, (Philadelphia: University of Pennsylvania Press, 2005). DVD-ROM.

71 Johanna Shapiro is a professor of family medicine and director of the Program in Medical Humanities and Arts, University of California, Irvine, College of Medicine. She is feature editor for the "Literature and the Arts in Medical Education" column published in the journal *Family Medicine*.


introduction by Edmund D. Pellegrino;\textsuperscript{75} John Salinsky, \textit{Medicine and Literature: The Doctor’s Companion to the Classics};\textsuperscript{76} Mark J. Fagan (et al.), \textit{Improving the Physical Diagnosis Skills of Third-Year Medical Students};\textsuperscript{77} and the journal \textit{Literature and Medicine}, published by the Johns Hopkins University Press.\textsuperscript{78}

Following the introduction of the study of literature and literary methodology into medical school curricula in the U.S. in the early 1970s, the potential value of introducing other humanities-based disciplines was explored and began to proliferate. A recent article in \textit{The Boston Globe} discusses how Dr. Claudius Conrad, “an accomplished pianist and a senior surgical resident at Massachusetts General Hospital, is scientifically


\textsuperscript{77} “We designed, implemented, and evaluated a literature-based physical diagnosis curriculum for third-year medical students in an internal medicine clerkship. The objective of our study was to determine if such a curriculum could improve student knowledge, skill, and self-confidence in physical diagnosis.” (p. 52). “Our results indicate that a multifaceted, literature-based physical diagnosis curriculum was successful in improving intervention students’ knowledge, skill and self-confidence in physical diagnosis. Although the magnitude of the improvement in knowledge and self-confidence was modest, the degree of improvement in skill was large.” (p. 54). “Our results offer encouragement for those who seek to revive interest and expertise in physical diagnosis. By modifying an existing required medical student course, we were able to produce significant improvements in medical student knowledge, skill, and self-confidence in physical diagnosis compared to standard teaching. Students who received the curriculum also expressed significantly greater satisfaction with the physical diagnosis teaching they received in the clerkship.” (p. 55). Mark J. Fagan, Rebecca A. Griffith, Laura Obbard, and Carolyn J. O’Connor, “Improving the Physical Diagnosis Skills of Third-year Medical Students,” \textit{Journal of General Internal Medicine} 18, no. 8 (2003): 652-655. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1494895/ (accessed November 2, 2009).

\textsuperscript{78} “Literature and Medicine is a journal devoted to exploring interfaces between literary and medical knowledge and understanding. Issues of illness, health, medical science, violence, and the body are examined through literary and cultural texts. Our readership includes scholars of literature, history, and critical theory, as well as health professionals.” http://muse.jhu.edu/journals/literature_and_medicine/ (accessed December 15, 2009).
testing how music affects surgeons, their patients, and even relatives in the waiting room.”

Fifteen years ago, a study in the *Journal of the American Medical Association* found that surgeons’ speed and accuracy in performing a stressful math task were improved when they selected their music instead of a piece – Pachabel’s Canon – chosen by the experimenter. A 2006 survey of 171 doctors and nurses at three hospitals found that the majority of respondents listened to music on a regular basis in the operating room and 58 percent preferred classical music. 

Conrad states: “like many surgeons… he works better when he listens to music.” Aside from the beneficial effects of music on health care professionals, the results of a 2007 study conducted by Conrad to gauge the potentially positive effects on patients concluded:

> Compared with controls, we found that music application significantly reduced the amount of sedative drugs needed to achieve a comparable degree of sedation. Simultaneously, among those receiving the music intervention, plasma concentrations of growth hormone increased, whereas those of interleukin-6 and epinephrine decreased. The reduction in systemic stress hormone levels was associated with a significantly lower blood pressure and heart rate.

Diagnostic radiologist Dan Wopperer identifies himself not just as a doctor, but also as an artist. A Clinical Professor of Radiology at the University of Rochester.

---


80 Johnson, “Musical Surgeon.”


Medical Center, as well as CEO and Managing Partner of Borg Imaging Group, LLP, Wopperer is also an accomplished photographer, illustrator, and musician. During his time as a medical student at Georgetown University, Wopperer “designed his own elective course on medical illustration.” According to Wopperer:

There’s just not enough right-brain activity going on in this day and age… Art and music and medicine to me are all creative activities… Music drives the spirit and art elevates it. I guess that’s why I work at both.

A great deal of scholarship has been dedicated to the role of the humanities in medical education, and the potential problems inherent in the integration of the two, particularly over the last decade. The following serve as a few noteworthy examples:

Deborah Kirklin, *Humanities in Medical Training and Education* and *Medical

---


84 Francis, “Dan Wopperer, MD,” xiii. “Roger W. Sperry’s research on human brain-hemisphere functions, for which he received a Nobel Prize, appeared in the press [in 1968]… [Sperry found] that the human brain uses two fundamentally different modes of thinking, one verbal, analytic, and sequential [the left brain hemisphere], and one visual, perceptual, and simultaneous [the right brain hemisphere].” (p. xii). “In the right-hemisphere mode of information processing, we use intuition and heave leaps of insight – moments when ‘everything seems to fall into place’ without figuring things out in a logical order… This, then, is the right-hemisphere mode: the intuitive, subjective, relational, holistic, time-free mode… most of our educational system has been designed to cultivate the verbal, rational, on-time left hemisphere, while half of the brain of every student is virtually neglected.” (p. 39). From: Betty Edwards, *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. 2nd rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999).

85 “This paper explores how current developments within medical humanities might provide a way to both understand and address the origin of recent events that have left the profession branded as arrogant, out of touch, and misguided. The arts provide a powerful medium to improve the understanding of the experience of illness. Furthermore the understanding obtained is qualitatively different from that acquired in the traditional doctor-patient encounter. In addition medical humanities can create a space for doctors to reflect on their own practice and experiences. The benefits of using this space are illustrated with four examples of arts-based education delivered to groups of practitioners at different stages in their professional lives.” (Abstract excerpt). Deborah Kirklin, “Humanities in Medical Training and Education,” *Clinical Medicine* 1 (2001): 25-7.
**Humanities: A Personal View**, Jane Macnaughton, The Humanities in Medical Education: Context, Outcomes and Structures; H. M. Evans and J. Macnaughton, *A “Core Curriculum” for the Medical Humanities?* and Should Medical Humanities be a Multidisciplinary or an Interdisciplinary Study?; R. Meakin, Medical Humanities in


87 “There is now a context for teaching humanities in undergraduate medical education via special study modules (SSMs). This paper discusses the instrumental and non-instrumental role of humanities in the education of doctors. Three courses are then described and compared. The most successful of the three is a SSM which had the following characteristics: it was voluntary, it was an integral part of the curriculum, and it was examinable.” (Abstract excerpt). “Arts and humanities subjects (and in this paper, I have focused on literature and philosophy) may be valuable in medical education but not all medical students respond enthusiastically to this teaching… It is clear that students need both the freedom to choose to take up the opportunity of broadening their educational experience by taking humanities subjects, and the impetus to work that comes from these subjects being an examinable part of the curriculum.” (p. 29). Jane Macnaughton, “The Humanities in Medical Education: Context, Outcomes and Structures,” *Journal of Medical Ethics: Medical Humanities* 26 (2000): 23-30.

88 “It seems to us that the relation between a ‘core curriculum’ and the Medical Humanities splits into two quite different questions, albeit related in certain contexts. The questions are these: (A) Is there, or could (should) there be an integral place for medical humanities study within the core curriculum of undergraduate medical education? And if there is what does that study comprise?; and (B) Is there, or could (should) there be, an agreed and coherent core curriculum for the study of medical humanities as such?” (p. 65). “This is an important debate for the nature and identity of the field, for regardless of whether we can claim a place within undergraduate medicine’s required curriculum, if we cannot say what we are trying to do when we teach medical humanities more generally, we are going to be in difficulties saying what we are trying to do in undertaking research in medical humanities. And we certainly do need to be able to say what we are trying to do particularly now at a time when the field desperately needs core funding for academic work, and when potential funders are likely to be listening very carefully.” (p. 66). H. M. Evans and R. J. Macnaughton, “A ‘Core Curriculum’ for the Medical Humanities?,” *Journal of Medical Ethics: Medical Humanities* 32 (2006): 65-66.

89 “The forthcoming annual conference of the Association for Medical Humanities addresses the substantial topic ‘Medicine and the humanities: towards interdisciplinary practice’. The organisers [sic] envisage the following objectives for the conference: to advance the debate about the practical benefits of medical humanities for clinical practice; to focus on the interface between medicine, health care, and a range of humanities disciplines; and to create a context in which professionals from a variety of backgrounds can exchange ideas and experiences. These eminently practice-centred [sic] objectives require, of course, to be approached in the spirit of what we might call ‘interdisciplinary theory’, that is, theoretical reflection on interdisciplinarity. Interdisciplinarity is perhaps easier to claim than it is to demonstrate, and putatively interdisciplinary work frequently turns out to be mere multidisciplinary, in the sense of involving relatively disconnected contributions from different disciplines – contributions which, taken in isolation, exhibit no real trace of contact with any other discipline beyond their own. Too often
Undergraduate Medical Education – Moving On; \(^90\) Robert G. Polson and Elizabeth S. Farmer, Integrating the Humanities in the Education of Health Professionals: Implications for Search and Retrieval of Information; \(^91\) Caroline Wachtler, Susanne Lundin, and Margareta Torein, Humanities for Medical Students? A Qualitative Study of a Medical Humanities Curriculum in a Medical School Program; \(^92\) V. J. Grant, Making Room for Medical Humanities; \(^93\) R. S. Downie, Medical Humanities: A Vision and Some

one attends discussions that consist in a succession of speakers presenting essentially discipline based perspectives, with little or no genuinely crossdisciplinary dialogue among them. Medical humanities requires, however, that we attain more than this.” (p. 1). H. M. Evans and J. Macnaughton, “Should Medical Humanities be a Multidisciplinary or an Interdisciplinary Study?,” Journal of Medical Ethics: Medical Humanities 30 (2004): 1-4.


\(^92\) “Today, there is a trend towards establishing the medical humanities as a component of medical education. However, medical humanities programs that exist within the context of a medical school can be problematic. The aim of this study was to explore problems that can arise with the establishment of a medical humanities curriculum in a medical school program… The ideological language used to describe the program calls it an interdisciplinary learning environment but at the same time shows that the conditions of the program are established by the medical faculty’s agenda. In practice, the ‘humanities’ are constructed, defined and used within a medical frame of reference. Medical students have interesting discussions, acquire concepts and enjoy the program. But the come away lacking theoretical structure to understand what they have learned… A challenge facing cross-disciplinary programs is creating an environment where the disciplines have equal standing and contribution.” (Abstract excerpt). Caroline Wachtler, Susanne Lundin, and Margareta Troein, “Humanities for Medical Students? A Qualitative Study of a Medical Humanities Curriculum in a Medical School Program,” BMC Medical Education 6 (2006): 16. http://www.biomedcentral.com/1472-6920/6/16 (accessed November 30, 2009).

\(^93\) “Should medical humanities become part of the core curriculum in medicine? This paper describes the experiences of one medical school that decided it should. The paper describes the professional and academic rationale for this decision, the process by which it was implemented, the structure of the course, the strategies for assessment of students’ work and the results of a teacher

36
Cautionary Notes; and L. D. Friedman, The Precarious Position of the Medical Humanities in the Medical School Curriculum.

Significant scholarly research has also been dedicated specifically to the teaching of humanism and empathy, and evaluating the efficacy of such endeavors. Some noteworthy examples include: Donald A. Misch, Evaluating Physicians’ Professionalism and Humanism: The Case for Humanism “Connoisseurs”; Richard Meakin and evaluation.” (p. 45). V. J. Grant, “Making Room for Medical Humanities,” Journal of Medical Ethics: Medical Humanities 28 (2002): 45-48.


“The author contends that bioethics, as currently conceived and taught in most medical schools across the country, should neither be considered as part of nor substituted for the humanities within the curriculum. Arguing that bioethics has evolved into a discipline dominated by rules—which has tilted it more toward scientific methods of reasoning—the author asserts that literature and the fine arts maintain a more humanistic approach rather than focusing on abstract principles. Consequently, the medical humanities and bioethics represent valuable but distinctly different ways of analyzing information, viewing the world, confronting dilemmas, and teaching students. The author stresses both the affective and the cognitive skills gained from incorporating the humanities formally within a medical education environment and shows how including literature and the fine arts emphasizes medicine as a profession rather than merely a trade. Incorporating these disciplines legitimizes individual questioning and collective probing that, in turn, motivate practitioners and students to confront fundamental questions about both their chosen field and their particular places within it. Thus, within the required educational curriculum structured discussions exploring a broad range of medical humanities can play a crucial role that can be neither emulated nor replicated by studying bioethics. Including the medical humanities as part of health care professional's basic training remains pivotal in helping to shape his or her future, both as a compassionate practitioner and as a reflective human being.” (Abstract excerpt). L. D. Friedman, “The Precarious Position of the Medical Humanities in the Medical School Curriculum,” Academic Medicine 77, no. 4 (April 2002): 320-2.

“Physicians' professionalism and humanism have become central foci of the efforts of medical educators as the public, various accrediting and licensing agencies, and the profession itself have expressed concerns about the apparent erosion of physicians' competency in these aspects of the art, rather than the science, of medicine. Of the many obstacles to enhancing trainees' skills in these domains, one of the most significant is the difficulty in assessing competency in physicians' professionalism and humanism. The author suggests that the assessment of these aspects of the art of medicine has more in common with the approaches used in criticism of the arts than with the quantitative assessment tools appropriate to the scientific method and the medical model. Quantitative and semi-quantitative tools, so effective in elucidating the etiology, pathophysiology, and treatment of disease, are often in-appropriate and invalid when applied to evaluation of professional and humanistic competencies. The author proposes that
humanism “connoisseurs” be employed to qualitatively evaluate medical trainees’ professionalism and humanism. Such connoisseurs would possess expert knowledge, training, and experience in the interpersonal aspects of the art of medicine, allowing them to deconstruct concepts such as empathy, compassion, integrity, and respect into their respective key elements while evaluating physicians' behaviors as an integrated, cohesive whole. Through the use of a rich descriptive vocabulary, humanism connoisseurs would provide valid formative and summative feedback regarding competency in medical professionalism and humanism. In the process, they would serve to counteract the relative marginalization of professionalism and humanism in the informal and lived curricula of medical trainees.” (Abstract excerpt).


98 “Empathy is critical to the development of professionalism in medical students, and the humanities-particularly literature-have been touted as an effective tool for increasing student empathy. This quantitative/qualitative study was undertaken to assess whether reading and discussing poetry and prose related to patients and doctors could significantly increase medical student empathy and appreciation of the relevance of the humanities for their own professional development... Empathy and attitudes toward the humanities improved significantly (p < 0.01) after participation in the class when both groups of students were combined. The scaled treatment effect size was in the moderate range (≥0.60 standard deviation units) for both measures that had statistically significant pre-to-post changes. Furthermore, student understanding of the patient's perspective became more detailed and complex after the intervention. Students were also more likely post-intervention to note ways reading literature could help them cope with training-related stress. Conclusion: A brief literature-based course can contribute to greater student empathy and appreciation for the value of humanities in medical education.” (Abstract excerpt). Johanna Shapiro, Elizabeth H. Morrison, and John R. Boker, “Teaching Empathy to First Year Medical Students: Evaluation of an Elective Literature and Medicine Course,” *Education for Health* 17, no. 1 (2004): 73-84.

99 “Medical education at the Colombian School of Medicine has undergone a reconceptualization and reorganization so as to encompasses three fundamental elements of medical practice: 1) development of general abilities and standards necessary for appropriate professional medical practice; 2) technical education which makes it possible to utilize the bases that science and technology have provided for the development and application of knowledge, and in turn, to expand this base through research and development; and 3) humanistic education to guide students into ethical professional practice.” (Abstract
Relationships Between Scores on the Jefferson Scale of Physician Empathy, Patient Perceptions of Physician Empathy, and Humanistic Approaches to Patient Care: A Validity Study, asserting that “empathy is the backbone of a positive physician-patient relationship.”

A student perspective is also warranted and useful to determine what the views of medical students are toward the relationship between the humanities and medical education. A review of the literature indicates that much of this information is anecdotal, although significant data are derived from student feedback. Some examples of research specifically addressing the views of students include: H. K. Lempp’s Perceptions of Dissection by Students in One Medical School: Beyond Learning About Anatomy; S. A. excerpt). J. E. Triana, “Humanistic and Social Education for Physicians: The Experience of the Colombian School of Medicine,” Journal of Medicine and Philosophy 21, no. 6 (December 1996): 651-57.


101 “INTRODUCTION: The practice of dissection, as part of undergraduate medical education, has recently resurfaced in the public eye. This paper focuses on a number of important learning outcomes that were reported by Year 1-5 medical students in a British medical school, during the dissection sessions in the first 2 years of their training, as part of a wider qualitative research project into undergraduate medical education. METHODS: A group of 29 students was selected by quota sampling, using the whole student population of the medical school as the sampling frame. Qualitative data were collected by 1:1 interviews with students and from formal non-participatory observations of dissection sessions. RESULTS: Apart from learning to cope with the overt 'emotional confrontation' with the cadavers which assists anatomical learning, 7 additional covert learning outcomes were identified by the students: teamwork, respect for the body, familiarisation of the body, application of practical skills, integration of theory and practice, preparation for clinical work, and appreciation of the status of dissection within the history of medicine. DISCUSSION: A number of medical schools have either removed the practical, hands-on aspect of dissection in the medical undergraduate curriculum or are seriously considering such a measure, on financial and/or human resource grounds. This study highlights the fact that dissection can impart anatomical knowledge as well as offer other relevant, positive learning opportunities to enhance the skills...
Azer and N. Eizenberg’s *Do We Need Dissection In An Integrated Problem-Based Learning Medical Course?: Perceptions of First- and Second-Year Students*;

Shapiro (et al.), *Relationship of Creative Projects in Anatomy to Medical Student Professionalism, Test Performance and Stress: An Exploratory Study*; and L. Rucker


102 “BACKGROUND: The introduction of a problem-based learning (PBL) curriculum at the School of Medicine of the University of Melbourne has necessitated a reduction in the number of lectures and limited the use of dissection in teaching anatomy. In the new curriculum, students learn the anatomy of different body systems using PBL tutorials, practical classes, pre-dissected specimens, computer-aided learning multimedia and a few dissection classes. The aims of this study are: (1) to assess the views of first- and second-year medical students on the importance of dissection in learning about the anatomy, (2) to assess if students' views have been affected by demographic variables such as gender, academic background and being a local or an international student, and (3) to assess which educational tools helped them most in learning the anatomy and whether dissection sessions have helped them in better understanding anatomy. METHODS: First- and second-year students enrolled in the medical course participated in this study. Students were asked to fill out a 5-point Likert scale questionnaire. Data was analysed using Mann-Whitney's U test, Wilcoxon's signed-ranks or the calculation of the Chi-square value. RESULTS: The response rates were 89% for both first- and second-year students. Compared to second-year students, first-year students perceived dissection to be important for deep understanding of anatomy (P < 0.001), making learning interesting (P < 0.001) and introducing them to emergency procedures (P < 0.001). Further, they preferred dissection over any other approach (P < 0.001). First-year students ranked dissection (44%), textbooks (23%), computer-aided learning (CAL), multimedia (10%), self-directed learning (6%) and lectures (5%) as the most valuable resources for learning anatomy, whereas second-year students found textbooks (38%), dissection (18%), pre-dissected specimens (11%), self-directed learning (9%), lectures (7%) and CAL programs (7%) as most useful. Neither of the groups showed a significant preference for pre-dissected specimens, CAL multimedia or lectures over dissection. CONCLUSIONS: Both first- and second-year students, regardless of their gender, academic background, or citizenship felt that the time devoted to dissection classes were not adequate. Students agreed that dissection deepened their understanding of anatomical structures, provided them with a three-dimensional perspective of structures and helped them recall what they learnt. Although their perception about the importance of dissection changed as they progressed in the course, good anatomy textbooks were perceived as an excellent resource for learning anatomy. Interestingly, innovations used in teaching anatomy, such as interactive multimedia resources, have not replaced students' perceptions about the importance of dissection.” (Abstract excerpt). From: S. A. Azer and N. Eizenberg, “Do We Need Dissection In An Integrated Problem-Based Learning Medical Course?: Perceptions of First- and Second-Year Students,” *Surgical and Radiologic Anatomy* 29, no. 2 (March 2007): 173-80.

103 “BACKGROUND: The anatomy course offers important opportunities to develop professionalism at an early stage in medical education. It is an academically significant course that also engenders stress in some students. METHODS: Over a three-year period, 115 of 297 students completed creative projects. Thirty-four project completers and 47 non-completers consented to participate in the
and J. Shapiro, *Becoming a Physician: Students’ Creative Projects in a Third-Year IM Clerkship.*

In 2001, Dr. Paul Rodenhauser, Professor Emeritus of Psychiatry and Neurology at Tulane University School of Medicine in New Orleans, conducted a survey of U.S. medical schools concerning the arts in medical education. Rodenhauser and his two medical student colleagues found that “exposure to a variety of the arts is commonplace study. Projects were analyzed for professionalism themes using grounded theory. A subset of project completers and non-completers were interviewed to determine their views about the stress of anatomy and medical school, as well as the value of the creative projects. We also compared test performance of project completers and non-completers. RESULTS: Projects completed early in the course often expressed ambivalence about anatomy, whereas later projects showed more gratitude and sense of awe. Project completers tended to report greater stress than non-completers, but stated that doing projects reduced stress and caused them to develop a richer appreciation for anatomy and medicine. Project completers performed significantly lower than non-completers on the first written exam (pre-project). Differences between groups on individual exams after both the first and second creative project were nonsignificant. CONCLUSION: For some students, creative projects may offer a useful way of reflecting on various aspects of professionalism while helping them to manage stress.” (Abstract excerpt). From: J. Shapiro, V. P. Nguyen, S. Mourra, J. R. Boker, M. Ross, T. M. Thai, and R. J. Leonard, “Relationship of Creative Projects in Anatomy to Medical Student Professionalism, Test Performance and Stress: An Exploratory Study,” *BMC Medical Education* 9 (November 3, 2009): 65. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2775735/?tool=pubmed (accessed January 5, 2010).

104 “PURPOSE: Medical educators have only limited understanding of how integrating humanities-based components into standard curricula contributes to the medical students' professionalism. This study qualitatively analyzed how students used a creative-project assignment during their third-year internal medicine clerkships to explore various aspects of their professional development. METHOD: A total of 277 students from three consecutive classes (1999-2002) at the University of California, Irvine, College of Medicine each completed a creative project reflecting on a particularly problematic or meaningful illness-related incident. Process and content analyses of the 221 projects submitted for analysis were performed. RESULTS: Students' projects employed a wide range of formats, tones, and styles to examine the process of socialization into medicine. Within this framework, their work tended to explore issues such as the proper relationship of medical students to patients, coming to terms with death and dying, understanding the patient's experience of illness, and coping with professional and personal stress. CONCLUSION: A creative-projects course component can be a valuable adjunct to traditional clerkship activities in helping students to reflect on the process of becoming a physician.” (Abstract excerpt). From: L. Rucker and J. Shapiro, “Becoming a Physician: Students’ Creative Projects in a Third-Year IM Clerkship,” *Academic Medicine* 78, no. 4 (April 2003): 391-7.

in U.S. medical schools.¹⁰⁶ Of the 128 campuses surveyed,¹⁰⁷ 78% responded: 21
schools indicated required art-related courses, and 42 schools indicated art-related
courses offered as electives; art-related extra-curricular activities were noted as supported
by 89 schools.¹⁰⁸ Based on the course titles provided, the survey data “suggest an
additive approach whereby such courses and activities remain distinct… in sharp contrast
to an integrative model” which would imply significant or substantial curricular
restructuring.¹⁰⁹

A follow-up study was conducted in 2002, and received a 65% response rate from
the 128 school surveyed.¹¹⁰ Rodenhauser and his colleagues concluded from this second
survey that “utilization of the arts serves four major functions: (a) enhancement of
student well-being, (b) improvement of clinical skills, (c) promotion of humanism, and
(d) employment by students as a teaching tool.”¹¹¹ In particular, student well-being was


¹⁰⁷ The Association of American Medical Colleges officially lists 125 established medical schools
in the U.S.; the survey included regional deans at three extension campuses, for a total of 128 schools

¹⁰⁸ Strickland et al., “Medical Education and The Arts,” 265.

¹⁰⁹ Strickland et al., “Medical Education and The Arts,” 266.

¹¹⁰ Paul Rodenhauser, Matthew A. Strickland, and Cecilia T. Gambala, “Arts-Related Activities
Across U.S. Medical Schools: A Follow-Up Study,” Teaching and Learning in Medicine 16, no. 3 (July

identified as of primary importance, noting, “clinical acumen and humanistic attributes are often natural consequences of self-esteem and confidence.”

The data from both Rodenhauser surveys clearly demonstrate arts-related courses and activities are prevalent in U.S. medical schools, ranging from literature to the visual arts, to the performing arts, and to music (see figs. A.3a-c). However, it is clear that “the advisability of reconstructing the medical school curriculum to include the arts as an integral and durable part of the education process” is quite variable and not widely addressed. Further, it is evident that “very few schools are formally evaluating these learning activities particularly for effectiveness in terms of improved student well-being, increased observational skills, and/or enhanced humanism.”

**Focus on the Visual Arts and Medical Education**

As Charon points out in *Literature and Medicine*, medical students and physicians have been taught to “listen more fully” via the use of literary methods. Rodenhauser and his colleagues found inclusion of the arts and humanities in U.S. medical school curricula “commonplace.” A variety of other studies have been cited herewith addressing the role of the humanities in medical school curricula. The focus of my research within the context of this dissertation is exclusively on the role of the visual arts in medical education.

---

112 Rodenhauser et al., “Arts-Related Activities,” 237.

113 Rodenhauser, “Arts-Related Activities,” 237.

The concept of integrating visual arts education into medical school curricula is not particularly new or revolutionary. Twenty-five years prior to the publication of Dr. Katz’s findings, the Society for Health and Human Values published a report entitled *The Visual Arts and Medical Education*, funded by a grant from the National Endowment for the Humanities, addressing this very topic. An excerpt from the foreword to this volume, authored by Georgetown University John Carroll Emeritus Professor of Medicine and Medical Ethics, Edmund D. Pellegrino, M.D., reads:

"The clinician’s craft begins with the eye – his essential diagnostic tool. With it he heeds the Hippocratic admonition to observe and to read the signs of illness impressed on the face and body of his patient. The artist’s craft also begins with the eye. With it he records the work of nature and man’s work upon nature. Like the physician the artist studies faces, forms, and colors. Clinician and artist are united in their need for a special visual awareness."

Comprised of a series of essays by health professionals and artists – some of who identified as actively practicing as both – the book addresses the education of physicians and what can potentially be gained by “a closer converse with the visual arts.” Most of the essays are supportive of the concept, while a few question the benefits of such a potentially dramatic change in medical education. The extent to which medical schools in the U.S. have seriously considered and reflected upon this and subsequent discourses, and have implemented some or any of the recommendations proposed, warrants further investigation.

---


A particularly noteworthy essay – contributed by artist, photographer, and psychiatrist Eric Avery – provides a compelling example of how the visual arts may contribute to how a physician approaches ethical questions in clinical practice. In October 1977, Avery took a series of photographs at the Pennsylvania University College of Medicine in Hershey, as part of his involvement in a Visual Arts and Medicine Dialogue Group. The black-and-white photographs are of plastic surgery resident Dr. Jane Petro as she worked over a ten-hour period to reattach the hand of a young man severed while chopping wood: the photographs are described as “hands healing another hand” (see figs. B.1a-d). Avery has shown these photographs over the years to diverse audiences, including medical students and practicing clinical physicians, as well as non-medical professionals, commenting:

One remarkable occurrence during the showing of these photographs was how quickly and consistently it lead into a discussion of the values and belief systems of the viewers – not merely how art or photography works, but how the viewers saw themselves in relation to medicine and surgery, to their bodies, and to their own medical experiences.

---

117 Eric Avery is currently a Clinical Associate Professor of Psychiatry and Behavioral Sciences and Associate Member of The Institute for the Medical Humanities at The University of Texas Medical Branch in Galveston, Texas. According to his website: “His art medicine actions have given form to the liminal space between art and medicine.” http://www.docart.com (accessed February 15, 2010).


Avery relates that it was surgeons in particular who had the most difficult time “seeing” the images, due to their familiarity with the “language of the procedure” and images shown; the surgeons would occasionally ask questions about procedure or technical aspects of the surgery.\textsuperscript{122} Avery observed that questions from the surgeons waned “when it became obvious that these images were not intended to illustrate technique or to teach anything specific.”\textsuperscript{123}

Avery was particularly moved by the response he received from Dr. Petro, the resident who performed the surgery he had photographed:

After viewing these images, she spontaneously began to cry, expressing the feeling that she had been unaware that she “was doing anything so beautiful.” She explained that the experience of being photographed in surgery had a profound effect upon her, that she had been becoming a surgeon for the last five years of her residency and on the day I photographed her, she felt she became a surgeon... her experience in surgery had only been enriched by what had happened with the photographs.\textsuperscript{124}

In September 2001, the \textit{Journal of the American Medical Association (JAMA)} published an article entitled “Use of Fine Art to Enhance Visual Diagnostic Skills.” Predating the Katz article by seven years, the authors of the \textit{JAMA} article present the methodology and results of a study conducted at Yale University that evaluated “whether the experimental process of seeing... visual details can be enhanced in medical school

\textsuperscript{122} Avery, “Hands Healing,” 15.
\textsuperscript{123} Avery, “Hands Healing,” 15.
\textsuperscript{124} Avery, “Hands Healing,” 15-16.
students through systematic visual training using representational\textsuperscript{125} painting.\textsuperscript{126} First year medical school students at Yale University were encouraged – not required – to participate in a project conducted by the Yale Center for British Art (YCBA). A control group attended standard clinical tutorial sessions on physical diagnosis skills utilizing radiographic images; an intervention group, which participated in the YCBA program, studied selected portrait paintings for 10 minutes, and was then asked to describe the paintings to the rest of the group. Both groups were given sets of photographs of individuals suffering from medical disorders, and were instructed to write descriptions of the photographs without providing a diagnosis; this testing was administered as a pre-test prior to the sessions noted above, and again as a post-test following the completion of the sessions. Controls were in place to blindly grade the tests. Results indicate little difference in the pre-test scores among both control and intervention groups; however, post-test scores differed significantly, with “students in the YCBA group [achieving] higher post-test scores in each of the photographs used in the post-test examination.”\textsuperscript{127}

The use of representational paintings capitalizes on students’ lack of familiarity with the artworks. The viewers search for and select all of the details in the paintings because they do not have a bias as to which visual attribute is more

\textsuperscript{125} The artistic rendering of an object, person, or experience in an attempt at depicting the object, person, or experience in a realistic, recognizable manner. Figurative art commonly refers to the rendering of a person. Representational and figurative art may include some degree of mild abstraction, though the objective is to arrive at a naturalistic rendering of the object, person, or experience.


\textsuperscript{127} Dolev et al., “Use of Fine Art,” 1020-1021.
important than another. This lowered threshold of observation has direct application to the examination of the patient.\textsuperscript{128}

A similar study, published in 2006 by Johanna Shapiro (et al.), University of California, Irvine, focuses on pattern recognition skills of medical students.\textsuperscript{129} In contrast with previous research, including the Yale study, which used representational art—specifically, portraiture—the Irvine study used both representational and non-representational art.\textsuperscript{130}

The range of artwork used in this study was chosen in order to exercise this methodology to the fullest extent possible. To train observational skills, we looked at less accessible artwork (i.e. artwork that is more difficult to characterize and less replete with familiar forms or content, such as non-representational art). To necessitate reflection, we looked at paintings with hidden meanings or paintings that were outside these students’ aesthetic preferences, such as surreal art. By exposing students to many genres of art, the instructor hoped they would develop a systematic process of observation that they could apply to highly divergent stimuli.\textsuperscript{131}

The Irvine study concluded that traditional training and arts-based training were both valuable, and complemented one another.\textsuperscript{132}

\textsuperscript{128} Dolev et al., “Use of Fine Art,” 1020-1021.

\textsuperscript{129} Johanna Shapiro, Lloyd Rucker, and Jill Beck, “Training the Clinical Eye and Mind: Using the Arts to Develop Medical Students’ Observational and Pattern Recognition Skills,” \textit{Medical Education} 40 (2006): 263-68.

\textsuperscript{130} Shapiro et al., “Training the Clinical Eye,” 264.

\textsuperscript{131} Shapiro et al., “Training the Clinical Eye,” 265.

\textsuperscript{132} “Several parallels between art and medicine emerged from our data analysis, including the importance of learning how to read gesture and expression, how to interpret context, how to determine what is symbolically as well as literally important, how to be skeptical about initial assumptions, and finally, how to empathically perceive emotional dimensions and narrative. These similarities reinforce our conclusion that the 2 teaching approaches studied were naturally complementary, and justify the growing inclusion of arts-based pedagogical tools and approaches in medical education. Taken together, training
Several medical schools have partnered with art museums to facilitate the enhancement of observational skills in their medical students. The University of Cincinnati, in association with the Cincinnati Art Museum, offers a course to medical students entitled “Art of Observation.” One of the course directors, Dr. Barbara Tobias, states: “A greater awareness of the difference between our objective and subjective view allows us to be more careful about the judgments we make about patients.”

Weill Medical College of Cornell University, in collaboration with the Frick Collection in New York City, has experimented with a similar non-credit art course for their medical students. All sessions take place at the Frick, removing student entirely from a clinical setting, in an effort to remove them from the familiar and sharpen their observational skills of the unfamiliar.

Use of the visual arts to enhance clinical observations skills is not limited to painting or photography. At the Medical College of Georgia, Donald A. Misch, M.D., Director of Education, Department of Psychiatry and Health Behavior, uses commercial employing a wide range of methods can bring greater texture to the process of teaching clinical medicine and help us see a more complete picture of the patient.” Shapiro et al., “Training the Clinical Eye,” 268.


films to facilitate psychosocial formulation training of psychiatry residents. Misch’s training does not exclusively utilize films directly addressing topics of mental illness – such as *Ordinary People*, *One Flew Over the Cuckoo’s Nest*, and *The Prince of Tides*; films “not specifically targeted to the field of psychiatry” are also examined – such as *A Streetcar Named Desire*, *Good Will Hunting*, and *Death of a Salesman*. Misch concludes that:

Movie videotapes reflect the realities of actual psychiatric practice, but they do so in an affectively-charged, invigorating, and time-efficient way that helps psychiatry residents to recognize psychopathology in the context of the everyday lives of ordinary people. It also allows residents to see the data directly (not filtered through a trainee presenter) and to learn to make inferences from thoughts, feelings, and behavior as demonstrated in the video.

Scholarly research addressing psychiatry in film is quite extensive, and includes the following examples with particular relevance to medical education: G. O. Gabbard, *The Psychoanalyst at the Movies*; G. O. Gabbard and K. Gabbard, *Psychiatry and the Cinema*; S. E. Hyler, G. O. Gabbard, and I. Schneider, *Homicidal Maniacs and Narcissistic Parasites: Stigmatization of Mentally Ill Persons in the Movies*;

---


136 Misch, “Psychosocial Formulation,” 104.


146 “Following a brief consideration of two contrasting purposes for teaching the medical humanities, a description is given of a film discussion elective course. In contrast to the usual teaching of medical ethics which is primarily a cognitive activity emphasizing the development of a code of principles such as justice, autonomy, and beneficence, the film discussion elective was primarily an affective activity emphasizing the development of an ethical ideal of caring, relatedness, and sensitivity to others. The pass/fail elective, offered for one credit each quarter for two quarters, met once a week for one hour for twenty-four weeks. Each week a film was shown followed by a group discussion. A wide variety of social issues were covered. The objective of the course was to increase the ethical sensitivity of the medical students through promotion of introspection and reflection on social issues. A brief discussion is given of the importance and appropriateness of using film to promote the affective focus of medicine on the relief of
and M. Olivarez, *Teaching Medical Ethics to First-Year Students by Using Film Discussion to Develop Their Moral Reasoning*.¹⁴⁷

Researchers have also explored the theater and performing arts – particularly opera – and it’s potential role in medical education and teaching empathy. In *Using Theater to Teach Clinical Empathy: A Pilot Study*, Alan W. Dow (et al.) asserts

“collaborative efforts between the departments of theater and medicine [at Virginia Commonwealth University] are effective in teaching clinical empathy techniques.”¹⁴⁸

¹⁴⁷ “PURPOSE. To evaluate a project on teaching medical ethics to first-year students by using film discussion to develop the students' moral reasoning. METHOD. The participants were 114 first-year students at Texas A&M University Health Science Center College of Medicine in 1989-90, 1990-91, and 1991-92: (1) 48 (20 women and 28 men) who participated during the fall quarter in an elective course on social issues in medicine, which consisted of weekly one-hour discussions of short films; (2) 37 (18 women and 19 men) who participated in the course during both the fall and winter quarters; and (3) a control group of 29 (8 women and 21 men) who did not take the course and so had no exposure to the film discussions. The influence of the discussions on the students' moral reasoning was measured by using Rest's Defining Issues Test for pretests and posttests. The scores of the three groups were compared by using multivariate analysis of variance. RESULTS. There were statistically significant increases in the moral reasoning scores of both the course registrants with one-quarter exposure to the film discussions (p < .002) and those with two-quarter exposure (p < .008) compared with the scores of the students who did not take the course and had no exposure (p < .109). CONCLUSION. No doubt there was a self-selecting bias on the part of the course registrants; however, since both groups of registrants showed significant increases on their posttest scores, clearly the course did have a positive influence on these students' moral reasoning. Thus, it is possible to develop young people's moral reasoning in medical school as well as in earlier educational environments.” (Abstract excerpt). From: Donnie J. Self, D. C. Baldwin, and M. Olivarez, “Teaching Medical Ethics to First-Year Students by Using Film Discussion to Develop Their Moral Reasoning,” *Academic Medicine* 68, no. 5 (May 1993): 383-5.

¹⁴⁸ “Clinical empathy is the skill of recognizing a patient’s emotional status and responding, in the moment, to the unique needs of the patient to promote better clinical outcomes. An empathy-conveying physician is more successful than one who is not. Patients have identified skills in understanding, listening, and honesty as the most important traits in their primary care physicians… Because of the importance of clinical empathy, curricula should include these skills… Part of the reason for the lack of clinical empathy curricula is that physician-educators have not been trained to teach these skills. Whereas many intellectually adroit clinicians develop expertise in these abilities through clinical practice, explicit training
Opera in particular is an interesting art form, as it combines literature, music, and performance. Stefan N. Willich, a Professor at the Institute for Social Medicine, Epidemiology, and Health Economics, at Charité University Medical Center, Berlin, explores the diverse depiction of doctors in opera – and how they were historically perceived in society – in *Physicians in Opera: Reflection of Medical History and Public Perception.*\(^{149}\) Austrian composer Carl Ditters von Dittersdorf “extols [the physicians’] importance in the introductory aria” to his 1786 opera *Doktor und Apotheker (Doctor and Pharmacist).*\(^{150}\) In Italian composer Domenico Gaetano Maria Donizetti’s 1832 opera *L’Elisir d’Amore (The Love Potion)*, Dr. Dulcamara “is one of the first physicians as a

---


\(^{150}\) Willich, “Physicians in Opera,” 1333-35.
leading character in opera and reflects the situation of medicine in the early 19th
century.” Donizetti’s 1843 Don Pasquale “portrays the increasing power of the
physician to exercise psychological influence.” Italian composer Giuseppe Fortunino
Francesco Verdi portrays Dr. Grenvil’s dedication to Violetta in his 1853 opera La
Traviata, in which “the role of the physician is extended with sympathy and comfort.”
German-born French composer Jacques Offenbach’s 1881 Les Contes d’Hoffman (Tales
of Hoffman) focuses on Antonia’s cardiac arrhythmia; “the scientist not only fails to
resolve the chaos or support the people involved but actually brings about the deadly
consequences.” Moving into the 20th century, Austrian composer Alban Berg’s 1925
opera Wozzeck involves a doctor who uses a man – Wozzeck – “for medical experiments
and as illustrative material for medical students… the doctor’s exalted and cynical
reaction indicates his powerful position in relation to the humiliated patient – clearly a
failed doctor-patient relationship.”

Other relevant studies include: The Physician in Contemporary Opera: Three
Divergent Approaches to the Doctor-Patient Relationship, by E. K. St. Louis; and

151 Willich, “Physicians in Opera,” 1333-35.
152 Willich, “Physicians in Opera,” 1333-35.
156 St. Louis, E. K. St. Louis, “The Physician in Contemporary Opera: Three Divergent
Approaches to the Doctor-Patient Relationship,” The Pharos of Alpha Omega Alpha-Honor Medical
Roger B. Mason, *Seeing Medicine Through Opera Glasses*,\(^{157}\) a review of Michael and Linda Hutcheon’s *Opera: Desire, Disease, Death*.\(^{158}\) Opera also provides rich examples of illness, such as Lucia’s descent into madness in Donizetti’s 1835 opera *Lucia di Lammermoor*, and Mimi’s progressive decline due to consumption/tuberculosis in Italian composer Giacomo Antonio Domenico Michele Secondo Maria Puccini’s 1896 operatic masterpiece *La Boheme*.

A number of studies have demonstrated that exposure to classical artistic training, such as participation in a life drawing class, enhance not only observational skills, but understanding of anatomy as well. The objectives of a life-drawing class for medical students at Southampton Medical School in the U.K. were:

To help students learn the basics of life drawing; to enable students to apply their anatomical knowledge in a more holistic context, hopefully thereby increasing their enjoyment of the locomotor systems course; to take students out of the medical ‘mind-set’ for an afternoon, and to consider the human body from a more

---


\(^{158}\) “This is a book about a particular set of stories and images—those about illness and death as represented on the operatic stage of Europe and North America in the nineteenth and twentieth centuries. It is about what some readers will consider, at least at first, an unlikely combination: medical history and musical history.” (p. 1). “Such an understanding of the meanings and values attached to disease in the past is timely, even crucial, to us today: we are witnessing a struggle over the different meanings being given to a new disease—aids, or acquired immunodeficiency syndrome. With its arrival have appeared all the social, psychological, and cultural dimensions that have always accompanied but have also been part of a biomedical understanding of disease. Although this has usually been the case—from the very first recorded plagues—our focus is on the particular period since science began to understand that diseases might not be a matter of personal idiosyncrasy and predisposition.” (p. 2). Hutcheon, Michael Hutcheon and Linda Hutcheon, *Opera: Desire, Disease, Death* (Lincoln, NE: University of Nebraska Press, 1999).
‘artistic’ point of view; and to give students a chance to practice observing a naked, living human body in detail.\(^{159}\)

Phillips’ observation about observing a living, naked human body is noteworthy and poignant. One might expect that both physicians and artists are naturally or inherently comfortable with the naked human body. What might not be readily considered is that this level of comfort is often developed over time, and that both physicians and artists progressively learn to become familiar and comfortable with the naked human body. Phillips observes:

It is difficult to imagine a more potent image than that of the human body. It is something that we are all familiar with – and yet at the same time it has the power to generate all kinds of feelings in us depending on how it is presented. A naked body may be sensual, repulsive, frightening or humorous. Given the power of the human body to affect us in so many ways, it is inevitable that there should be some interplay between the worlds of art and anatomy.\(^{160}\)

Reflecting on my own formative years as an art student in the early 1980’s, I recall the complex and diverse mixture of feelings and emotions I experienced when I entered my first drawing and composition class: a combination of consternation and curiosity, of fear and fascination, of apprehension and anticipation. My fellow students and I clipped our sheets of newsprint to our masonite drawing boards, set our conté crayons and charcoal sticks on our desks, and prepared anxiously and nervously for the

---


model to make their entrance. When the model appeared and disrobed, the discomfort and unease of the students was palpable.

Over the next three hours, the model assumed multiple poses of differing duration and physical demand, as we filled our pages with lines and smudges. By the end of the session, critiquing the product of one another’s endeavors and labors, it was evident that our fears and apprehensions, associated with our initial stark confrontation with the model’s nakedness, had fallen away along with the model’s robe; with varying degrees of success, we had succeeded in depicting not a naked man, but the male nude. Likewise, relates of the medical students involved in the life drawing class he had organized:

Students, once they had got over their initial embarrassment (both at the nakedness in front of them and at the quality of their own drawings), were interested in learning the skills of seeing the body in three dimensions, and capturing this on two-dimensional paper.161

At Royal North Shore Hospital in Sydney, Australia, artists’ “models were used to teach normal physical examination skills to a group of junior medical students, during their surgical rotation.”162 Evaluation of this teaching method revealed that “in the four areas of evaluation (interaction, explanation, presentation, and organization), the large-group interactive sessions were consistently rated higher than the bedside tutorial.”163 At


the Department of Functional Anatomy, University Medical Center, in Utrecht, the Netherlands, body painting is used to “enhance courses in living anatomy.”\textsuperscript{164}

A significant challenge to promoting the potential importance of visual arts-related activities to medical education lies with the difficulty in assessing outcomes: specifically, the professionalism, integrity, humanism, compassion, empathy, respect, and altruism of physicians.\textsuperscript{165} As the following section will demonstrate, few medical schools have formally assessed such outcomes.

**Visual Arts and Medical Education Today: Survey Results**

Rodenhauser (et al.) notes that “although the literary arts initiated the movement to include the humanities in medical education, little is known about the incorporation of other art forms;”\textsuperscript{166} his “2001 survey of the variety of arts-related activities incorporated

\textsuperscript{164}“We describe a new method, bodypainting, to enhance courses in living anatomy. This novel approach was fully integrated in a course that comprised gross anatomy, living anatomy, and physical examination of the major abdominal and thoracic organs. We designed a course in which the students familiarized themselves with the surface markings and subsequently painted the full organ at the site of its projection on the body surface. Based on our first experiences, we conclude that the course is a successful and enjoyable means of teaching various aspects of anatomy in relation to physical examination. This was confirmed by an evaluation among the first groups of students.” (Abstract excerpt). J. W. Op Den Akker, A. Bohnen, W. J. Oudegeest, and B. Hillen, “Giving Color to a New Curriculum: Bodypaint as a Tool in Medical Education,” *Clinical Anatomy* 15, no. 5 (August 2002): 356-62. http://0-www3.interscience.wiley.com.library.lausys.georgetown.edu/journal/98016199/abstract?CRETRY=1&SRETRY=0 (accessed January 15, 2010).


\textsuperscript{166}Strickland et al., “Medical Education and The Arts,” 264.
by U.S. medical schools revealed expansion far beyond the literary arts introduced in the early 1970’s. A follow-up survey conducted in 2002 by Rodenhauser (et al.) sought “to assess student involvement in arts-related activities in greater depth,” inclusive of literature, visual arts, performing arts, and music. As my research for this dissertation focuses specifically on the visual arts, I developed a survey modeled after Rodenhauser’s 2001 and 2002 questionnaires designed to ascertain the extent to which U.S. medical schools currently incorporate visual arts-related activities into their curricula, as well as the extent to which they may have considered questions pertaining to enhanced diagnostic skills, and increased empathy and humanism in clinical practice related to such curricular initiatives.

On November 30, 2009, a five-page questionnaire and cover letter (see fig. A.4a) was distributed via email to deans of the 131 accredited M.D. degree-granting U.S. medical schools represented by the Association of American Medical Colleges (AAMC) (see fig. A.4b). This survey was purposely designed to not be anonymous in order to provide the ability for follow-up communication with individual representative institutions, as needed, to clarify response data. It is acknowledged that by design, the survey requests that the individual completing the questionnaire attempt to provide

---


169 “You are quite welcome to use any parts of the questionnaire and to adapt all or part of it to suit your objectives.” Permission granted by Paul Rodenhauser, M.D., Professor of Psychiatry, Emeritus, Tulane University School of Medicine, by email (November 6, 2009).

170 The questionnaire was formatted as a Microsoft Excel spreadsheet.
assumed consensus feedback on behalf of their institution, and that their responses may
not necessarily be representative of that institution’s actual consensus view with regard to
the questions asked. The purpose of the survey is to attempt to gauge the extent to which
U.S. medical schools have possibly considered the questions asked, have integrated
visual arts-related courses and activities into their curricula, and have assessed outcomes
of such curricular initiatives. It is also acknowledged that responses provided may not
necessarily constitute comprehensive information with regard to all visual arts-related
courses and activities for medical students for the school in question. It is further
acknowledged that responses regarding potential benefits, such as enhanced humanism
and ethics in clinical practice, represents opinions expressed by the individual completing
the survey, and may not necessarily represent scientifically valid data analyses.

Respondents were asked to provide the following information:

• **Responder Information**: Name of medical school, public or private, total
  student body population, average class size, and name, title, telephone number
  and email of the individual completing the survey.

• **Section One**: Required courses that emphasize/incorporate the visual arts,
  including course titles, internet Uniform Resource Locator’s (URL’s) to
course descriptions and syllabi (if available), number of years offered, course
  length, number of credit hours, number of students involved, if the students
  are active (create) or passive (appreciate) regarding the visual arts, if the
course is separate or integrated into a larger course, and funding source(s).

• **Section Two**: Elective courses that emphasize/incorporate the visual arts,
  including course titles, internet URL’s to course descriptions and syllabi (if
  available), number of years offered, course length, number of credit hours,
  number of students involved, if the students are active (create) or passive
  (appreciate) regarding the visual arts, if the course is separate or integrated
  into a larger course, and funding source(s).
• **Section Three**: Extracurricular activities that emphasize/incorporate the visual arts, including activity title, internet URL’s to activity descriptions and schedules (if available), number of years offered, activity length, number of students involved, if the students are active (create) or passive (appreciate) regarding the visual arts, and funding source(s).

• **Section Four**: Assessment of courses and activities that emphasize/incorporate the visual arts, inquiring if any of the visual-arts related courses or activities noted have been assessed for effectiveness in terms of improved student well-being, increased observational/diagnostic skills of medical students, increased observational/diagnostic skills of physicians in clinical practice, and enhanced humanism.

• **Section Five**: Attitudes and opinions regarding courses and activities that emphasize/incorporate the visual arts, inquiring:
  
  o What (if any) value is added, and what are the drawbacks (if any) with regard to enhancing/improving students’ observational/diagnostic skills, improving student well-being, and enhancing humanism, empathy, and ethical behavior in clinical practice.
  
  o If an additive approach (additional, independent course options), or an integrative approach (integrated into existing medical courses), or a combination of the two, is preferred, and whether arts-related courses should be required or elective.
  
  o If an active approach (direct creative involvement on the part of the student), or a passive approach (appreciation and understanding, without creative activity on the part of the student), or a combination of the two, is preferred, and what are the potential curricular implications.

• **General Comments**: Other comments regarding attitudes and opinions toward arts-related courses and activities and medical education.

An initial response deadline of December 31, 2009, was given, with a follow-up reminder emailed on December 15, 2009. An email was sent on January 6, 2010, to institutions that had not responded by the initial December 31, 2009 deadline, extending the response deadline to January 15, 2010. Of the 131 schools surveyed, 29 schools (22%) responded.
Among those schools that responded, 11 (38%) identified as private, with 18 (62%) identified as public. The total medical student population ranged from 39 students to 920 students, with a median population of 660 students.

The relatively low response rate of 22% is likely due to a variety of factors. At the time when Dr. Rodenhaus er and his colleagues conducted their research in 2001 and 2002, it was not uncommon for surveys to be distributed via the AAMC; due to the fact that this mechanism implied authorization by the AAMC, response rates were likely fairly good, and provided a reasonable sampling. In autumn 2009, I contacted the AAMC to ascertain if my survey could be distributed via the AAMC’s list serve of U.S. medical school deans. The email response I received indicated: “Due to the sheer number of surveys that the deans receive about their schools, their faculty, their practice plans, research, financial resources, etc., no external surveys (from individual researchers) are sent to the deans.” It was therefore necessary for me to compile my own mailing list of all 131 U.S. medical school deans, as well as any associate or assistant deans specifically identified as responsible for medical curricula in their respective institutions. Without the AAMC’s imprimatur, medical school deans likely

\begin{footnotes}
\footnote{171 Two of the medical schools that responded to the survey matriculated their first incoming class in 2009.}
\footnote{172 Email communication from John E. Prescott, M.D., Chief Academic Officer, Association of American Medical Colleges, November 19, 2009.}
\footnote{173 This mailing list was compiled by consulting the AAMC’s Member Medical Schools listing, available on their website: http://services.aamc.org/memberlistings/ (accessed November 19, 2009). Each member institution’s website was visited to ascertain the name and email address of the medical school dean, and associate or assistant deans responsible for medical curricula development, management, and oversight.}
\end{footnotes}
did not feel compelled to reply. It is likely that those schools that did respond to the survey place some value on arts related courses and activities – or had strong opinions either for or against such curricular initiatives – and therefore were more inclined to provide a response. Therefore, the conclusions that can be drawn are limited due to the fairly low response rate to my survey.

**Required Courses:** Among those schools that responded, 13 (45%) indicated offering at least one required course that emphasizes/incorporates the visual arts, with a total of 24 courses noted (see fig. A.5a). One school reported offering 5 individual courses, one school reported offering 3 individual courses, with two other schools reporting offering at least 2 individual courses. Course titles included: “Doctoring,” “On Doctoring,” “Perception, Art, and Clinical Judgment,” and “Medical Humanities.” Eight courses were noted as having been offered for at least five years; one school responded that such a course has been offered since the 1970’s. Data on course length and credit hours were not consistently reported. Data on number of students involved was generally consistent with data provided on the average class size for each institution. Eighteen of the courses noted (75%) specified active creative participation on the part of the student. Seven courses (29%) were designated as separate courses, with 4 (17%) designated as integrated into larger courses; 8 responses (33%) were inconsistent, noting that the course was both separate and integrated into a larger course; 5 courses (21%) did not specify if the course was separate or integrated into a larger course. Seventeen courses (70%) are supported with school based funding, and 4 courses (17%) are supported by student fees;
three schools noted a combination of school based and student fee funding. Five courses (20%) noted other unspecified funding sources.

**Elective Courses:** Among those schools that responded, 9 (31%) indicated offering at least one elective course that emphasizes/incorporates the visual arts, with a total of 19 courses noted (see fig. A.5b). Two schools reported offering 4 individual courses, with three other schools reporting offering at least 2 individual courses. Course titles included: “Individualized Electives in Arts/Humanities,” “Understanding Anatomy through the Art of Sculpting,” “Medicine and Society Through Films,” “The Art of Advanced Diagnosis and Clinical Reasoning,” “The Intelligent Eye,” and “Art of Observation.” Data on number of years offered, course length and credit hours were not consistently reported. Data on the number of students involved ranged from 1 to 46 participants per course. Seven of the courses noted (37%) specified active creative participation on the part of the student. Sixteen courses (84%) were designated as separate courses; 1 response was inconsistent, noting that the course was both separate and integrated into a larger course; 2 courses (10%) did not specify if the course was separate or integrated into a larger course. Twelve courses (63%) are supported with school based funding, and 3 courses (16%) are supported by student fees; three schools noted a combination of school based and student fee funding. Two courses (10%) noted endowed funding; 5 courses (26%) noted other unspecified funding sources.

**Extracurricular Activities:** Among those schools that responded, 13 (45%) indicated offering at least one extracurricular activity that emphasizes/incorporates the
visual arts, with a total of 32 activities noted. Three schools reported offering 5 individual activities, with two other schools reporting offering at least 3 individual activities. Activity titles included: “Art and Literary Magazine,” “Drawings of Cadaver,” “The Art of Observation,” “Student Art Show,” “Arts in Medicine Training for Medical Students,” and “Life Drawing Classes.” Data on number of years offered ranged from 1 to 18 years. Data on activity length were not consistently reported. Data on number of students involved ranged from 1 to 50 per activity. Sixteen of the activities noted (50%) specified active creative participation on the part of the student. Support for extracurricular activities was widely varied, evenly distributed among school based, endowment, fund raising, and other unspecified sources.

One school commented on a specific course offering targeting observational skills:

This is a collaboration with our campus art museum to use their collection to get our students to learn to carefully "see". Students go in groups of 8 each [and] look at a painting and describe what they see to 3 colleagues. Then a docent goes deeper into the painting – after all 8 students have done this, they go into a classroom and are given clinical pictures to help see the abnormalities. The Art Museum also uses their special exhibits as opportunities arise – e.g. an exhibition of African Art of Healing was used to talk about culture and healing as one example.

One school noted that an art class is offered for first and second year students, whereby students integrate drawing with their study of anatomy. Students can also partner with a local art museum to involve children with disabilities in very special arts projects in an effort “to foster communication.” A movie series has been offered for several years by the same school focusing on films with themes about "doctoring.”
Based on the responses received, it is apparent that very few schools have formally evaluated courses and activities that emphasize/incorporate the visual arts. Four schools have evaluated such courses and activities with regard to improved student well being. Each indicate that such evaluation is conducted by way of a questionnaire distributed to the students engaged in these courses/activities. In general, it is observed that engaging with the visual arts helps to offset the “rigors” of, and provide “escape” from, the standard science-based medical school curriculum.

Seven schools indicate that they have attempted to evaluate potential increases in observational and diagnostic skills of medical students resulting from direct engagement in visual arts related courses and activities. In most instances, such evaluation is conducted by way of a questionnaire distributed to the students. One school comments:

> Although the underlying objective of the courses is to enhance their observational and perceptual skills, encourage analysis and questioning, the outcome cannot be answered without a tightly controlled systematic study conducted over an extended period of time.

Only one school noted that they assess effectiveness of engagement in these activities in relation to increased observation and diagnostic skills of physicians in clinical practice, commenting that practicing physicians participate through their interaction with medical students in relevant courses and activities. Four schools indicate that they have conducted assessments of enhanced humanism. One school comments:

> The arts excel in conveying the human condition. The students are exposed to a whole range of human experience through the arts. Whether or not that exposure enhances their humanism remains at the [level of] anecdotal, individual reporting.
Comments submitted pertaining to attitudes and opinions about enhanced or improved observational and diagnostic skills, improved student well-being, and enhanced humanism, empathy and ethical behavior were quite varied. Comments by those who question the value of visual arts-related courses and activities include:

[Note: Each block quotations represents an individual response form an individual medical school]

The results from prior studies are not convincing. Everything we know from the research on skill learning is that it is specific. The old idea that studying Latin would sharpen the mind for any mental task is dead. Studying art to sharpen the observation skills is a reincarnation of that idea.

We have an integrated case-based curriculum and there are no courses per se. In the 2007-08 and 2008-09 academic years, we hired an English professor with a background in medical education, and who purportedly specialized in the medical humanities. She tried a number of modalities in attempts to integrate visual arts, writing, and reflective activities into the curriculum. This thread was not well-received at all and the feedback we got from students was that they thought some of the activities were important, but were distressed by the approach of the faculty who tended to present the material in a very abstract manner. The students were clearly not connecting the activities to good medical practice and we had to discontinue the program designed by this faculty--it seemed to be turning students off and the focus became the resistance and rebellion to the program. The experience with the visual arts aspect met with great resistance, mainly because the students felt that it had nothing to do with medical training. We are in the process of developing a new thread for humanism in medicine and have not yet incorporated any visual arts activities. I can see the value of it and hope that we can find a way of incorporating this in a meaningful way for the students.

There is a lack of consensus that there is value-added. As such, elective experiences have worked well for us. About ten years ago we incorporated visual arts as a required part of our doctoring course and received tremendous push-back from students; as that course was revised, this aspect was omitted. Additional difficulties (beyond the uncertain value added as perceived by both students and faculty) includes familiar challenges: (1) students learning to deal with the large volume of scientific information needed for success in medical school and (2) limits on curriculum time with many competing priorities. More specifically, faculty & students see many topics as highly relevant to medical education but
schools still have difficulty finding time for inclusion in the curriculum (e.g., healthcare in interprofessional teams, quality improvement, patient safety, public health, prevention, evidence-based medicine, informatics, healthcare policy, healthcare system). My personal sense is that the most qualified faculty for teaching this important aspect of medicine are found on undergraduate campuses, and that inclusion of visual arts (along with humanities and other non-scientific fields) would be best included as prerequisites for medical school rather than medical schools trying to hire faculty with this expertise.

Comments by those who have identified value added in visual arts-related courses and activities include:

Faculty who teach these courses observe that student derive benefit from learning how to open themselves to the acts of beholding. We also appreciate the development of attention and contemplation in the students who seriously study visual arts.

Some of the comments and observations reflect mixed attitudes and opinions, including:

The consensus among the students is that the activities are valuable. Current faculty and administration seem less sure.

Those faculty and students involved believe that all of the values above are added; there are of course many who don't believe, and who want to see "proof." The participants from the faculty believe these exercises do enhance these skills. The believers believe-the skeptics don't. Those who participate KNOW these things work—but they are the choir. The major barrier is time and an already too dense packed curriculum.

Preferences voiced with regard to an additive curricular approach (additional, independent course options), an integrative curricular approach (integrated into existing medical courses), or a combination of the two, were also widely varied. Comments include:

The issue of added courses is time— to convince faculty to take time away from other elements in the curriculum to incorporate this in any but an elective would require vastly more data showing incontrovertible evidence that it is better than current approaches.
There is no consensus. We favor including humanities and arts in required courses in highly individualized ways. Students always get to select their courses of study in these realms. We try not to marginalize these materials in "enrichment" curricula. Arts related [activities at our school] includes visual arts, music, dance, literature, cinema, memoir, creative writing.

The faculty and students who participate see the value – in teaching specific skills. This IS an important approach that serves as an adjunct to the beautiful science. Someone once said that the major outcome of the dense packed, test intensive, judgment prone science curriculum is that it makes students hate science – which is indeed beautiful. Perhaps the arts could help that beauty be appreciated.

Arts related courses that are structured to have persuasive direct relevance to clinical application, physician development, and doctor-patient relations should be required.

With regard to favoring an active approach (direct creative involvement on the part of the student) versus a passive approach (appreciation and understanding, without creative activity on the part of the student), or some combination of the two, comments include:

Many of these activities, other than courses, are student led. Students do seem to favor active involvement… many rave an opportunity to engage in creative activities which they feel are otherwise lacking in medical school.

For this subject, the students need to be involved, participatory, mindful – not passive objects as they are so much in the curriculum that exists.

The final section of the questionnaire allowed respondents to make other comments regarding attitudes and opinions toward arts-related courses and activities and medical education. Examples of such comments include:

The big problem with this is the assumption - not convincingly supported that lack of humanism is a big problem by the end of medical school, the second is the exposure to the arts in required arenas will help with this perceived problem.
Many of our students are accomplished musicians, artists and writers - and my guess is that we are not unique in this regard. Trying to fit formal instruction in the arts into the curriculum here would be fraught with difficulty - without compelling data suggesting it was actually detrimental to our students and their patients not to have it, I doubt it can be justified.

If patients could help this cause by telling how much they appreciate doctors who notice, listen, engage – see nuances, describe the patients more fully, etc. – that would be helpful.

As far as I can assess, I found students coming away from their experience of taking this course to be much more confident and with a more positive attitude in successfully tackling on the next block which deals with heart. The course Art & Anatomy intends to improve the observational skills of the students by analyzing contemporary and classical pieces of art. In a second part historical anatomical drawings are studied and compared over time to illustrate simultaneously the development of the discipline of anatomy in a historical time frame. The third part of the course covers studio time in which the students and lecturer draw anatomical specimens from the dissecting laboratory. The course is well received and we obtain anatomical art work created by the students during the studio time.

As Rodenhauser (et al.) surmised in 2004:

Although it is clear that many U.S. medical schools are involving a variety of the arts in their instructional and extracurricular programs, approaches to integrating arts into their curricula vary widely. Of greater significance, however, is the observation that very few schools are formally evaluating these learning activities particularly for effectiveness in terms of improved student well-being, increased observational skills, and/or enhanced humanism… Given society’s and the medical profession’s expectations of physicians and the current imperative for evidence on which to base educational and clinical practices, medical education should next incorporate outcome assessment as a component of arts-related programs for medical students.174

Again, the conclusions that can be drawn are limited due to the fairly low response rate to my survey. Survey data reveals that some U.S. medical schools involve a variety of specifically visual arts-related courses and activities into their curricula, with widely

varying approaches. More than one school responded that while a number of faculty and students highly value the availability of visual arts-related courses and activities, there is clearly not a strong consensus that the value of such initiatives can be clearly demonstrated, and therefore justify significant curricular changes. It is also evident that very few schools formally evaluate existing visual arts-related learning activities, aside from questionnaires distributed to students immediately following their participation.

Rodenhauser (et al.) further notes:

As a result of a review of the literature as well as administrative and artistic involvement in an endowed program in the arts for medical students at Tulane University, our impressions favor student well-being as the fundamental and most pervasive justification for inclusion of the arts in medical education currently. Clinical acumen and humanistic attributes are often natural consequences of self-esteem and confidence. Likewise, the creativity involved in use of the arts by students in community service activities can be understood in terms of enthusiasm made available by a supportive, reflective, benevolent learning environment. It is important to note, however, that the literature advocating for use of the arts as a desirable teaching method remains largely anecdotal and unsystematic.¹⁷⁵

My recent review of the literature, as well as examination of the results from the survey I distributed, continues to support the claim that student well-being remains the primary justification for the inclusion of arts in medical education today, particularly the visual arts. However, it is also clear form the literature review and survey results that, at least anecdotally, many medical faculty educators and medical students find value in visual arts-based curricula with regard to improving diagnostic skills, and improving humanism and empathy in clinical practice. The challenge before medical educators

remains to what extent they are able and/or willing to institute curricular initiatives integrating the visual arts with medical education.
All our knowledge has its origins in our perceptions. 

– Leonardo da Vinci

If I have ever made any valuable discoveries, it has been due more to patient attention, than to any other talent. 

– Sir Isaac Newton

This chapter will provide an exploration of the historical interaction between science and the humanities, with particular focus on the unique interplay between – as well as concurrent/complementary developments in – medicine and the visual arts. Three primary themes illustrate the distinctive reciprocity and engagement between medicine and the visual arts: humanism and empathy; emphasis on the individual, or “whole” person; and developments in anatomical study.

**The Renaissance: Man as the Measure of All Things**

Toward the end of the Late Middle Ages, a renewed interest in Greek and Roman culture heralded the dawn of the early modern era: the Renaissance.

The Renaissance is popularly perceived primarily in relation to the visual arts and architecture, particularly in Italy between the 15th and 17th centuries. Indeed, the Renaissance had a profound impact on European art and architecture of the period, and
The observational skills necessary to perform modern science come from the skills introduced by artists in the Renaissance. It has been said that the greatest discovery of science is science itself. Yet it was the artist, in his attempt to mirror nature, who first learned to observe nature as it really presented itself. And, in turn, for the artist the greatest discovery of the Renaissance – actually a rediscovery – was the notion prevailing in classical antiquity that man was the measure of all things.¹

Although the Renaissance is widely considered to have been centered in Florence, later spreading throughout the rest of Europe,² it is important to approach the Renaissance from a broader, more global perspective³ in an effort to understand and conceive the interrelationships between the sciences and the humanities⁴ - and, by extrapolation – between medicine and the visual arts.

Various metaphors have been employed to describe and define the Renaissance. An “awakening from a long sleep or emerging from a state of torpor” was the most commonly coined in the 16th century.⁵ Italian poet Giovanni Boccaccio and French

---


³ “In recent years, alternative approaches to the Renaissance from history, economics, and anthropology have complicated the picture, and offered alternative factors crucial to understanding the Renaissance… trade, finance, commodities, patronage, imperial conflict, and the exchange with different cultures were all key elements of the Renaissance.” From Jerry Brotton, *The Renaissance: A Very Short Introduction* (Oxford; New York: Oxford University Press, 2005), 19.


writer François Rabelais – and others – favored “the light of the new age dissipating the darkness of the preceding one.”6 The view of the Renaissance as a “rebirth” – particularly in relation to the revival of classical learning – is traced to French humanist Nicholas of Clémanges, and eventually came to replace existing metaphors. The Renaissance as a rebirth was considered to be the general definition by the time of the 1873 publication of The Renaissance by English writer Walter Pater.7 Regardless of the definition favored, The Renaissance clearly arose from “a profound and enduring upheaval and transformation in culture, politics, art, and society in Europe”8 at the end of the Late Middle Ages.

A crucial seminal event to the advent of the Renaissance can be traced to the early 14th century. In 1333, Italian scholar and poet Francesco Petrarca – commonly known as Petrarch – discovered a manuscript by 1st century B.C. Roman senator and orator Marcus Tullius Cicero, Pro Archia (Oration for Archias).9 Cicero’s speech espoused “the virtues ‘de studiis humanitatis’” – the virtues of a liberal arts education grounded in the humanities.10 This served as a framework for Petrarch’s notion of humanism,11 a defining

7 Ergang, The Renaissance, 6.
8 Jerry Brotton, The Renaissance, 9.
9 Brotton, The Renaissance, 42.
10 Brotton, The Renaissance, 42.
concept of the Renaissance, and a significant contribution to “the formation of the intellectual culture of the Early Modern Period in Western Europe.”\textsuperscript{12} The \textit{trivium} (grammar, logic and rhetoric – the three basic arts comprising the lower division of the seven liberal arts), and the \textit{quadrivium} (arithmetic, music, geometry, and astronomy – comprising the upper division of the seven liberal arts), together “formed the basis of the \textit{studia humanitatis},”\textsuperscript{13} or humanism.\textsuperscript{14}

Humanism represented a significant new development in late 14\textsuperscript{th}- and 15\textsuperscript{th}-century Europe that involved the study of the classical texts of Greek and Roman language, culture, politics, and philosophy. The highly flexible nature of the \textit{studia humanitatis} encouraged the study of a variety of new disciplines that became central to Renaissance thought, such as classical philology, literature, history, and moral philosophy.\textsuperscript{15}

A series of events in the latter half of the 15\textsuperscript{th} century can be cited as hastening the birth of the Renaissance. From the 12\textsuperscript{th} through the 14\textsuperscript{th} century, western scholars were exposed to “the treasures of classical Greek literature that had been preserved by Byzantine copyists”\textsuperscript{16} via diplomatic ties with Eastern Mediterranean capital of the

\begin{footnotes}
\footnotetext[12]{Karl A. E. Enenkel and Jan Papy, eds., \textit{Petrarch and His Readers in the Renaissance} (Leiden; Boston: Brill, 2006), 1.}
\footnotetext[13]{Brotton, \textit{The Renaissance}, 3.}
\footnotetext[14]{“It is difficult to assess briefly the lasting contribution of Renaissance humanism to Western civilization. Many of its features have mainly historical interest today. But the central belief of the early humanists that the human personality is worth cultivating and developing to its fullest extent for its own sake is a continuing inspiration.” From Thomas G. Bergin and Jennifer Speake, eds., \textit{The Encyclopaedia of the Renaissance} (London: B. T. Batsford, 1988), s.v. “humanism,” 217.}
\footnotetext[15]{Brotton, \textit{The Renaissance}, 3.}
\end{footnotes}
Byzantine Empire, Constantinople. In 1453, Constantinople fell to the Ottoman Turks. The subsequent influx of Byzantine scholars into Europe – primarily Italy – resulted in even greater access to classical Greek texts.

The invention of the moveable type printing press by Johannes Gutenberg in Mainz, Germany, three years prior to the fall of Constantinople, contributed significantly to the dissemination of classical Greek texts throughout Europe. Presses rapidly spread throughout Germany, particularly in commercial areas and university cities, such as Cologne, Strasbourg, Basle, Nuremberg, Augsburg, and Frankfurt; by 1470, presses spread quickly outside of Germany to important economic and cultural centers such as Paris, Rome, and Venice.

17 “During the Early Middle Ages (sixth through tenth centuries A.D.), also known as the Dark Ages, Greek and Roman literature, philosophy, and science were largely forgotten in Western Europe. But the ancient texts had been preserved in the Byzantine Empire, along with the knowledge of classical Greek… In antiquity, the Romans were in awe of Greek art, philosophy, and science, and their noble families often employed Greek intellectuals as tutors for their children. But the Romans themselves hardly produced any original science. However, Roman architects and engineers wrote many important treatises, and Roman scholars condensed the scientific legacy of Greece into large encyclopedias that were popular during the Middle Ages and the Renaissance. These Latin texts were eagerly consulted by the humanist artists and intellectuals, and some were translated into the Italian vernacular.” From Fritjof Capra, The Science of Leonardo: Inside the Mind of the Great Genius of the Renaissance (New York: Doubleday, 2007), 138.


19 The invention of movable type has also been linked to Laurens Coster of Haarlem, the Netherlands, in 1440, though Gutenberg is widely favored as the inventor. Ergang, The Renaissance, 136.

20 Bergin and Speake, Encyclopedia of the Renaissance, s.v. “printing press,” 331. “Within a quarter-century after the invention of movable type, most of the important commercial and intellectual centers of Germany, Switzerland, the Netherlands, Italy, France, England, Spain, and Portugal had one or more presses. It has been calculated that by 1500 presses had been established in thirteen European countries… Soon the presses were turning out large numbers of books in the vernacular as well as in Latin. Neither were Greek and Hebrew books in limited numbers long in making their appearance. It has been estimated that by 1500 no fewer than 30,000 distinct editions were published. Estimates of the total
Once the Italian introduction of roman and italic types made smaller and cheaper formats a possibility, books were able to be acquired easily by individuals as well as by institutional libraries… Printing in vernacular languages soon began to outstrip Latin and other learned tongues… [and were] one more way of bringing new ideas to the growing number of those able to read.²¹

The 1482 Ulm printing of Ptolemy’s *Geography* “transformed 15ᵗʰ-century perceptions of the shape and size of the earth,” in stark contrast to the existing *mappae mundi*, based on the “Christian understanding of creation.”²² The Ptolemaic map was quickly rendered obsolete when Portuguese navigator Bartolomeu Diaz rounded the tip of South Africa in 1488, followed by Christopher Columbus’ 1492 discovery of the “New World,” and Vasco da Gama’s 1498 circumnavigation of Africa and sailing across the Indian Ocean. New trade routes with the east had been discovered to replace those closed off by the fall of Constantinople, and a new world map was generated by Ottoman naval commander Piri Reis in 1513 reflecting these global discoveries.²³ Portuguese explorer Ferdinand Magellan’s circumnavigation of the globe in 1519-21 provided practical evidence supporting the concept of the Earth as spherical, dating to Ancient Greek speculation in the 6ᵗʰ century B.C., and presumed as factual in Hellenistic Greece by the 3rd century B.C.

---


The renewed interest in classical antiquity is evident in Renaissance art: “an appreciation of both classical form and content” combined with “a growing interest in naturalistic values” are hallmarks of “Renaissance’ values” in the visual arts.24

Two phenomena are always seen as central to the Renaissance, particularly in Italy: one is the new interest in classical Latin and Greek associated with humanism; the other the dramatic change that occurred in the visual arts… as a process of rebirth and development to a level unsurpassed even by the ancients. Historians have often supposed that the two were closely related, yet it is not immediately obvious why this should be so… There are four main ways in which the two groups might have interacted. The ideals of humanism could have influenced artists, by encouraging them to emulate the achievements of their ancient predecessors. Equally, artists could have influenced humanists, by opening their eyes to the aesthetic and historical significance of ancient art and architecture. Again, humanists might have changed the ways in which contemporary art was discussed and criticized by educated people. Finally, there is the issue of direct humanist involvement in the production of works of art, particularly in the employment of learned subject-matter.25

The beauty of the external world and of nature became a primary focus of Renaissance art.26 The role classical art itself played in influencing Renaissance artists, however, has been debated:

The accomplishments of the Graeco-Roman world in painting had been almost entirely forgotten during the Middle Ages, nor did the early Renaissance painters know much about them. The little they knew came not from actual paintings, but from the writings of Pliny and Vitruvius. Some influence may have been exerted on Renaissance painters by the sculptural remains of classical art. Even this influence was in no way decisive.27

---


Renaissance painters sought to depict scenes that combined both the secular and religious aspects of life. As Renaissance art became more secularized and naturalized, religious themes and subjects were not totally abandoned; rather, the “otherworldly elements and symbolism” that predominated during the Middle Ages were no longer emphasized as strongly.\textsuperscript{28} St. Francis of Assisi has been cited as “an important influence in stimulating interest in nature”\textsuperscript{29} and naturalism in the early 13\textsuperscript{th} century.

To [St. Francis] nature was a mirror of the goodness of God… [and] an expression of his religious temper, not of the new secularism… His joy was a religious joy, a joy in God the Creator and His creations, not the \textit{joie de vivre} of the worldly circles… St. Francis’ philosophy influenced the attitude of his contemporaries and of posterity toward nature. It was more than accidental that the first individualized portraits of the naturalistic trend are those of St. Francis, painted by Giotto near the end of the thirteenth century in the upper Church of St. Francis at Assisi.\textsuperscript{30}

Italian painter Giotto di Bondone is widely renowned for his frescoes,\textsuperscript{31} particularly depicting events in the life of St. Francis in the Church of St. Francis at Assisi, and the Basilica di Santa Croce in Florence, Italy.\textsuperscript{32} These frescoes demonstrate

\begin{footnotesize}
\begin{enumerate}
\item Ergang, \textit{The Renaissance}, 154.
\item Ergang, \textit{The Renaissance}, 154.
\item Ergang, \textit{The Renaissance}, 154-5.
\item Specifically \textit{buon fresco}, a method of painting whereby dry pigment is mixed with water and applied in layers to wet lime or plaster; the pigment is bound to the plaster as it dries. Typically, the artist must work on small areas rather rapidly, while the plaster is wet. \textit{A secco}, or “dry” fresco, is an alternate method of fresco painting whereby the dry pigment is mixed with water and a binding medium, such as oil or glue, and then applied to dry plaster.
\item The Giotto frescoes in Assisi and Florence were likely painted with the assistance of Giotto’s pupils, and were not necessarily painted exclusively by the hand of Giotto.
\end{enumerate}
\end{footnotesize}
his “mastery of dramatic narrative and of psychological expression… still mystical, but presented with simplicity and a degree of naturalism” (see fig. B.2). The St. Francis frescoes stand out in stark contrast to the “austere representations” of other painters contemporary to Giotto.\(^{34}\)

Three defining contributions to the overall development of Renaissance art can be identified as: the use of oil paints, the invention of linear perspective, and the use of cadavers to understand human anatomy.\(^{35}\) These, combined with an emphasis on humanistic themes through the “rebirth of classical antiquity,”\(^{36}\) serve to define the art of the Renaissance.

In the 16\(^{th}\) century, Italian artist and architect Giorgio Vasari credits Flemish painter Jan van Eyck as the “first inventor” of “colouring in oil” in the early 15\(^{th}\) century.\(^{37}\) This statement is not entirely accurate, as the use of oil in painting\(^{38}\) predates


\(^{38}\) Oil painting is a painting medium consisting of pigment mixed with drying oil, particularly linseed oil. Oil-based paints are viscous and slow drying by nature, providing the artist with greater flexibility of application and workability. Traditionally, oil paints could only be thinned with a solvent such as turpentine, although water-soluble oil paints with the same slow-drying properties as traditional oil paints became available toward the end of the 20\(^{th}\) century.
the Renaissance by centuries. Van Eyck may more accurately be characterized as the “father of oil painting” for his standardization of the use of oils as a distinct break from the predominance of tempera in medieval art. Tempera paintings are executed by mixing dry color pigments with water and a binding medium, such as egg yolk; the paint is typically applied to a wooden panel, prepared with a gesso ground. The base colors are applied to the dry ground using a petit lac method, with layers of brushwork applied on top. Tempera dries very quickly, usually with a flat, matte finish; it is therefore very difficult to achieve three-dimensional modeling effects with tempera. A detail of the 14th century Wilton Diptych, a portable diptych painted in egg tempera for King Richard

---


40 Tempera (a.k.a. “egg tempera”) is a painting medium typically consisting of pigment mixed in an emulsion of water and egg yolk. Tempera is fast drying by nature, providing the artist with limited flexibility in application. Tempera was the primary painting medium until the 15th century, when oil painting became standard during the European Renaissance. In tempera grassa, or “fat” tempera, a small amount of oil or wax is included in the emulsion.

41 Stork, “Optics and Realism,” 83.

42 “Plaster of paris or gypsum prepared with glue for use in painting or making bas-reliefs; a paste prepared by mixing whiting with size or glue and spread upon a surface to fit it for painting or gilding,” s.v. “gesso.” http://www.merriam-webster.com/dictionary/gesso (accessed November 30, 2010). With the advent of oil painting on canvas and linen in the 15th century, calcium carbonate was substituted with lead carbonate, and linseed oil was added, to provide for a more flexible ground. Acrylic-based gesso was developed in the 20th century as a ground for both oil and acrylic-based paints.

43 Petit lac: in French, “small lake.” A method of painting primarily used with egg tempera, particularly common in Greek and Russian Orthodox icon painting. Pre-defined areas of a ground – usually a wooden panel prepared with gesso – are flooded with a puddle of tempera. Once dry, thicker tempera is then applied on top of this base coat with small brushstrokes to build up the painting. The luminous quality of tempera allows the quality of under-layers – including the petit lac base – to effect the overall quality of the painting.

44 In the visual arts, a method of achieving an illusion of volume, or three-dimensionality, on a flat, two-dimensional surface, usually through the use of shading.
II of England, shows the brushwork used to build up the flesh tones in the figure of Mary, mother of Christ (see figs. B.3a-b). The same holds true for fresco painting, whereby pigment is applied directly to wet plaster. In tempera painting, frescoes, drawings, woodcuts, and etchings, an approximation of volume and dimensionality could be achieved through *chiaroscuro*,\(^{45}\) or contrasts between dark and light areas; however, the natural properties of these media were severely limiting to the artist.

By contrast, pigments mixed with oil have a much longer drying time, allowing the artist to blend colors on the painting over a prolonged period; this allows for a wider range of effects, including more convincing and realistic three-dimensional modeling (see fig. B.4). Depending upon the quantity of oil used in relation to dry pigment – as well as the properties of the pigment – the paint may be either opaque or transparent. This allows for gradation,\(^{46}\) layering,\(^{47}\) and glazing\(^{48}\) of colors – combined with the fact that a wider range of “more vivid saturated colors”\(^{49}\) is available.\(^{50}\) Further, oils can be applied

\(^{45}\) *Chiaroscuro* is a contrast between light and dark in visual media such as paintings, drawings, etchings, woodcuts, photographs, and film. The effect is often used to achieve an appearance of modeling, or three-dimensionality, in objects; it may also be used to achieve dramatic compositional effects.

\(^{46}\) “A gradual, smoothly nuanced, step-by-step change from dark to light values or from large to small shapes, or rough to smooth textures, or one color to another. Gradation is unlike contrast which stresses sudden changes in elements.” s.v. “gradation.” http://www.artlex.com/ArtLex/Gm.html#anchor1010681 (accessed January 31, 2010).

\(^{47}\) In the visual arts, primarily painting, the application of successive layers of an opaque, semi-opaque, or transparent media, such as paint, to construct an image.

\(^{48}\) “A glaze can be a thin, translucent or transparent coat over a painting, sometimes meant simply to protect the paint underneath, but more often to add a veil of coloration to an area of a picture,” s.v. “glaze.” http://www.artlex.com/ArtLex/G.html (accessed January 31, 2010).

on a more supple and pliable background – such as canvas or linen – and the artist’s of the Renaissance were no longer limited to painting on rigid wooden panels or plaster walls. The paintings of 19th century French neoclassicist Jean Auguste Dominique Ingres provide an exceptional example of modeling in oil (see figs. B.5a-b). Ingres utilized the *grisaille*\(^51\) technique as an under painting to compose the modeling of the figure, before adding layers of color. *Grisaille* paintings could also stand on their own without the subsequent application of layered color.

The invention of linear perspective\(^52\) allowed for greater realism in painting. In antiquity, the placement of objects and figures in painting were usually hierarchically based. By the Middle Ages, artists often used size and proportion in an attempt to approximate distance; objects intended to appear in the foreground were painted larger than those intended to appear in the distance. Aerial – or atmospheric – perspective\(^53\) was

---

\(^{50}\)“Saturation - A color's purity of hue; its intensity. A pure hue has the highest saturation. A brilliant color is strongly saturated, and also very light in value. A deep color is also highly saturated, but has little lightness. A pale color is little saturated and has great lightness.” s.v. “saturation.” http://www.artlex.com/ArtLex/S.html (accessed January 31, 2010).

\(^{51}\)In the visual arts, *grisaille* is a technique of painting or drawing executed in a monochromatic color, usually grey or sepia. Grisaille was commonly used as an under painting in preparation for layering and glazing in oil.

\(^{52}\)In the visual arts, linear perspective is a method of rendering images on a flat, two-dimensional surface, to give the impression of the images as they are perceived in nature, utilizing a mathematical process whereby parallel lines converge on one or more vanishing points, based on the viewer’s line of sight.

\(^{53}\)In the visual arts, aerial perspective (a.k.a. “atmospheric perspective”) is a method of rendering images on a flat, two-dimensional surface, to give the impression of the images as they are perceived in nature, whereby objects in the foreground are rendered concisely, while objects intended to recede into the background are rendered with decreasing contrast. In painting, images in the foreground are rendered with more vivid, saturated color, while images in the distance are rendered with less color saturation, and often given a light bluish tone.
also used in painting. With this method, objects in the foreground are painted more concisely, while objects meant to recede into the background are painted with less contrast, providing the illusion of three-dimensional depth.

Greek and Roman painters were able to “evoke astonishing levels of three-dimensionality in their murals but did so from an intuitive grasp of the convergence concept rather than a fully accurate construction.” Giotto, through his study and mathematical analysis of architecture, has been credited as the first to use mathematically based perspective in his 1305 painting *Jesus Before the Caïf,* as well as “the first painter to turn sharply in the direction of naturalism.”

Turning away from the stiffness and unnaturalness of the traditional Byzantine style, [Giotto] imbued his figures with greater vitality, posed them in more graceful attitudes, and gave a more natural coloring to the flesh… Giotto also displayed a greater knowledge of perspective than his predecessors had by giving his scenes more depth and relief.

However, it would be more than 100 years before Italian architect Filippo Brunelleschi’s “perspectival demonstrations galvanized the widespread use of convergent perspective of the Renaissance proper.”

---


55 Tyler, “Perspective as a Geometric Tool,” 493.


58 Tyler, “Perspective as a Geometric Tool,” 493.
Based on a horizon line, a vanishing point, and orthogonal lines, or “visual rays,” that lead to viewer’s eye to the vanishing point, this mathematical system [of linear perspective] created the illusion of space and distance on a flat surface and allowed artists to depict scenes in a more naturalistic fashion.\(^5^9\)

In 1436, polymath Leon Battista Alberti published his treatise *Della Pittura (On Painting)*,\(^6^0\) in which he sought to “state the principles of the new art.”\(^6^1\)

The general idea on which Alberti based his treatise is that the painter’s primary function is to portray what he sees in the visible world… It is the idea of a return to nature after a long period during which painters endeavored to produce representations of a supernatural world. Thus it is an expression of the clanging attitude toward the world of nature and things secular.\(^6^2\)

Alberti shunned medieval methods in favor of “scientific naturalism,” and stressed accurate representation of the human body in motion, and the importance of mathematics, particularly the understanding and “application of geometrical principles” in painting.\(^6^3\)

German painter Albrecht Dürer was extremely prolific in painting, woodcuts, and engraving. His *Underweysung der Messung mit dem Zirckel und Richtscheyt (Four Books on Measurement)* and *Vier Bücher von Menschlicher Proportion (Four Books on Human Proportion)* – on which he was still working at the time of his death in 1528 – were significant contributions to the mathematical and scientific approach to art. Dürer interpreted the changes that define the Renaissance as “Wiedererwachung” – or


\(^6^0\) *On Painting (Della Pittura)* was an Italian translation of his original treatise written in Latin the previous year, *De pictura* (1435).

\(^6^1\) Ergang, *The Renaissance*, 164.

\(^6^2\) Ergang, *The Renaissance*, 165.

\(^6^3\) Ergang, *The Renaissance*, 165.
reawakening – in 1525.\textsuperscript{64} Dürer’s writings were greatly influenced by his interactions with Italian artists who had written “treatises on the mathematical basis of art,” including Filippo Brunelleschi, Leon Battista Alberti, Piero della Francia, and Cennino Cennini.\textsuperscript{65}

One of Dürer’s most recognizable and enduring images is his 1525 woodcut \textit{Study for Perspective Drawing} (see fig. B.6a). The vertical panel between the draughtsman and the female model is a pane of glass with gridlines drawn on the surface; the paper on the table in front of the draughtsman has corresponding gridlines. The draughtsman uses a sight to place the model within the grid on the glass panel, and transfers what he views to the corresponding grid on his sheet of paper, thus resulting in a rendering of the figure in perspective. A similar example is shown in Dürer’s \textit{Man Drawing a Lute (The Draughtsman of the Lute)} utilizing a different method of rendering in perspective (see fig. B.6b).

The printing press brought together art and science as never before, and one of the individuals who capitalized on this situation was Albrecht Dürer. He quickly mastered the new technique of copperplate engraving, and traveled to Italy ‘to learn the secrets of the art of perspective’. He believed that ‘the new art must be based upon science – in particular, upon mathematics, as the most exact, logical, and graphically constructive of the sciences’. In 1525 he published a treatise on geometry and perspective entitled \textit{A Course in the Art of Measurement with Compass and Ruler}, to ‘benefit not only the painters but also goldsmiths, sculptors, stonemasons, carpenters and all those who have to rely on measurement’\textsuperscript{66}.

\textsuperscript{64} Ergang, \textit{The Renaissance}, 6.

\textsuperscript{65} Ergang, \textit{The Renaissance}, 401.

\textsuperscript{66} Brotton, \textit{The Renaissance}, 108.
The development of perspective in the visual arts during the Renaissance – in conjunction with the ability to disseminate printed materials more quickly and widely with the invention of the moveable type printing press – was of great significance and importance, and it transformed man’s concept of space and his relationship to the world.

The exploration of space by the Renaissance painters involved the viewer in a vicarious form of travel, an effortless way of moving about the earth, a mental facsimile of physical motion. It was not only the actual voyages of discovery, with their cargo of exotic impressions, that represented an obvious organic extension of this experience – so that the domestic landscape paintings, together with the maps and illustrated travel reports of the Renaissance, formed a kind of panoramic tableau of the world, unfolding before the age’s insatiable visual curiosity.67

The exploration of space in the visual arts was not limited strictly to Renaissance painters:

The appearance of motion in Renaissance sculpture and bas-relief, following in due course the painters’ discovery of physical space, depicted people casually standing, strolling, galloping on horseback, or immersed in milling or fighting crowds – a dramatic change from the essentially immobile figures of the Gothic statuary and all the long centuries of static Medieval art. The world, near or far, had been unlocked by the painters. Now people could feel they were moving about the world by their own efforts, simply by identifying with the new avant-garde sculptures.68

Toward the end of the 15th century, Ptolemy’s Geography and the subsequent discoveries about the world by explorers Diaz, Columbus, and da Gama – combined with Reis’


global discoveries in the early 16th century, transformed how man viewed, perceived, conceived, and related to the world in which he lived.69

By the late 15th century, there was a renewed interest in anatomy as a result of the influx of scholars and Greek texts from the east, especially following the fall of Constantinople. Of particular interest were the anatomical treatises of Greek-born Roman physician Galen of Pergamum [or Pergamon] dating to the 2nd century A.D. Galen’s treatises focused on primate anatomy, as human dissection was strictly forbidden at the time. Man’s increasing knowledge of the world during the Renaissance impacted the visual arts and the sciences simultaneously and concurrently:

The ‘discovery of the earth’ amounted in a very real sense to an exploration of the third dimension. It was here that science came to coincide most closely with art. The artists had to cultivate not only the realistic representation of natural detail and the study of perspective, but also that of anatomy and movement. How people moved around in their world, making themselves at home, was certainly a significant aspect of the new three-dimensional emphasis, subjectively perhaps the most important, in that it provided for the viewer an especially pleasurable type of self identification; and anatomy had to do with the three-dimensionality of the human body. In areas like these the scientific investigation of nature and the artist’s (and viewer’s) esthetic delight often came so close that they were virtually overlapping.70

Prior to the invention of the moveable type printing press, manuscripts were written entirely by hand, primarily in monastery scriptoriums.71 By the beginning of the 13th century, secular manuscript copying began to proliferate. Copying by hand was

---

69 Brotton, The Renaissance, 79.

70 Goldstein, Dawn of Modern Science, 214-16.

quite time-consuming, and manuscripts were costly, limiting their availability to a select audience – primarily royalty and the wealthy. Treatises on the human body dating to the late 13th century demonstrate rather crude representations and understanding of human anatomy (see figs. B.7a-c).

By the late 15th century, human dissection was used primarily as a very limited teaching tool in universities (see fig. B.8), with little emphasis placed upon the value of anatomical research.

The situation changed dramatically in the years around 1490, with a remarkable flowering of interest in anatomy as a problem not just of teaching but also of research. This enthusiasm for anatomy was not confined to doctors, but swept up contemporary artists and other laymen… Some artists began to perform their own dissections, while prominent citizens became a fixture at university anatomies.72

By the early 16th century, the audiences at dissections grew into the hundreds, compared with less than two dozen a century earlier.73

In 1543, Belgian physician and anatomist Andreas Vesalius published his groundbreaking seven-volume work on human anatomy, *De humani corporis fabrica* (On the Fabric of the Human Body) (see figs. B.9a-b).

---


73 “The size of the audience increased dramatically in formal university dissections, which now began to assume a truly public character. The 1405 statutes of the University of Bologna allowed no more than twenty students at the anatomy of a male cadaver, and thirty at that of a female. In his *Commentaries on Mondino* (1521), in contrast, Jacopo Berengario da Carpi claimed to have demonstrated the placenta of a hanged woman to ‘almost five hundred students at the university of Bologna, together with many citizens.” Katharine Park, “The Criminal and the Saintly Body: Autopsy and Dissection in Renaissance Italy,” in *The Renaissance: Italy and Abroad*, ed. John Jeffries Martin (London; New York: Routledge, 2003), 235.
Vesalius’s book marked the beginning of modern observational science and anatomy. It’s title page depicts Vesalius conducting a graphic public anatomy lesson, held in a ‘theatre’, surrounded by students, citizens, and fellow physicians. Vesalius returns our gaze as he peels back the female cadaver’s abdomen. This gesture invites the reader to open the book and follow the anatomist as he reduces the human body to the skeleton that hovers above the dissected body.  

Jan van Calcar – a pupil of Italian master painter Tiziano Vecelli, better known as Titian – is credited with illustrating this work, though it is widely believed that a number of artists contributed to Vesalius’ publication. The drawings were of exceptionally high quality, and were therefore tremendously influential on physicians and artists alike. Vesalius’ work was revolutionary, as his “anatomical studies were based on methodological observation and analysis of empirical reality.” He “revealed the mystery of the inner body as a complex map of flesh, blood, and bone, a potentially infinite source of study.”

To date, a limited number of artists have actually “documented visible clinical signs of disease for teachings purposes,” such as 19th century French neurologist and draughtsman Jean-Martin Charcot.

[In the Early Renaissance] the body was seen as a gift from God and as such, of course, its representation tended to be in the most aesthetically pleasing manner possible. This was the basis of the link between art and anatomy, and it was not

---


until the 19th century, when medical textbooks began to be illustrated by specialized medical artists, that the two worlds loosened their grip on each other.78

One individual in particular exemplifies the quintessential Renaissance man, and stands out for the diversity of his talents and significance of his contributions to both science and art:

An early influence on Dürer’s career was the figure who has come to personify the relations between art and science in the Renaissance: Leonardo da Vinci. Luca Pacioli claimed that Leonardo was the ‘most worthy of painters, perspectivists, architects, and musicians, one endowed with every perfection’, who utilized his immersion in science to market his skills as a sculptor, surveyor, military engineer, and anatomical draughtsman. Leonardo’s ability to combine artistic skills with practical scientific ability made his services highly prized by several powerful patrons.79

Self-identified as a painter by profession, da Vinci was also “an engineer, architect, sculptor, writer, and musician,” and “conducted experiments in or read treatises on mathematics, anatomy, physiology, geology, botany, chemistry, biology, hydraulics, optics, aeronautics, physics, and mechanics.”80

Art and science converged so closely during the Renaissance that they often became almost interchangeable. Many a time the modern viewer is unable to tell whether a given drawing should be seen more as an art work or a scientific study. Nor are we always certain whether to ‘classify’ some individual genius as scientist or artist.81

80 Ergang, The Renaissance, 168.
81 Goldstein, Dawn of Modern Science, 192.
Austrian-American scientist Fritjof Capra explores the relationship between da Vinci’s artistic and scientific exploits in *The Science of Leonardo: Inside the Mind of the Great Genius of the Renaissance*,\(^2\) as does Turkish-American artist and scientist Bülent Atalay in *Math and the Mona Lisa: The Art and Science of Leonardo da Vinci*.\(^3\) Capra notes that for da Vinci, observation was essential to his varied undertakings:

Leonardo’s approach to scientific knowledge was visual. It was the approach of a painter…. He asserts repeatedly, especially in his early manuscripts, that painting involves the study of natural forms, and he emphasizes the intimate connection between the artistic representation of those forms and the intellectual understanding of their intrinsic nature and underlying principles… Leonardo was gifted with exceptional powers of observation and visual memory. He was able to draw the complex swirls of turbulent water or the swift movements of a bird with a precision that would not be reached again until the invention of serial photography. He was well aware of the extraordinary talent he possessed.\(^4\)

According to Capra, da Vinci’s emphasis on observation was deeply rooted in his belief in the importance of direct “experience” of nature:

One revolutionary change Leonardo brought to natural philosophy in the fifteenth century was his relentless reliance on direct observation of nature. While the Greek philosophers and scientists had shunned experimentation, and most of the Renaissance humanists uncritically repeated the pronouncements of the classical texts, Leonardo never tired of emphasizing the importance of *sperienza*, the direct experience of natural phenomena. From his earliest entries, when he began his scientific investigations, to his final days, he sprinkled his Notebooks with declarations about the critical importance of methodical observation and experimentation.\(^5\)

\(^2\) Capra, *The Science of Leonardo*.

\(^3\) Atalay, *Math and the Mona Lisa*.


Atalay in turn contends:

The quality of art one produces is as much a function of how one observes as of how one wields a pencil, a paintbrush, or a chisel. Observing is a collaboration of the eye sensing and the brain processing.\(^{86}\)

Considering “the eye as his principal instrument as both a painter and scientist,”\(^{87}\) drawing was essential as the basis for da Vinci’s intermingled artistic and scientific endeavors, according to Capra:

Leonardo’s principal tool for the representation and analysis of nature’s forms was his extraordinary facility of drawing, which almost matched the quickness of his vision. Observation and documentation were fused into a single act. He used his artistic talent to produce drawings that are stunningly beautiful and at the same time serve as geometric diagrams. For Leonardo, drawing was the perfect vehicle to formulate his conceptual models – a perfect “mathematics” for his science of organic forms. The dual role of Leonardo’s drawings – as art and as tools of scientific analysis – shows us why his science cannot be understood without his art, nor his art without his science… In order to practice his art, he needed the scientific understandings of the forms of nature; in order to analyze the forms of nature, he needed the artistic ability to draw them.\(^{88}\)

Da Vinci’s theory of observation was strongly rooted in empirical, \textit{a posteriori}\(^{89}\) experience, in stark contrast to a theoretical, \textit{a priori}\(^{90}\) approach, independent of direct experience:

\(^{86}\) Atalay, \textit{Math and the Mona Lisa}, 152.


\(^{90}\) “Deductive; relating to or derived by reasoning from self-evident propositions; presupposed by experience; being without examination or analysis; formed or conceived beforehand,” s.v. “a priori.” http://www.merriam-webster.com/dictionary/a+priori (accessed February 25, 2010).
The empirical approach came naturally to Leonardo. He was gifted with exceptional powers of observation and a keen visual memory, complemented by his great drawing skills... What turned Leonardo from a painter with exceptional gifts of observation into a scientist was his recognition that his observations, in order to be scientific, needed to be carried out in an organized, methodical fashion.91

In painting and drawing, he was a master of *chiaroscuro* and of rendering emotion and psychological expression, as revealed in his most famous and notable works: his late 15th century mural, the *Il Cenacolo or L'Ultima Cena (Last Supper)*, and his early 16th century *La Gioconda (Mona Lisa)*.

The various figures [in the *Last Supper*] reflect horror, sadness, indignation, pain, silent melancholy, rising anger, timidity, and curiosity, with each one giving outward and visible expression to his inward state through eloquent gestures... [the *Mona Lisa’s*] most intriguing features are the delicate modeling and the subtle expression.92

The enigmatic smile of the *Mona Lisa* is world-renowned, with few artists able to approach the subtlety of da Vinci’s artistic mastery and genius.

Da Vinci’s sketchbooks are filled with drawings of human anatomy (see figs. B.10a-c). British physician and medical historian Kenneth D. Keele was a da Vinci specialist, particularly with regard to the artist’s anatomical studies. Keele observed:

[A] line of approach to anatomy arising from Leonardo’s artistic vision lay inherent in his definition of the purpose of art; this is to paint ‘man and the intention of his soul’ in terms of the ‘attitudes and movements of the limbs’. The pursuit of this goal led him to analyse [sic] the postures and gestures of men’s bodies in terms of their mathematical and mechanical laws. It led him also to make his first examinations of the mechanical instruments responsible for those gestures and attitudes; and so he dissected the human body, not only to reveal the

---


forms of its muscles but to trace the source of their forces back to the spinal cord and brain.\textsuperscript{93}

Keele contends Leonardo viewed “anatomy as subservient to art.”\textsuperscript{94} While in Milan between 1506-12, Leonardo began working with a professional anatomist, Mercantonio della Torre.\textsuperscript{95}

In his scientific observations and experiments, Leonardo showed the same patience and subtle attention to detail that he practiced as a painter. This is especially noticeable in his anatomical research. For example, in one dissection he poured wax into the cavities of the brain known as cerebral ventricles to determine their shape.\textsuperscript{96}

Keele observes Leonardo undoubtedly “intended to produce a Treatise on Anatomy,”\textsuperscript{97} a plan which was likely compromised by the death of della Torre from plague at the age of 30 in 1511, as well as Leonardo’s subsequent paralysis of the right hand due to an acute ischemic stroke in 1517.\textsuperscript{98} Fortunately, Leonardo’s extant works are voluminous, particularly his notebooks. Francesco Melzi, a pupil of Leonardo, worked with a scribe


\textsuperscript{95}“A catalyst for his [Leonardo’s] mastery of anatomy came with his meeting the prodigiously talented young anatomist, Marcantonio della Torre, who had recently transferred from the University of Padua to the University of Pavia. The former was one of the few Church-sanctioned seats of anatomical studies, including dissections, and the latter was aspiring to build up a program. The collaboration with della Torre, half his age, galvanized Leonardo’s intense dedication to the pursuit of knowledge.” From Atalay, Math and the Mona Lisa, 207.

\textsuperscript{96}Capra, The Science of Leonardo, 163.


around 1550 to organize and compile da Vinci’s writings on painting, which resulted in the *Trattato della Pittura (Treatise on Painting).* During his lifetime, da Vinci contributed drawings to Italian mathematician Fra Luca Bartolomeo de Pacioli’s 1509 publication *De Divina Proporzione (On The Divine Proportion).* De Pacioli, a Franciscan friar, is credited with rediscovering the “Golden Ratio,” which is linked to Ancient Greek philosopher Pythagoras of Samos, dealing with proportion in mathematics and art.

The artists of classical antiquity incorporated the divine proportion into a variety of objects, ranging from vases to eating utensils, from paintings to statuary. To the sculptors of classical Greece and Rome the divine proportion was recognized as ideal for the human anatomy: the length of the fingers to the hand, the hand to the forearm, the forearm to the full arm, etc. Among these proportions there is the ratio of one’s height to the height of one’s navel.

Leonardo’s observations on the “Divine Proportion of Human Anatomy” are evident in one of his most recognizable works, *Vitruvian Man* (see fig. B.11).

Leonardo da Vinci was what we would call, in today’s scientific parlance, a systemic thinker. Understanding a phenomenon, for him, meant connecting it

---


101 [The Divine Proportion of the Human Anatomy] The space between the slit of the mouth and the base of the nose is one-seventh of the face... the space from the mouth to below the chin will be a quarter part of the face, and similar to the width of the mouth... the space between the chin and below the base of the nose will be a third part of the face, and similar to the nose and the forehead. The space between the midpoint of the nose and below the chin will be half the face... If you divide the whole of the length of the nose into four equal parts, that is to say, from the tip to where it joins the eyebrows, you will find that one of these parts fits into the space form above the nostrils to below the tip of the nose, and the upper part fits into the space between the tear duct in the inner corner of the eye and the point where the eyebrows begin; and the two middle parts are of a size equivalent to the eye from the inner to the outer corner. – Leonardo da Vinci.” From Atalay, *Math and the Mona Lisa*, 101-02. Leonardo quote taken from: Martin Kemp, ed., *Leonardo on Painting: An Anthology of Writings by Leonardo da Vinci with a Selection of Documents Relating to His Career as an Artist* (New Haven: Yale University Press, 1989), 123-29.
with other phenomena through a similarity of patterns. When he studies the proportions of the human body, he compared them to the proportions of buildings in Renaissance architecture. His investigations of muscles and bones led him to study and draw gears and levers, thus interlinking animal physiology and engineering. Patterns of turbulence in water led him to observe similar patterns in the flow of air; and from there he went on to explore the nature of sound, the theory of music, and the design of musical instruments. This exceptional ability to interconnect observations and ideas from different disciplines lies at the very heart of Leonardo’s approach to learning and research.102

Atalay credits da Vinci with the rediscovery of “some of the scientific principles first developed by the ancients and subsequently forgotten,” and with inventing “fields of science and technology that would not be reinvented for centuries.”103

If an abiding message is to be gleaned from an examination of Leonardo’s scientific and artistic legacy, it is the insatiable curiosity, the persistent questioning that defined his life – from resolving everyday problems to exploring grand-scale issues pertaining to the workings of nature. He observed and pondered; the commonplace became the wondrous, the wondrous commonplace. “Nature is the best teacher,” he wrote. “Learn from nature, not from each other.” His curiosity encompassed diverse intellectual worlds: technical and nontechnical, scientific and artistic; and indeed it is by the conjoining of these intellectual worlds that he was able to produce works of such dazzling quality and diversity.104

The Scientific Revolution and The Mechanization of the Natural World

The Renaissance is characterized by monumental progress in both the arts and the sciences. In the preceding section, the importance of the arts to scientific discovery and development has been discussed.

102 Capra, The Science of Leonardo, 4-5.
103 Atalay, Math and the Mona Lisa, 57.
104 Atalay, Math and the Mona Lisa, 269-70.
Virtually all empirical sciences profited immensely from the new dimension in art. It gave them a medium, both for explicit demonstration and for the storing of observations, that in its significance may be compared to the role of mathematics in the theoretical disciplines. Not geography, geology, mineralogy, nor zoology, botany, pharmacology, or physiology (to name only some) could possibly have developed to their modern level without the graphic, in-depth representation of samples based on the Renaissance concept of physical space.\textsuperscript{105}

From a broad perspective, the Renaissance can be conceived as a global cultural movement comprised of a series of interrelated and concurrent events reflecting a significant change in how the world – and the universe – was viewed and understood. The formulation of a new method of understanding and explaining nature and the universe – the scientific method – was central to the Scientific Revolution during the Renaissance. A discussion of the impact of the Scientific Revolution is important and relevant; as introduced in Chapter I, Snow cites the Scientific Revolution as the cause for the separation between the sciences and the arts.\textsuperscript{106}

Prior to the fall of Constantinople in 1453, the scientific works of the ancient Greeks were widely available throughout Western Europe:

In the twelfth century, Arabic, Jewish, and Christian scholars began to supply the demand for more knowledge of nature by bringing in Latin versions of Arabic translations of Greek writings on science; in some cases the Latin translations were made directly from Greek texts. At the same time the commentaries on these texts by learned men of the Arab world were also introduced into Western Europe. In this way almost all of the scientific work of the ancients were made available in Latin translations to the scholars of Western Europe by the middle of the thirteenth century.\textsuperscript{107}


\textsuperscript{106} Snow, \textit{The Two Cultures and the Scientific Revolution}.

\textsuperscript{107} Ergang, \textit{The Renaissance}, 265.
The medieval approach to scientific knowledge was “largely the science of the ancients modified by the commentaries of Arab scholars.”

During the 13th century, scholars at Oxford University and the University of Paris focused on natural science and scientific methodology. Rooted primarily in theology as “a further means of discovering God and his ways,” it was not until the early 15th century that the emphasis became more secular. For example, the “science taught and studied [at the University of Padua] was not a theologically oriented science, but a science nourished by the Greek and Arab traditions.”

Atalay observes: “like the artist, the scientist is a lover of nature.”

An unfortunate banality in philosophy ascribes to science the exclusive process of analysis, and to art, the exclusive process of synthesis. The scientist, this platitude explains, takes apart his subject. The artist, puts its together… in reality the scientist engages in both processes, as does the artist. For each, imagination begins with a very close scrutiny and analysis of nature, and ends in synthesis, putting together a “form by which the creative mind transcends the bare limits, the bare skeleton that nature provides.”

Atalay differentiates the two by noting “the artist is more interested in the whole of his composition than its very find details,” contrasted with the scientist, who “is more

---


interested in the generality of nature’s laws than in its particulars.”¹¹³ This statement is quite broad and generalized in and of itself, and cannot be evenly applied across the board. Atalay explains:

Nature provides inspiration for both the artist and the scientist. Although both are interested in describing nature, their expressions take distinctly different tacks: the artist is interested in interpreting the visible world, the scientist in explaining why and how nature operates. The style and modus operandi of the artist is to glean information about nature directly with his senses, to seek its subtle qualities, and he may even be susceptible to subliminal messages presented by nature...¹¹⁴

Da Vinci serves as a prime example of the individual who attempts to both interpret the visible world, as well as explain how nature operates. Da Vinci’s Notebooks serve as a fascinating and important document of the progress of science in the 15th century. Leonardo’s Notebooks were likely intended as personal journals to record and explore his thoughts and ideas for the ultimate purpose of supporting his artistic endeavors, and to sate his insatiable curiosity. Much of what is recorded in his Notebooks reveal ideas that were not necessarily original or unique to Leonardo, but rather his own explorations and investigations of existing knowledge, and his unique ability to expound upon these theories and ideas in new, creative ways.¹¹⁵

As scientists – physicists, mathematicians, engineers, anatomists, botanists – have undertaken examinations of Leonardo’s work in science and technology, they have returned to pronounce Leonardo the first modern scientist. His methodology prefigures Galileo’s work by more than a century. Ultimately, it is the originality

¹¹⁴ Atalay, Math and the Mona Lisa, 89-90.
¹¹⁵ Ergang, The Renaissance, 278.
of his questions and the prescience of the solutions that still impress us after five hundred years.\textsuperscript{116}

As noted in the previous section, Atalay contends “the observational skills necessary to perform modern science come from the skills introduced by artists in the Renaissance,”\textsuperscript{117} with da Vinci and Vesalius serving as exemplary examples. The genesis of the Scientific Revolution is deeply rooted in observational skill, and is commonly associated with Polish astronomer Nicolaus Copernicus’ 1543 publication of \textit{De Revolutionibus Oribium Coelestium (On the Revolutions of the Celestial Spheres)}.\textsuperscript{118}

Copernicus’ treatise, along with Vesalius’ \textit{On the Structure of the Human Body} – which were published within a month of each other – transformed science.\textsuperscript{119}

While Vesalius discovered the microscopic secrets of the human body, Copernicus explored the macrocosmic mysteries of the universe. The implications were profound. Copernicus ultimately transformed scientific apprehension of time and space by undermining the notion of a divinely ordered world. Instead, the earth was envisaged as one planet amongst the vast time and space of the universe. Vesalius envisaged the individual as an infinitely complex and intricate mechanism of blood, flesh, and bone that Shakespeare’s Hamlet would later regard as a “quintessence of dust” and the philosopher René Descartes would call a ‘moving machine’.\textsuperscript{120}

\textsuperscript{116} Atalay, \textit{Math and the Mona Lisa}, 19.

\textsuperscript{117} Atalay, \textit{Math and the Mona Lisa}, 18.

\textsuperscript{118} “Having expounded his heliocentric theory of the universe Copernicus time and again postponed publication of his manuscript because he feared the reaction would be hostile. As he himself wrote, ’The book has lain in my study not merely nine years, but four times nine.’… Copernicus dedicated the work to Pope Paul III, expressing the hope that his studies would be useful to the Church.” Ergang, \textit{The Renaissance}, 283.

\textsuperscript{119} Brotton, \textit{The Renaissance}, 99.

\textsuperscript{120} Brotton, \textit{The Renaissance}, 101.
Preexisting geocentric theories, such as those promoted by 3rd century B.C. Greek mathematician and astronomer Aristarchus of Samos, contended that the earth was the center of the universe; Copernicus, through his understanding and explanation of the movements of the celestial bodies, was able to demonstrate scientifically that this was not the case, and promote an alternative heliocentric theory. The Copernican Revolution that followed eventually displaced the prevailing Ptolemaic and Aristotelian geocentric contentions that all celestial objects revolve around the earth, thus fomenting a proliferation of scientific investigation that marks the nascency of modern science.

Galileo Galilei, born twenty-one years after both the publication of On the Revolutions of the Celestial Spheres and Copernicus’ death, was an avid supporter and proponent of Copernicanism. Galileo’s espousal of heliocentrism and the Copernican system over geocentrism and the Ptolemaic system, as elaborated upon in his 1632 Dialogo Sopra i Due Massimi Sistemi del Mondo (Dialogue Concerning the Two Chief World Systems), led to unavoidable confrontation with the Roman Catholic Church, which contended that the theory contradicted the scriptures and could not be empirically proven as factual. Ultimately forced by the Inquisition to publicly disavow his beliefs,

121 “Relating to, measured from, or as if observed from the earth’s center; having or relating to the earth as center; taking or based on the earth as the center of perspective and valuation,” s.v. “geocentric.” http://www.merriam-webster.com/dictionary/geocentric (accessed December 15, 2010).

122 “Referred to or measured from the sun’s center or appearing as if seen from it; having or relating to the sun as center,” s.v. “heliocentric.” http://www.merriam-webster.com/dictionary/heliocentric (accessed January 30, 2010).

123 “Finally we shall place the Sun himself at the center of the Universe. All this is suggested by the systematic procession of events and the harmony of the whole Universe, if only we face the facts, as they say, ‘with both eyes open’.” Nicolaus Copernicus, On The Revolutions of the Heavenly Spheres, trans. Charles Glenn Wallace (Amherst, NY: Prometheus Books 1995), 13.
Galileo remained instrumental in fostering the Scientific Revolution in its infancy and ensuring its continuation and endurance, and made significant contributions to the advancement of astronomy and the history of science.

The Scientific Revolution witnessed new approaches to scientific methodology. In his *Novum Organum (New Organon)* of 1620, English philosopher and scientist Sir Francis Bacon proposed that existing approaches to science were flawed, and promoted his stance that the world could be understood through analysis and observation of facts to arrive at principles and laws that would support those facts.¹²⁴ Bacon’s approach was potentially one of man’s dominance over nature,¹²⁵ in contrast to da Vinci’s approach to nature:

Leonardo did not pursue science and engineering to dominate nature, as Francis Bacon would advocate a century later. He had a deep respect for life, a special compassion for animals, and great awe and reference for nature’s complexity and abundance. While a brilliant inventor and designer himself, he always thought that nature’s ingenuity was vastly superior to human design. He felt that we would be wise to respect nature and learn from her.¹²⁶

Conversely, French philosopher and physicist René Descartes was a strong proponent of deductive reasoning and methodology, whereby basic truths are subjected to reasoning in

¹²⁴ “The discoveries which have hitherto been made in the sciences are such as lie close to vulgar notions, scarcely beneath the surface. In order to penetrate into the inner and further recesses of nature, it is necessary that both notions and axioms be derived from things by a more sure and guarded way, and that a method of intellectual operation be introduced altogether better and more certain.” Francis Bacon, *The New Organon and Relating Writings*, edited, with an introduction, by Fulton H. Anderson (Englewood Cliffs, NJ: Prentice Hall, 1960), XVIII.

¹²⁵ Scholar William Leiss contends that the prevailing interpretation of Bacon’s writings as supporting man’s dominance over nature is flawed. For further discussion on the topic see: William Leiss, *The Domination of Nature* (Montreal: McGill-Queens University Press, 1994).

order to reach valid conclusions. In his 1637 treatise *Discours de la Méthod pour bien
conduire sa raison, et chercher la verité dans les Sciences* (*Discourse on the Method of
Rightly Conducting One’s Reason, and Searching for Truth in the Sciences*), Descartes
calls into doubt existing contentions and rejects preconceptions, in order to arrive at fresh
perspectives on scientific truths.  
127 Bacon began with the facts to arrive at the laws; Descartes began with commonly accepted laws, discarding preconceived notions
associated with them, in order to deduce acceptable and reasonable new outcomes, or facts.

Although divergent in concept and approach, the theories of both Bacon and
Descartes were significant contributions to the history of science.

The scientist operates as if physical laws already exist, in unique form, and only
need to be discovered, or to be extricated from nature. But in reality, the physical
laws no more exist in unequivocal manner than the statue in that rough block. In
the hands of different sculptors the block is destined to yield different forms. And
in the hands of different scientists the laws are destined to emerge in different
form, although ultimately perhaps susceptible to a demonstration of equivalence. Depending on how exactly the questions are asked, the results can appear
differently, but correctly.  
128

The 1687 publication of English philosopher, astronomer and physicist Sir Isaac
Newton’s *Philosophiæ Naturalis Principia Mathematica* (*Mathematical Principles of

---

127 “I am unwilling here to say anything very specific of the progress which I expect to make for
the future in the sciences, or to bind myself to the public by any promise which I am not certain of being
able to fulfill; but this only will I say, that I have resolved to devote what time I may still have to live to no
other occupation than that of endeavoring to acquire some knowledge of Nature, which shall be of such a
kind as to enable us therefrom to deduce rules in medicine of greater certainty than those at present in use.”
René Descartes, *Discourse on Method and Meditations on First Philosophy*, translated by Donald A. Cress

Natural Philosophy) is widely considered to be the most important and influential work in scientific history, and has been cited as the primary influence on Albert Einstein’s development of his theory of relativity. Newton was able to combine Bacon’s experimental method with Descartes’ mathematical and rational approach, thus creating a new, impartially conducted scientific methodology.

The Severance of Man from God During the Enlightenment

Laying the foundations of modern science, the Scientific Revolution had a profound impact on the great thinkers of the Enlightenment. It has been cited as a factor that helped spark the subsequent Industrial Revolution, both serving as landmarks of the modern era. In particular, Newton’s scientific methodology greatly inspired Enlightenment philosophers. The world of modernity and the modernist view of life began in the 17th century with Isaac Newton in science and René Descartes in philosophy and culminated in the 18th-century Enlightenment… Medicine is perhaps the quintessential example

---

129 “In experimental philosophy we are to look upon propositions inferred by general induction from phenomena as accurately or very nearly true, notwithstanding any contrary hypotheses that may be imagined, till such time as other phenomena occur by which they may either be made more accurate or liable to exceptions. This rule we must follow, that the argument of induction may not be evaded by hypotheses.” Isaac Newton, The Principia: Mathematical Principles of Natural Philosophy, trans. I. Bernard Cohen and Anne Whitman (Berkeley, CA: University of California Press, 1999), 17.


of modernity in that it relies on the accumulation of objective scientific knowledge to establish scientific truth.\textsuperscript{133}

Scientific knowledge was viewed by most Enlightenment thinkers as “paradigmatic of all knowledge claims, and, if correctly pursued, would lead to the irresistible progress of mankind,”\textsuperscript{134} creating “a genuine optimism that it was… only a matter of time before all truths would be discovered.”\textsuperscript{135} Beyond the Enlightenment, Newton’s legacy was ultimately reaffirmed in a 2005 poll conducted by The Royal Society to determine, between Newton and Einstein, who made the greatest contribution to science and to humankind; Newton was favored by a noteworthy margin.\textsuperscript{136}

One of the greatest and most prominent Enlightenment admirers of Newtonian thought was German philosopher Immanuel Kant; the period of the Enlightenment itself has been identified as “the century between two major figures: Isaac Newton and


\textsuperscript{134} Henry, “Science and the Coming of Enlightenment,” 11.

\textsuperscript{135} Henry, “Science and the Coming of Enlightenment,” 23.

\textsuperscript{136} Founded in London in 1660, The Royal Society is identified as the oldest scientific academy in continuous existence in the world. 1,363 members of the public, and 345 scientists of The Royal Society, consisting of both Fellows and Research Fellows, participated in the 2005 poll. With regard to the greatest overall contribution to science, the public voted 61.8% in favor of Newton, and 38.2% in favor of Einstein; the scientists overwhelmingly voted 86.2% in favor of Newton, and 13.8% in favor of Einstein. With regard to the greatest overall contribution to humankind, the public narrowly voted in favor of Newton by 50.1%, over 49.9% for Einstein; the scientists voted 60.9% in favor of Newton, and 39.1% for Einstein. Royal Society, “Newton Beats Einstein in Polls of Scientists and the Public,” \textit{Royal Society Press Release} (November 23, 2005): http://royalsociety.org/news.asp?id=3880 (accessed February 21, 2009).
Immanuel Kant.\textsuperscript{137} In his \textit{Kritik der reinen Vernunft (Critique of Pure Reason)} published in 1781, Kant states:

Without sensibility no object would be given to us, and without understanding none would be thought. Thoughts without content are empty, intuitions without content are blind. It is thus just as necessary to make the mind’s concept sensible… as it is to make its intuitions understandable.\textsuperscript{138}

For Kant, scientific exploration and investigation was integral to the comprehension and understanding of the world. He believed that in order to comprehend the world, both \textit{a priori} as well as \textit{a posteriori} concepts were necessary. Kant envisioned a synthesis of empiricism and rationalism. Experience alone is dependent upon the perspectives and perceptions of the individual; without reason, one’s findings would be purely subjective. Alternatively, pure reason, devoid of any direct experience, would potentially yield only illusions and fallacies. It is therefore necessary, in Kant’s view, to apply understanding to experience. Kant’s concept of the categorical imperative, which is central to his moral philosophy, emphasizes the primacy of reason in order to identify moral precepts; yet, it implies a similar synthesis of \textit{a priori} and \textit{a posteriori} concepts as his approach toward scientific investigation and understanding. Kant’s concept of “practical reason” serves as the middle ground he sought between empiricism and rationalism.


One of Kant’s greatest contributions to the philosophy and history of science during the Enlightenment appears in his 1755 *Allgemeine Naturgeschichte und Theorie des Himmels* (*Universal Natural History and Theory of the Heavens*), in which he presents his theory on the nature of the solar system, or nebular hypothesis, based on Newtonian principles. Swedish scientist Emmanuel Swedenborg originally proposed the theory in 1734, which Kant greatly expounded upon twenty-one years later. The theory deals with gaseous clouds, or nebulae, and the effects of gravitational forces on these nebulae, which led to the formation of the cosmos. Kant provided a close approximation of the Milky Way as a disc-shaped “galaxy” comprised of spinning nebulae, and suggested the existence of similar extragalactic nebulae. Although Kant’s cosmological theories had many flaws, his contribution to the further development of the science of astronomy and understanding of the cosmos, particularly beyond our solar system, is noteworthy.

As the Scientific Revolution emerged, publications such as French author and playwright Bernard le Bovier de Fontenelle’s 1686 *Entretiens sur la pluralité des mondes* (*Conversation on the Plurality of Worlds*) explained the Copernican concept of heliocentrism to a lay audience. Throughout the Enlightenment, the demonstration of scientific knowledge and principles through experimentation, particularly of Newtonian concepts, became increasingly popular. As an example, a simple demonstration of

---

centrifugal force, whereby a pail of water attached to a rope, swung in a widely arching circular motion to show how force would keep the water in the pail without spilling, were quite popular and became relatively commonplace.

Anatomy and surgery became prominent at the start of the 18th century, even dominant over the development and practice of medicine.140 Just as the “manual fine arts,” like painting and sculpture, were “comprised of useful human skills,” so too was surgery, thus creating a “tactile analogy between surgery and the visual arts.”141 In teaching diagnostics, models were brought into the medical lecture hall or amphitheatre, and were “treated diagnostically as a substitute for the actual sufferer” in “both the anatomical and the psychiatric instance.”142 Just as artists used live models in their studios to learn to draw the human form, so too did medical students use models to learn diagnostic skills.

The problem of imaging what was “out of sight” became critical in the fine arts and the natural sciences. The latter are here understood in their widest sense to comprise all “field” investigations of unexplained phenomena (including those of the body) requiring their practitioners remarkable powers of observation and manual dexterity. Thus, for the present purpose, the fine arts and the medical arts are grouped with natural history insofar as all involve sensory deduction and a tactile craft.143


141 Stafford, *Body Criticism*, 53-54.

142 Stafford, *Body Criticism*, 75.

143 Stafford, *Body Criticism*, xvii.
The rapidly growing interest in science and experimental demonstrations in popular culture are revealed in the intersection of Enlightenment science and Enlightenment art. It is important to keep in mind that although the visual arts reflect the impact of the Scientific Revolution throughout the period of the Enlightenment, the Scientific Revolution has been cited by Snow as the cause for the separation between the sciences and the arts.\(^\text{144}\) During the Renaissance, da Vinci’s theory of observation was strongly rooted in empirical, \textit{a posteriori} experience: “In order to practice his art, he needed the scientific understandings of the forms of nature; in order to analyze the forms of nature, he needed the artistic ability to draw them.”\(^\text{145}\) Da Vinci’s approach to art and science is not representative, however, of the relationship between the arts and the sciences in general following the Scientific Revolution. Much of the art produced during the period of the Enlightenment does provide valuable insight into the overall impact and role of science.

English painter Joseph Wright of Derby’s 1768 painting \textit{An Experiment on a Bird in the Air Pump} (see fig. B.12a) depicts a demonstration of a scientific experiment wherein a cockatoo has been placed in a glass vessel from which air is slowly removed, revealing the effects of oxygen deprivation on the feathered creature.\(^\text{146}\) The group

\(^{144}\) Snow, \textit{The Two Cultures and the Scientific Revolution}, 31.


\(^{146}\) Another popular scientific demonstration of the air pump at the time involved placing an apple in the pump, which would eventually explode as oxygen was extracted and the vacuum pressure was increased. Geoffrey V. Sutton, \textit{Science for a Polite Society: Gender, Culture, and the Demonstration of Enlightenment} (Boulder, CO: Westview Press, 1995), 199.
assembled around the pump witnessing the experiment appear to be members of a family of varying ages; children, young people, adults, and an elderly man, thus suggesting the popularity of such presentations beyond the scientific intelligentsia and intellectual elite. Wright’s 1766 painting A Philosopher Giving a Lecture on the Orrery (see fig. B.12b) depicts a similar scene, here demonstrating the Copernican concept of heliocentrism. The unseen light that illuminates the figures in the composition is a lamp representing the sun, around which the celestial bodies revolve. In contrast with free public lectures on subjects such as mathematics, many of these experimental demonstrations were quite theatrical in nature, often drawing significant crowds willing to pay to witness these dramatic entertainments. The lighting in these particular paintings demonstrates visually the air of theatricality likely experienced by the viewers of these experiments, thus serving to invigorate public interest in the sciences.

Scientific societies proliferated by the end of the 18th century, reaching into areas often outside of major cities; as natural philosophy “found an audience further afield, it also found deeper resonance in social strata otherwise excluded.” As the public’s interests in the natural sciences grew, so did the frequency of public lectures and experimental demonstrations, as well as the publication of scientific periodicals and encyclopedias. Notably, in Britain, coffeehouses were increasingly popular as a means

---


by which scientific discourse extended beyond the universities, making scientific concepts and theories more accessible to the general public.

Although the Scientific Revolution had an unquestionable impact on Enlightenment thinkers, attitudes toward the natural sciences among these thinkers varied. The rationalist, \textit{a priori} approach of Descartes, rooted in the philosophy of Plato and Socrates, was embraced by German philosopher and mathematician Gottfried Leibnitz, as well as Dutch philosopher and biblical critic Baruch Spinoza. The empirical, \textit{a posteriori} approach of Bacon, rooted in the philosophy of Aristotle, was embraced by British political philosopher and epistemologist John Locke, English political philosopher Thomas Hobbes, Irish philosopher and metaphysicist George Berkeley, and Scottish philosopher David Hume. The views of each of these thinkers toward the natural sciences were predominantly in line with the views of either rationalism or empiricism. Although Kant is commonly linked primarily with the rationalists, the influence of David Hume’s philosophy awoke him from his “dogmatic slumbers” and gave his investigations in the field of speculative philosophy a new direction,\textsuperscript{149} resulting in his synthesis of rationalist and empiricist concepts and approaches.

In Kant’s discussion of aesthetic judgment in his 1790 \textit{Kritik der Urteilskraft} (Critique of Judgment), he uses the example: “when he says that Canary-wine is agreeable, another corrects the expression and reminds him that he ought to say: It is

\begin{flushright}
\end{flushright}
agreeable to me.”¹⁵⁰ In Hume’s Essays: Moral, Political, and Literary of 1742, he states that one must be “sensible to pains as well as pleasures, which escape the rest of mankind.”¹⁵¹ The implication in both instances is that judgment of pleasure and beauty is dependent upon not only the senses, but intellectual and emotional factors as well. The same concepts can be applied to the practice of medicine, and will be elaborated upon further in Chapter IV.

One Enlightenment thinker stands out as noteworthy in his particular disdain of the increasing emphasis on science: French philosopher Jean-Jacques Rousseau. In his 1750 essay Discours sur les sciences et les arts (Discourse on the Arts and Sciences), Rousseau expressed his concerns regarding the corruption of morality due to both the arts and the sciences.¹⁵² He became one of the first great Enlightenment thinkers to question and criticize this “new Enlightenment faith in science and progress.”¹⁵³ He believed that the sciences increasingly distanced man from nature, and that science ultimately did not function in the service of man’s happiness and fulfillment. Rousseau praised nature, and


¹⁵² “Astronomy was born of superstition, eloquence of ambition, hatred, falsehood, and flattery; geometry of avarice; physics of an idle curiosity; and even moral philosophy of human pride. Thus the arts and sciences owe their birth to our vices; we should be less doubtful of their advantages, if they had sprung from our virtues.” Jean-Jacques Rousseau, “A Discourse on the Moral Effects of the Arts and Sciences,” in The Social Contract and Discourses, trans. with an introduction by G. D. H. Cole (London and Toronto: J. M. Dent and Sons, 1923), 15.

raised questions regarding the consequences of the modern emphasis on science. Rousseau’s position gave rise to Romanticism, which emphasized literature and the arts as a reaction to the Enlightenment emphasis on the sciences, which Rousseau viewed as politically based. In contrast to the Enlightenment emphasis on reason, knowledge, substance and reality, Romanticism focused on imagination, perception, feeling and intuition. As a counter-movement in reaction to the Scientific and Industrial Revolutions, Romanticism rejected neo-Classicism in favor of medievalism.

Toward the end of the 18th century, the optimistic Kantian version of inevitable progression toward Enlightenment was put to the test by the French Revolution. In 1793, King Louis XVI of France, and his wife, Queen Marie Antoinette, were executed by the revolutionary French government; their son and only male heir, Louis-Charles, died in prison. The period that followed, known as the Reign of Terror, was marked by political conflict between the rival Girondins and the Jacobins, and by significant social and cultural upheaval, which included mass imprisonments and executions. The rumblings of the French Revolution were far-reaching, and shook leaders in other nations who were influenced by the French Enlightenment. Catherine the Great corresponded regularly with French essayists and philosophers François-Marie Arouet – better known as Voltaire – and Denis Diderot, and sought to apply Enlightenment principles to her own political and social reforms in the Russian empire; she even hosted Diderot, by her own

invitation, at her court in 1773. Although Catherine openly proclaimed her disdain for the institution of serfdom, she was ever wary of revolution in her own country, and actually instituted laws that expanded control of serfs by gentrified landowners.

**Postmodern Distrust in Theories and Ideologies**

Postmodernism emerged as an “anti-modernist” movement in response to Enlightenment modernism, accelerated by the devastating effects of world war in the first half of the 20th century. The intellectual and cultural clashes between modernism and postmodernism are woven into the very fabric of contemporary thought: from philosophy and critical theory to politics; from religion to cultural theory and lifestyles; and from science and technology to the fine arts and literature. Focusing on the latter – specifically, medical science and the visual arts – I contend that modernist and postmodernist intellectual and cultural clashes are clearly evident in contemporary approaches to medicine and the arts, and influence opinions on the role of the visual arts within the context of medical education.

Postmodernism emerged in the late 19th century in reaction to the modernism spawned by the Enlightenment. Postmodern thinkers were critical of the rationality that formed the basis of Enlightenment thought, and questioned the “very possibility of establishing universal truths.”

---

155 Wilson, “Postmodernism and the Enlightenment,” 652.
One of the staunchest and most outspoken critics of Kantian optimism was 19th-century German philosopher Friedrich Nietzsche, who “rigorously indicted eighteenth-century philosophy for subsuming its arguments into grand narratives about cultural and intellectual progress” which, in his view, “[supported] the aspirations of the period’s political rulers.”156 In his 1882 publication Die fröhliche Wissenschaft (The Gay Science), Nietzsche made the startling, and often misunderstood, proclamation that “God is dead,”157 that “we have killed him – you and I… God is dead. God remains dead. And we have killed him.”158 Nietzsche does not necessarily contend that God as an “entity” or “being” is literally dead; rather, he asserts that humankind no longer accepts an overarching cosmic order, or teology; as a result, a universally relevant moral law or code is no longer recognized as valid. The breakdown of this order can be attributed, in Nietzsche’s view, to the proliferation of the natural sciences in the modern era, as well as the increasing secularization of society in general.

Influenced by Nietzsche – as well as 19th-century Danish philosopher Søren Kierkegaard and his philosophy of Angst – German philosopher Martin Heidegger was an important and influential postmodern thinker of the 20th century. In his 1927 book Sein und Zeit (Being and Time), Heidegger focuses on the philosophy of being and existence. Much of his philosophy of being focuses specifically on Dasein, or the existence of the

156 Wilson, “Postmodernism and the Enlightenment,” 651.
human being. He claims that dating back to Plato, Western philosophy has misunderstood much of the theories of “being” put forth by the Ancient Greeks. He claims that errors in the understanding of being contribute to our relationship to technology in the modern era.

Heidegger’s 1950 publication Der Ursprung des Kunstwerkes (The Origin of the Work of Art) – based on lectures dating to 1935 – outlines his philosophy of art:

He rejects two widely held doctrines. First, that art is concerned only with beauty and pleasure: 'art is rather the disclosure of the being of beings'. Second, that a work of art is primarily a thing, and that aesthetic value is superimposed on it by our subjective view of it: for Heidegger it is art that shows us what a thing is… The nature of art would then be this: the truth of beings setting itself to work'. The work is not a thing with artistic qualities added: the work reveals the nature of things.\(^\text{159}\)

For Heidegger, “art is the main way in which truth happens.”\(^\text{160}\)

In modern times… beings become 'objects', to be calculated and manipulated. (This is what lies at the root of 'technology'.) Each time a new world arises; unconcealment of beings happens; and it sets itself into work, a setting accomplished by art. When art happens, a thrust enters history and history begins again. Art grounds history, not history in the sense of important events, but history as the entry of a people into its native endowments and its movement towards its appointed destiny. Now we understand the word 'origin' in the title of the essay. 'Origin', Ursprung, means a 'leap forth'. Art lets truth leap forth. Art is the origin or leaping forth of the work of art. Thus it is the origin of the creators and preservers of the work, and that means of the existence of a historical people.\(^\text{161}\)


\(^{160}\) Inwood, Heidegger, 121.

\(^{161}\) Inwood, Heidegger, 125.
In contrast with his philosophy of art, Heidegger contends science projects “a view of being onto entities, a projection of a sort which ultimately underlies the work of any science.”

For Heidegger:

Science is not an 'original happening of truth'. It fills in the details of a 'domain of truth already opened . . . [I]nsofar as a science passes beyond correctness and goes on to a truth, . . . it is philosophy'. But art is the main way in which truth happens.

Georgetown University Professor of Philosophy Rev. Dr. Patrick A. Heelan, S.J. – a specialist on the philosophy of Heidegger – contends “Heidegger lacked the practical engagement with science necessary for an alternative philosophy of science,” and suggests “we should think Heidegger's thoughts on science as a propaedeutic to an 'authentic' philosophy of science.”

Also influenced by Nietzsche, French philosopher Michel Foucault criticized Enlightenment values in his 1966 publication *Les Mots et les choses: Une archéologie des sciences humaines* (*The Order of Things: An Archaeology of the Human Sciences*). Foucault rejected the “possibility of any ‘ideal discourse that is both ultimate and timeless.’”

---


165 Wilson, “Postmodernism and the Enlightenment,” 652.
Postmodern thinkers were concerned with the idea of “whether there can be a single, coherent and reasoned account of all aspects of thought and experience.”

In La Condition postmoderne; rapport sur le savoir (The Postmodern Condition: A Report on Knowledge), 20th century French philosopher Jean-François Lyotard defines postmodern as “incredulity toward metanarratives,” characterized by a “transcendent or universal truth;” he contends this incredulity is “a product of progress in the sciences.” Lyotard argues that the processing of knowledge through computerization and telecommunications has changed the very status and nature of knowledge itself, resulting in the delegitimation of metanarratives, thus raising the question of how knowledge is legitimated in the postindustrial/postmodern age. Lyotard’s primary concern revolves around access to knowledge, particularly cybernetic knowledge, which he believes is linked to language games and power: “The games of scientific language become the games of the rich, in which whoever is wealthiest has the best chance of being right.”

He contends knowledge should not be limited to – or hoarded by – the wealthy who are versed in the “language games” that are used to control knowledge.

---

166 Wilson, “Postmodernism and the Enlightenment,” 648.

167 In postmodernist theory, a metanarrative is a transcendent or universal truth that underlies and attempts to order knowledge and/or experience.


169 Lyotard, The Postmodern Condition, 45.
American intellectual Thomas S. Kuhn’s impact on the history and philosophy of science in the 20th century is particularly noteworthy. In his 1962 book *The Structure of Scientific Revolutions*, Kuhn argues: “science proceeds not primarily by patient accretion of facts, but by revolutionary interpretive shifts in which one scientific ‘paradigm’ displaces another.” Therefore, rather than the idealistic linear continuity espoused by Kant and other Enlightenment thinkers, Kuhn purports that the history of science is “marked by discontinuity.” At the heart of Kuhn’s argument is his discussion of the incommensurability of competing paradigms. Due to the very nature of competing paradigms in science, one cannot use the terminology, concepts, and arguments of one paradigm to explain or understand a competing paradigm.

Another perspective on the issue of languages addressed by Lyotard and Kuhn can be found in French psychiatrist Jean-Bertrand Pontalis’ autobiographical book *L’amour des commencements (Love of Beginnings)*. A student of both Jean-Paul Sartre and Jacques Lacan, Pontalis expounds upon his simultaneous “love and hatred of

---

170 Cahoon, *From Modernism to Postmodernism*, 200.

171 Cahoon, *From Modernism to Postmodernism*, 200.

172 “Lacking a basis of comparison in respect to a quality normally subject to comparison,” s.v. “incommensurable.” http://www.merriam-webster.com/dictionary/incommensurable (accessed December 3, 2010). In the context of scientific inquiry and analysis, the inability to make comparisons between contrasting theories to prove the accuracy of one theory over another, when the bases for comparison are incompatible, such as different units of measurement.

words.” Throughout the book, he moves between semiotic circles, demonstrating how we move between and among the use of language in our everyday lives. For example, we use one type of language when speaking with family, another when speaking with colleagues at work, and yet another when speaking with strangers. We move comfortably among and between these semiotic circles, shifting rather seamlessly and effortlessly from one to the other. In some instances, the circles overlap; yet, each retains its own inherent qualities, its own specific language and jargon. There is, therefore, no overarching, universal language that addresses all knowledge and truth.

In general, postmodern thinkers have been overwhelmingly critical of the sciences. Enlightenment proponents of the sciences, such as Kant, viewed scientific progress as a search for universal truths, whereas postmodern critics claim that the search for truth in the sciences is subject to “social forces both within and without the scientific community,” whereby “periodic shifts in outlook comes as a result of irrational conversions on the part of influential scientific leaders, not from systematic searches.”

Traditionally, scientists are supposedly objective observers, whereas the postmodern critique argues that “observations do not interpret themselves,” and that “human minds

---


175 Dennis McCallum, ed., *The Death of Truth: What’s Wrong with Multiculturalism, the Rejection of Reason and the New Postmodern Diversity* (Grand Rapids, MI: Bethany House, 1996), 81.
are affected by their culture and language to such an extent that the ‘actual’ nature of things may be unknowable.”

The modern scientist makes systematic observations with instruments more sensitive than the senses and generates explanations that have internal consistency and universality; in the process some of the sources of those subliminal messages and subtleties are revealed. The artist works subjectively with full artistic freedom; the scientist is constrained by objectivity, acts, and data. But it is not just facts and data that dictate the operating mode of the scientist, there is also intuition, inspiration, and imagination.

Kant promoted the concept that science is rational, and that scientists employ both inductive and deductive logic to address scientific questions; the postmodernist questions “whether rationality provides any real insights,” and argues that “the rules of logic only apply within a given cultural paradigm, or model based on a given language/thought system.” Concerning the testing of hypotheses, Kant would argue that a hypothesis “must be tested under conditions where falsifiability is possible;” postmodernists would argue that “when scientists form hypotheses they lose objectivity,” and refuse “to see data that [contradicts] their current understandings.” In simple terms, the postmodern critique of science questions the ability of modern scientists to remain neutral, apply formal rules of deduction, and develop theories that objectively explain empirical data.

176 McCallum, The Death of Truth, 81.
177 Atalay, Math and the Mona Lisa, 90.
178 McCallum, The Death of Truth, 82.
179 McCallum, The Death of Truth, 82.
The clash between modern and postmodern intellectual and cultural issues discussed in relation to science are likewise applicable to the visual arts. Not unlike Nietzsche’s proclamation that “God is dead,” German essayist Walter Serner claimed in the Dadaist manifesto *Letzte Lockerung (Final Dissolution)* of 1919 that “Art is dead.” Greatly affected by the tremendous ravages of the first world war in Europe, Serner and the Dadaists are not necessarily arguing that art no longer has the ability to “speak” or impart a message; rather, Serner is attempting to convey that the prevailing artistic logic and ideology in art – the academic approach to art and the governing rules of traditional aesthetics and culture – are being rejected in favor of chaos and the irrational.

Views toward medicine have evolved since the Enlightenment. In the modernist view, doctors were primarily objective and scientific in their approach to the patient and to disease; however, in the postmodern view, the “narrative of illness increasingly tells the patient’s story.” In contemporary society, even the postmodern criticism of science has been subjected to scrutiny. In reaction to the postmodern approach to and criticism of medicine, psychiatrist Sally Satel contends in her 2000 book *PC, M.D.: How Political Correctness is Corrupting Medicine*, that postmodern dogmas and concepts are a threat to the practice of clinical medicine.

Our sciences and technologies have become increasingly narrow in their focus, and we are unable to understand our multifaceted problems from an interdisciplinary perspective. We urgently need a science that honors and respects

---

the unity of all life, that recognizes the fundamental interdependence of all natural phenomena, and reconnects us with the living earth. What we need today is exactly the kind of thinking and science Leonardo da Vinci anticipated and outlined five hundred years ago, at the height of the Renaissance and the dawn of the modern scientific age.\textsuperscript{182}

\textsuperscript{182} Capra, \textit{The Science of Leonardo}, 12.
CHAPTER III
FORMULATION OF THE MODERN MEDICAL CURRICULUM

The greatest mistake in the treatment of diseases is that there are physicians for the body and physicians for the soul, although the two cannot be separated.

– Plato

Let not your conceptions of disease come from words heard in the lecture room or read from the book. See, and then reason and compare and control. But see first.

– William Osler, *The Principles and Practice of Medicine*

In this chapter, I will investigate the roots of modern medicine as it is currently understood, taught, and practiced in the Western hemisphere, as well as the factors that led to the development of the contemporary medical curriculum in U.S. medical schools. This general overview is necessary and relevant as it provides perspective on the current philosophy of medical education in the U.S., and illuminates the role of humanism is contemporary western medicine; it also raises questions about the challenges facing medicine and medical education in an age of advanced technological resources. In turn, this perspective provides a framework for understanding the potential role of the visual arts in U.S. medical education, and the assertion of “value added” outcomes as a result of such curricular endeavors.
The Roots of Western Medicine

In a general sense, medicine has existed for a long as “people have felt ill, and have tried to find explanations for their symptoms and ways of feeling better.”¹ Dr. Kenneth Kiple, Emeritus Distinguished University Professor of History at Bowling Green State University in Bowling Green, Ohio, has written extensively on the history of medicine, disease, and nutrition. Kiple observes that evidence of human efforts to fight disease date back at least three thousand years.² According to Kiple, at the end of the last ice age – about 10,000 years ago – the nomadic lifestyle of hunting and gathering began to gradually be replaced by agriculture.³ Hunter-gatherer hominids were exposed to disease primarily through contact with wild animals, as well as the inheritance of pre-hominid organisms; their mobile lifestyle and low density populations resulted in minimal exposure to viral and bacterial infections, contagions, and water-bourn pathogens, notes Kiple.⁴ The availability of fresh water supplies and “a wide range of wild plant and animal food” rich in nutrients and vitamins, contributed to overall health.⁵

² “Humans have been fighting the diseases of ‘civilization’ since they began congregating in large numbers. There is written and pictorial evidence of this from Egypt and Mesopotamia around 1000 BC, India about 750 BC, Greece of the sixth century BC, and China about 100 BC.” Kenneth F. Kiple, “The History of Disease,” *The Cambridge History of Medicine*, ed. Roy Porter (Cambridge; New York: Cambridge University Press, 2006), 10.
³ “As [American anthropologist] Mark Cohen has remarked, around 10,000 years ago almost everybody lived exclusively on wild food; by 2,000 years ago, most people were farmers.” Kiple, “The History of Disease,” 12-13.
Kiple concludes that as wild grasses and animals became domesticated, and human populations began to concentrate and expand into permanent settlements, the resulting agricultural revolution and cultivation of the land also led to the cultivation of disease.⁶

Toward the end of the 16th century, Swiss physician and scholar Theodor Zwinger traced the origins of medicine to the ancient Greeks.⁷ Although the contemporary western approach to medicine is deeply rooted in the traditions of Ancient Greece, it would be inaccurate to credit the Greeks with the “invention” of medicine.⁸ The Corpus Hippocraticum (Hippocratic Corpus), attributed to Greek physician Hippocrates (460-370 B.C.), is commonly revered as the seminal basis for western medicine and medical ethics; Hippocrates himself is widely referred to as “the Father of Medicine.” However, medical texts and traditions traced to ancient Mesopotamia and Egypt predate the Hippocratic Corpus by centuries.

It is noteworthy that the visual record historically mirrors man’s involvement with medicine. For example, in The Medical Skills of Ancient Egypt,⁹ J. Worth Estes “credits

---

⁶ Kiple, “The History of Disease,” 13-14. “Pathogens of domesticated animals now found their way into human bodies… These animals joined with humans in fouling drinking water with their bodily wastes. Humans scattered those wastes on the cultivated land, which maximized the opportunities of parasitic worms and attracted disease-spreading insects… Mice and rats learned to take shelter with humans… Permanent settlements attracted mosquitoes and other assorted blood-sucking insects… Fleas and lice colonized the outside of the human body, and amoebas, hookworms, and countless other parasitic worms moved into its interior… Cattle contributed their poxes to the growing pool of pathogens.” (p. 14-15).


circumcision with being the first surgical technique to be depicted pictorially, as evidenced by a wall carving in a Dynasty VI tomb [of Ankhmahor] over 4,000 years old\textsuperscript{10} (see fig. B.13). While the scene depicts a widely practiced religious ritual, this “social and religious custom was a driving force behind medical practice.”\textsuperscript{11} A similar relief in Ankhmahor’s tomb depicts surgery being performed on a foot: the operation is thought to be purely corrective in nature, and is unrelated to any known religious rite.

Notations on the symptoms of disease have been found on fragmentary clay tablets dating to Babylonia in 1700 B.C.\textsuperscript{12} The most extensive medical text to predate the *Hippocratic Corpus* is the *Diagnostic Handbook* of Esagil-kin-apli of Borsippa, dating to the reign of Babylonian king Adad-apla-iddina (1068-1047 B.C.).\textsuperscript{13} The *Diagnostic Handbook* introduces concepts of physical examination and diagnosis, and the prescribing of therapies to treat illness and disease, including medications.

Clearly, a somewhat formalized understanding and practice of medicine predates the Greeks of the Classical period (roughly 500-323 B.C.), and can be found in civilizations outside of Greece itself. Likewise, the *Hippocratic Corpus* certainly summarizes previously existing texts and concepts of the practice of medicine in Ancient


\textsuperscript{12} Nutton, “The Rise of Medicine,” 47.

Greece. The distinguishing factor is that although there was certainly some level of cultural exchange between neighboring civilizations in the Ancient world, the Greeks can be attributed with the unique formulation of our modern understanding of western medicine rooted in rationalism.

Both Egyptian and Babylonian medicine show evidence of accurate observation, as well as hierarchies of practitioners. What their writings do not yet reveal is the questioning, argumentative, and speculative discussions that mark early Greek medicine, as found in the Hippocratic Corpus... Hence, scholars have often asserted the independence of Greek medicine from that of neighbouring [sic] civilizations, a claim more than likely to be true of Greek theory than of actual therapeutic practice. ¹⁴

Though attributed to Hippocrates, the *Hippocratic Corpus* consists of a collection of works associated with the general teachings of Hippocrates, but likely composed by multiple anonymous ancient Greek authors. Pre-Hippocratic medicine in Greece was associated with Knidos, known as Knidian medicine; the school of medicine associated with Hippocrates, who was born on the island of Kos, is known as Koan medicine. Knidian medicine focused primarily on disease and diagnosis of specific diseases. By contrast, Koan medicine focused on the patient; diagnosis was also important, though greater emphasis was placed on caring for the patient as a whole person - or *cura personalis* ¹⁵ – and patient prognosis based on observation and evaluation.


¹⁵ “The Catholic, Jesuit concept of *cura personalis*, which translates as “care of the whole person,” suggests individualized attention to the needs of others, distinct respect for unique circumstances and concerns, and an appropriate appreciation for singular gifts and insights. This ideal, founding principle of Georgetown University Medical Center, has special resonance for the scientific and educational missions of the university.”  http://som.georgetown.edu/about/curapersonalis/ (accessed February 12, 2010).
A distinct and important aspect of Hippocratic medicine is that it can be considered as providing a uniquely rational approach to medicine.

In prehistoric cultures around the world, the origin of illness and the process of healing were associated with forces belonging to the spirit world, and a great variety of healing rituals and practices were developed to deal with illness accordingly… At the core of Hippocratic medicine was the conviction that illnesses are not caused by supernatural forces, but are natural phenomena that can be studied scientifically and influence by therapeutic procedures and wise management of one’s life. Thus medicine should be practiced as a scientific discipline and should include the prevention of illness, as well as its diagnosis and treatment. This attitude has formed the basic of scientific medicine to the present day.16

Hippocrates rejected any supernatural causes for illness, thus separating medicine from religion, ritual, and superstition. Hippocrates approached the treatment of disease from a practical, rational, and logical – or, purely naturalistic – perspective.

As pioneered by the Hippocratics… medicine was expertise in the body. Greek medical theory thus plucked sickness from the heavens and brought it down to earth. Historians have regarded the Hippocratic programme [sic] as, symbolically at least, constituting the foundation of scientific medicine, through denial of a supernatural causation of disease and concentration on the body.17

Hippocrates also placed significant emphasis on ethics and ethical behavior by physicians. His philosophy of medical ethics, discipline, and professionalism is

---


elaborated upon in five books attributed to Hippocrates: Oath, Physician, Law, Medical Decorum, and Aphorisms.\textsuperscript{18}

A defining component of Hippocratic medical philosophy is humorism – an “erroneous but well-worked-out and comprehensive theory of disease” inherited by Renaissance medicine.\textsuperscript{19} Hippocrates believed that illness and disease were the result of an imbalance, disequilibrium, or disharmony (dyscrasia) of the four humours (see fig. A.6).

If Graeco-Roman medicine was secular and naturalistic, it was also holistic. It focused upon what it called the humours, those fluids whose equilibrium was vital for life… the human animal was presented as a complex, differentiated integrated whole. The humours formed one facet, and their balance was reflected in the ‘complexion’ (or outward appearance) and the ‘temperament’ – or, as we might say, personality type. Humours, complexion, and temperament constituted an interactive system.\textsuperscript{20}

The role of the physician was to re-establish balance, equilibrium, and harmony of the humours (eucrasia). Leonardo da Vinci would echo this concept centuries later during the European Renaissance by stating:

Doctors, teachers, and those who nurse the sick should understand what man is, what is life, what is health, and in what manner a parity and concordance of the elements maintains it, while a discordance of these elements ruins and destroys it...\textsuperscript{21}

\textsuperscript{18} Hippocrates, The Genuine Works of Hippocrates, trans. from the Greek, with a preliminary discourse and annotations, by Francis Adams (Birmingham, AL: The Classics of Medicine Library, 1988; originally published 1891).

\textsuperscript{19} Bergin and Speake, Encyclopaedia of the Renaissance, s.v. “medicine,” 265.

\textsuperscript{20} Porter, “What is Disease?,” 79.

\textsuperscript{21} Capra, The Science of Leonardo, 57. Quote from: Codex Atlanticus, folio 730r.
Greek philosopher and physician Galen of Pergamum (29-200 A.D.) was an important proponent of Hippocratic theory. After traveling extensively throughout the Mediterranean, Galen eventually settled in Rome, where he built upon and promoted Hippocratic medicine, specifically the concept of humorism.

Galen was an extremely prolific writer, and published hundreds of treatises. In particular, his treatises on science reveal his attempts to reconcile the divergent medical approaches of rationalism and the empiricism, particularly with regard to human anatomy.\textsuperscript{22} Galen’s writings reveal that he considered himself both a philosopher and a physician;\textsuperscript{23} like Hippocrates, he sought to base his approach to medicine on direct observation, knowledge, reason, and experimentation.

\textbf{The Spread of Rational Medicine}

Galen’s writings – heavily influenced by Hippocratic theory – were of vast importance and significance to the study of medicine. Following Galen’s death until about 600 A.D., “there was formed in medicine… a canon of works of Galen and Hippocrates that was accorded a special place in teaching, certainly at Alexandria and perhaps elsewhere.”\textsuperscript{24} As a result, book-learning came to define the study of medicine.\textsuperscript{25}

\begin{footnotesize}
\begin{enumerate}
\item Nutton, “The Rise of Medicine,” 55.
\item Nutton, “The Rise of Medicine,” 55.
\end{enumerate}
\end{footnotesize}
With the decline of the Roman Empire, the medical theories of Hippocrates and Galen were all but lost in Europe during the Dark Ages, roughly between 500-1050 A.D. British historian of medicine and Galen specialist Professor Emeritus Vivian Nutton, of the Wellcome Trust Centre for the History of Medicine at University College, London, notes that the associated “catastrophic downturn in economic prosperity” resulted in “a massive decline in the number, and quality, of medical writings available.”

Nutton elaborates:

Two features stand out in this decline. The first is the preeminence of ‘do-it-yourself’ handbooks, primarily of dietetic medicine, which presented a small amount of basic theory with a concise exposition of a few diagnoses and treatments. By contrast, only a handful of Hippocratic and Galenic texts were available in translations made in northern Italy around 550… The second feature is the ecclesiastical takeover of medical learning – and learning in general, for few outside the ecclesiastical community could read. Probably only within monasteries or, from the ninth century, the schools that grew up around certain major cathedrals, such as Laon and Chartres in France, were medical texts in Latin being copied and studied.

Outside of Western Europe, Galen’s treatises continued to be copied in Greek and were available throughout Byzantium: “In Constantinople… professors argued, taught, and perhaps even demonstrated in the Galenic tradition of learned medicine.” As a result, “the medical services of the Byzantine Empire were far superior to those of the contemporary West.”

---

Middle Ages, many of Galen’s texts were translated into Arabic by Muslim scholars, further facilitating the spread of Greek medical philosophy outside of Europe.\(^{30}\)

In the seventh century, powerful Muslim armies... conquered peoples in the Middle East, across North Africa, and in southern Europe. As they built their vast empire, they not only spread Islam and the Arabic language, but also came into contact with the ancient texts of Greek philosophy and science in the Byzantine libraries. The Arabs deeply appreciated Greek learning, translated all the important philosophical and scientific works into Arabic, and assimilated much of the science of antiquity into their culture. In contrast to the Romans, the Arab scholars not only assimilated Greek knowledge but examined it critically and added their own commentaries and innovations. Numerous editions of these texts were housed in huge libraries throughout the Islamic empire. In Moorish Spain, the great library of Córdoba alone contained some six hundred thousand manuscripts. When the Christian armies confronted Islam in their military crusades, their spoils often included the works of Arab scholars. Among the treasures left behind by the Moors in Toledo when they retreated was one of the finest Islamic libraries, filled with precious Arabic translations of Greek scientific and philosophical texts. The occupying forces included Christian monks, who quickly began to translate the ancient works into Latin. A hundred years later, by the end of the twelfth century, much of the Greek and Arabic philosophical and scientific heritage was available to the Latin West.\(^{31}\)

Within the Arab world, the works of individuals such as Arab physician Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi (a.k.a. Abulcasis in the West) were highly influential. Often called the father of modern surgery,\(^{32}\) Abu al-Qasim likely had access to Arabic translations of Galen’s treatises. Published in 1000 A.D., Abu al-Qasim’s thirty volume medical encyclopedia, *Kitab al-Tasrif (The Method of Medicine)*, is a...


comprehensive treatise on the practice of medicine, with particular emphasis on surgery and surgical technique.\textsuperscript{33} Known in the west by its Latin title, \textit{Concessio ei data qui componere haud valet}, the work is particularly noteworthy as it contains approximately 200 simple illustrations, primarily of medical instruments (see fig. B.14). Abu al-Qasim’s encyclopedia was highly regarded until at least 1600 A.D., in Europe as well as the Arab world. One of his entries addresses the treatment of arrow wounds;\textsuperscript{34} a Pompeian fresco dating to the 1st century A.D. depicts just such a scene (see fig. B.15).

Nutton places the transition from European Dark Age medicine in Salerno, Italy, around 1050, where there “was a thriving medical community in touch with the Greek and Arab worlds, as well as the wealthiest and intellectually most advanced in Europe, Monte Cassino.”\textsuperscript{35} He notes:

The Salernitan masters reintroduced theoretical speculation into medical teaching. Aided by contacts with Constantinople, and, from 1200 onwards, by Latin translations of some Arabic texts… they re-established Galenic academic learning, combining commentary on a few set texts with philosophical discussion of wider issues… Galenism was reintroduced in Arabic form, in particular via the medical compendia of al-Majusi and the so-called \textit{Introduction of Johannitius} (an abbreviated version of Hunain ibn Ishaq’s \textit{Questions and Answers}).\textsuperscript{36}

\textsuperscript{33} In addition to descriptions of surgery and surgical technique – and illustrations of surgical instruments – Abu al-Qasim’s \textit{Kitab al-Tasrif (The Method of Medicine)} also addressed nutrition, anatomy, types of diseases, ophthalmology, and orthopaedics.

\textsuperscript{34} Carmichael, \textit{Medicine: A Treasury}, 25.

\textsuperscript{35} Nutton, “The Rise of Medicine,” 63.

\textsuperscript{36} Nutton, “The Rise of Medicine,” 63.
Nutton elaborates further on the “Arabic basis of Latin medicine,” noting translations of Arabic medical texts into Latin in the 12th century by Gerard of Cremona, including:

Hussain ibn Abdullah ibn Hassan ibn Ali ibn Sina’s *Al-Qanun fi al-Tibb (Canon of Medicine)*,38 Abu Yusuf Ya’qub Ibn Ishaq al-Kindi’s various works on drugs and drug interaction, particularly *De Gradibus* and *Aqrabadhin (Medical Formulary)*,39 and Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi’s *Kitab al-Tasrif (The Method of Medicine)*.40

Along with these major Arabic works, many of Galen’s most important treatises had been

---


38 Abu-Ali Ibn Sina Balkhi (a.k.a. Avicenna in Latin) was a Persian philosopher and physician (c.981-1037 A.D.). His *Al-Qanun fi al-Tibb (Canon of Medicine)*, completed in 1025 A.D., is a medical encyclopedia consisting of fourteen volumes. Science historian George Sarton writes: “One of the most famous exponents of Muslim universalism and an eminent figure in Islamic learning was Ibn Sina, known in the West as Avicenna (981-1037). For a thousand years he has retained his original renown as one of the greatest thinkers and medical scholars in history. His most important medical works are the Qanun (Canon) and a treatise on Cardiac drugs. The ‘Qanun’ is an immense encyclopedia of medicine. It contains some of the most illuminating thoughts pertaining to distinction in mediastinitis from pleurisy; contagious nature of phthisis; distribution of diseases by water and soil; careful description of skin troubles; of sexual diseases and perversions; of nervous ailments.” From George Sarton, *Introduction to the History of Science* (Baltimore: Published for the Carnegie Institution of Washington by the Williams & Wilkins Company, c.1927).

39 Abu Yusuf Ya’qub Ibn Ishaq al-Kindi (a.k.a. Alkindus in Latin) was an Arab philosopher and scientist (c.801-873 A.D.). Plinio Prioreschi writes: “The most important of al-Kindi’s medical writings… is *De gradibus*, a remarkable work in which, in an original departure from tradition, he attempts to apply mathematics to pharmacology. Previously, Galen confronted with the necessity of distinguishing between more and less powerful drugs, had devised the distinction between the four degrees of intensity of drug qualities (warmth and coldness, wetness and dryness)… Galen’s scale of strength was approximate and, since his time, a ‘degree’ was understood to be a ‘certain quantity,’ two degrees ‘the double of one degree,’ three degrees the triple, and four degrees the quadruple. It was not clear how much a degree was, nor was it clear whether the term ‘degree’ referred to the quality of the drug or to the sensation that it generated… Al-Kindi, with remarkable originality and scientific foresight, decided to give those concepts a mathematical basis so that one could quantify the strength of drugs. In other words, al-Kindi was the first attempt to serious quantification in medicine (in this case, of drug actions). From Plinio Prioreschi, “Al-Kindi, A Precursor of the Scientific Revolution,” *Journal of the International Society for the History of Islamic Medicine* 1, no. 2 (October 2002): 17-20.

40 Abu al-Qasim’s *The Method of Medicine* was highly influential during the Middle Ages and the European Renaissance, and was referenced quite extensively; Oxford scholar John Channing’s 1778 translation included the original text in Arabic.
translated by 1190, which facilitated widespread distribution of these texts throughout the West. By 1350, many of Galen’s minor works were translated into Latin by Niccolo da Reggio.41

The integration of medicine into university education in Western Europe occurred in the Late Middle Ages. Founded in 425 A.D., the University of Constantinople is considered by many scholars to be the first university in the world. However, identification of the first university varies, based on the definition of “university” one uses. The historical precursor of the university dates back to the Platonic Academy founded by Plato in Athens in 387 B.C. As an institution of higher learning, the University of Constantinople would thus qualify as the first; as a corporation of students, it would still qualify, as it was re-designated as such in 849 A.D. Some scholars consider the University of Salerno, founded in the 9th century A.D., as the first degree-granting university. Others consider the University of Bologna, founded c.1088 A.D., as the first university, based on the contemporary definition of university as an institution of higher learning focused on research and teaching and granting degrees in a variety of fields; it was also the first institution of higher learning to use the word “universitas,” taken from the Latin for “community of teachers and scholars” (universitas magistrorum et scholarium). Regardless of the definition used, “by 1400 many areas of Western Europe had their own institutions of higher learning.”42

---

42 Nutton, “The Rise of Medicine,” 64.
Nutton observes that translation of medical texts and treatises into Latin “accompanied the development of university medicine.” While the University of Constantinople included a school of medicine upon its founding in 425 A.D., Nutton notes that “medicine came late into the universities” of Europe, with “professional associations of medical teachers” joining “universities only when they saw the advantages of the new institutions’ ability to secure their own rights and privileges in law and theology.”

Once in the universities, the doctors readily adopted university procedures – lectures on set texts, such as The Introduction of Johannitius, Ibn Sina’s Canon, and some Galen, debates on medical questions, and a theoretical (heavily Aristotelian) bias – and university prejudices. Because their medicine was based on texts, they increasingly argued that proper medicine depended on such knowledge, and that they, as university graduates, alone had the right to decide who should or should not practise [sic] medicine – a textual examination supplemented, and at times replaced, practical instruction by apprenticeship.

As noted in Chapter II, the medieval approach to science and scientific knowledge was “largely the science of the ancients modified by the commentaries of Arab scholars;” “medical thinking took its cue from the Ancients for a long time: Galen of Pergamum, in particular, was deified throughout the Middle Ages.” Science in medieval Europe was also deeply rooted in theology, a tradition that would be

45 Nutton, “The Rise of Medicine,” 64.
46 Ergang, The Renaissance, 265.
47 Porter, “What is Disease?,” 80.
“challenged by the Scientific Revolution, especially its onslaught on the person-centered and vitalistic views ingrained in Greek, and especially Aristotelian, science.” In particular, philosophers René Descartes and Thomas Hobbes “denounced Aristotle for falsely endowing Nature with vitality, proclivities, appetites, will, consciousness, and purpose (‘final causes’).” Enlightenment thinkers “propagandized” on behalf of the “New Science,” and by the 19th century, “it became essential for any ambitious doctor to acquire a scientific training.”

**Medicine in the New World**

The first successful permanent settlement in the English colonies of the New World – now the United States of America – was on the James River at Jamestown in the Virginia colony. Among the original settlers arriving May 13, 1607 on three ships – the *Susan Constant, Goodspeed,* and *Discovery* – Captain John Smith lists, by name and profession, a total of 66 individuals: 4 Councells, 2 Preachers, 29 Gentlemen (1 noted as a Surgeon), 6 Carpenters, 1 Blacksmith, 1 Sailor, 1 Barber, 2 Bricklayers, 1 Mason, 1 Taylor, 1 Drummer, 13 Labourers (1 noted as a Surgeon), and 4 Boyes.

---

48 Porter, “What is Disease?,” 80.

49 Porter, “What is Disease?,” 80.


Surgeon and researcher Luis H. Toledo-Pereryra, M.D., Ph.D., is an expert on colonial American medicine. He notes that there were no educated physician among the first Virginia inhabitants;\textsuperscript{52} “they did include barber-surgeons, chirurgeons, apothecaries, midwives, and folk practitioners.”\textsuperscript{53} Surgeons were generally divided into three groups: barber-surgeons, the lowest type; chirurgeons, who had some kind of apprenticeship experience; and gentlemen surgeons, who were educated professionals.\textsuperscript{54} Among the 1607 settlers, there was one barber-surgeon and one chirurgeon.\textsuperscript{55} Unlike European medicine, which was based on the practices of Galen and his associated theories of humorism,\textsuperscript{56} the early Virginia settles depended upon the medicine practiced by the native Indians, based on spiritual rituals and botanicals to achieve healing.\textsuperscript{57}

With poor lines of communication, New World medicine was isolated from its European counterpart. Educated physicians attempted to heal by bloodletting, bingeing, and purging in an attempt to balance the humors in the body. In America, such ideas of educated medicine were rarely used. Settlers learned from the Indians to look for medicinal plants to treat the sick and hunted for food.\textsuperscript{58}

\textsuperscript{52} “In Europe, educated doctors practiced medicine according to the teachings of the ancient Greek physicians Hippocrates and Galen.” Luis H. Toledo-Pereryra, \textit{A History of American Medicine From the Colonial Period to the Early Twentieth Century} (Lewiston: Edwin Mellen Press, 2006): 3.

\textsuperscript{53} Toledo-Pereryra, \textit{A History of American Medicine}, 3.

\textsuperscript{54} Toledo-Pereryra, \textit{A History of American Medicine}, 14.

\textsuperscript{55} Toledo-Pereryra, \textit{A History of American Medicine}, 14.

\textsuperscript{56} Toledo-Pereryra, \textit{A History of American Medicine}, 19.

\textsuperscript{57} Toledo-Pereryra, \textit{A History of American Medicine}, 7.

\textsuperscript{58} Toledo-Pereryra, \textit{A History of American Medicine}, 3.
Among the second group of settlers arriving in January 1608, there was 1 physician, 2 chirurgeons, and 2 apothecaries; in 1610, an additional physician/surgeon arrived, and in 1621, 1 surgeon/physician and 1 apprentice.\(^{59}\)

The first educated physicians to practice in Virginia were selected and sent by the London Company. Their medical educations had been obtained like that of other well-educated English physicians of the day, at Oxford and Cambridge; however, better opportunities existed in Italy and France. A seventeenth-century English medical student would have been exposed to chemistry and physics. Clinical observation as a systematic way of teaching in Europe was just beginning to be introduced in medicine, but no instruction was given to students as to how to make appropriate and effective observations. Only apprenticeship offered a better means of becoming acquainted with the clinical practice of the day.\(^{60}\)

The study of medicine in England was quite rigorous; it was also quite expensive and restrictive, and was primarily theoretically based.\(^{61}\) In the English colonies, those interested in studying medicine did not have the resources – financial or otherwise – to attend prominent medical schools in England; they depended upon the apprenticeship system: “the aspiring doctor’s father would contact the local medical practitioner for his son to learn ‘the art and mystery of his craft’.”\(^{62}\) Whereas study at Oxford, Cambridge or Edinburgh averaged 14 years, the typical apprenticeship in the Colonies averaged only 3

---


\(^{61}\) “If a student chose to study medicine in England, he would most likely go to either Oxford or Cambridge, but these schools were available only to members of the Church of England. They granted medical diplomas after 14 years of attendance. To obtain a medical degree from one of these universities, one first had to earn a bachelor of arts, master of arts, and bachelor of medicine before being allowed to earn a medical doctorate. The training at these universities was mainly theoretical, with little or no practical experience. The student read the writings of the ancients and medieval commentaries on these ancient writers.” From Toledo-Pereyra, *A History of American Medicine*, 21.

years; further, the average age of the beginning apprentice was between 14 and 16
years. Further, while English medical education was theoretically based, with little or
no practical experience, the apprenticeship system was conversely based on practical
experience rather than theroticism.

Academic medicine first emerged in the colonies in 1765 with the opening of the
College of Philadelphia (now the University of Pennsylvania), which was modeled after
European universities, particularly English. By the end of the 18th century, four other
American medical schools were founded: the Medical Faculty of King’s College in New
York in 1767 (now Columbia University); the Medical School of Harvard College in
Boston in 1782; the Medical Department of Dartmouth College in Hanover, New
Hampshire, in 1797; and the Medical College of Transylvania University in Lexington,
Kentucky, in 1799 (which closed by the middle of the 19th century). By 1825, twenty
degree-granting medical schools were open and operational in the United States.

Medical education in a university setting provided a stark contrast to learning
through apprenticeship. In keeping with the practice of European universities –

63 Toledo-Pereyra, A History of American Medicine, 23.
64 Toledo-Pereyra, A History of American Medicine, 59.
65 Toledo-Pereyra, A History of American Medicine, 62.
66 “Students liked the medical schools because they awarded degrees, which impressed potential
patients more than a preceptor’s apprentice certificate. The degree let possible patients know that a
physician had the most up-to-date knowledge available. Faculty members benefited from medical schools
because being appointed to the faculty of a medical school was a mark of prestige and because the names of
the faculty were popularized in school advertisements. This rationale, supported by students and faculty,
caused the number of medical schools to increase.” From Toledo-Pereyra, A History of American
Medicine, 61.
particularly English – upon which American medical schools were founded, practical experience gave way to theoretical study.

Most [Early American] medical schools agreed that the curriculum consisted of seven subjects. These were anatomy, physiology, chemistry, material medica, medicine, surgery, and midwifery. In the early nineteenth century, diseases of women and children were added to the curriculum. Lectures were usually conducted by faculty members reading from hand-written manuscripts. Sometimes, students would see demonstrations in chemistry and pharmacy or watch as ambulatory patients were treated. Occasionally they would even see a minor operation in clinical courses. Teachers emphasized how to practice medicine “such as useful prescriptions and descriptions of natural histories of diseases.” There was also an extremely limited amount of hospital teaching, which was mostly optional in the few colleges that had hospitals… Clinical training was limited because a student only listened to what a patient had to say and there was no actual contact with the patient.  

Toledo-Pereyra contends “the status of American medical education during a great part of the 19th century was disastrous.” This is in part attributable to the fact that the majority of “American physicians rejected science during most of the nineteenth century.” Toledo-Pereyra identifies the reasons behind this position as: “1) utilitarian beliefs, 2) simplicity, 3) opposition to the germ theory of disease, 4) opposition to research, and 5) lack of education and academic standards.”

67 Toledo-Pereyra, A History of American Medicine, 63.

68 “Few principles and theories of disease were being taught, and no real academic standards were in practice. American physicians cared little about education and academic goals. They attended medical school to complete the minimal requirements to practice medicine. They were not interested in finding explanations for the causes of diseases nor reasons for the types of treatments. They were not committed to academic pursuits or the development of research-related studies. They were focused in practical endeavors conducive to practical and simple results.” From Toledo-Pereyra, A History of American Medicine, 141.

69 Toledo-Pereyra, A History of American Medicine, 143-4.

70 Toledo-Pereyra, A History of American Medicine, 143-4.
American medical schools would not begin to break away and distinguish themselves from the European model upon which they were based – particularly those located in Leyden, Edinburgh, and London – until the latter half of the 19th century.\(^71\) Toledo-Pereyra associates the genesis of this change “with the advent of schools based more in the German system”\(^72\) which, combined with “the introduction of dedicated and full-time physicians, and the inclusion of courses in anatomy and dissection,” signals America’s beginning “its own unique and distinguished path developing the world’s best medical schools.”\(^73\)

The establishment of a medical school at the University of Michigan in 1850, and of the Johns Hopkins University Medical School in Baltimore, Maryland in 1893, herald when “American medical education began to compete and emerge from the shadows of its European counterparts.”\(^74\) At Michigan, medical departments were founded “to prepare medical students to a better way of medical practice.”\(^75\) Hopkins distinctively attempted to integrate research “as an important part of their educational mission.”\(^76\)

What made Johns Hopkins so revolutionary was its integration of teaching and research and its drive to get the best doctors of the time on its faculty. That it had small classes, real clinical teaching, and laboratories in the basic sciences made it


stand out as well. The school also sought to give attention to new fields that were virtually ignored by other American medical schools such as mental illness, pediatrics, public hygiene, and medical history.\textsuperscript{77}

The success of Johns Hopkins University Medical School “marked the most important decade into the final acceptance of science and research-related matters by the American physician in particular and the public in general,”\textsuperscript{78} and resulted in Hopkins being identified as “the first modern medical school in the United States.”\textsuperscript{79} This in turn set American medical education apart from its European counterparts.

The humanistic patient-as-person movement that originated in Europe also took hold at Johns Hopkins. Viennese professor of medicine Hermann Nothnagel in 1882 “embodied the new philosophy” when he stated: “I repeat once again, medicine is about treating sick people and not diseases.”\textsuperscript{80}

In seeing the patient as ‘a person’ and not just as ‘a case of disease’ the physician was able to approach him in an understanding and sympathetic manner that was \textit{in and of itself therapeutic}.\textsuperscript{81}

Canadian physician Sir William Osler “embodied these humanistic values, teaching the medical students on rounds at Johns Hopkins University that, ‘the good physician treats

\begin{footnotes}
\item \textsuperscript{77} Toledo-Pereyra, \textit{A History of American Medicine}, 71.
\item \textsuperscript{78} Toledo-Pereyra, \textit{A History of American Medicine}, 143-4.
\item \textsuperscript{79} Toledo-Pereyra, \textit{A History of American Medicine}, 155.
\item \textsuperscript{80} Edward Shorter, “Primary Care,” \textit{The Cambridge History of Medicine}, ed. Roy Porter (Cambridge; New York: Cambridge University Press, 2006), 123.
\item \textsuperscript{81} Shorter, “Primary Care,” 123.
\end{footnotes}
the disease but the great physician treats the patient who has the disease.” Nothnagel also stressed the importance of history taking, noting “in taking a long and careful history the doctor has the chance to establish an emotional rapport with the patient.”

**U.S. Medical Education: Flexner and Beyond**

Fifteen years after the founding of the Johns Hopkins University Medical School, Hopkins graduate Abraham Flexner published *The American College: A Criticism* in 1908. Flexner was highly critical of the lecture as the primary means of instruction in U.S. colleges and universities. Henry Pritchett, president of the Carnegie Foundation, hired Flexner as a research staff member that same year, with the specific task of evaluating medical education in U.S. medical schools. Two years later, in 1910, Flexner released his highly influential study *Medical Education in the United States and Canada*. Flexner’s study became “the pivotal document upon which reputable medical schools had to measure themselves to reach prominence and remain above the unique standards derived from this study.”

The Flexner Report demanded an atmosphere of excellence in American medicine. Its standards became the ultimate goal for medicine around the country. Universities began to build upon the principles of this report and started to exert pressure on the medical schools under their jurisdiction. It was a matter of time before the whole country was regimented by the ideas and

---

82 Shorter, “Primary Care,” 124.

83 Shorter, “Primary Care,” 124.

84 Flexner was not a graduate of the Medical School at Johns Hopkins University.

recommendations of this extraordinary document. The Flexner Report changed American medicine forever!\textsuperscript{86}

Washington University in St. Louis Professor of History and Medicine Kenneth Ludmerer’s \textit{Time to Heal: American Medical Education From the Turn of the Century to the Era of Managed Care}\textsuperscript{87} provides a comprehensive overview of medical education in the U.S. in the 20\textsuperscript{th} century. Ludmerer quite importantly notes that between the two world wars, “the education of a physician was viewed as a continuum, not as a succession of isolated experiences.”\textsuperscript{88}

The education of a physician began long before medical school, since a student’s success at learning medicine depended heavily on the aptitude, characteristics, and educational background that person brought to medical school in the first place. The four years of medical school – ‘undergraduate medical education,’ as it came to be called – were focused on principles and fundamentals. Specialized training was reserved for after the completion of medical school. All practicing physicians, general practitioners and specialists alike, needed to remain up-to-date, whether through continuing medical education courses or informal conferences, discussions, and readings.\textsuperscript{89}

Ludmerer notes that an important aspect of undergraduate medical education was the “hidden curriculum.” The formal curriculum – which was primarily lecture-based – focused specifically on “knowledge and facts, reasoning and cognition.”\textsuperscript{90} The “noncognitive objectives of education,” which contributed to “a physician’s attitudes,

\textsuperscript{86} Toledo-Pereyra, \textit{A History of American Medicine}, 167.

\textsuperscript{87} Kenneth M. Ludmerer, \textit{Time to Heal: American Medical Education from the Turn of the Century to the Era of Managed Care} (Oxford; New York: Oxford University Press, 1999).

\textsuperscript{88} Ludmerer, \textit{Time to Heal}, 59.

\textsuperscript{89} Ludmerer, \textit{Time to Heal}, 59.

\textsuperscript{90} Ludmerer, \textit{Time to Heal}, 70.
values, character, and professional identity” were equally important. Ludmerer identifies the hidden curriculum – which was “latent and implicit, though not at all casual, idiosyncratic, or random” – as the “broader cultural milieu within which the formal curriculum operated.” According to Ludmerer, the hidden curriculum contributed to: the cultivation of a student’s bedside manner; the student’s ability to listen to patients and to be attentive; inspiring confidence; providing comfort; the development of thoroughness, reliability, empathy, and devotion. Each of these qualities, which contributed to the formation of “good physicianship,” was dependent upon “demonstration and reinforcement.” Most importantly, the hidden curriculum “influenced the gaze with which students viewed patients,” and was the “primary determinant of whether students learned to view patients as people or as abstract disease entities.” Ludmerer suggests “the fact that so many medical educators” of the early 20th century “worried about this suggested that the worldview of students was becoming much more depersonalized, intellectualized, and medicalized than they wished.” Ludmerer further observes:

[The] debate over educational first principles surfaced with regard to… the production of caring doctors. To some medical educators, empathy, compassion, and social responsibility could be formally taught – either through a premedical

---

91 Ludmerer, *Time to Heal*, 70.
92 Ludmerer, *Time to Heal*, 70.
93 Ludmerer, *Time to Heal*, 70.
training that emphasized the humanities and social sciences, or through courses in medical school in the history of medicine, psychology, sociology, or economics. To others, teaching the art of medicine was the responsibility of the hidden curriculum… Still others doubted whether these qualities could be taught at all.⁹⁶

Prior to World War II, the teaching of medical students formed the central mission of medical schools;⁹⁷ this focus changed profoundly by mid-century. By the 1960’s, the education of medical students became “no more than a byproduct of what academic medical centers were now doing,” which Ludmerer attributes to the combined “pressures of research, graduate medical education, and the provision of increased patient care.”⁹⁸ It is clear that as the nature and overall mission of academic medical centers continued to change and evolve in the latter half of the 20th century, there was a constant “mandate to change” the nature and content of the medical curriculum.⁹⁹ This mandate included the need to “incorporate the most important new knowledge and ideas,” to “discard the unimportant or incorrect,” and to “accommodate the larger changes affecting medical practice.”¹⁰⁰ As a result of this continual mandate to change:

The greatest deficiency of the medical curriculum, as judged from the persistent complaints of students, educators, and official commissions, was its narrow, technical focus. The curriculum provided the scientific foundation of medical practice, but it gave scant attention to issues such as preventive medicine,

---

⁹⁶ Ludmerer, Time to Heal, 77.
⁹⁷ Ludmerer, Time to Heal, 196.
⁹⁸ Ludmerer, Time to Heal, 196.
⁹⁹ Ludmerer, Time to Heal, 196-7.
¹⁰⁰ Ludmerer, Time to Heal, 196-7.
occupational medicine, the doctor-patient relationship, and the changing social and economic environment in which physicians practiced their art.\textsuperscript{101}

**U.S. Medical Education in the Era of Managed Care**

Hippocrates has been quoted as saying: “It is more important to know what sort of person has a disease than to know what sort of disease a person has.” To “know what sort of disease a person has” implies factual knowledge – the learning commonly associated with didactic coursework, or lectures in huge amphitheatres with a large group of medical students, and memorizing minute details from textbooks. To “know what sort of person has a disease” humanizes medicine, and removes the approach to medicine from the purely factual.

Medicine has moved away from everyday knowledge as part of the process of becoming a science; where ancient medicine was very closely based on the senses, modern medicine looks to the laboratory for truth.\textsuperscript{102}

One of the postmodern criticisms of medicine is that physicians today rely too heavily on equipment and tests to reach their diagnoses: x-rays, MRI and CAT scans, radiography, EKG’s, and laboratory test results. The implication that can be read into Hippocrates’ quote is that a synthesis is necessary to fully treat a person. One must be able to ascertain not just what disease process is at work, but a plethora of other factors associated with the individual before them.

Among the many conflicts and contradictions encountered by doctors of today, perhaps none is more vexing that the demands for uniformity and conformity in

\textsuperscript{101} Ludmerer, *Time to Heal*, 198.

\textsuperscript{102} King, *Greek and Roman*, 64.
practice on one hand and the historic role of the doctor to exercise judgment in the care of patients on the other.  

The Katz study links the erosion in physical diagnosis skills to “a decline in the use of fundamental bedside procedures, such as inspection, which are often replaced by expensive laboratory tests and radiological studies.” Katz and his team suggest that through the teaching of “visual literacy” – the ability to find meaning in imagery – medical students might improve their “ability to reason physiology and pathophysiology from visual clues.”  

The introduction – or, rather, “re-introduction” – of the humanities into U.S. medical school curricula was emphasized starting in 1972 through the literary arts, in an effort to “help physicians develop skills in the human dimensions of medical practice.”  

Until the initiation of progressive education reforms in the 1960s, medical schools expected their students to become empathetic and attentive clinicians by watching skilled physicians at work. Students were supposed to absorb the human competencies of doctoring – what many call “the art of medicine” – during training. But just as physicians can no longer learn the scientific bases of practice

103 Weinberg, The Golden Age of Medical Science, 41.
in apprenticeship programs, they can no longer learn the human bases of practice without explicit and ongoing training. Such training is not meant to recapture some long-lost proficiency in compassionate doctoring from generations ago but to extend the accomplishments of the past using knowledge that was unavailable to physicians in former times.\textsuperscript{109}

With the dawn of a new century, the challenges to academic medicine are daunting.

As the twentieth century ends and the twenty-first dawns, administrators in medical schools have opportunities to foster more constructive dialogues between the humanities and medicine than ever before. They can choose to support small cadres of humanities professionals with a variety of disciplinary perspectives, including – but not limited to – history and ethics. They can employ teachers who are willing to offer their perspectives in ways that genuinely respond to the cultural needs of today’s students, professors, and practitioners.\textsuperscript{110}

With continual rapid improvements in technological resources to support clinical practice – combined with the fact that academic medical center across the U.S. face increasing financial challenges – the argument for curricular reform in an attempt to address the growing distancing between the sciences and the humanities does not rank high among the priorities of most medical educators.

At the beginning of the twenty-first century we find ourselves not only with a deeper chasm dividing C. P. Snow’s two cultures but also with a third intellectual culture formed by members of the seceding computer-literate “techies” – neither natural scientists nor humanists. Members of the other two intellectual cultures benefit from application programs such as word processing, mathematical computing, and cyberspace technology, developed by computer scientists. The details of the actual programs remain as incomprehensible, mystifying, and

\textsuperscript{109} Charon et al., “Literature and Medicine,” 599.

irrelevant to these two cultures as their own material is to each other. The cultural divide describing the dissociation of the first two cultures now demands a reorganization, with a “digital divide” now describing the further dissociation of the third culture.111

It is also noteworthy to comment briefly on contemporary education in the visual arts in the United States. The primary focus of this dissertation is the potential value added gained through an interface of the visual arts and medical education, specifically to enhance diagnostic skills and promote humanism and empathy in clinical practice. Medical education is faced with the challenge of maintaining an interface with the humanities in general at a time when technological advances and ever-growing financial constraints make such an endeavor increasingly difficult. Education in the fine arts is also faced with challenges related to technological advancement.

As an undergraduate student at The Catholic University of America between 1980-1984, my baccalaureate curriculum was grounded in a strong liberal arts education. The university’s mission statement elaborates:

The university seeks the advancement of knowledge within a context of liberal studies, a context which reflects both its concern for the whole person and the distinctive wisdom to which it is heir as a Catholic institution. This dimension of learning is reflected particularly in its undergraduate programs where religious studies and philosophy are regarded as integral to curricula that include requirements in the arts and humanities, language and literature, and the natural and social sciences. Through its professional programs, the university seeks to educate men and women who can represent their respective professions with distinction and who are formed by the learning and values inherent in its academic and Catholic traditions.712

111 Atalay, Math and the Mona Lisa, 272.

In addition to the courses requisite to my field of study in the studio arts – which included fundamentals of design, drawing and composition, painting, sculpture, ceramics, printmaking, and the history of art – the courses required in other areas provided perspective to my specific field of study. In science, I took a course in the Department of Physics – *Discovery in Physics and Art* – that focused on sound, light, and the arts. In philosophy, I had the distinct pleasure of taking Paul Weiss’ *Philosophy of Art*, in addition to the standard foundational courses in philosophy required of all undergraduates, regardless of their major field of study. In one of many courses to fulfill the history requirement, I enrolled in *Social and Economic History of Medieval Europe*; my final research paper for this course focused on manuscript illumination. In an advanced course in *German Literature and Society*, in fulfillment of language requirements, each student gave a lecture – in German – as their final exam. My topic of choice for this course was the Bauhaus movement in the early 20th century. For a religion course on the *Religious Experience of China and Japan*, the focus of my final research paper was religious art in Asia.

Continuing with my study for the master of fine arts degree at CUA from 1984-86, the curriculum was quite rigorous, and strongly founded in classical training in the fine arts. For both the baccalaureate and master’s degrees, studio coursework consisting of drawing and sculpting from live nude models was standard. The M.F.A. was a two-year, full-time degree. For the final thesis, students had the option of a written thesis, or a body of creative work; I completed both. In addition to a body of more than twenty-
five oil paintings and drypoint etchings, I completed a research paper of over 200 pages on Goethe’s color theory involving color perception, as contrasted with Newton’s views on the physics of color. My final comprehensives consisted of a two-hour oral defense of both my creative work and my Goethe/Newton research paper, as well as a 12 hour written comprehensive examination – divided over two days – on art history and theory. Additionally, each student was allotted a two-hour timeframe, and was required to draw – from memory, without any visual aids – either the human skeleton or human musculature. Three drawings were required of either the skeleton or musculature – a front view, a side view, and a back view – with as much details provided as possible, and labeling of a minimum of forty bones or muscles, in both Latin and English translation.

In the 1980’s, CUA’s Department of Art offered only majors in studio art, concentrating primarily in painting, though printmaking and sculpture were available as options. While art history was not available as a specific major, all fine arts students were required to have a strong foundation in the history of art. Twenty-five years later, CUA no longer offers the M.F.A. degree, although graduate level coursework in the Department of Art is offered. Among their course selections for the bachelor of arts degree – in addition to traditional courses in design, drawing, and painting – are:

- Introduction to Digital Arts
- Sculpture in Digital Space
- Web Design and Flash
- Introduction: Digital Photography & Photoshop
- Digital Arts II
- Introduction to Web Design
- Introduction: Sound Production Design
- IMultimedia Art: Final Cut Pro
It is important for academic programs to provide training relevant to career pathways and personal development consistent with contemporary culture and society; the courses noted above are certainly important and relevant within this context. The concern one might raise is at what cost. As with medical training, there is an increasing reliance in the visual arts on advanced technologies, potentially at the risk of sacrificing a liberal arts, humanities-based educational context.

---

113 The Catholic University of America, Department of Art: Course Descriptions. http://art.cua.edu/Course_Descriptions/courses.cfm (accessed March 2, 2010).
CHAPTER IV

VISUAL ARTS EDUCATION TO DEVELOP “BETTER” PHYSICIANS

The only real voyage consists not in seeking new landscapes, but in having new eyes; in seeing the universe through the eyes of another, one hundred others – in seeing the hundred universes that each of them sees.

– Marcel Proust

As noted in the Introduction, the visual arts can be broadly defined as creative works that are predominantly visual in nature, including: painting, drawing, printmaking, sculpture, photography, and film. A relatively fluid term, this may also be expanded to include architecture, performing arts, ceramics, and textiles.

When considering the potential integration of the visual arts into medical education, accessibility to the visual arts is an important and significant consideration. Ideally, any artwork is best appreciated when the actual work itself is available for direct observation and study. Access to specific works of art – such as a particular painting by da Vinci, or sculpture by Michelangelo – is challenging, if not verily untenable. Travel to other cities – and other countries – to view specific works of art is impractical. Medical schools located in large urban areas may have museums and galleries in ready proximity, while those located in rural areas may not enjoy the same convenience of accessibility.

Two-dimensional art forms – such as painting, drawing, and photography – are perhaps the most accessible, and easiest to disseminate for study by way of reproductions. Whether the reproductions are hard copy prints, projected image, or
electronic scans, the reproduction itself is two-dimensional; and, if well done, provides the closest proximity to the original artwork.

Three-dimensional artworks – such as sculpture – prove more challenging, as two-dimensional reproductions do not provide the same level of observational opportunity as viewing the actual work. The same holds true for architecture, ceramics, and textiles. Film and the performing arts likewise have much to offer; however, watching full-length films can be time-consuming for medical students with demanding schedules, and accessibility to the performing arts – such as live theater performance, particularly of specific pieces – can be quite limited if not impossible.

To the extent possible, I wholeheartedly and earnestly advocate experiencing actual works of art in person, in order to achieve the purest level of interaction with the work. In the absence of such opportunities, computer technology provides an invaluable – albeit not ideal – resource for the viewing of most, if not all, visual art forms. Electronically scanned images of two-dimensional artworks can be readily viewed in high-resolution formats on personal computers and laptops. In some instances, the availability of scanned artworks may actually provide greater access and opportunity to explore the work. Many artworks in museums – particularly valuable works by revered masters – are exhibited behind glass, or with a rope limiting how close the viewer can approach the work; in some instances, and for a variety of reasons, they may not be available for public viewing at all. Digital images often allow the viewer to explore the
artwork at a level not possible in a museum. An excellent example is *Slidingtime*, a video installation by Walter Verdin, a Belgian video artist. This online installation consists of high resolution images of Flemish painter Rogier van der Weyden’s *The Descent From the Cross* (see figs. B.4a-b). The painting is divided into ten panels, allowing the viewer to examine the image with an astonishing level of detail.

Three-dimensional forms—such as sculpture and architecture—can also be viewed in an interactive format, which allows one to view a three-dimensional object from multiple angles. An excellent example is the book *Joseph Cornell: Shadowplay, Eterniday*, by Lynda Roscoe Hartigan (et al.)—Chief Curator of the Peabody Essex Museum in Salem, Massachusetts, and Joseph Cornell specialist—which contains an interactive CD-ROM, allowing one to view the three-dimensional box constructions of American artist Joseph Cornell on a computer. For example, Cornell’s construction *Untitled: Life of King Ludwig of Bavaria* (see fig. B.16) consists of a valise containing various items. Many of Cornell’s constructions consist of boxes or other objects that can be opened, containing various items that can be removed—such as paper items, corked bottles containing sand, glass cubes, wooden balls, and the like. In an interactive electronic format, one can view the closed object from a variety of angles. With a click or drag of the computer mouse, one can virtually “open” the object and “remove” contents for closer inspection, and view the objects from every possible angle. In a

---


museum setting, many of these items are displayed under glass; although one can view the actual item – rather than a reproduction – one cannot “interact” with the artwork by handling it, such as opening a closed item and removing its contents for closer examination and exploration.

The visual arts, broadly examined, provide a plethora of educational opportunities relevant to medical education. Again noting that two-dimensional artworks – such as painting, drawing, and photography – are perhaps the most accessible, I will focus in this chapter on a number of examples with particular relevance to the potentially positive interaction between the visual arts and medical education. I will also briefly comment on other visual art forms – such as sculpture and film – which have much to offer by way of helping to shape “better” physicians.

Study and dialogue centered on a variety of artworks can enable [health care practitioners] to more fully and deeply understand both the human experiences of illness and disability and the caring responses these call forth. We can best understand these experiences through engaging with expressive arts such as… photographs and paintings, for the artist’s portrayal of human experience are often most vivid, evocative, and powerful.³


The Breasts of Night: Sculpture, Human Anatomy, and Physical Diagnosis

Sculpture provides an ideal visual arts media with direct applicability to medical education. One of the earliest known three-dimensional sculptures of the human form, the Venus of Willendorf (see fig. B.17), was discovered in Austria in 1908. Measuring
11.5 cm in height, and dating to approximately 24,000 B.C., this limestone statuette of a female figure is commonly thought to be an idealized representation of a fertility goddess. Although the figure is referred to as a “Venus,” the statuette substantially predates Venus mythology.

Sculpture reached great heights in antiquity in Ancient Greece, particularly sculpture representing the nude human form:

The earliest nudes in Greek art [dating to the 6th century B.C.], traditionally known as Apollos, are not beautiful. They are alert and confident… they are stiff, with a kind of ritual stiffness; the transitions between their members are abrupt and awkward, and they have a curious flatness… They are clear and they are ideal.4

The early Apollos, or Kouros figures, were rather crude and rigidly stylized (see fig. B.18a). The “perfect human body” in Greek sculpture appears around 480 B.C.5 (see fig. B.18b), and the “perfection of symmetry by balance and compensation [became] the essence of classical art.”6 As noted in Chapter II, a renewed interest in Greek and Roman culture arose toward the end of the Late Middle Ages during the European Renaissance: “How pleasure in the human body once more became a permissible subject of art is the unexplained miracle of the Italian Renaissance,”7 and “since the Greeks of the fourth

---


5 Clark, The Nude, 32.

6 Clark, The Nude, 38.

7 Clark, The Nude, 53.
century no man felt so certain of the godlike character of the male body as Michelangelo.\textsuperscript{8}

Arguably one of the greatest sculptors of the Renaissance, Michelangelo studied human anatomy through participation in the dissection of human corpses.\textsuperscript{9}

He started dissecting human bodies when aged 18, and many of these dissections took place in the Monastery of Santo Spirito in Florence where the corpses often originated from associated hospitals. It is therefore likely that Michelangelo was familiar not only with the anatomy of the [human] body but also with its pathology.\textsuperscript{10}

He also used “small anatomical models to crystallize his concepts into reality and the application of anatomy to his art.”\textsuperscript{11}

A prime example for discussion can be found in Michelangelo’s sculpture of \textit{Night}, from the tomb of Giuliano de Medici in the Medici Chapel, Church of San Lorenzo, in Florence, Italy (see fig. B.19).

The shape of the breasts is perceived to be unnatural, and possible explanations are that Michelangelo was unfamiliar with the female body or that he based the sculpture on a male model with subsequent addition of female-sized breasts; others have remarked that the figure's thighs, neck and shoulders are more male than female. Ensuing commentaries included the adventurous explanation that Michelangelo, reputed to have been homosexual, resented female features and deliberately created a male with added breasts. However, a more recent

\begin{footnotes}
\item[8] Clark, \textit{The Nude}, 59.
\end{footnotes}
interpretation offers a morbid explanation—namely, that the left breast has features of locally advanced cancer.  

In *The Breasts of “Night”: Michelangelo as Oncologist*, J. J. Stark and J. K. Nelson contend:

Michelangelo carefully inspected a woman with advanced breast cancer and accurately reproduced the physical signs in stone. Even if he did not see the disease in a model, he could have studied the corpse of a woman… Given that Michelangelo depicted a lump in only one breast, he presumably recognized this as an anomaly… Historians of breast cancer agree that the disease and its treatment were discussed, often at length, and described as cancer by the most famous medical authorities of antiquity… and by several prominent medieval authors.

Michelangelo’s representations of the human body have been subject to considerable discussion among scholars of art, history, and medicine. P. Ciaglia raises questions about Michelangelo’s well-known representation of *David* as uncircumcised. Although the biblical/historical David would most certainly have been circumcised, Michelangelo’s depiction has been explained as “although circumcision was widely practised [*sic*], in renaissance art it was customary not to admit to the effects of the operation.”

G. Eknoyan observes in *Michelangelo: Art, Anatomy, and the Kidney*, that “Michelangelo was likely familiar with the anatomy and function of the kidney as it was understood at

12 Strauss and Marzo-Ortega, “Michelangelo and Medicine,” 514.


15 Strauss and Marzo-Ortega, “Michelangelo and Medicine,” 514.
the time."¹⁶ Frank Lynn Meshberger explores Michelangelo’s representation of Adam on the ceiling of the Sistine Chapel in *An Interpretation of Michelangelo’s Creation of Adam Based on Neuroanatomy*.¹⁷

As quoted earlier, Bülent Atalay observes:

The scientist operates as if physical laws already exist, in unique form, and only need to be discovered, or to be extricated from nature. But in reality, the physical laws no more exist in unequivocal manner than the statue in that rough block. In the hands of different sculptors the block is destined to yield different forms.¹⁸

¹⁶ “[Michelangelo’s] early anatomic interests were revived later in life when he aspired to publish a book on anatomy for artists and to collaborate in the illustration of a medical anatomy text that was being prepared by the Paduan anatomist Realdo Colombo (1516-1559). His relationship with Colombo likely began when Colombo diagnosed and treated him for nephrolithiasis in 1549. He seems to have developed gouty arthritis in 1555, making the possibility of uric acid stones a distinct probability. Recurrent urinary stones until the end of his life are well documented in his correspondence, and available documents imply that he may have suffered from nephrolithiasis earlier in life. His terminal illness with symptoms of fluid overload suggests that he may have sustained obstructive nephropathy. That this may account for his interest in kidney function is evident in his poetry and drawings. Most impressive in this regard is the mantle of the Creator in his painting of the Separation of Land and Water in the Sistine Ceiling, which is in the shape of a bisected right kidney. His use of the renal outline in a scene representing the separation of solids (Land) from liquid (Water) suggests that Michelangelo was likely familiar with the anatomy and function of the kidney as it was understood at the time.” (Abstract excerpt). G. Eknoyan, “Michelangelo: Art, Anatomy, and the Kidney,” *Kidney International* 57, no. 3 (March 2000): 1190-201. http://www.ncbi.nlm.nih.gov/pubmed/10720972?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_SingleItemSupl.Pubmed_Discovery_RA&linkpos=4

¹⁷ “The Creation of Adam (1508-1512) on the ceiling of the Sistine Chapel has long been recognized as one of the world’s great art treasures. In 1990 Frank Lynn Meshberger, M.D. described what millions had overlooked for centuries — an anatomically accurate image of the human brain was portrayed behind God. On close examination, borders in the painting correlate with sulci in the inner and outer surface of the brain, the brain stem, the basilar artery, the pituitary gland and the optic chiasm. God’s hand does not touch Adam, yet Adam is already alive as if the spark of life is being transmitted across a synaptic cleft. Below the right arm of God is a sad angel in an area of the brain that is sometimes activated on PET scans when someone experiences a sad thought. God is superimposed over the limbic system, the emotional center of the brain and possibly the anatomical counterpart of the human soul. God’s right arm extends to the prefrontal cortex, the most creative and most uniquely human region of the brain.” Frank Lynn Meshberger, “An Interpretation of Michelangelo’s Creation of Adam Based on Neuroanatomy,” *Journal of the American Medical Association* 264, no. 14 (October 10, 1990): 1837.

An analysis of Michelangelo’s sculptures – particularly unfinished works such as *Awakening Captive* and *St. Matthew* (see figs. B.20a-b) – might lead one to question Atalay’s sentiment. In many of Michelangelo’s unfinished sculptures, the figures appear as if they are struggling to free themselves from the stone. Michelangelo clearly had a vision of the finished work, and with his hammer and chisel, seemingly freed the figure from the marble. Certainly any other artist would likely have created an entirely different sculpture from the raw marble; yet, Michelangelo’s unfinished sculptures give the impression that the sculpture already exists within the stone.

Michelangelo’s art – particularly his sculpture – clearly provides fertile examples for discussion within the context of the visual arts and medicine. Michelangelo’s understanding and study of human anatomy was integral to his creative process, as demonstrated by the examples provided herewith. Not only might students of medicine gain benefit through the study of his sculptures, but students of art may also gain an understanding of human anatomy.

**The Eye of the Beholder:**
**The Portrait and Observational Diagnosis**

As discussed in Chapter I, the 2001 *JAMA* article “Use of Fine Art to Enhance Visual Diagnostic Skills” notes that first year medical students at Yale University who participated in a project conducted by the Yale Center for British Art studied selected portrait paintings for the purpose of enhancing visual diagnostic skills. An excellent
example of the use of the portrait for this purpose can be found in the self-portraiture of 17th century Dutch painter Rembrandt van Rijn.

Carlos Hugo Espinel, a doctor of internal medicine, provides a clinical evaluation of Rembrandt through the analysis of a self-portrait completed when the artist was aged 53 years, ten years before his death (see fig. B.21). Espinel notes that “in the elderly patient, the physician has to differentiate the signs of ageing from those of disease.” Espinel’s medical evaluation of Rembrandt “integrates art technique, history, and clinical observation.” His clinical study evaluates the artist’s skin for signs of ageing as well as signs of disease. In reaching a physical diagnosis, Espinel concludes:

I suggest that at the time of the portrait, Rembrandt presented (a) the changes associated with ageing (premature by current life-expectancy), including brow and eyelid ptosis indicating dermachalasis; (b) possible xanthelasma and arcus senilis; (c) lesions of a specific inflammatory skin disease, rosacea with complicating rhinophyma; and (d) temporal arteritis.

Espinell arrives at his diagnosis through the observation of a single portrait of Rembrandt; in a clinical setting, the physician is also dealing with a single individual, attempting to arrive at a diagnosis based on observations made during the physical examination. However, the physician does not necessarily purely base his diagnosis on a

---


single, static observation. The patient’s case history is also of importance; further, if the physician has known the patient for any extended period of time, then the physician may be in an even better position to address the patient’s symptoms, based on repeated observations. In Rembrandt, one finds a unique opportunity to evaluate the artist through different stages of his life. An analysis of a series of Rembrandt’s self-portraits spanning most of his adult life, from age 22 until his death at age 63, provide a “pictorial biography” of the artist.\textsuperscript{22} When evaluating such portraits, it is important to keep in mind:

The changes in Rembrandt's face and expression from one self-portrait to the next may be attributable to any combination of the following factors: normal aging changes, modifications and developments of his artistic style, alterations in the way he viewed himself, and changes in the way Rembrandt wanted us to see him. In addition, the modifications may be attributed in part to some illnesses from which the artist may have suffered and/or to a decline in his eyesight that may have influenced both his ability to detect details and his ability to paint.\textsuperscript{23}

Israeli researchers conducted a comprehensive analysis of Rembrandt portraits from the combined perspectives of two plastic surgeons, a doctor of internal medicine, and an art curator and conservator at a major museum.\textsuperscript{24} Tal Friedman (et al.) contests the diagnoses reached by Espinel – and others in the medical community – that Rembrandt

\begin{flushright}


\textsuperscript{24} Friedman et al., “Rembrandt – Aging and Sickness,” 67-71.
\end{flushright}
suffered from temporal arteritis, rosacea, and rhinophyma, as well as other possible diseases. Friedman and his colleagues conclude that Rembrandt suffered from melancholia or mild depression, and possibly chronic lead poisoning. Starting with various diagnoses suggested by Espinel and others, Friedman and his colleagues “perform a medical and artistic assessment in an attempt to verify these diagnoses” through the study of “25 uncontested self-portraits from age 22 to 63.” Focusing on six particular Rembrandt self-portraits (see figs. B.22a-f), employ objective measurements and descriptive techniques to evaluate proposed diagnoses.

Temporal arteritis is characterized by “a painful inflammation and swelling of the temporal artery at the temporal region.” Espinel suggests this diagnosis based on a single portrait from 1659; Friedman and his colleagues observe that “this interesting finding appears only in two portraits done in 1659,” and do not appear in any of Rembrandt’s other self-portraits. They conclude that the artist “simply illustrated a

25 “Rembrandt van Rijn (1606–1669) left behind the largest collection of self-portraits in the history of art. These portraits were painted over a period of 41 years, using a realistic technique. To evaluate Rembrandt's aging process we studied 25 uncontested Rembrandt oil self-portraits by means of objective and descriptive techniques. By measuring brow position changes through the years, we demonstrated that brow descent started in the second half of the third decade and began to level out in the fourth decade. Based on Rembrandts' aging physiognomy, from age 22 to 63, we believe that Rembrandt did not suffer from temporal arteritis, hypothyroidism, rosacea, or rhynophima and that no other facial signs of systemic diseases are evident, contrary to the opinions expressed by other medical professionals. We suggest that Rembrandt suffered from melancholia or mild depression, and propose the possibility of chronic lead poisoning as a theoretical illness that he might have had.” (Excerpted from Abstract). Friedman et al., “Rembrandt – Aging and Sickness,” 67.

26 Friedman et al., “Rembrandt – Aging and Sickness,” 67.

27 Friedman et al., “Rembrandt – Aging and Sickness,” 69.

28 Friedman et al., “Rembrandt – Aging and Sickness,” 69.
distended sentinel vein in the temporal region.” Espinel associates Rembrandt’s bulbous nose with rhynophima; Friedman (et al.) observe that “from a young age, Rembrandt’s nose tip was bulbous,” as shown in all of the portraits studied. Friedman and his colleagues further observe:

[Rembrandt’s] use of red colors in the Washington portrait [studied by Espinel] does not recur in chronologically adjacent portraits. In particular, it is not present in Edinburgh [1659], which was executed in the same year. Since all the lesions mentioned develop slowly, we would expect to see some evidence in successive portraits. However, after scrutinizing the subsequent self-portraits, we were unable to substantiate these findings. We believe that there is no evidence to prove any of Espinel’s suggestions.

Concerning their alternate diagnosis of chronic lead poisoning, Friedman and his colleagues note that “lead powder was used as the basis for all white colors” during Rembrandt’s time. They explain:

There are written recommendations from the 17th century with regard to color handling in situations when the color did not lie smooth on the canvas: ‘You may lick it all off with your tongue or wipe it off with a moist sponge.’ In this way, painters were exposed to lead by inhaling the lead powder, through direct cutaneous penetration, or via the gastrointestinal system. Chronic exposure to lead it potentially damaging to various systems such as the gastrointestinal, blood, renal, or central nervous systems.

---

29 Friedman et al., “Rembrandt – Aging and Sickness,” 69.
30 Friedman et al., “Rembrandt – Aging and Sickness,” 69.
31 Friedman et al., “Rembrandt – Aging and Sickness,” 69-70.
32 Friedman et al., “Rembrandt – Aging and Sickness,” 70.
33 Friedman et al., “Rembrandt – Aging and Sickness,” 70.
Undoubtedly, Espinel must have had some appreciation for art to prompt him to evaluate Rembrandt’s portrait and provide clinical diagnoses of possibly diseases from which the artist suffered; my research has not revealed that Espinel has any particular training in the visual arts. Friedman – a physician specializing in plastic surgery – collaborates with another plastic surgeon, as well as a practitioner of internal medicine, and an art expert. Espinel arrives at his diagnosis through very careful and thoughtful observation of a single portrait, primarily through the eyes of a physician; Friedman (et al.) arrive at their conclusions based on careful and thoughtful observation of multiple portraits, from the combined perspective of clinicians and an art expert. Friedman and his colleagues also assume a wider perspective: aside from the purely clinical observations, they also take into account changes in artistic style, as well as how the artist viewed himself, and possibly wished to portray himself to the viewer.\(^{34}\)

A series of paintings by 19\(^{th}\) century French Romantic artist Théodore Géricault provide more subtle – though no less meaningful or noteworthy – case studies. The very subtlety of these portraits makes them fine examples of the importance of visual awareness. Executed later in his career, these commissioned portraits of the insane – totaling ten in all – depict patients of his friend, psychiatrist Étienne-Jean Georget, considered a pioneer in the field. Compare his *Portrait of a Kleptomaniac* (see fig. B.23a) with is *Portrait of Lord Byron* (see fig. B.23b). If the works were unlabeled, without their titles, would it be evident that one man was sane, and that the other suffered

\(^{34}\) Marcus, “Rembrandt’s Late Self-Portraits,” 25.
from a psychiatric affliction? Closer inspection of the former might reveal meaningful clues: the somewhat disheveled hair and clothes, the scruffy facial hair, and the vacant stare in the eyes. But how is the latter portrait of Lord Byron different? His hair may be better groomed; yet, his eyes have a determined, intent quality, open to various interpretations. Could the former not just simply be a portrait of a man who is perhaps destitute but sane, and the latter actually the portrait of one who may be of better economic standing, but suffering from some form of mental illness? The subtle differences in how Géricault portrays these men offer revealing clues. Likewise, his *Portrait of a Woman with Gambling Mania* (see fig. B.23c) and *Portrait of a Woman Suffering from Obsessive Envy* (see fig. B.23d) could simply be of elderly peasant women. Look carefully, and see what can be learned from studying the women’s faces that might yield clues as to their possible afflictions.

**St. Anthony’s Fire: Learning Empathy through Paintings**

As noted in Chapter I, much of the scholarly literature pertaining to the relationship between the humanities and medical education focuses on the improvement of physical diagnosis skills. It is my contention, however, that the shaping of better physicians is not limited to improving diagnostic skills in a clinical setting. I contend that the integration of the humanities into medical education – particularly by way of the visual arts – also enhances humanism, empathy, and ethics in clinical practice, thus shaping better physicians in general.
The relationship between medicine and the visual arts is not always clearly evident. Were one to utter the words “art and medicine,” and ask someone to mention the first image that came to mind, they might recall Leonardo da Vinci’s *Vitruvian Man* (see fig. B.11) – if not by name, then by description, such as “the drawing of the nude man in the circle with two sets of arms and legs.” If one were to ask a medical student or doctor, they might envision the illustrations contained in Henry Gray’s classic textbook *Anatomy of the Human Body* (a.k.a. *Gray’s Anatomy*), continuously in print since its original publication in 1858, and familiar to all in the medical profession (see fig. B.24). It is highly unlikely, however – unless the individual queried is well versed in the arts – that German painter Matthias Grünewald’s early 16th century *Isenheim Altarpiece* would be noted.

The altarpiece was commissioned by the Monastery of St. Anthony in Isenheim, near Colmar – then in Germany, now in France – where the monks at the monastery hospital treated patients suffering from skin ailments, particularly leprosy and ergotism. Ergot poisoning was usually acquired through the ingestion of tainted grains and cereals – particularly rye – and was not at all uncommon during the Middle Ages. Ergotism is often characterized by gangrenous, rotting flesh, resulting from reduced blood supply to

---

35 “A toxic condition produced by eating grain, grain products (as rye bread), or grasses infected with ergot fungus or by chronic excessive use of an ergot drug,” s.v. “ergotism.” http://www.merriam-webster.com/medical/ergotism (accessed January 30, 2010). “Ergot alkaloids are fungal metabolites that have a long history as mycotoxins” and “their effects on the central nervous system (CNS) are deleterious.” P. Tudzynski, T. Correia, and U. Keller, “Biotechnology and Genetics of Ergot Alkaloids,” *Applied Microbiology and Immunology* 57, no. 5-6 (December 2001): 593.
the extremities: the burning sensation associated with ergotism led to it’s being commonly referred to as “St. Anthony’s Fire,” in direct reference to the Antonine monks who specialized in treating victims of the disease. Madness was also a common symptom of ergotism, as evidenced as recently as a 20th century outbreak in Pont-Saint-Ésprit, France.

The image of the crucified Christ intentionally displays the symptoms of ergotism (see figs. B.25a-b), and not necessarily the sole effects of flogging and crucifixion alone, which many who are unfamiliar with the artwork’s history usually presume. Compared with the other figures in the composition, Christ’s flesh is rendered in a yellow-green hue; the wounds covering his body are more consistent with the symptoms of gangrene than of flogging, though they are often associated with Christ’s scourging at the pillar prior to his crucifixion. One could readily argue that the altarpiece depicts a combination of the two – the ravages of ergotism, as well as the ravages of Christ’s passion. The artwork was intended to soothe and comfort those being treated at the hospital through

36 “The initial symptoms of the gangrenous and the convulsive forms [or ergotism] were described as being similar. After a short period of vague illness, perhaps with some gastrointestinal symptoms, the first manifestation of the disorder was an abnormal sensation in the limbs, mainly the legs, which was described as feeling like ants crawling over the skin. Local pain then developed in the limbs… In gangrenous ergotism, ischaemia, mainly in the limbs, was associated with distal changes of skin colour [sic] and some loss of sensation. The subsequent dry gangrene could result in the need to amputate, in some cases as high as the thigh in affected legs. Gangrene was sometimes complicated by secondary infection, and the mortality rate was high.” M. J. Eadie, “Convulsive Ergotism: Epidemics of the Serotonin Syndrome?,” The Lancet Neurology 2, no. 7 (July 2003): 431.

37 “Without warning, pain and sudden death clutched Pont-Saint-Ésprit… the first man died in convulsions. Later, two men who had seemed to be recovering dashed through the narrow streets shouting that enemies were after them. A small boy tried to throttle his mother… Among the stricken, delirium rose: patients thrashed wildly on their beds, screaming that red flowers were blossoming from their bodies, that their heads had turned to molten lead. Pont-Saint-Ésprit’s hospital reported four attempts at suicide.” “Medicine: St. Anthony’s Fire,” Time (September 10, 1951). http://www.time.com/time/magazine/article/0,9171,815355,00.html (accessed January 5, 2010).
association with Christ’s suffering and Christ as the Redeemer. Diane Apostolos-
Cappadona, Ph.D., Adjunct Professor at Georgetown University’s Prince Alwaleed Bin
Talal Center for Muslim-Christian Understanding, and Core Faculty for Visual Culture in
Graduate Liberal Studies, notes “historical attitudes toward the concept of healing can be
traced through the transformations of Christian art in narrative and symbolic renderings
of disease and cure”.38

A comparative study of the physical characteristics of the hospice patients with
the body of Christ reveals the artist’s careful rendering of what were everyday
realities of the afflictions they knew as their everyday realities. When first
admitted to this hospice, patients were taken into the chapel to view the altarpiece
and meditate upon its meaning for them.39

The altarpiece includes an image of the resurrected Christ (see fig. B.25c), glorious and
physically restored, promising the faithful the same redemption and freedom from
affliction and death.

The sadly-damaged body of the Crucified Christ gave way as the altarpiece was
opened to the next series of panels to a vision of the glorified body of the
Resurrected Christ – cleansed of his bodily afflictions and restored to wholeness –
he was restored to wholeness in his Resurrected body and the promise of this
extended to all Christians.40

Apostolos-Cappadona has explored the “essence of agony” and the haptic aspects of the
Isenheim Altarpiece, and the influence of this particular work on the art of Pablo

38 Diane Apostolos-Cappadona, “Healing Miracles in Christian Art: Casting Out the Devil.” Celâl


According to Apostolos-Cappadona, “the precise influence of Grünewald’s visualization of the ‘essence of agony’ can be seen in Picasso’s Crucifixion drawings after 1932, and his master painting, Guernica.”

Apostolos-Cappadona compares the haptic image of Grünewald’s Magdalen (see fig. B.25d) with a figure from Picasso’s 1937 masterpiece addressing the tragedies of the Spanish Civil War, Guernica (see fig. B.26).

Grünewald’s depiction of the ‘essence of agony’ was centralized then in the bodily configuration of the twisted deformities of the Magdalen. Hers was the hapticity of physical contractions produced by a spiritual struggle… it was the agony, that is, the bodily contractions, thus the hapticity or emotive physicality, of her deep grief which was Picasso’s subject.

As a religious-themed work, Grünewald’s altarpiece offers hope and healing once the panels are opened to reveal the resurrected Christ; Picasso’s work does not offer this comfort:

By opening his agonized Crucifixion onto the vision of the incarnate, perfect child, and the glorified resurrected (and healed) body, Grünewald affirmed the Christian belief in the miracle of new life (spiritual and physical) after death. Picasso, however, did not offer a similar image or promise of solace to his

---

41 “I am interested in how the work of one of the twentieth century’s leading secular artists was influenced by and attempted to retrieve the haptic, that is, the emotive physicality of the human body, but not the religious, content of a well-known work of Christian art with specific reference to the agonized figure of St. Mary Magdalene. I do not consider Picasso or any of his work as being influenced by Christianity, or faithful to any religion. Picasso painted many fine works on the theme of tragedy, especially on the theme of the common human tragedy. However, in the paintings and drawing studied here the focus of his interest is on haptic agony, not common human tragedy. Therefore, Picasso became engaged by not just any presentation of the Crucifixion, but by one of the most haptically agonized Magdalenes in Western art history.” Diane Apostolos-Cappadona, “The Essence of Agony: Grünewald’s Influence on Picasso,” Artibus et Historiae 13, no. 26 (1992): 31-32.

42 Apostolos-Cappadona, “The Essence of Agony,” 34.

viewers. He had no interest in Grünewald’s depictions of the glorified body of the resurrected Christ or the perfect baby Jesus; rather, his vision was empathetic to the agonized hapticity of the Magdalen. Thus, Picasso emphasized all he thought available in the modern world: the cathartic experience of art and the sensitive dynamism of woman. Even in the age of secular spirituality, the theme of the ‘essence of agony’ continued to be reinterpreted through the hapticity of the female body.  

Apostolos-Cappadona concludes that the viewer is engaged no by “the energy or emotion of color, but the hapticity of the human body,” and that “visual memory and visual retention are based as much upon what we have seen as upon what we want to see.”

The journal of the Association of American Medical Colleges (AAMC), *Academic Medicine*, features a recurring segment – “Medicine and the Arts” – to remind those involved in the education of medical students that the humanities remain an important and essential component of the study and practice of medicine, providing examples in literary fiction, poetry, film, and fine art.

The arts, because they are about the gray zone of human experience, are where one learns to appreciate nuance, uncertainty, and varieties of experience, to engage with crucial human questions rather than with memorizable answers. That is why the humanities are essential to physicians’ education… even the seemingly black-and-white world of medicine itself is fraught with uncertainty and the need to appreciate nuances, particularly in the realm of diagnosis. Physicians’ primary tools remain language, sight, touch, and sound – tools also fundamental to poetry, music, fine arts, and film.

---

44 Apostolos-Cappadona, “The Essence of Agony,” 44.


A commentary from *Academic Medicine* focuses on Rembrandt van Rijn’s 1632 painting *The Anatomy Lesson of Dr. Nicolaes Tulp* (see fig. B.27), noting that the “beginnings of visual studies in medicine” can be traced to the “great anatomical investigations of the Renaissance.” The commentary concludes that “then and now, science and art are joined together to demonstrate and to teach.” The “medical gaze” is characterized as a “complex triangulation of the patient, the doctor, and the patient’s body,” and is likened to the “classical triangle of the artist, the viewer, and the world.”

In Grünewald’s *Isenheim Altarpiece*, a similar triangulation can be envisioned between the patient suffering from ergotism, the Antonine monks who treated them, and the promise of redemption embodied in the crucified and resurrected Christ. Grünewald’s masterpiece provides a rare example of symbiotic empathy by way of association with Christ’s suffering.

Andrew Wyeth’s 1948 painting *Christina’s World* (see fig. B.28) serves as an excellent example of an artwork that relates explicitly to the importance of empathy.

Good medicine is the practice not only of the science of the subject but also of its humanities. Central to the humanitarian practice of medicine is the development of good communication skills. Central to the development of good communication skills is the development of empathy. Empathy means trying to

---


get inside the patient’s head, to feel his or her fears and pain, a task that even the most empathetic of doctors can find extremely difficult.50

One’s immediate impression on viewing this work might be of a young woman leisurely basking in the warmth of a summer day. The colors may not be particularly vibrant; but the woman wears what appears to be a comfortable short-sleeved dress, a wisp of hair gently captured by the breeze, and the sun clearly illuminating the side of the farmhouse towards which she gazes. Upon closer study and reflection, one might perhaps notice “her bony arms and knotted hands, the twisted crippled quality of her in that field.”51

The subject, Anna Christina Olson, suffered from paralysis of the lower body due to an undiagnosed progressive muscular deterioration detected in early childhood.52 Andrew Wyeth’s wife, Betsey James, summered as a child with her family in Cushing, Maine – the setting for the painting; the James family settled there permanently when Betsey was in her early twenties. Andrew visited the James’ Cushing home in the summer of 1939, and was introduced to the neighboring Olson family. Wyeth was immediately enamored with the Olson family, particularly with Christina.

Henry Holland, M.D., a Clinical Professor of Psychiatry at the School of Medicine of Virginia Commonwealth University’s Medical College of Virginia in

50 Baum, “Teaching the Humanities,” 246.


52 Anna Christina Olson’s condition has been identified as possibly polio, although her disorder remained undiagnosed during her lifetime.
Richmond, is a polio survivor. During his tenure as President of the Central Virginia Post-Polio Syndrome Support Group, he wrote of *Christina’s World*:

What inspired Wyeth to paint this image of a disabled woman, alone in a field, apparently looking at her home? Was Christina posing for this painting or was she doing something very ordinary for her? Did Christina have polio? As polio survivors, do we identify with her dilemma? Do we wonder about what is missing? If she had polio and cannot walk, where are her braces, crutches or even her wheelchair? Why is she alone in this state of helplessness? Her arms, forearms and legs seem so thin. We cannot see her face. Is she frightened, scared, crying, screaming for help or just determined? Is she a young woman or even middle aged? Is she even a real person or just an artist’s creation? Like any good painting, each of us will see and feel various perceptions from this painting.  

At the time *Christina's World* was painted, Christina was actually in her mid-fifties. Christina and her brother, Alvaro, were frequent models and inspirations for Wyeth’s work. Andrew had ample opportunity to interact with Christina, and to witness how she dealt with her disability. Interestingly, although Christina Olson served as the inspiration for this work, Andrew’s wife Betsey actually served as the model for the figure. It is also noteworthy that Andrew’s father, artist N. C. Wyeth, died in a tragic automobile accident in 1945 – along with Andrew’s toddler nephew – when his stalled car was struck by a train. After his father’s death, Andrew’s palette became much more subdued, and his subject matter more emotionally charged.

Holland states:

Christina's disability progressed as she got older. In her twenties, she began to fall often... She would not tolerate anyone referring to her as crippled. She would state

---

that she was just lame and could do most everything that anyone else could do… At age twenty-six, she could walk no more than three steps without grabbing an object, her hands were weakening, and she was experiencing exhaustion after ordinary tasks… She was advised [by doctors] to spend as much time outdoors as possible... By 1946 (age 53), she was no longer able to stand, had stopped trying to walk, and resorted to crawling. She resisted the use of a wheelchair despite the fact that her own father had begun using a wheelchair as early as 1922. She had a dear friend who lived in a house eight hundred feet away. She could crawl this distance in less than an hour, but would arrive quite fatigued.  

Undoubtedly, Andrew witnessed Christina’s struggle with her disability, including her insistence on crawling, both indoors and out, as opposed to using a wheelchair.

As do many works of art, *Christina’s World* challenges and clarifies our concept of empathy. This simple projection of oneself into the life of another is not enough. True empathy demands that we struggle to understand—and acknowledge we may never know.  

It is important to note that not only representational art proves beneficial to improving one’s ability to see. Dr. Katz’s colleague at Harvard, Dr. Shah Shoshbin, notes that learning to look at abstract art is helpful – citing the work of American abstract expressionist painter Jackson Pollock – as beneficial to learning pattern recognition, which can translate to observing skin ailments (see figs. B.29a-d). Through careful observation and study of Pollock’s drip paintings, one can recognize subtle variations in the artist’s patterns; this visual awareness can be transferred to the

---

54 Holland, “Dr. Henry Writes About ‘Christina’s World’.”

55 Soricelli, “Christina’s World,” 19.

56 “Imagery which departs from representational accuracy, to a variable range of possible degrees, for some reason other than verisimilitude. Abstract artists select and then exaggerate or simplify the forms suggested by the world around them.” s.v. “Abstraction and abstract art.” http://www.artlex.com/ArtLex/a/abstraction.html (accessed January 15, 2010).
observation of rashes and diseases affecting the skin. This serves to demonstrate that it is necessary to open one’s visual perception beyond what one might find comfortably recognizable and identifiable.

In a 2006 documentary directed by Harry Moses, *Who the #$&% is Jackson Pollock?*, a retired truck driver – Teri Horton – purchases an abstract painting in a thrift store for five dollars. It is soon suggested to the 73 year-old retiree that the painting may actually be an original Jackson Pollock, valued at up to fifty million dollars. With the assistance of a team of forensic experts and lawyers, Ms. Horton attempts to determine if the painting is an authentic Pollock. A number of art experts are consulted, who examine the drip patterns in the painting, in an effort to determine if they correspond with drip patterns in indisputable Pollock paintings – similar to how a presumed painting by Vincent van Gogh or Claude Monet might be authenticated through identification and verification of their distinctive brushwork. Examinations of the possible Pollock have remained inconclusive, even though a fingerprint on the back of the painting matches a fingerprint found in Pollock’s preserved studio in East Hampton, New York. This serves as an example of the extent to which observation and analysis can be taken. Experts familiar with Pollock’s drip pattern are unable to agree if the Horton painting is indeed an authentic Pollock, even after careful examination and observation.

---

57 *Who the #$&% is Jackson Pollock?*, DVD. Directed by Harry Moses, 2006 (Burbank, CA: New Line Home Video, 2007).
A Few Small Nips: The Artist as Patient

Grünewald’s altarpiece serves as an excellent example of the interplay between art and medicine through the visual representation of the physical symptoms of a specific disease in the crucified Christ. At the request of his patron, Grünewald purposely portrays the ravages of ergotism in the body of Christ with a specific purpose in mind: to allow the patient suffering from this and similar diseases of the skin to empathize symbiotically through the images of both the crucified and risen Christ. In Rembrandt’s self-portraits, there is no evidence to support that the artist was specifically attempting to portray any specific disease or diseases from which he may have suffered. Rather, Rembrandt was merely providing a visual representation of how he saw himself – and how he wished the world to view him – at various stages throughout his life. In addition to these examples, there are examples of artists specifically depicting aspects of their health through their art that help to define them as a person and illuminate the human experience.

It is difficult to find an artist whose life and works were more deeply affected by illness than Frida Kahlo’s. Her art is permeated by her struggle against medical hardships; physical and psychical suffering lay at the heart of her talent.58

Born near Mexico City in Coyoacán, self-taught Mexican painter Frida Kahlo lived a life filled with chronic and often debilitating physical and emotional pain – pain which permeates a large number of her paintings.

Kahlo’s medical history is a catalogue of misfortune. She was born in 1907 and was affected by poliomyelitis, which left her right leg withered and her spine scoliotic. When she was 18 a tram accident caused devastating injuries. She was impaled through her pelvis by a steel bar and sustained multiple fractures of the spine, pelvis, right leg, and foot. In subsequent years she underwent numerous orthopaedic operations in a vain attempt to alleviate pains in her back and right leg, which was eventually amputated. Her death at 47 followed soon afterwards. More than one pregnancy was terminated by therapeutic abortion, and she had two (possibly three) first trimester miscarriages.59

Kahlo entered the National Preparatory School in Mexico City at age 15 originally intending to pursue a career in medicine,60 but her studies were interrupted by the tram accident three years later. Bedridden for months in a full body cast, convalescing from her serious injuries, she turned to painting to “escape from boredom and pain.”61 Her father Guillermo enjoyed landscape painting as a hobby; her mother Matilde arranged for an easel to be fashioned such that Frida could paint while lying in bed, and with her father’s paints and brushes embarked on a career as a painter.62 For the remainder of her life, Kahlo would work on many of her paintings while lying in bed for weeks – or months – on end (see fig. B.30a).

Following the tram accident, Kahlo endured at least thirty operations until her death at age 47. Her early interest in medicine prior to the tram accident, combined with


her development as an artist during her convalescence – and her subsequent years of physical and emotional suffering that followed – provided Kahlo with a unique mode of self-expression in her paintings.

As a patient she overcomes her dependency on medical authority by pastiche and appropriation of its language. In a letter written after her operation for spinal fusion in 1946 she encloses a casual sketch in the distinctive style and format of medical notation to depict the wounds on her back. Furthermore, it adopts the doctor’s viewpoint to scrutinise [sic] her body from a position that was physically denied her as a patient. By this inversion she negotiates a degree of autonomy, at least within the field of visual representation.\footnote{Lomas and Howell, “Medical Imagery,” 1586.}

Kahlo was not particularly prolific, completing approximately 143 paintings in her short lifetime. Forty percent of her paintings were self-portraits – numbering 55 – and the majority of these reflect some aspect of her physical and/or emotional anguish. Four years following the tram accident, Kahlo sought out famed Mexican muralist Diego Rivera, primarily to seek his opinion and advice about her artwork. The two married when Kahlo was 22; Rivera was twenty years her elder. Their marriage was rather tumultuous. Rivera was a known womanizer, and their marriage ended in divorce shortly after Kahlo learned that Rivera had an ongoing clandestine affair with her younger sister, Cristina. Kahlo and Rivera remarried in 1940, though they often lived quite separate lives. Kahlo was openly bisexual, and took several lovers, both male and female. Their mutual jealousies and fighting contributed significantly to Kahlo’s emotional anguish.

In 1932, Frida traveled with Diego to the United States, where he was commissioned to complete a series of frescos for the Detroit Institute of Arts. Kahlo was
pregnant at the time, and suffered at miscarriage at the Henry Ford Hospital on Independence Day – July 4th. Her physical and emotional anguish over the miscarriage is represented in the jarring painting *Henry Ford Hospital*, also known as *La Cama Volando (The Flying Bed)* (see fig. B.31). The nude Kahlo lies on the hospital bed, stained with blood from the miscarriage. Six items extend from her hands, clutched to her stomach, on red threads reminiscent of umbilical cords: the male fetus she lost; an orchid, a gift from Diego; a snail, representing the slow agony of the miscarriage; a pink female torso on a pedestal, representing a woman’s unique physiology; an abstracted machine-like item, which she described as representing the mechanical aspects of the ordeal; and an image of her own fractured pelvis. These harsh and disturbing images lay bare Kahlo’s physical and mental anguish, and allow one “to gain a deeper understanding of the lived experiences of suffering, chronic pain, miscarriage, and disability through engaging with” the painting.  

Kahlo’s work is rich with imagery and symbolism. As stated at the opening of this manuscript, this project is not intended to explore or provide an iconography or iconology of the visual arts – or of any particular artist or artwork – in relation to medicine, medical education, or the medical sciences. Kahlo’s paintings are examined herewith not within the context of any inherent iconography or iconology, but rather from the perspective of the empathy that their imagery evokes in the viewer, and the

---

64 Darbyshire, “Understanding the Life of Illness,” 51.
subsequent value an exploration and examination of her work might have for medical students.

An early Kahlo painting, *Unos Cuantos Piquetitos (A Few Small Nips)* (see fig. B.32), reflects both her anguish over her physical pain, as well as her emotional torment. Painted in 1935, Kahlo was reportedly inspired by a newspaper article about a man who murdered his adulterous wife. The title for the work apparently comes from the man’s attempted defense before the judge, when he claimed that all he inflicted on his wife was “a few small nips.” The painting can be interpreted on a number of levels. By this time, Kahlo had already endured countless surgeries, perhaps reflected in the body of the woman, covered with knife wounds. Although the image of the woman in the bed is not an outright self-portrait, Kahlo expressed that she sympathized with the murdered woman. This painting was also executed following her discovery of Rivera’s affair with her sister. Kahlo has been quoted as saying she felt “murdered by life,” a sentiment reflected in this particular allegorical work.

A creative product may function intraphysically as a kind of messenger between dissociated self-states and consciousness, and it may also serve as a witnessing presence in a self-supporting and self-constituting way. Artistic work may thus be used by the artist for an expressive as well as for a protective purpose, as a means of sympathetic participation in painful experience, or as a medium for a view from the outside. The act itself of finding and of making expressive forms at the time of traumatic experiences is a remarkable assertion of the human capacity to synthesize and to counteract fragmenting dissociative processes.65

---

Kahlo’s serious injuries from the tram accident contributed to her inability to carry a child, resulting in multiple miscarriages, thus contributing to her emotional distress.

Painted in 1939 shortly after her divorce from Rivera, *Las Dos Fridas (The Two Fridas)* (see fig. B.33) portrays dual aspects of the artist’s person. Kahlo’s diaries reveal that as a girl, she had an imaginary friend, which served as inspiration for this work. She later noted that the work actually reflected her state of mind following the failure of her marriage. On the right, Kahlo portrays herself in traditional Mexican Tehuana costume; she holds a small portrait of Rivera as a boy. This represents the Frida loved by Diego. On the left, Kahlo portrays herself in a white lace European-style costume, perhaps a wedding dress. This represents the Frida rejected by Diego. Both Fridas have exposed hearts on their breasts. The heart of the Frida on the right – the Frida loved by Diego – appears whole, while the heart of the Frida on the left – the Frida rejected by Diego – appears torn open. The two Fridas hold hands; both hearts are connected by a vein. A vein also extends from the heart of the loved Frida to the small portrait she holds of Diego. Another vein extends from the heart of the rejected Frida to her lap, which she holds at the end with a pair of forceps; however, the forceps do not stem the flow of blood from her heart – Frida’s pain likewise cannot be halted. Having been rejected by her husband, Diego, Frida’s only companion is herself.

Kahlo’s 1944 painting *La Columna Rota (The Broken Column)* (see fig. B.34), was painted at a time when Kahlo was forced to wear a steel corset for nearly half a year. Unlike many of her other self-portraits, she appears alone in this painting – perhaps
representing the fact that only she can address her physical and inner pain. The straps bind her body, while the exposed column represents her broken spinal column. Nails pierce her nude upper torso, as well as her draped lower torso, likely representing the chronic physical pain which she endures. Nails are also shown piercing her heart, likely in representation of the pain caused by her turbulent relationship with Rivera. Tears stream down her face in representation of her overall anguish.

The incorporation of overtly medical iconography into Kahlo’s painting has thus far been treated as an incidental element subordinate to the aim of articulating her experience. Yet its importance far exceeds this… Kahlo uses medical imagery in a disruptive way as a foreign element that causes one to question the boundaries and exclusions enforced by art.66

A particularly jarring work is Kahlo’s 1945 *Sin Esperanza (Without Hope)* (see fig. B.35). Following a series of surgeries, Kahlo was without appetite, and began to lose weight. Her doctor prescribed a diet that Kahlo perceived as forced feeding, which she depicts in this work. Her portable easel holds a funnel which leads to her mouth. The food in the funnel – consisting of fishes with heads, a seemingly plucked and uncooked lifeless chicken, and various other unusual items – is less than appetizing. On the back of the painting Kahlo inscribed the following: “*A mí no me queda ya ni la menor esperanza... Todo se mueve al compás de lo que encierra la panza*” (Not the least hope remains for me… everything moves in step with what's in the belly).

Frida Kahlo’s art is particularly valuable in promoting caring for several reasons. Her work addresses human experiences such as pain, disability, illness, loneliness,

---

66 Lomas and Howell, “Medical Imagery,” 1586.
hospitalization, miscarriage, and emotional distress and shows a strength of spirit that elevates Kahlo from being merely a suffering victim.\textsuperscript{67}

Born in Rio de Janeiro, Brazil in 1954, Vicente Artur Carneiro is a professional artist living and working in Bethesda, Maryland.\textsuperscript{68} In 1986, Carneiro visited Salvador, Bahia, on the northeast coast of Brazil. Carneiro always takes a small drawing pad with him when he travels, to make sketches of the people he encounters and the places he experiences. The images and other notations in his sketchbooks ultimately find their way into his artwork.

Salvador is a very mystical place, and I felt a very strong pull to go there. My work in those days was religious-based, not in a biblical sense, but more in my deep interest with the traditions of Catholic imagery, particularly those having connections with Candomble, the prevalent African-based religion which is at the very soul of Bahia. Salvador has 365 churches, one for each day of the year. The city offers some of the most beautiful examples of colonial architecture in Brazil.\textsuperscript{69}

Upon his return to the United States, Carneiro noticed he was getting very thin; shortly thereafter he was diagnosed with a serious thyroid condition requiring a thyroidectomy. At the time, his then-wife was living and working in Africa, and his parents were living in Brazil. “It was a particularly bleak and dark time for me,” Carneiro recalls; “I felt alone and vulnerable.”\textsuperscript{70} Carneiro had already begun a drawing based on his visit to Bahia, and he brought his paper and drawing materials with him to the

\textsuperscript{67} Darbyshire, “Understanding the Life of Illness,” 54.

\textsuperscript{68} Carneiro’s father and maternal grandmother were both artists.

\textsuperscript{69} Vicente Artur Carneiro, e-mail message to author, February 17, 2010.

\textsuperscript{70} Carneiro, e-mail, 2010.
hospital. Following surgery, he worked on much of the drawing while in his hospital bed (see fig. B.30b). The completed work, Crossroads, reflects his experience at this challenging time of dealing with illness (see fig. B.36).

In a way, this work is representative of a gilded niche, much like those I found inside of the churches of Bahia. When I lived as a boy in Mexico, a work of this type would be called a retablo… there is both symbolic and personal imagery within the piece… some of it is self-explanatory, since it deals with a representation of an actual event.  

The central image in the piece is a Crucifixion. For Carneiro, this image serves as “a symbol and a reminder of the kind of suffering that encompasses not only physical agony, but also psychic anguish and emotional turmoil.” In retrospect, he now sees it “as a memento, or token of solidarity, with time remembered.” Much of the imagery in the work is taken from sketches he made while visiting Bahia: “I drew the little hut on the shore from life while I was in Salvador. It was near a fisherman's village. I would refer to this drawing pad many times.” As the landscape is taken from the artist’s native Brazil, perhaps it provides a level of comfort and familiarity.

In my mind's eye, the center part of the drawing depicts a procession of Baianas (women from Bahia, often followers of Candomble) dressed in white and carrying vases of flowers on their heads. Above them, on a partition that cuts through the composition, is a bed of flow, among which sits a single small vase to the right.

---

71 Carneiro, e-mail, 2010.
72 Carneiro, e-mail, 2010.
73 Carneiro, e-mail, 2010.
74 Carneiro, e-mail, 2010.
That vase was brought to my room while I recovered, and I drew it while it sat by the windowsill. It was the first detail added after I came out of surgery.\textsuperscript{75}

At the time of his surgery – in the absence of his then wife and parents – Carneiro’s then brother-in-law was particularly supportive, accompanying him to doctors appointments, and constantly trying to lift his spirits. The blindfolded figure in the lower left of the drawing, holding an urn, represents his then brother-in-law.

As for the urn he's carrying, I could conjecture; not so much an ‘urn’ but a vessel to hold something he does not want to see, a receptacle perhaps, where dark things could be placed and put to rest as to never see the light of day again. A blind offering? A small vesicle symbolizing that which has been removed? I can't say for sure. I remember when I first exhibited this work. That was often the question asked most: ‘what is that he's carrying?’ When you draw something, it could mean one thing at one time, and something totally different years later.\textsuperscript{76}

The nude figure in the lower right is a self-portrait of the artist. Carneiro observes: “I’m exposing my throat, where the incision was made.”\textsuperscript{77} The image in the square, center left, is also a self-portrait; a finger points to the location of the thyroid, which is to be removed. Above this figure, there is a tear in the curtain which is partially mended – perhaps representing the incision made in the artist’s throat. In both self-portraits of the artist, the figure looks up – not only to reveal the throat, but perhaps also looking up toward the crucified Christ, or the heavens, seeking comfort or solace – or, solidarity. The image in the circle, center right, reveals the exposed thyroid. The image

\textsuperscript{75} Carneiro, e-mail, 2010.

\textsuperscript{76} Carneiro, e-mail, 2010.

\textsuperscript{77} Carneiro, e-mail, 2010.
directly above it appears to be some type of fruit, or berries; they are reminiscent of the thyroid gland, ready to be plucked from the artist’s throat.

Art, literature, poetry, music, philosophy and architecture impart wisdom. They speak to that universal experience of humankind that unites and harmonises [*sic*]. In the metaphors of art, poetry, music and architecture, human suffering and transcending courage find their expression. Compassion and identification with the progress of human thought comes through literature and philosophy. Science may give us the tools for curing, but it is the humanities which give us the tools for caring. 78

**Vile Bodies:**  
**Photography and Conditions of Being**

British art historian Kenneth Clark, in his 1956 book *The Nude: A Study in Ideal Form*, 79 addresses the concept of beauty in western culture as it relates to the human body. Focusing almost exclusively on European art, the author traces the roots of the idealized nude in the pottery and sculpture of the ancient Greeks, to the paintings and drawings of Pablo Picasso and the sculpture of Henry Moore in the mid-twentieth century.

The Greeks attached great importance to their nakedness… Greek confidence in the body can be understood only in relation to their philosophy. It expresses above all their sense of human wholeness. Nothing that related to the whole man could be isolated or evaded; and this serious awareness of how much was implied in physical beauty saved them from the two evils of sensuality and aestheticism. 80

---


79 Clark, *The Nude*.

It is worth noting that the Greek comfort with nakedness was not widely accepted outside of Ancient Greece. Clark comments that “the Romans were shocked by the nakedness of Greek athletes, and Ennius attacked it as a sign of decadence.” 81 Although human nakedness appears frequently in the art of the Renaissance, this does not imply a generalized comfort with nudity in European society. It is not widely known that when Michelangelo’s most recognizable artwork – the sculpture of David – was first publicly displayed in 1504, the Florentines added a gilt-bronze belt to the statue, covering the genitals. 82

Clark opens his exploration by providing a distinction between the terms “naked” and “nude” and the connotations and conceptualizations associated with each word. “To be naked is to be deprived of our clothes,” 83 and implies embarrassment, defenselessness, discomfort and vulnerability; “the word ‘nude,’ on the other hand, carries, in educated usage, no uncomfortable overtone.” 84 Clark intrinsically intertwines the concept of the

81 Clark, The Nude, 24.

82 “The hero was crowned with a golden wreath of victory, the sling and tree stump were gilded, and gilded too the grape leaves that (eventually) concealed his nudity. Thus adorned, David was finally unveiled on 8 September, the feast of the Nativity of the Virgin, in the site now occupied by a replica.” From: Rona Goffen, Renaissance Rivals: Michelangelo, Leonardo, Raphael, Titian (New Haven: Yale University Press, 2002), 130. “The loins were covered and the genitalia totally concealed by another garland… which was attached to the statue before it was unveiled to the public. This covering remained in place at least until the middle of the sixteenth century.” From: Anton Gill, Il Gigante: Michelangelo, Florence and the David, 1493-1504 (London: Review, 2002), 295. “The final touches were added: the tree stump and sling strap were gilded and a garland of golden leaves (which has long since disappeared) placed around [the loins].” From: Monica Bohm-Duchen, The Private Life of a Masterpiece: Uncovering the Forgotten Secrets and Hidden Life Histories of Iconic Works of Art (Berkeley: University of California Press, 2001), 28.

83 Clark, The Nude, 3.

84 Clark, The Nude, 3.
nude with artistic representation. Reflecting on the Renaissance, he notes that like the Greeks, Michelangelo “was passionately stirred by male beauty.” He further contends “the formalized body of the ‘perfect man’ became the supreme symbol of European belief,” as reflected in da Vinci's *Vitruvian Man* (see fig. B.11).

The nude gains its enduring value from the fact that it reconciles several contrary states. It takes the most sensual and immediately interesting object, the human body, and puts it out of reach of time and desire; it takes the most purely rational concept of which mankind is capable, mathematical order, and makes it a delight to the senses; and it takes the vague fears of the unknown and sweetens them by showing that the gods are like men and may be worshipped for their life-giving beauty rather than their death-dealing powers.

In contemporary society, Clark notes a diminishment in the predominance of the nude – particularly the male nude – which he connects “with a declining interest in anatomy.” He contends “modern art shows even more explicitly than the art of the past that the nude does not simply represent the body, but relates it, by analogy, to all structures that have become part of our imaginative experience.” Interestingly, the average, educated person would likely describe an unclothed figure in a painting or sculpture as “nude;” asked to describe an unclothed figure in a clinical photograph, the term “naked” would more than likely be used. In all likelihood, an artist will more often use the term “nude,” while a physician will more often use the term “naked,” to describe

---


an unclothed human body. This would seem to suggest that the artist’s and physician’s perception of, and attitude toward, the human body is conditioned by both their training and their innate preconceptions of the human body.

In our Diogenes search for physical beauty our instinctive desire is not to imitate but to perfect. This is part of our Greek inheritance, and it was formulated by Aristotle with his usual deceptive simplicity. ‘Art,’ he says, ‘completes what nature cannot bring to a finish. The artist gives us knowledge of nature’s unrealized ends.’ A great many assumptions underlie this statement, the chief of which is that everything has an ideal form of which the phenomena of experience are more or less corrupted replicas. This beautiful fancy has teased the minds of philosophers and writers on aesthetics for over two thousand years, and although we need not plunge into a sea of speculation, we cannot discuss the nude without considering its practical application, because every time we criticize a figure, saying that a neck is too long, hips are too wide or breasts too small, we are admitting, in quite concrete terms, the existence of ideal beauty.89

While sculpture and painting have collectively dominated the history of art, American art critic Irving Sandler observes that photography increasingly became an alternative mode of expression for artists in the 20th century: “photography or, rather, ‘the photographic… has come to affect all the arts’; [some] actually consider photography to be the medium of postmodernism.”90 The nude became an increasingly popular subject in photography. American photographer George Platt Lynes is best known for his photographs of the male nude in conjunction with Alfred Kinsey’s research on sex, gender, and reproduction for the Kinsey Institute in the 1930’s and 1940’s, as well as his work for George Balanchine producing publicity stills for the American Ballet company.

His photos were tasteful and relatively tame by contemporary standards, though with obvious homoerotic undertones. By the 1980’s, American artist Robert Mapplethorpe gained recognition for the graphic homoerotic and sadomasochistic nature of his black-and-white photography and the subsequent Corcoran and National Endowment for the Arts controversies surrounding his work, including censorship of art and public funding of the arts.

Contemporary American photographer Joel-Peter Witkin consistently transcends the boundaries of art in his photography. His works confront our conception of beauty and empathy, and his subjects “challenge notions of ideal versus anti-ideal bodies.”

Professor of Humanities Ann Millett-Gallant of the University of North Carolina, Greensboro, has written on the portrayal of the disabled in contemporary art, and on the photography of Witkin – specifically focusing on his use of amputees as models. She describes Witkin’s photographs as “corporeal tableau-vivants that showcase body difference, taboo, and abnormality.” In a 1997 interview, Witkin states:

“I wrote this as a kind of an advertisement for models. ‘A partial listing of my interests: physical prodigies of all kinds, pinheads, dwarfs, giants, hunchbacks, amputees, scrolls, knees, decapitations, and wounds.”

---


92 Millett, “Performing Amputation,” 8.

93 This interview with Joel-Peter Witkin was conducted in 1997. It is understood that an artist’s artistic vision and approach to the creative process usually continue to evolve and develop over the course of an artist’s creative career. Therefore, it is understood that quotations taken from this interview – or any other – reflect the artist’s views and opinions at the time the interview was conducted, and may not necessarily reflect the artist’s attitude toward their work and their creative over the duration of their career. Interview Referenced: Joel-Peter Witkin, “Vile Bodies 1997,” Joel-Peter Witkin: The Mystery of Presence, DVD (New York: Ricco/Maresca Gallery, 1997).
pre-op transsexuals, bearded women, active or retired side-show performers, contortionists (erotic), women with one breast (centered)…"\(^94\)

Millett-Gallant observes:

The freak show provides a strong example of representational collisions between art, science, and popular entertainment in performances of the disabled body, qualities shared with Witkin’s staging of amputees particularly. Witkin’s work shares with medicine a preoccupation with curious or abnormal bodies, and his medical gaze is likewise voyeuristic and theatrical.\(^95\)

A variety of factors and personal experiences contributed to Witkin’s unique artistic vision. Witkin recalls an event that occurred in front of his home when he was a small boy:

It happened on a Sunday when my mother was escorting my twin brother and me down the steps of the tenement where we lived. We were going to church. While walking down the hallway to the entrance of the building, we heard an incredible crash mixed with screaming and cries for help. The accident involved three cars, all with families in them. Somehow, in the confusion, I was no longer holding my mother's hand. At the place where I stood at the curb, I could see something rolling from one of the overturned cars. It stopped at the curb where I stood. It was the head of a little girl. I bent down to touch the face, to speak to it – but before I could touch it someone carried me away.\(^96\)

Witkin also recalls:

My grandmother had only one leg, and in the morning I would wake up and smell her gangrenous leg. Where most kids would wake up and smell coffee, I would wake up and smell grandmother's rotting leg. So eventually, too, the experience of having a person in the family who was physically challenged made the

---

\(^94\) Witkin, “Vile Bodies.”

\(^95\) Millett, “Performing Amputation,” 16.

connection between the world outside and this world of the freak show inside more direct and more sublime for me.97

Witkin also notes that his first sexual experience was with a pre-op transsexual at a freak show.98

Witkin’s black and white photographs are unquestionably theatrical. He carefully plans and stages his tableaus. In addition to physical prodigies, his photos also contain human and animal corpses – or pieces of corpses – arranged in scenes of his own imagining, or inspired by classical artworks. Millet-Gallant observes:

Witkin dissects and sutures together multiple visual genres, such as art history, popular culture, pornography, theatre, medical exhibits and photography, and freak show displays… Witkin poignantly pairs the conventions of medical imagery for diagnosing bodily difference with the traditions and motifs of classical art, which serve as a benchmark for ideal physical beauty in Western culture.99

Witkin contends: “Visually, I would never photograph a very beautiful person, like a high fashion model. That’s of no interest to me, because like actors, they have a particular kind of presence, and fashion models, beautiful people, per se, knowingly have a particular visual persona that I’m not interested in.”100 Millett-Gallant comments:

The argument that Witkin pushes the envelope too far is a strong one, as he perverts so-called photographic objectivity into a blatant and unashamed objectification of his own. Witkin’s work has been largely criticized for tasteless

97 Witkin, “Vile Bodies.”

98 Witkin, “Vile Bodies.”


100 Witkin, “Vile Bodies.”
display and exploitation of bodies for shock value. Witkin’s camera is said to fetishize, capitalize on, and even contribute to human suffering.\textsuperscript{101}

In his 1985 photo \textit{Woman in the Blue Hat} (see fig. B.37), Witkin portrays a disabled woman, Jacqueline Tellalian, who is confined to a wheelchair. Ms. Tellalian comments in a 1997 interview on the experience of being photographed:

I wasn’t quite sure how I would come across on film. I didn’t know how, despite the back drop, and what I was not wearing or wearing, and, I just, I had no idea what it would turn out to be, and I had kind of hoped it wasn’t going to portray me as somebody who is going to be more freakish than I could possibly be considered as it is.\textsuperscript{102}

Although relatively mild when compared with other photographs of individuals with physical anomalies in Witkin’s oeuvre, this particular photograph has been criticized as exploitive. Ms. Tellalian commented about the finished work:

I’ve had many people say ‘didn’t you feel exploited by that,’ and I said actually, no, because first of all he never made me feel as though he was using my disability as a sensational aspect of the picture. It was always within context, within some sort of larger vision that he had. I was really amazed at what he had done; it was really quite beautiful. There is a beauty to deformity on some levels if you allow yourself to see it as not necessarily deformed but different, and knowing that not everybody is perfectly proportioned, it might be something people fantasize about being, or whatever, but it generally speaking is not really the case. There’s probably fewer people that are perfect than are not perfect. So, I think it’s easier to accept yourself.\textsuperscript{103}

---

\textsuperscript{101} Millett, “Performing Amputation,” 28.


\textsuperscript{103} Tellalian, “Vile Bodies.”
Witkin contends that he is “on the model’s side,” and not the side of the ridiculer: “it might as well be myself as subject, because who breaks that rule is my self.”\footnote{Witkin, “Vile Bodies.”}

I’m not interested in going around and photographing people in hospitals; people who are dying all around the world. I’m sad about that, as we all are. I’m most interested in photographing conditions of being, to basically show changes in attitudes that affect me and my needs, and how those needs happen to be expressed through my photography. It’s really part of myself; I’m really photographing myself. I’m really photographing what I don’t know.\footnote{Witkin, “Vile Bodies.”}

It is also noteworthy that the model’s eyes are covered in this photograph, which is reminiscent of historical clinical photography:

Many clinical images objectified their subjects by blocking their eyes, a technique which Witkin’s images subvert specifically as he subverts the assumed neutrality of the medical gaze. Technicians (many of whom were physicians) blocked the eyes when developing the image, or covered the face of the subject with a veil or blindfold, making the body anonymous for the benefit of the patient and the physician or other viewer, such that the subject could be examined with objective, impersonal disinterest. The shielding of the eyes was seen more in especially freakish or curious subjects and those of lower socio-economic status. However, this technique provided far more protection for the viewer of the photograph than the subject. Blocking of the eyes, meant to maintain the patient’s dignity, functioned rather to impose shame and impeded a returned gaze, preventing the patients’ agency as individuals to transcend the medical frame.\footnote{Millett, “Performing Amputation,” 20.}

Concerning Witkin’s comment regarding the autobiographical nature of his photographs, some of his works are labeled as self-portraits, such as \textit{Self Portrait as a Dead Clown: The Aleph} (2001) and \textit{Myself as a Dead Clown} (2007). Witkin himself is not physically represented in either photograph. Each photo contains a human male
corpse, with the skin of the chest pulled away or removed entirely to reveal the ribcage, and with a mask placed on the face – in the 2001 photo, the head is physically separated from the body. One might question why he would label these works as “self-portraits” if he does not actually appear within the photo. When Rembrandt painted his many self-portraits, he was using oil paints to render an image or likeness of himself. As Marcus and Clarfield point out, Rembrandt portrayed himself as he likely wanted the viewer to see him. Recent articles in the press report “scientists hope to exhume the remains of Leonardo da Vinci so they can reconstruct his face to discover whether the Mona Lisa is a disguised self-portrait.” In photography in particular, there is often a misconception among viewers that a photograph is a representation of reality. In the examples of Witkin’s self-portraits, he is using different materials to portray himself; whereas Rembrandt and da Vinci use paint and canvas, Witkin uses corpses and the photographic plate.

Many of Witkin’s pieces are reminiscent of classical sculpture, such as his 2004 photos First Casting for Milo (see fig. B.38a) and Portrait of Greg Vaughan (see fig. B.39a). The former portrays a woman without hands – the right hand is missing to the mid-forearm. Her body and hair are covered with chalk white, evoking the appearance of a marble sculpture – Millett-Gallant likens this “pasty whiteness” to plaster, “a material

that crosses art and medical use.”

Her upper torso is bare, save for a barely visible brassiere, her lower torso covered by a heavily folded drapery of cloth. The figure is certainly modeled after the ancient Hellenistic Greek sculpture of the goddess of love, *Aphrodite of Milos* – or, to the Romans, *Venus de Milo*, as the work is better known – dating to approximately 100 B.C. (see fig. B.38b). The statue was discovered in 1820 on the Aegean island of Milos; it was in two pieces, roughly separated where the torso meets the drapery. The right arm is missing at mid-upper arm; the left arm is missing entirely, up to the shoulder. It is commonly held by art historians that the *Venus de Milo* certainly had arms, which were broken from the sculpture and lost to time and history. Witkin contrasts an actual woman, without hands, with this classical image of ideal female beauty. His “images of classicized amputees intervene in how a viewer reads so-called objective representations of the body in scientific rendering, as well as in the ideals of art.”

The *Portrait of Greg Vaughan* is likely modeled after the ancient Greek sculpture *Hermes with the Infant Dionysus* – also known as the *Hermes of Praxiteles* – dating to

---

108 Millett, “Performing Amputation,” 22.

109 It is speculated that the main body of the sculpture was carved from two separate blocks of marble, and that each of the arms were carved separately.

110 Additional statuary fragments were discovered at the site, including pieces thought to be part of the upper left arm, as well as the left hand holding an apple, which was likely raised and meet with the goddess’s gaze. The right hand likely rested on the upper left thigh, giving the appearance of holding the drapery in place, keeping it from falling away from the lower torso. However, insufficient fragments were found to incorporate into the statue as it is currently displayed.

111 Millett, “Performing Amputation,” 22.
approximately 300-320 B.C. (see fig. B.39b). The *Hermes of Praxiteles* was discovered in 1877 in the temple of Hera at Olympia. Numerous digs uncovered the various pieces of the statue, which were reassembled as presently displayed at the Archaeological Museum at Olympia. The statue’s right forearm, two left fingers, left foot, and penis are missing. By contrast, Witkin’s model is missing his entire right arm up to the shoulder, but is otherwise completely intact. As with the *Venus de Milo*, pieces of *Hermes* have been lost to time and history, as the statue was undoubtedly whole at one time.

Psychologically, the viewer knows this about both works, and can still appreciate the beauty of the body as it is presently represented, with missing limbs and appendages. Why, then, would Witkin’s comparable photos be viewed as disturbing, exploitive, or ugly? Vaughan’s upper torso is slighter, and more slender than that of Hermes. The lower torsos – save for the missing penis in the *Hermes* statue – are very similar in stature and musculature. By Clark’s definition, would Hermes be viewed as nude, while Vaughan might be viewed as naked – or exposed?

Just as symmetry can produce a sense of harmony, balance, and proportion, too much symmetry in certain contexts, such as in an endless line of row houses or identical statues, can have negative emotional impact. Similarly, *asymmetry* can produce a sense of discord and lack of proportionality. But in some instances, such as in the shape of an egg (as opposed to a smooth sphere), it can generate a positive emotional response, a sense of release, freedom, and mystery.\(^{112}\)

---

\(^{112}\) Atalay, *Math and the Mona Lisa*, 16.
During the Baroque period in European art – roughly between the 16th and 18th centuries – *vanitas*\(^{113}\) became a popular subject. The Roman Catholic Church’s Ecumenical Council of Trent in the mid-16th century decreed that sacred art should impart religious subject matter through direct emotional engagement with the viewer.\(^{114}\) *Vanitas* paintings were primarily still life, rich with symbolism intended to remind the viewer that earthly pleasures are fleeting and empty, and to encourage spirituality. Popular items included: a human skull, meant to remind the viewer of the inevitability of death; overripe or rotting fruit, fading flowers, and dead animals – such as hares, pheasants, or fish – representing ageing and decay; candles and hourglasses, representing passing time and the brevity of life; and mirrors and musical instruments – such as lutes and violins – alluding to the temporality of life. Painters began to incorporate human figures into *vanitas* paintings, particularly saints. For example, Italian artist Michelangelo Merisi da Caravaggio’s 1606 *Saint Francis in Meditation*\(^{115}\) (see fig. B.40a), and French artist Georges de la Tour’s 1635 *Magdalene at the Mirror* (see fig. B.40b), both depict the respective saints contemplating human skulls, in typical renderings of religious-themed *vanitas* paintings.

\(^{113}\) “Something that is vain, empty, or valueless; inflated pride in oneself or one's appearance,” s.v. “vanity.” http://www.merriam-webster.com/dictionary/vanity (accessed February 26, 2010).


\(^{115}\) It is said that Saint Francis of Assisi kept a human skull in his room, and contemplated it frequently – sometimes sleeping with it – to remind him of the inevitability of human death, and the eternalness of spirituality.
A number of Witkin’s still life photos are similar to 17th century Baroque paintings, such as those of famed Dutch still life painter Cornelis de Heem (see fig. B.41a). In his 1990 Feast of Fools (see fig. B.41b), Witkin incorporates severed body parts – specifically feet and hands, as well as a dead fetus – among the arrangement of fruits. Witkin’s 1994 Portrait as a Vanité116 (see fig. B.42) incorporates a human figure. As in his First Casting for Milo and Portrait of Greg Vaughan, the figure’s complexion is chalky white, although this appears to be attributable to the model’s actual complexion, rather than the thick application of chalk. The model,117 missing his right arm at the shoulder, rests his left hand on a human skull. However, in Witkin’s representation, the figure does not directly contemplate the skull, as in the Caravaggio and de la Tour examples; rather, his gaze – his eyes covered in a faux blindfold of black paint – is directed at the viewer. The figure’s nudity emphasizes the corporeality of life.

It is also noteworthy that in First Casting for Milo, Portrait of Greg Vaughan, and Portrait as a Vanité, the models are depicted against a rather plain background, devoid of any other substantial imagery – this differs from many of Witkins other works, some of which will be discussed henceforth. In clinical photographs, the subject is commonly placed against a plain background, and portions of the body may be cropped or covered.

Clinical photographs performed… scientific discourses specifically by conforming to strict visual conventions. The images characteristically capture live human bodies with an aesthetic and discursive detachment, by framing a frontal or profile image of the face or full body against a generally

116 Vanité is the Middle English and Anglo-French term for the Latin vanitas.
117 The same model appears to be used for Portrait as a Vanité and Portrait of Greg Vaughan.
indistinguishable backdrop. This kind of voided background, like a natural history illustration, symbolizes the void of context or lack of personal information about the subject portrayed.\footnote{Millett, “Performing Amputation,” 19.}

In the three Witkin photos noted, the voided background does not necessarily lend an air of detachment as a clinical photograph would; on the contrary, it sets the figures apart, focusing one’s attention directly on the figure.

Witkin’s controversial and excessive photographs disrupt medical models for disability by staging amputees as objects of art, design, and aesthetic magnificence, particularly because of their curious and spectacular, abnormal bodies. Through Witkin’s lens, the medical gaze proves to be infected with voyeurism, desire, and repulsion.\footnote{Millett, “Performing Amputation,” 9.}

Many of Witkin’s photographs of persons with physical anomalies are more jarring and shocking, though they are also reminiscent of classical portrayals of the human form. In his 1987 Woman on a Table (see fig. B.43), Witkin poses a female figure with no legs below the knee atop a three-legged wine table, set against a somewhat bucolic wooded background. In 1997’s Abundance, Prague (see fig. B.44), a female figure with no lower torso, and deformed arms, is placed atop an urn, with an arrangement of fresh fruits atop her head. Millett-Gallant describes the figure as “an eroticized sculptural object of beauty.”\footnote{Millett, “Performing Amputation,” 37.} As with many of Witkin’s presentations of amputees, “the photograph intervenes in what the viewer may think they know about
representation and about the disabled body.”¹²¹ At initial glance, *Abundance, Prague* might appear to be a composite of photographic images pieced together; upon closer inspection, it is evident that this is a photograph of a woman with no lower torso. By framing her in a classical setting, he places her in a context quite different from that in which one might encounter her in daily life. Millet-Gallant notes that “despite the plethora of visual details, the viewer’s eyes are drawn to the sites of the model’s impairments.”¹²²

Not all of Witkins models are amputees. Many of his subjects have other physical anomalies. His 1990 *Man with Dog, Mexico* (see fig. B.45) is a photo of an individual with male genitalia and breasts, with the general appearance of female qualities – such as the hairstyle, jewelry, and makeup. Were the genitals to be obscured, it would appear to be the photo of a young woman. The model is quite Khalo-esque in appearance, perhaps as an homage to Frida Kahlo. Kahlo was bisexual, known to have had affairs with both women and men; the embodiment of both feminine and masculine attributes in one figure could be interpreted as an affirmation of Khalo’s innate bisexuality. As noted earlier, Witkin states in a 1997 interview that his first sexual experience was with a pre-op transsexual. Is the figure in *Man with Dog, Mexico*, a grotesque or disturbing aberration; or, is it the portrayal of a quite beautiful individual?


¹²² Millett, “Performing Amputation,” 12.
In many of Witkins photographs, he actively manipulates the negative, by scratching and other invasive techniques, thus altering the final image: “the image exceeds medical discourses in its blatant theatricality, and the artist’s personal touch on the photographic plate disrupts the illusion that photography produces and reproduces its subject scientifically." Witkin’s 1986 photo *Leda and the Swan* (see fig. B.46a) is one such photo, demonstrating significant manipulation to the photographic negative as revealed in the final print. The subject is taken from Greek mythology. Leda, wife of King Tyndareus of Sparta, is visited by Zeus – the Greek god of thunder and the sky – in the form of a swan. The two have intercourse – it is debated if by seduction or rape – and that same night, Leda also has relations with her husband. Leda bears four children; two fathered by Zeus – Helen and Polydeuces, and two by her husband Tyndareus – Castor and Clytemnestra. The theme of Leda and the swan was particularly erotic, and has been the frequent subject of both sculpture (see fig. B.46b) and painting (see fig. B.46c). During the Renaissance, it was somewhat more palatable in art to show a woman having intercourse with a swan than with a man. In many of the painted interpretations of the myth, either two or four children are depicted with Leda – two children representing those fathered by Zeus, while four children includes the two fathered by Tyndareus.

Witkin’s interpretation of the myth includes two infants in the lower left of the photo, likely representing the children fathered by Zeus. The model for Leda is an emaciated male figure, Johnnie Baima, a survivor of polio. Witkin challenges the

---

123 Millett, “Performing Amputation,” 12.

209
viewers' sensibility and preconceptions about beauty and the ideal human form on different levels. For one, he has chosen a male figure to portray Leda, thus challenging the viewer’s preconceptions of gender and sexuality. For another, the figure is not beautiful in the “classical” sense, as the model’s body is ravaged by the effects of polio. Yet, the work has a strange eloquent beauty to it, however unsettling.

We substitute the body for the spirit, and we substitute the physical reality for spiritual reality. Since we are living in a world that doesn’t honor, as it would, say in the past, the body of Christ, the body of the Church, how people function in the pristine way. We honor blatant beauty, empty beauty of things, the quick aesthetic fix of the body and flesh. But instead I want to honor older aspects, more sincere spiritual and historic aspects of suffering, in a religious factor. Suffering to me is preparation for the life to follow.  

Witkin’s photographs challenge our concept of beauty. In many ways, his work is reminiscent of 18\textsuperscript{th} century French artist Jacques Fabien Gautier d'Agoty’s anatomical paintings and engravings (see figs. B.47a-c). Turkish writer Enis Batur labels d’Agoty as “one of the legendary names of the field”\textsuperscript{125} of human anatomical representation, commenting:

d’Agoty’s works stand as a turning point in anatomical painting; the representation of a taboo, the repulsive side of which was dominant, with a smoothing language particular to fine arts has, in one sense, made it easier to accept. If we refer once more to the imitation that is mentioned most, the style, here, is one in which the body blooms and blossoms like an enchanting flower: d’Agoty’s approach could be perceived as the bringing into consonance, the reconciliation of a reality which appears to be completely in contrast to the

\textsuperscript{124} Witkin, “Vile Bodies.”

criteria of beauty ascribed to the human body. Nobody was ready to face reality itself yet.\textsuperscript{126}

It is not particularly important or relevant for a physician to differentiate or classify various human bodies as either beautiful or ugly. Rather, as Witkin’s artwork demonstrates, it is important to recognize that how one perceives the body is conditioned by preconceptions of what is meant by beautiful. As Witkin model Jacqueline Tellalian points out, “there’s probably fewer people that are perfect than are not perfect.”\textsuperscript{127}

**Dark Victory: Diagnosis and Empathy(?) in Film**

Many cinematic productions are drawn from literature, based on novels or plays. It is often difficult and challenging to translate words on the page into a visual media, such as film. Fyodor Mikhaylovich Dostoyevsky’s 1880 novel *The Brothers Karamazov* is over one thousand pages in length; the classic 1958 film version by Richard Brooks totals 145 minutes. Lev (Leo) Nikolayevich Tolstoy’s 1869 novel *War and Peace* totals over twelve hundred pages, while King Vidor’s 1956 production totals 208 minutes. Totaling over thirteen hundred pages, Ayn Rand’s 1957 novel *Atlas Shrugged*, considered one of the greatest novels of the 20\textsuperscript{th} century, has yet to be made into a film.\textsuperscript{128}

\textsuperscript{126} Batur, “Anatomy, Aesthetics, Ethics,” 40.

\textsuperscript{127} Tellalian, “Vile Bodies.”

\textsuperscript{128} Various attempts have been made to adapt *Atlas Shrugged* for the screen. Rand herself began a screenplay version of her novel, but died prior to its completion. Baldwin Entertainment Group has announced a film version of the novel as “in development,” slated for release in 2011; however, the status of the project remains uncertain at this time.
Overall, the experience of reading a novel or play is quite distinct from viewing a film or stage production. The reader develops their own visual imagery based on their personal preconceptions and experiences relevant to the subject matter.

Conversely – while original literary works hold significant value, and unquestionably provide a depth of detail and insight that cannot easily be translated into film or other visual media – motion pictures provide an altogether unique perspective by visually portraying what is often difficult to put into words. A writer, for example, can describe in elaborate detail a pastoral landscape, the lush and abundant table setting at a banquet, or the inner emotions that a character is experiencing; it is up to the reader to form a mental picture of what is being read from the pages before them. Film producers can translate their own mental images of a novel into film. Mental imagery varies widely among readers, and cinematic interpretations certainly vary from the interpretations of individual readers. Yet, is generally not difficult for a reader to evoke mental imagery while reading a novel.

By contrast, a painter can render a visual interpretation of a landscape, or of emotion in a face. Yet, the experience of visual media such as a painting, requires a different level on interaction between the artwork and the viewer. The enigmatic expression of Leonardo da Vinci’s La Gioconda (Mona Lisa) is iconic. Try to describe the painting to another person, either verbally, or in writing; it is nearly impossible to convey the visual imagery in words. Ask an artist what question they least like to be asked, and they will more than likely respond that it is a request to describe their artwork.
In film, similar visual subtleties hold true. It is not uncommon in cinema for a character's emotion to be written on their face, or in their mannerisms, rather than conveyed verbally. Observation is inherent to the appreciation of visual media, such as film. In many instances, film adaptations of literary works provide their own uniquely insightful perspective.

The 1939 motion picture *Dark Victory*\(^{129}\) provides an excellent example of two primary themes addressed in this paper: the importance of visual awareness with regard to physical diagnosis, and empathy.

Bette Davis plays a twenty-three year old Long island heiress, Judith Traherne, who is plagued by headaches, dizziness, and blurred vision. She ignores her symptoms for as long as possible, attributing them to her socialite lifestyle of drinking and partying. An accomplished equestrian who enjoys hunting and riding, her personal assistant and her family physician suggest taking her to see a specialist in New York, following an extraneous fall from a horse – she claims that she threw the horse, rather than the horse throwing her, because she saw “two jumps” rather than one. Insisting she does not need to see a doctor, she is ultimately forced to go following a tumble down a flight of stairs.

Judith is taken to see Dr. Frederick Steele, played by George Brent, a doctor specializing in brain surgery. He is preparing to close his practice and board a train for

---

\(^{129}\) The 1934 stage production of George Brewer’s and Bertram Bloch’s *Dark Victory* was a commercial failure. The 1939 film version, written by Casey Robinson, was nominated for three Academy of Motion Picture Arts and Sciences Awards in 1940 for: Best Picture, Best Actress in a Leading Role (Bette Davis), and Best Music-Original Score (Max Steiner). All quotes and references to this film are taken from: *Dark Victory*, restored and remastered ed. DVD, directed by Edmund Goulding (1939; Burbank, CA: Warner Home Video, 2005).
Vermont where he plans to conduct brain cell research. Judith’s family physician, Dr. Parsons, is insistent that Steele examine her, as he is concerned with her persistent headaches, which she calls “hangovers.” Steele acquiesces when he encounters Judith in the waiting room.

The next roughly ten minutes of the film provide a classic example of the multiplicity of factors that contribute to physical examination and evaluation. It is important to note that Steele’s observational skills are key to his examination. Parsons has provided Steele with very limited background information about the patient; Judith herself is uncooperative – Parsons earlier notes that she is stubborn – and is not very forthcoming with information pertinent to her symptoms.

When Judith offers her hand to Steele in greeting, he immediately notices burns on her first two fingers; she claims that she has never noticed them before. After escorting her into his office for evaluation, Steele raises the window shade, and observes that Judith squints, and appears to be bothered by the light; she denies this when questioned about it. Judith explains that she doesn’t like talking about her health, as she finds the topic boring; although Steele comments that he makes his living listening to people, she replies that he is just wasting his time.

As Judith provides Steele with a very rapid-fire synopsis of her background and lifestyle, Steele stares intently into her face. Noting that she is “accustomed to a reasonable quantity of tobacco and alcohol,” she takes out a cigarette, which she attempts to light. She is unable to bring the match to the tip of the cigarette, and Steele guides her
hand. When Steele in turn takes out a cigarette, she lights a match, and is similarly unable to light his cigarette, requiring him to guide her hand. She is visibly perturbed by this observation.

Steele questions Judith about her activities the previous day; she replies that she played bridge in the afternoon, and attended the theatre in the evening. Parsons had earlier related to Steele that against his recommendation to her that she rest, she had engaged in these activities, though in reverse order from what she has just stated – she actually attended a play in the afternoon, and played bridge all night. She is unable to recall how she performed at bridge – that she lost; she also cannot recall what play she saw – *Cyrano*. When Steele asks if she liked the play, she replies that she had an awful headache; when he asks how long she has had these headaches, she states: “I don’t have them.” He claims, “you have one now,” which she denies.

Up until this point, Judith has been uncooperative, resistant, and visibly disturbed by her interaction with Steele. She has refused to answer questions truthfully, and has denied facts brought to her attention – even to the point of contradicting herself, by first stating she had an awful headache, and then claiming she does not have headaches. The bulk of Steele’s observations have been primarily visual; the burns on her fingers, her sensitivity to light, her inability to touch a lighted match to the tip of a cigarette.

Frustrated by the encounter, Judith heads for the door to leave; Steele confronts her, claiming that she has held things back from Dr. Parsons, because she is frightened. She hesitates, and Steele leads her to a chair. He observes that she has likely had these
headaches for months, which have progressively gotten worse, to the point that she is “never free of them.” He likens her vision “cutting out” to “someone shutting a pair of folding doors.” He notes that the “queer, dull feeling in [her] right arm” is due to sensory nerve paralysis; she likely obtained the burns on her fingers from a cigarette burning down which she was unable to feel. He notes that she is unable to concentrate – hence, her poor performance at bridge – and is irritable because her nerves are on edge, due to her attempts to avoid addressing her symptoms.

Following this confrontation, Judith becomes noticeably more cooperative and receptive. At this point, Steele calls in his nurse, and performs a number of simple tests likely not unfamiliar to most people who have visited their general practitioner. He tests her hand strength by having her squeeze his hands with each of hers, followed by testing her arm and leg reflexes with hammer taps. When he looks into her eyes with a light, he immediately notices something. He asks Judith to close her eyes, and hold out her hands, palms up. In her left hand, he places a dice, which she is able to correctly identify as a hard cube; when he places the same object in her right hand, she is unable to describe it. She is likewise unable to identify a pencil placed in her right hand, though she can immediately identify it when placed in her left. Placing a square of fabric in her left hand, she immediately identifies it as a piece of silk. Claiming that he is now going to trick her, Steele places a swatch of burlap in her right hand; she responds that his trick did not work, and that it is the same piece of silk. When asked again about her headaches and blurred vision, she does not hesitate to share that her headaches have been occurring
for five or six months, and that problems with her vision appeared over the last few weeks.

When the nurse reminds Steele that he must leave now or miss his train to Vermont, Judith looks at him with apprehension; she has opened up and placed her trust in him. He tells the nurse to cancel the tickets, and Judith appears relieved that he will be remaining to perform further tests – as Steele notes, “lots of x-rays.”

Steele diagnoses Judith with a life-threatening glioma, and operates to remove the brain tumor. However, post-operative examinations determine that her condition is terminal, and that she will likely die within a year. Steele does not share this diagnosis with Judith. The two fall in love; determined that she should live out her remaining months in happiness, Steele proposes, and they become engaged to marry.

The remainder of the film is devoted to the complexity and delicacy of their relationship. Steele does not want Judith to know about her condition, which she ultimately discovers, and questions if Steele’s romantic interest in her is out of pity rather than love. She resumes her previous lifestyle of drinking and partying, but ultimately realizes she wants to live out her remaining time with Steele, whom she truly loves. The two marry, and move to Vermont. Judith has learned that when the end draws near, she will experience blindness. Judith and Steele live happily together for a time, with Steele pursuing his brain cell research. Invited to give a lecture in New York, Steele plans that he and Judith will travel there together. As they are preparing to leave, Judith realizes that her vision is fading, signaling her imminent death. However, she does not share this
with Steele, and insists that he go to New York on his own. Her love for him is so great, that she does not want to compromise his career; she also does not want him present, as he would be anguished by her approaching death.

Aside from *Dark Victory* providing a noteworthy cinematic example of physical diagnosis in action, the film raises significant questions about the nature of the physician-patient relationship. In his empathy for Judith, has Steele overstepped an ethical boundary by falling in love with her and marrying her? Was it appropriate for him to withhold her prognosis from her? These and many more questions provide fertile discussion for medical students on the topic of empathy and the physician-patient relationship.

The 1965 film *Lilith*,130 starring Warren Beatty and Jean Seberg, provides another cinematic example of empathy potentially taken to the extreme. Beatty portrays Vincent Bruce, a young man who takes a job as an occupational therapist at a sanitarium. He immediately becomes intrigued by the beautiful Lilith Arthur, played by Seberg, a patient suffering from schizophrenia and nymphomania. Vincent falls in love with Lilith, and carries on a clandestine relationship with her in defiance of sanitarium policy. Vincent soon learns of other patients at the sanitarium who are infatuated with Lilith. One female patient noticeably adores Lilith from afar, and Vincent learns that Lilith has had an ongoing lesbian affair with another female patient, Yvonne Meaghan. A male patient, 

---

130 The 1965 film *Lilith* is based on J. R. Salamanca’s novel of the same name, published in 1961. The novel enjoyed commercial success, selling more than a million copies before the film was made. All quotes and references to this film are taken from: *Lilith*, DVD, directed by Robert Rossen (1964; Culver City, CA: Sony Pictures, 2004).
Stephen Evshevsky, also infatuated with Lilith, gives her a gift he has lovingly made specifically for her by hand – an intricately carved box. When she rejects him, he ultimately commits suicide. Stephen’s death drives Lilith to insanity. Vincent himself assumes some blame for Stephen’s death; he is aware of Stephen’s adoration of Lilith, and out of his own jealousy, does not intervene by providing Stephen with appropriate counseling. The film ends with Vincent quitting his job, and asking the doctors at the sanitarium for help.

At the start of the film, it is noted that Vincent is a veteran who has recently returned home from the Korean War. No blatant statements are made that Vincent is suffering from any type of mental illness due to his involvement in the war. On the contrary, he appears to be a well-adjusted young man. Did crossing the line in his empathy for Lilith, and his guilt over Stephen’s suicide, drive him to question his own sanity? Was there some pre-existing, underlying mental disturbance that was brought to the surface by his experiences at the sanitarium? Perhaps repeated viewings of the film might yield clues; perhaps not. The film certainly yields rich material for discussion within the context of medical empathy.

The films _Dark Victory_ and _Lilith_ provide questionable portrayals of empathy. In _Dark Victory_, was Steele’s handling of Judith’s case and medical condition appropriate? One might conclude that he crossed the ethical boundary of the doctor-patient relationship by becoming romantically involved with Judith, and ultimately marrying her. Yet, Judith died having experienced true love, however briefly. In _Lilith_, Vincent is
clearly cognizant of the fact that he is crossing a boundary in his relationship with a patient. Not only is his love for Lilith questionable, but also his interactions with Stephen. As a person placed in a position of authority and responsibility, did his own indiscretions directly result in Stephen’s suicide, and Lilith’s decent into madness – as well as his ultimate questioning of his own sanity?

A somewhat different perspective can be found in Alfred Hitchcock’s 1964 film *Marnie,*\(^{131}\) which provides a classic example of Freudian repression and psychoanalysis. The title character, portrayed by Tippi Hedren, is a sexually frigid misandrist, liar, and thief, with a profound fear of thunderstorms and the color red. She is employed by Mark Rutland, played by Sean Connery, who catches her attempting to steal from the company safe. Intrigued by Marnie, Rutland blackmauls her into marrying him, to avoid being turned over to the police. In love with Marnie, Rutland grows increasingly concerned by her unusual behavior, particularly her apparent loathing of him, and of men in general.

Rutland hires a private investigator to look into Marnie’s past, and eventually uncovers the apparent causes of her strange behavior. Marnie’s mother, a single parent, was a prostitute near the docks in Baltimore, Maryland. When one of her sailor clients tries to comfort Marnie as a young, frightened child during a thunderstorm, her mother mistakes his actions as sexual advances toward her young daughter, and the two struggle. Out of concern for her mother, Marnie grabs an iron from the fireplace, and strikes the

---

\(^{131}\) English writer Winston Graham’s 1961 novel, *Marnie*, was the basis for Hitchcock’s film. Hitchcock made a number of changes, which included a different ending, where Marnie is apparently freed from her repressed memories, and it is suggested that her marriage will thereafter be happy. A stage adaptation was produced in 2001 by Sean O’Connor.
sailor, killing him. Her repressed memories of these events apparently led to her fear of men (the sailor who “attacked” her mother), of thunderstorms (the traumatic event took place during a thunderstorm), and of the color red (the blood after she struck the sailor with the iron).

Although Rutland is not a physician, his empathy for Marnie can be questioned. For instance, angered by her frigidity during their honeymoon cruise, he forces himself on her sexually. Yet, he is committed to helping her uncover her repressed memories so that she can lead a normal and happy life. Were his actions in dealing with Marnie questionable, or commendable?

David Lean’s 1965 cinematic interpretation of Boris Pasternak’s 1957 novel *Doctor Zhivago* provides dual examples of empathy. Victor Komarovsky, an attorney, summons Professor Boris Kurt to treat Larissa’s mother Amelia, after she has apparently attempted suicide by swallowing a bottle of iodine. Kurt asks his student, Yuri Zhivago, “how would the poet like to see a bit of general practice,” and takes him along with him to attend to the ailing woman. Kurt and Zhivago pump Amelia’s stomach, and once the initial crisis has passed, prepare to have her transported to a hospital for further treatment and convalescence. Kurt pulls back the sheet to reveal Amelia, nude, disheveled, and drenched in sweat. He asks the “poet” Zhivago what he thinks of humanity now; Zhivago replies that he actually finds her quite beautiful. Kurt embodies the representation of a doctor perhaps with questionable empathy for his patient. By contrast, Zhivago, who is a poet – an artist – studying to become a doctor, has more
empathy for Amelia, which is implied is likely due to his artistic disposition. Zhivago is
not unlike Russian poet Anton Chekhov, who wrote:

I am not a liberal, nor a conservative, not a gradualist, nor a monk, not an
indifferentist. I merely want to be a free artist, and I only hope that God will give
me the strength to be one. I loathe lies and violence in all its forms.  

The study of the visual arts provides rich opportunities for medical students to
improve skills necessary for physical diagnosis, enhance empathy, and approach those
ethical questions encountered daily in clinical practice. Classical sculpture provides
abundant examples relevant to the study of human anatomy; or, in the instance of
Michelangelo’s Night, an example of honing observational skills relevant to physical
diagnosis. Studying representational portrait paintings – such as Rembrandt’s life-
spanning self-portraits, or Géricault’s renderings of the insane – promote the
development of visual literacy. The study of non-representational artwork – such as
Jackson Pollock’s drip paintings – removes the viewer from what is comfortably
recognizable and identifiable, and expands and sharpens the medical student’s visual
acumen. Grünewald’s Isenheim Altarpiece – as well as Wyeth’s Christina’s World –
engage the viewer via symbiotic empathy with the images portrayed. Kahlo’s self-
portraits document a lifetime of physical and emotional anguish; she “uses medical
imagery in a disruptive way as a foreign element that causes one to question the
boundaries and exclusions enforced by art.”

The disturbingly beautiful photographs

133 Lomas and Howell, “Medical Imagery,” 1586.
of Joel-Peter Witkin challenge our preconceptions of beauty, normalecy, and conformity. And the cinema provides endless opportunities to explore the complexity of the human psyche. The visual arts as a teaching tool arguably have value within the context of medical education.
CHAPTER V

INTEGRATING VISUAL ARTS EDUCATION INTO MEDICAL SCHOOL CURRICULA

The question is not what you look at, but what you see.
– Henry David Thoreau

Summary of Findings and Curricular Proposals

In the preceding chapters, I have attempted to establish the historical importance of a liberal arts education, tracing the roots of the concept to Cicero’s 1st century B.C. speech Pro Archia (Oration for Archias), in which he espoused the virtues of ‘de studiis humanitatis’ – a liberal arts education grounded in the humanities.\(^1\) This served as the foundation for Petrarch’s notion of humanism in the 14th century, which became a defining concept of the Renaissance.\(^2\) The study of humanism and the humanities is not strictly relevant to the arts with regard to illuminating the human experience. Pellegrino submits:

Medicine, like the arts, also provides a kind of human experience that makes it a special medium for revealing the world. It too, can yield an esthetic wisdom of its own special object, man. Medicine taught in a humanistic frame prepares the student for its human practice.\(^3\)

---

1 Brotton, *The Renaissance*, 42.


The concept of humanism is a founding principle in the practice and philosophy of medicine in the West:

Two concepts of the idea of humanism were recognized by Aulus Gellius, the second-century grammarian, when he spoke of the meaning of the word humanitas, from which ‘humanism’ was later derived. He distinguished humanitas – education and training in the ‘good’ arts – from a ‘good’ feeling toward all men. Humanitas is more properly subsumed under the Greek term paideia – an educational and cognitive ideal; and the ‘good’ feeling – what we would call compassion – is more akin to the Greek concept of philanthropia. Following Aulus Gellius, we can discern the same two ideals when embodied in the term humanism in medicine. One, the cognitive, deals with the physician as a man, a cultural being possessing ideas, values, and modes of expression in word and art. The other, the affective, concerns the feeling of the physician for the person-as-patient experiencing the existential trials of illness. Together, these ideals enable the physician to understand his science and also to identify with the humanity of those he serves.4

Within the context of medical education in the United States, American medical education emerged “from the shadows of its European counterparts”5 with the establishment of the Johns Hopkins University Medical School in 1893, where the humanistic patient-as-person movement took hold in the early 20th century.6 The 1910 Flexner Report “demanded an atmosphere of excellence in American medicine,” and “its standards became the ultimate goal for medicine around the country.”7 The importance of the humanities and the applicability and relevance of the liberal arts in medical education – stemming in part from much of the groundwork laid by Flexner – has been

4 Pellegrino, Physician and Philosopher, 154-55.
5 Toledo-Pereyra, A History of American Medicine, 59.
6 Shorter, “Primary Care,” 123.
7 Toledo-Pereyra, A History of American Medicine, 167.
researched and examined quite extensively, and is represented in the literature, such as:

R. H. Curry and K. Montgomery, in *Toward a Liberal Education in Medicine*, building on Flexner’s thesis of medical education within the context of the opportunity for exposure to other disciplines within a university setting;8 D. J. Doukas, L. B. McCullough, and S. Wear, in *Reforming Medical Education in Ethics and Humanities by Finding Common Ground with Abraham Flexner*, proposing “a reformation of medical humanities teaching in medical schools inspired by Flexner's writings on premedical education in the context of contemporary educational requirements;”9 and K. S. Warren

8 “The central thesis of Abraham Flexner's analyses of North American and European medical education was that the university is essential to the provision of a medical education. The authors invoke the spirit of Flexner to envision further contributions of the university at large to undergraduate medical education. Medical curricula now include elements of a variety of other disciplines that are better represented in other parts of the university. Most schools, however, even those closely affiliated with a comprehensive university, do not take full advantage of these resources, nor do they offer sufficient opportunities for students to pursue individualized interests and learning goals. Medical school now plays a different role in the education of physicians than it did a century ago-it remains the definitive, but is no longer the ultimate, stage in a continuum involving college, professional, postgraduate, and continuing education. The authors explore the medical school years as an opportunity for a liberal education in medicine. Beyond the assurance of competence in core knowledge, skills, and perspectives, this model places more emphasis on nurturing students' intellectual curiosity about phenomena of illness and disease, their understanding of the human condition, and their exploration of the many other disciplines related to medicine and the life sciences. A richer, broader education can be achieved through more flexible and individualized paths to the MD and facilitated by realizing medical schools' full academic citizenship in the university.” (Abstract excerpt). From: R. H. Curry and K. Montgomery, “Toward a Liberal Education in Medicine,” *Academic Medicine* 85, no. 2 (February 2010): 283-7.

9 Abraham Flexner was commissioned by the Carnegie Foundation for the Advancement of Teaching to conduct the 1910 survey of all U.S. and Canadian medical schools because medical education was perceived to lack rigor and strong learning environments. Existing proprietary schools were shown to have inadequate student scholarship and substandard faculty and teaching venues. Flexner's efforts and those of the American Medical Association resulted in scores of inadequate medical schools being closed and the curricula of the survivors being radically changed. Flexner presumed that medical students would already be schooled in the humanities in college. He viewed the humanities as essential to physician development but did not explicitly incorporate this position into his 1910 report, although he emphasized this point in later writings. Medical ethics and humanities education since 1970 has sought integration with the sciences in medical school. Most programs, however, are not well integrated with the scientific/clinical curriculum, comprehensive across four years of training, or cohesive with nationally formulated goals and objectives. The authors propose a reformation of medical humanities teaching in medical schools inspired
in *The Humanities in Medical Education*, addressing the presumption that “a major impediment has been the belief that gaining admittance to medical school is exceedingly difficult and, therefore, a student must major in the sciences” at the expense of studies in the liberal arts.¹⁰

Kenneth Ludmerer of Washington University in St. Louis identified the “hidden curriculum” in undergraduate medical education, which consisted of the “noncognitive objectives of education,” and contributed to “a physician’s attitudes, values, character, and professional identity.”¹¹ The hidden curriculum complemented the formal curriculum – which was primarily lecture-based – focused specifically on “knowledge and facts, reasoning and cognition.”¹² Ludmerer identified the importance of the hidden curriculum by Flexner’s writings on premedical education in the context of contemporary educational requirements. College and university education in the humanities is committed to a broad education, consistent with longstanding tenets of liberal arts education. As a consequence, premedical students do not study clinically oriented science or humanities. The medical school curriculum already provides teaching of clinically relevant sciences. The proposed four-year curriculum should likewise provide clinically relevant humanities teaching to train medical students and residents comprehensively in humane, professional patient care.” (Abstract excerpt). From: D. J. Doukas, L. B. McCullough, and S. Wear, “Reforming Medical Education in Ethics and Humanities by Finding Common Ground with Abraham Flexner,” *Academic Medicine* 85, no. 2 (February 2010): 318-23.

¹⁰“The importance of humanities in general education is generally acknowledged. With respect to premedical education, a major impediment has been the belief that gaining admittance to medical school is exceedingly difficult and, therefore, a student must major in the sciences. In compensation, the humanities have been introduced in medical schools either through compressed 6-year programs or as curricular or extracurricular options. Studies have shown, however, that approximately 50% of all applicants are admitted to medical schools and that the relatively small proportion of students who have majored in the humanities do somewhat better than average. With respect to medical schools, results of an examination of programs throughout the country suggest that strong extracurricular rather than curricular programs should be developed for the humanities.” (Abstract excerpt). From: K. S. Warren, “The Humanities in Medical Education,” *Annals of Internal Medicine* 101, no. 5 (November 1984): 697-701.

¹¹Ludmerer, *Time to Heal*, 70.

¹²Ludmerer, *Time to Heal*, 70.
curriculum’s contribution to the cultivation of empathy and “good physicianship,” and its influence on “the gaze with which students viewed patients,” which was the “primary determinant of whether students learned to view patients as people or as abstract disease entities.”

Pellegrino contends:

Humanism and the humanities are essential to the fullest maturation of the physician not only as a professional, but as an educated human. They are indispensable to the fullest expansion of the medical intellect, allowing for a life of competency and responsibility and of satisfaction and delectation. No education can assure that every physician will savor the arts and the humanities for their intrinsic worth. Those who do can hope to approach the ideal of the Compleat Physician. In him the profession is graced by a complete human in whom science and art, profession and life, morality and competence are inseparably united. This is the ideal toward which each of the engagements between the idea of humanism and medicine ultimately must tend.

By the middle of the 20th century, the education of medical students in the U.S. became “no more than a byproduct of what academic medical centers were now doing,” which Ludmerer attributes to the combined “pressures of research, graduate medical education, and the provision of increased patient care.” Under the increasing pressure of the “mandate to change” the nature and content of the medical curriculum, which emphasized the need to “incorporate the most important new knowledge and ideas,” to “discard the unimportant or incorrect,” and to “accommodate the larger changes affecting

---


14 Pellegrino, *Humanism and the Physician*, xi.


medical practice,”¹⁷ medical curricula became too narrowly, technically focused.¹⁸ While “a frequently recurring theme in requirements for admission to medical training since the beginning of [the 20th] century has been that of prior instruction in what would now be called the liberal arts,”¹⁹ emphasis on the liberal arts in general has waned considerably. Atalay observes:

The typical liberal arts curriculum offered in the American undergraduate education system give students exposure to different intellectual cultures. But then the need to develop specialized skills in one field or another tends to discourage further forays across the cultural divide. The higher education systems in most other countries calls for this specialization to begin even earlier. Beyond formal education, normal maturation or aging itself is sadly accompanied by the monotonic dimming of one’s curiosity. Once the specialization process begins, those individuals who are more technically oriented have greater facility communicating with others who are technical, and those who are artistic or less technical similarly feel comfortable in the company of individuals with skills and interests akin to their own. In short, birds of a father most clearly flock together, communicating with each other in their own languages.²⁰

Furthermore:

The doctors’ dilemma is made no easier by a widespread suspicion of science and technology in general. In spite of their impact on the way we live, ignorance about them is common. Science is thought of as antithetical to human values; technology is associated with pollution, weaponry, and all manner of environmental destruction. Medical science suffers by association and, of course, by its own tragedies and misapplications.²¹

¹⁷ Ludmerer, Time to Heal, 196-7.
¹⁸ Ludmerer, Time to Heal, 198.
²⁰ Atalay, Math and the Mona Lisa, 270.
Pellegrino contends:

In the growing litany of criticism to which our profession is increasingly exposed, there is one that in many ways is more painful than all the rest. It is the assertion that physicians are no longer humanists and that medicine is no longer a learned profession. Our technical proficiency is extolled, but in its application we are said to be insensitive to human values. We are, in short, presumed to be wanting as educated men and as responsive human beings. The assertion is painful because there is some truth in it… our art is indeed in danger of being engulfed by its technological apparatus… The criticism is especially poignant for medical educators, at whose door much of the responsibility is laid. We are told that we neglect the teaching of human values and the art of medicine; that in our zeal for science we ignore liberal studies… even our friendlier critics… fear that our haste will further erode the liberal education of future physicians and thus accentuate the dehumanization of the student and the depersonalization of the patient.²²

By the early 1970’s, U.S. medical schools introduced the study of literature and literary methodology into their curricula in an effort to reintroduce and reintegrate some aspect of liberal arts and the humanities in medical education. Soon thereafter, the potential value of introducing other humanities-based disciplines was explored and began to proliferate.

In the preceding chapters, I have explored the potential benefits the visual arts in particular can contribute to medical education and the shaping of better physicians. The challenge remains identifying specifically what types of curricular changes and initiatives might be feasible and how to implement them. The greatest challenge is the rigidity and inflexibility of the current four-year curriculum typical in most U.S. medical schools. Medical curricula is highly regimented, where “the student is actively engaged in

²² Pellegrino, Physician and Philosopher, 153-54.
relatively formal learning situations and has very little unstructured time.” Many U.S. medical schools find it difficult to justify “whether the visual arts can provide a vital contribution to the making of tomorrow’s physicians, and thus be deemed essential for their education.”

The educational background medical students bring with them, and their perceptions and approach to medical education, bear significant relevance to the issue as well. In one of the responses to the survey I conducted, one medical school replied regarding their attempts at integrating humanities into their medical curricula:

The students were clearly not connecting the activities to good medical practice and we had to discontinue the program… it seemed to be turning students off and the focus became the resistance and rebellion to the program. The experience with the visual arts aspect met with great resistance, mainly because the students felt that it had nothing to do with medical training.

Pellegrino observes:

Not many students today perceive the value of a rigorous education in the cognitive elements of traditional humanism. Some will perceive them later in life, when medicine itself becomes so routinized as to verge on boredom. Others, perhaps the majority, will never perceive the life-enhancing qualities of traditional humanistic study… Some students will continue to follow the pattern of a professional education built on a prior base in the liberal arts. For the majority, the most effective teaching of student’s motivation and goal directedness will help to focus the cognitive features of the humanities. The medical context is rich in possibilities for explicating the essential cognitive skills unique to human and liberal studies. The pedagogic aim in the pre-degree years is to uncover the student’s interest in these skills and, in the years of continuing education, to reinforce them in his own experiences as a person dealing with other persons in the medical transaction.


Dr. Paul Rodenhauser and his colleagues at Tulane University demonstrated arts-related courses and activities are prevalent in U.S. medical schools; however, they concluded that “the advisability of reconstructing the medical school curriculum to include the arts as an integral and durable part of the education process” is quite variable and not widely addressed.26

Many medical educators are outright opposed to the prospect, contending that “enhanced emotional responsiveness including that induced by deeper cultivation in the humanities may not be what all medical students need, and furthermore that it may in fact be a detriment to the effectiveness of at least some physicians.”27 As a potential response to this stance, Dr. Jane Petro commented to Eric Avery after viewing his photographs of her reattaching a severed hand, that she found it difficult to concentrate in the operating room in the weeks that followed:

Several weeks after she had seen the photographs, she informed me that, to my surprise, she was having difficulty in the operating room detaching herself from elements she had seen in the photographs. I was concerned that possibly my photographs should not be seen by the person being photographed, that I was in some way tampering with the necessary distance surgeons need to do their work. However, to my relief, she reported that over the next two weeks, she had moved through this reaction and felt that her experience in surgery had only been enriched by what had happened with the photographs. She explained that now when she is in the operating room, she can consciously focus or shift her attention to various aspects of the surgery. She can attend to what I have seen and shown her about surgery, or she can remain detached from it.28

---

26 Rodenhauser et al., “Arts-Related Activities,” 237.


Dr. Petro states she felt she “became a surgeon” following the experience with Avery’s photos.  

Investigations into recent forays into such curricular initiatives in U.S. medical schools has gauged the successfulness and efficacy of such changes – even if only anecdotally – and has helped to build a strong argument in favor of the integration of visual arts training into medical education. As noted in Chapter I, P. S. Phillips, a medical student at Southampton University, U.K., organized a life drawing class for medical students. The class was taught in three, three-hour sessions, by a drawing tutor, in consultation with a human morphology tutor. An anatomist also attended, and was given the opportunity to quiz the students on musculature, innervations and vascular supply; “the exercise was a potent experience in integrating detailed, uncontextualized knowledge about separate anatomical areas into an understanding of the workings of a normal human body.” As noted in his article published in Medical Education in 2000, Phillips concluded:

Life drawing was successfully used to give students a wider perspective on anatomy and the human body. It was no substitute for more formal anatomical learning, and the potential exists for further integration of medical science and clinical teaching with life drawing.

---


Also noted in Chapter I, Dr. Donald A. Misch at the Medical College of Georgia has “complemented the traditional psychosocial formulation curriculum with a highly structured teaching venue in which psychiatry residents regularly observe commercial films,” as outlined in his 2000 Academic Psychiatry article. Following the viewing of these films, the group collectively constructs “psychosocial formulations for the principal characters.” Films specifically about mental illness (e.g., One Flew Over the Cuckoo’s Nest), as well as films involving secondary themes of mental illness (e.g., A Streetcar Named Desire), are selected: “by choosing films that depict typical situations or experiences of typical people, the concept of psychopathology moves from the realm of rarified intellectual theory to everyday reality and practicality,” reminding psychiatry trainees that “psychodynamics and psychopathology are all around us, if we are interested and willing to look for them.”

The 2001 Yale study (Dolev, et al.) published in the Journal of the American Medical Association found “visual details can be enhanced in medical school students through systematic visual training using representational painting.” The 2006 Irvine study (Shapiro, et al.) concluded “traditional training and arts-based training were both

32 Misch, “Psychosocial Formulation,” 99-104.
33 Misch, “Psychosocial Formulation,” 99.
34 Misch, “Psychosocial Formulation,” 101.
valuable, and complemented one another.\textsuperscript{36} And, in their 2008 study published in the *Journal of General Internal Medicine*, Dr. Joel T. Katz and his colleagues at Harvard concluded qualitatively and quantitatively that “observation skills, including those directly relevant to clinical medicine, can be successfully acquired through active, structured study of works of art and medical imagery.”\textsuperscript{37}

For the remainder of this concluding chapter, I intend to propose: integrative approaches, whereby visual arts approaches can be integrated into existing medical coursework; and additive approaches, outlining potential elective or extra-curricular options that would most effectively utilize existing resources available to most medical schools. These approaches will differentiate between passive participation on the part of the student, whereby the student gains an appreciation of potential value added by way of the application of visual arts tools; and the value of active participation on the part of the student, whereby the student is creatively involved in the visual arts as a means of enhancing their medical education. The general areas I have identified where these potential curricular initiatives are most applicable and feasible are, based on common curricular components of the medical curriculum at most U.S. medical schools: physical

\textsuperscript{36}“Several parallels between art and medicine emerged from our data analysis, including the importance of learning how to read gesture and expression, how to interpret context, how to determine what is symbolically as well as literally important, how to be skeptical about initial assumptions, and finally, how to empathically perceive emotional dimensions and narrative. These similarities reinforce our conclusion that the 2 teaching approaches studied were naturally complementary, and justify the growing inclusion of arts-based pedagogical tools and approaches in medical education. Taken together, training employing a wide range of methods can bring greater texture to the process of teaching clinical medicine and help us see a more complete picture of the patient.” Shapiro et al., “Training the Clinical Eye,” 268.

\textsuperscript{37}Naghshineh et al., “Formal Art Observation Training,” 991-97.
diagnosis and the physician-patient relationship; human gross anatomy and physiology; psychiatry and behavioral psychology; and doctoring and medical ethics. Following my research and investigation of the topic, my question is not if such initiatives have value; rather, my contention is that such initiatives are relevant, important, and imperative.

There is indeed a genuine and urgent dilemma. Society has the right to require that physicians be competent, that they practice with consideration for the integrity of the person, and that some of them also be educated men who can place medicine in its proper relationship to culture and society. Medicine enjoys a unique position among disciplines – as a humane science whose technology must ever be person-oriented. Its practitioners are, therefore, under an extraordinary mandate to live, and work within a humanistic frame.38

**Where Does It Hurt?: Improving Diagnostic Skills**

During the recently concluded two-week television broadcast of the 2010 Winter Olympic Games in Vancouver, Canada, viewers were subjected to the frequent airings of a commercial to promote an advanced diagnostic tool for physicians.

GE is helping to transform the delivery of patient care with Venue™ 40, a miniaturized ultrasound system with advanced touch-screen technology, launched by GE Healthcare, a business unit of General Electric Company (NYSE: GE). Venue 40 is portable, allowing physicians to quickly perform rapid diagnostics and needle-guided procedures right at a patient's bedside, providing real-time results. Whether it is being used in the emergency room, operating room or sports medicine clinic, the lightweight system can be easily transported from location to location, offers high-resolution imaging, and is easy to both use and clean.39

Depicting a doctor with a patient in different locations around the world and at different times in history, the doctor lifts the patients’ shirt or blouse, and asks – in different

---


languages – “where does it hurt?” In various scenarios, the doctor either prods the patients’ abdomen, visually examines it, or listens with his ear. In the final example, the doctor lifts a child’s shirt, and holds a hand-held imaging device to the child’s abdomen, which provides both a visual display and digital readout. The technological ultrasound device advertised is certainly an invaluable tool to modern physicians, providing vital and much-needed information in a portable, instantaneous fashion. At the same time, this commercial demonstrates the contemporary dependence and reliance upon technology for physical diagnosis.

Physical diagnosis is generally defined as an examination performed by a physician on a patient in an effort to identify signs of disease. Combined with information on a patient’s medical history and consideration of the patient’s symptoms, the examination will assist the doctor in arriving at a diagnosis, prognosis, and a potential course of treatment. Learning physical diagnosis is a required integral component of the medical curriculum at all U.S. medical schools. Physical diagnosis may be taught beginning in the first year, though it is more typically taught as part of the second year of study, in preparation for third year clinical clerkships and rotations. As an example, the School of Medicine at Georgetown University – my home institution – describes the goal of their physical diagnosis module as follows:

In this three semester course, students will learn the format and features of a complete history and physical examination, including its systematic and structured format and how to record and convey findings and observations; learn how to conduct an organ and system-specific history and physical examination and learn to distinguish between normal and abnormal findings; and start to develop the capacity to formulate a differential diagnosis and integrate history and
physical examination findings with basic sciences, anatomy, and pathophysiology.\footnote{Georgetown University School of Medicine website, First Year Curriculum Modules. http://som.georgetown.edu/medicaleducation/curriculum/FirstYearModules/Modules/74108.html (accessed February 28, 2010).}

Aspects of the physician-patient relationship may be integrated into courses on physical diagnosis, or may be taught as a separate, independent course or courses.

As I have previously observed in Chapter I, Katz’s and his Harvard colleagues developed an elective course, \textit{Training the Eye: Improving the Art of Physical Diagnosis}, to help medical students learn to see more carefully in an effort to improve their skills in diagnosing illness in a clinical setting through: close observation and guided discussion of visual art; exploration of core artistic concepts; and opportunity to apply these skills to the clinical assessment of patients with a broad range of disorders.\footnote{Naghshineh et al., “Formal Art Observation Training,” 991-97.} Also discussed in Chapter I, the 2001 Yale study (Dolev, et al.) found “visual details can be enhanced in medical school students through systematic visual training using representational painting;”\footnote{Dolev, “Use of Fine Art,” 1020-1021.} in Chapter IV, I provided as an example the self-portraiture of 17\textsuperscript{th} century Dutch painter Rembrandt van Rijn. Studies by Espinel,\footnote{Espinel, “A Medical Evaluation of Rembrandt,” 1836.} Friedman (et al.),\footnote{Friedman et al., “Rembrandt – Aging and Sickness,” 67.} and Marcus and Clarfield\footnote{E. L. Marcus and A. M. Clarfield, “Rembrandt’s Late Self-Portraits: Psychological and Medical Aspects,” \textit{International Journal of Aging and Human Development} 55, no. 1 (2002): 25.} were cited. Another example from painting can be found in Ingres’
Grand Odalisque of 1814 (see fig. B.5b). At first glance, this appears to be a representational portrait of a nude, reclining woman, with no particular physical anomalies. Studying the painting closely, would one notice that the figure’s spine is actually quite long, and appears to have additional vertebrae? The model certainly did not have such an elongated spine; rather, Ingres took “artistic liberties” in order to achieve the compositional effects he desired. Likewise, would one readily be able to identify anything unusual about Michelangelo’s sculpture of the Pietà (see fig. B.48). The figures of Mary and Christ appear to be perfectly natural representations of the human body. Look at the statue carefully, and imagine the figures of both Christ and Mary standing, side-by-side; the figure of Mary is significantly disproportionate compared to that of Christ. Had Michelangelo depicted the figures in realistic proportional size, the body of Christ would not rest comfortably in Mary’s lap, and would appear bulky and awkward. Michelangelo has taken “artistic liberties” in order to convey the motherly embrace of Mary.

As noted in Chapter I, Johanna Shapiro and her colleagues at the University of California Irvine focused their research on the pattern recognition skills of medical students using both representational and non-representational art.46 By including “artwork that is more difficult to characterize and less replete with familiar forms or content” in addition to representational artwork, they sought to “develop a systematic


46 Shapiro et al., “Training the Clinical Eye,” 263-68.
process of observation that [students] could apply to highly divergent stimuli.” Dr. Shah Shoshbin, Dr. Katz’s colleague at Harvard, proposes looking at abstract art, such as expressionist works by Jackson Pollock, as beneficial to learning pattern recognition.

The extent to which such an initiative may be integrated into existing physical diagnosis courses at individual medical schools is highly dependent upon the current structure and duration of such courses: some institutions may devote the equivalent of one semester to physical diagnosis, while others may devote three – or more - semesters. The Harvard study revealed “students who attended 8 or 9 sessions had a greater increase in their mean change score, compared to those who attended 7 or fewer sessions.”

Another important factor is accessibility to individuals with some level of knowledge and expertise in the visual arts, and the availability of funding to support such an interaction. Medical schools associated with a university with an Art Department may be able to tap into their faculty to collaborate. However, there are potential drawbacks to such endeavors. In the survey responses I received, it was observed by one medical school:

We hired an English professor with a background in medical education, and who purportedly specialized in the medical humanities. She tried a number of modalities in attempts to integrate visual arts, writing, and reflective activities into the curriculum. This thread was not well-received at all and the feedback we got from students was that they thought some of the activities were important, but were distressed by the approach of the faculty who tended to present the material in a very abstract manner.

And in another observation:


My personal sense is that the most qualified faculty for teaching this important aspect of medicine are found on undergraduate campuses, and that inclusion of visual arts (along with humanities and other non-scientific fields) would be best included as prerequisites for medical school rather than medical schools trying to hire faculty with this expertise.

Pellegrino contends:

Not many bona fide humanists are prepared for this sort of teaching. Hopefully, more of them will see challenges and benefits for their own studies in an intimate exchange with medicine. If current interest among medical educators grows, we will need to educate some humanists specifically for the engagement with medicine. There is some danger at present, as with any new field as yet unproven intellectually, that the field may fall to the willing and eager rather than to the most competent teachers.49

Even in the event that appropriate financial and instructor resources might be available, a potential drawback of incorporating such an initiative into existing physical diagnosis coursework would be the risk of diluting the potential beneficial effects of the training. The development of an independent, complementary course, such as that taught at Harvard, presents itself as the best possible pathway for most U.S. medical schools. The inclusion of exercises providing the opportunity for active involvement in the visual arts on the part of the students would also be highly encouraged. For example, The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence by California State University-Long Beach Professor Emeritus of Art Betty Edwards,50 provides some potentially useful exercises to enhance right-brain

49 Edmund Pellegrino, Physician and Philosopher: The Philosophical Foundation of Medicine, foreword by Daniel P. Sulmasy (Charlottesville, VA: Carden Jennings Publishing Company, 2001), 162.

development. Edwards has demonstrated startling development by students who attended a five-day workshop (see fig. B.49). She contends: “learning to perceive is the basic skill that the students acquired.”\(^{51}\) Another example provided by Edwards involves an exercise in copying Picasso’s 1920 drawing of Igor Stravinsky (see fig. B.50a). The exercise involves the student placing the Picasso drawing right-side up, and making a copy of the drawing; a subsequent exercise requires inverting the Picasso drawing, from which a copy is attempted by the student, “forcing the cognitive shift from the dominant left-hemisphere mode to the subdominant right-hemisphere mode” (see fig. B.50b).\(^{52}\) The results of the exercise are quite stunning (see fig. B.50c-d). When the student inverts the drawing, the shapes and forms of the Picasso drawing are less familiar and identifiable, as a face, and arm, a pair of eyeglass, a chair, etc. The student is forced to observe the various forms, lines, and shapes that compose the drawing. This cognitive shift results in improved observational skill.

Quite inarguably, it is entirely unfeasible for medical students to devote eight hours a day for five days to such an endeavor; however, many of the exercises outlined in Edward’s book can be easily adapted to awaken visual awareness in medical students through shorter-duration exercises in an elective course.

---

\(^{51}\) “The change you see in their ability to draw possibly reflects an equally significant change in their ability to see.” From: Betty Edwards, *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. 2\(^{nd}\) rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999), 21.

I have noted that one of the challenges to introducing visual arts techniques and methodologies to medical students rests with differences in language and semiotics. Teaching some of the basics of color theory might serve to address this potential difficulty by utilizing scientific language and concepts familiar to medical students, and introducing concepts of color theory familiar to visual artists. Training in basic color theory would also prove beneficial to pattern recognition – a useful tool in diagnosing skin disorders, for example – as suggested by Dr. Shoshbin of Harvard.

In the mid to late 17th century, Newton experimented with light, contributing significantly to our present understanding of light and color. His investigations involved refraction of white light through prisms to demonstrate light as the source of colors, as the prism broke light down into its component colors. Newton’s theories were scientifically based upon the physical action of light interacting with an object and entering the eye.

In 1810, German writer Johann Wolfgang von Goethe – a true polymath in the spirit of da Vinci – published his Zür Farbenlehre (Theory of Colors). Simply summarized, Goethe disputed many of Newton’s color theories, and explored color sensation and perception. Goethe’s color theories are not limited to Newton’s understanding of light acting upon the eyes, but involve deeper perceptual interaction between objects, light, and the sensory system of the viewer. As examples: whereas Newton saw light as heterogeneously composed of separate color elements, Goethe saw light as homogeneous; Newton viewed darkness as the absence, and therefore the absence
of color, while Goethe viewed darkness within the context of its interaction and polarity with light; Newton considered white light to be composed of seven pure colors, while Goethe considered blue and yellow to be the only pure colors, with all other colors as degrees of blue and yellow (see fig. A.7 for a detailed table). Following Goethe, 19th century German physiologist Karl Ewald Konstantin Hering contributed to much of our contemporary understanding of spatial perception and color vision. Hering’s approach to color was qualitative, and involved retinal reception of color.

Although many of these color theories have been disputed and on many levels discredited, an understanding of the history of color theory contributes to improved visual awareness. Of particular relevance to introducing color perception to medical students for the purpose of improving physical diagnosis skills, 20th century German-American artist Josef Albers contributed significantly to the teaching of color theory in art education. Albers was associated with the Bauhaus movement that ended in 1933 with the rise of the Nazi regime in Germany. He joined Black Mountain College in Asheville, North Caroline, along with many other displaced Bauhaus artists, where he taught painting and color theory. His Interaction of Color,53 originally published in 1963, became a popular handbook for the teaching and understanding of the interaction of color. In one example, two smaller squares of color placed in the center of two larger squares of color appear to be of the same shade (see fig. B.51); however, when viewed

---

independently, each of the smaller squares of color are actually of differing value, hue, and intensity. In a reverse example, the two smaller squares appear to be different shades of a particular color; yet, shown independently, the shades in the smaller squares are actually of identical value, hue, and intensity. These and other examples serve to demonstrate how colors interact and affect one another. The 1994 edition of Albers’ Interaction of Color, available from Yale University Press, contains an interactive CD-ROM, providing the ability to perform color exercises on a computer. What value would these exercises have for the medical student? As noted in Chapter IV, the enhanced visual awareness derived from through the study of color and pattern – such as in the paintings of Jackson Pollock – has been demonstrated to improve diagnosis of skin disorders in patients (see fig. B.29a-d).

**The Paragon of Animals: Human Anatomy**

In William Shakespeare’s *The Tragedy of Hamlet, Prince of Denmark*, Hamlet professes the following in a famous soliloquy in Act II:

> What a piece of work is a man, how noble in reason, how infinite in faculties, in form and moving how express and admirable, in action how like an angel, in apprehension how like a god! the beauty of the world, the paragon of animals⁵⁴

From the time of the Ancient Greeks, the human body has been the preferred subject of artists, and the object of fascination to physicians. For both, the human body is a complex – sometimes mysterious – and endless source of discovery and beauty. It was

---

not until the end of the 15\textsuperscript{th} century, however, that exploration of human anatomy by way of dissection and anatomical research was emphasized as a teaching tool for medical students in the universities of Europe;\textsuperscript{55} artists – such as Michelangelo and da Vinci – also became interested in dissection as a foundation for their artistic endeavors. The 1543 publication of Vesalius’ seven-volume \textit{De humani corporis fabrica (On the Fabric of the Human Body)} was groundbreaking, and Gray’s classic textbook \textit{Anatomy of the Human Body} (a.k.a. \textit{Gray’s Anatomy}) has been continuously in print since its original publication in 1858. Yet, contemporary medical education has resorted to advanced technological methods for exploring the human body:

For a variety of reasons, new radiological imaging techniques are supplanting traditional cadaver dissection in the teaching of human anatomy... Cadaver dissection offers an active, hands-on exploration of human structure, provides deep insights into the meaning of human embodiment and mortality, and represents a profound rite of passage into the medical profession. Radiological imaging permits in vivo visualization, offers physiologic as well as anatomic insights, and represents the context in which contemporary practicing physicians most frequently encounter their patients' otherwise hidden internal anatomy. Despite its important strengths, radiology cannot simply substitute for cadaver dissection, and the best models for teaching gross anatomy will incorporate both cadaver dissection and radiological imaging.\textsuperscript{56}

Clearly, advances in medical technology are not to be ignored, and broaden the tools available to the medical student and practicing clinician. Students can perform


dissections of “virtual cadavers” via interactive computer programs, or practice on plasticine cadaver replacements. Yet, it is also clear that such technological advances should not supplant or replace traditional methods for study of the human body. P. S. Phillips demonstrated in his 2000 Medical Education article, “Running a Life Drawing Class for Pre-Clinical Medical Students,” that participation in a life drawing class enhances not only observational skills, but also understanding of human anatomy.

To help students learn the basics of life drawing; to enable students to apply their anatomical knowledge in a more holistic context, hopefully thereby increasing their enjoyment of the locomotor systems course; to take students out of the medical ‘mind-set’ for an afternoon, and to consider the human body from a more ‘artistic’ point of view; and to give students a chance to practice observing a naked, living human body in detail.57

Human Gross Anatomy is a fairly structured learning endeavor, and in its current format, does not lend itself well to the incorporation of visual arts methodologies into the actual course. As with physical diagnosis, the most workable option would be to develop an independent, complementary course offering, similar to that developed at the Southampton Medical School in the United Kingdom. It is important to clarify that it is not adequate to have medical students take established life drawing classes designed for art students. In order to gain the highest benefit from the experience, a class should be tailored specifically for medical students, wherein relevant aspects of human anatomy can be emphasized. Such an initiative would likely be limited, however, to institutions with access to an art department within their associated university, or a local museum with art

teaching facilities. Certainly, such a course would be offered as an elective option, and costs for running the course could be offset by student fees. At Southampton, the course was co-taught by a drawing tutor and a human morphology tutor.

Students, once they had got over their initial embarrassment (both at the nakedness in front of them and at the quality of their own drawings), were interested in learning the skills of seeing the body in three dimensions, and capturing this on two-dimensional paper. The teacher was enthusiastic, and used simple shapes and curves to get the students used to dealing with complex forms; she then got the model to adopt 'moving poses' and asked the students to try to capture these on paper. This provided the anatomist with an opportunity to quiz the students on the muscles visible on the model, and which particular ones were being used in the actions being carried out. This was extended to questions about innervations and vascular supply… the exercise was a potent experience in integrating detailed, uncontextualized knowledge about separate anatomical areas into an understanding of the workings of a normal human body.58

A life drawing class is a non-invasive approach to studying and understanding human anatomy. A medical student’s first experience with cadaver dissection can be quite challenging and often traumatic; it is not uncommon for students to feel faint – or to actually faint – upon their first exposure to a human cadaver. Yet, over time, the students become accustomed to working with the cadaver, and often tend to disassociate the cadaver from the concept of a living, moving, breathing human being. Technological tools, such as virtual cadaver dissection, remove the student even further from interaction with a living human being. Certainly, life drawing does not allow the medical student to invasively explore the inner anatomy of the human body; however, as demonstrated by the Southampton course, students are able to consider musculature, innervations, and vascular supply.

The Kindness of Strangers: Behavioral Psychology

As medical students transition into their third year of study, psychiatry and human behavioral psychology are a required component of clinical clerkships and rotations. While the human brain as an organ can be analyzed – both physically through dissection, as well as functionally through magnetic resonance imaging – the inner working of the human mind are less tangible. As outlined in Chapter I, research addressing psychiatry and psychology in film is quite extensive. Psychiatrist Donald Misch at the Medical College of Georgia uses commercial films to facilitate psychosocial formulation training of psychiatry residents.59 Misch contends that this educational opportunity “helps psychiatry residents to recognize psychopathology in the context of the everyday lives of ordinary people,” and to “learn to make inferences from thoughts, feelings, and behavior as demonstrated in the video.”60

Integrating film studies into existing psychiatric training may not be as difficult as the other examples provided for physical diagnosis and human gross anatomy. Films are conveniently available on DVD for students to either rent or remove from reserve at a library to view as their schedules permit. Further, many films are becoming available in their entirety in segmented increment on websites such as YouTube.com. Ideally, students would gain the greatest benefit by watching the films – or portions of the films – as a group, where the film could be paused, and various aspects discussed among the

59 Misch, “Psychosocial Formulation,” 99-104.
60 Misch, “Psychosocial Formulation,” 104.
student and the teacher/facilitator on the spot. However, there is greater flexibility for the incorporation of film into existing curricula, although developing a separate training opportunity is also possible.

In Chapter IV, I cited the 1965 film *Lilith* in my discussion of empathy taken to the extreme; *Lilith* also provides rich visual material for exploring the human psyche. Misch points out that films such as *One Flew Over the Cuckoo’s Nest*, with blatant themes dealing with mental illness, are not the sole source exploring human psychoses and neuroses. For example, the film adaptations of many of Tennessee Williams’ plays provide ample, subtle examples of mental illness – and these subtle examples may prove more intellectually challenging for the student.

In Williams’ 1947 play *A Streetcar Names Desire*, adapted for film in 1951 by Elia Kazan, the main character of Blanche Dubois is said to have been modeled after Williams' sister, Rose, who suffered from mental illness and was lobotomized in 1937. Following a nervous breakdown, Blanche – a fading Southern belle and inferred nymphomaniac – is committed to a mental institution at the end of the film. As the men from the institution arrive to escort her to the asylum, Blanche says to the kindly doctor: “Whoever you are, I have always depended on the kindness of strangers.” Williams himself underwent psychoanalysis prior to writing 1958’s *Suddenly, Last Summer*, adapted for film in 1959 by Joseph L. Mankiewicz. The main character, Catharine, is

---

threatened with confinement to a mental institution and lobotomy, following her return from Europe where her cousin Sebastian died mysteriously; she appears to be sinking into madness. It is ultimately revealed that Sebastian was cannibalized by a band of boys as a direct result of his homosexuality – a fact that Catharine had repressed, and which is revealed after a doctor injects her with a sedative. Williams’ 1955 play Cat On A Hot Tin Roof, adapted for film in 1958 by Richard Brooks, revolves around themes of mental illness, alcoholism, preoccupation with mendacity, and implied repressed homosexuality in the main character of Brick.

There are countless examples of films that can be used to enhance the learning of psychiatry and human behavior, such as Roman Polanski’s 1965 film Repulsion, about a woman suffering from androphobia – a fear of men – who, left alone, spirals into madness, subjected to uncontrollable hallucinations, and committing multiple murders. Luis Buñuel’s controversial 1967 film Belle de Jour (Beauty of the Day), starring Catherine Deneuve, focuses on a woman – Séverine – who is unable to be physically intimate with her husband, and engages in explicit sadomasochistic sexual fantasies. Séverine begins working at a brothel during the day – hence her moniker, Belle de Jour – and as the film progresses, it is difficult for the viewer to differentiate between Séverine’s real world and fantasy world.

Undoubtedly, the study of film offers benefits from a variety of perspectives for the student. Examples of physical diagnosis and the physician-patient relationship – as in Dark Victory – as well as examples of empathy, psychoses, and neuroses.
Walk beside Me: Ethics and Doctoring

French-Algerian philosopher and writer Albert Camus is quoted as saying: “Don’t walk in front of me; I may not follow. Don’t walk behind me; I may not lead. Just walk beside me and be my friend.” Ethics and empathy go hand-in-hand, though the teaching of ethics and empathy can be quite disparate. U.S. medical schools include training in ethics as a required component of their curricula. Taught during the second year of preclinical study at Georgetown University’s School of Medicine, the goals of the Health Care Ethics module are outlined as follows:

Our goals are, in one respect, not unlike those that animate other courses, including courses in the basic sciences: we aim to impart to students a specialized “body of knowledge,” to equip them with one of the defining features of their membership in collectives for which we reserve the word, “profession.” But we have other perhaps more ambitious goals: we want to create a space in which our students can cultivate a refined capacity for moral reflection and discourse. That is, we want to be an impetus to the growth, the strengthening, of the moral agency of our students.\(^{62}\)

Although clinical ethics is taught in most U.S. medical schools as a specific course, ethics is often followed as a common thread throughout the educational experience. There is contention, however, over whether or not empathy can be taught; it is often left to what Ludmerer identified as the “hidden curriculum.” How, then, can exposure to the visual arts be made available to medical students with the goal of fostering empathy and ethical behavior in clinical practice?

---

The development of new humanities programs in medical education and the continuing presence of a humanities perspective in medicine are the legacy of physicians, medical students, medical administrators, clergy, scholars in humanist disciplines, government leaders, and others who took risks with their careers, subjected themselves to the scorn of their more traditional colleagues, and pursued the task of redressing an imbalance that had arisen through the post-World War II influx of science and technology into the practice of medicine. The work that remains is to continue to develop humanities programs, to increase the effectiveness of humanist faculty members, and to refine the base of scholarship that has been produced. Most important, we must sustain the interaction of physicians and humanists – for it is in the conversation between disciplines that history, theory, and practice are most closely kept in creative tension.63

Spanish cardiac surgeon Alejandro Aris has extensively explored the depiction of medicine in art, and particularly the depiction of the physician-patient relationship. The physician-patient relationship is strongly represented by 17th century Dutch paintings, and “medicine became fashionable as a source of inspiration for artists”64 until the early 20th century.

The relation between doctors and patients are seldom depicted in our days. Medical science has evolved and these relations are being substituted by blood analysis, ultrasound tests, digital exploration of the human body and the like. Medicine as a pictorial subject is out-of-date. We should enjoy the legacy of the artists who took this fascinating subject as theme for their works of art.65


65 Aris, “From the Eyes of Western Painters,” 70.
I opened this investigation with the observation that within the medical community, the physical diagnosis is understood as a “perishable” skill that steadily diminishes after physicians complete their medical training and enter clinical practice, particularly as technological resources have become increasingly sophisticated and accessible. This degradation in physical diagnostic skills is in part compounded by the fact that medical curricula are perceived as too narrowly focused on the practical science of medicine, also at the expense of those cultural values that inform and support ethical behavior.

The contention of my thesis has been that the integration of the visual arts into medical curricula not only enhances the quality and durability of diagnostic skills, but also proves essential to a physician’s approach to those ethical questions encountered daily in clinical practice. My review of the literature supports these claims.

I designed and distributed a survey to ascertain the extent to which U.S. medical schools currently incorporate visual arts-related activities into their curricula, as well as the extent to which they may have considered questions pertaining to enhanced diagnostic skills and increased empathy and humanism in clinical practice related to such curricular initiatives. The conclusions that can be drawn from this survey are limited due to the fairly low response rate. I have been able to surmise that there appears to be no general consensus among U.S. medical schools concerning the potential value of the interface between the visual arts and medical education; while some students and faculty involved in such endeavors recognize value added, other remain skeptical, in part due to a
lack of data demonstrating that the exclusion of such initiatives would prove detrimental to medical education. Obstacles cited include rigid medical curricula and lack of resources – both financial and instructional.

It is clear to me that medical curricula will likely remain rather rigid and inflexible, and that the integration of visual arts educational methodologies and modalities into existing curricula – particularly required core courses – is implausible at this time. Further, the fact that most academic medical centers across the U.S. are facing increasing financial challenges, initiatives in this direction are unlikely within the current fiscal climate. However, these facts do not by any means negate the importance of the humanities and the liberal arts in medical education. I contend that the visual arts in particular offer fundamentally unique opportunities not found in other humanities – such as literature, which at present has the strongest presence among U.S. medical curricula through emphasis on narrative medicine.

My survey and review of the literature indicates that research on this topic continues, and that there are valid data supporting the contention of my thesis. The results of the survey I conducted reveal a handful of U.S. medical schools – about a half dozen – value the importance of the contribution the visual arts can make to medical education. This is suggested through the variety of curricular opportunities available – including partnerships with local museums – and survey comments. I would strongly advocate that those institutions with an apparent established commitment to the visual arts in medical education take the necessary and appropriate steps to formally evaluate
the potential efficacy of such curricular initiatives – to the extent possible – in an effort to validate the claims of value added, beyond promoting student well-being.

While is it my strong contention that all medical students would benefit from educational opportunities employing visual arts methodologies and modalities, I do not advocate “forcing” these initiatives universally through significant curricular restructuring at this time. In light of various constraints to curricular reform outlined herewith, I would advocate that those medical schools currently without any educational opportunities incorporating the visual arts consider the implementation of elective courses and extracurricular options, based on existing models revealed through my survey of the literature. As such opportunities become available – and if they are well organized and structured, taught by competent and supportive faculty – students with interests in these initiatives will take advantage of these instructional opportunities; ultimately, this could lead to further expansion of such endeavors, particularly if outcomes of value added analysis support these initiatives.

I would also advocate that medical educators and researchers explore the extent to which physicians currently in clinical practice potentially value the role of the visual arts in relation to medical practice. Plastic surgeon Jane Petro, M.D., who was photographed by physician and photographer Eric Avery, M.D., recounts how she feels she “became a surgeon” following her experience with Avery’s photographs. Juvenal R. Goicochea, M.D., a general surgeon who performed the thyroidectomy on artist Vicente Artur Carneiro, vividly recalls his memory of Carneiro working on his Crossroads drawing
following surgery, and how the artist captured a multiplicity of perspectives relating to his illness and treatment. Goicochea has remained closely acquainted with Carneiro since his surgery nearly twenty-five years ago, and continues to comment on the visual impact of Carneiro’s *Crossroads*. Endocrinologist Helena W. Rodbard, M.D. – Past-President of the American College of Endocrinology (ACE), and Past-President of the American Association of Clinical Endocrinologists (AACE) – is a collector of Carneiro’s art; one of the many pieces in her personal collection is on display in the reception area of her medical office. The educational experiences of established practicing physicians such as these likely did not include the visual arts to any significant extent. Exploring what role the visual arts play in relation to their views toward medicine and their medical practice might reveal perspectives relevant to the contentions of my thesis.

In a career spanning more than 60 years in medicine, Georgetown University Professor Edmund D. Pellegrino, M.D. – a member of my thesis committee – has long promoted and advocated for the importance of the humanities and liberal arts as an essential component of medical education. Through my research for this thesis project, I have endeavored to echo Dr. Pellegrino’s claims:

> Medicine oscillates today, as never before, between the antipodes of the sciences and the humanities, never resting long in one or the other. It must look at embodied man as an object of science, yet never forget him as a thinking and feeling subject of the humanities. Medicine thus must always balance fact and value. It if is pulled too closely by one pole or the other, it becomes inauthentic and even dangerous.⁶⁶

---

APPENDIX A:

FIGURES AND TABLES
Figure A.1:
Course Description: *Training the Eye: Improving the Art of Physical Diagnosis*
Harvard Medical School Course Catalog
Table 2

Change in Mean Frequency of Accurate Observations for Intervention and Control Groups

<table>
<thead>
<tr>
<th>Paired Pre- and Post-course Images</th>
<th>Intervention (n = 24)</th>
<th>Control (n = 34)</th>
<th>Difference Between Intervention and Control (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean Δ Score* (SD)</td>
<td>P-value¹</td>
<td>Mean Δ Score* (SD)</td>
</tr>
<tr>
<td>1</td>
<td>5.67 (0.89)</td>
<td>&lt;.001</td>
<td>0.75 (0.73)</td>
</tr>
<tr>
<td>2</td>
<td>4.99 (0.99)</td>
<td>&lt;.001</td>
<td>1.30 (0.81)</td>
</tr>
<tr>
<td>3</td>
<td>2.48 (0.81)</td>
<td>&lt;.001</td>
<td>-0.61 (0.87)</td>
</tr>
<tr>
<td>4</td>
<td>4.72 (1.12)</td>
<td>&lt;.001</td>
<td>-0.74 (1.07)</td>
</tr>
<tr>
<td>5</td>
<td>8.89 (1.44)</td>
<td>&lt;.001</td>
<td>0.73 (1.19)</td>
</tr>
<tr>
<td>TOTAL²</td>
<td>5.41 (0.63)</td>
<td>&lt;.001</td>
<td>0.36 (0.53)</td>
</tr>
</tbody>
</table>

*Post-course frequency of accurate observations minus pre-course frequency

†P-values based on paired t-tests from generalized estimating equations

†Total score were calculated by adding mean number of accurate observations for each image then dividing by five

---

**Figure A.2a:**

**Table 3**

<table>
<thead>
<tr>
<th>Category</th>
<th>Control (n = 34)</th>
<th>Intervention (n = 24)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>12.9</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Speculative thinking</strong></td>
<td>18.5</td>
<td>18.8</td>
</tr>
<tr>
<td><strong>Interpretations + evidence</strong></td>
<td>11.8</td>
<td>12.1</td>
</tr>
<tr>
<td><strong>Pertinent negatives</strong></td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Use of fine arts concepts</strong></td>
<td>67.8</td>
<td>68.8</td>
</tr>
</tbody>
</table>

*Based on the content analysis of students’ descriptions of five images on a visual skills examination*

---

**Figure A.2b:**

Figure A.2c:
Figure 1

Graded impact of attendance on total mean observation score on pre- vs. post-test observations of all images.

Copyright © Society of General Internal Medicine 2008

Figure A.2d:
Table 1. *Required Arts-Related Courses: Frequency of Characteristics (26 Schools)*

<table>
<thead>
<tr>
<th>Courses</th>
<th>Art Forms</th>
<th>Participation</th>
<th>Funding Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate 22</td>
<td>Literature 26</td>
<td>Active 18</td>
<td>School based 34</td>
</tr>
<tr>
<td>Integrated 11</td>
<td>Visual arts 18</td>
<td>Passive 12</td>
<td></td>
</tr>
<tr>
<td>No response 1</td>
<td>Performing arts 8</td>
<td>Combined 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Music 4</td>
<td>No response 1</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *One school also listed student funding as a source.*

**Figure A.3a:**

Table 2. *Elective Arts-Related Courses: Frequency of Characteristics (43 Schools)*

<table>
<thead>
<tr>
<th>Courses</th>
<th>Art Forms</th>
<th>Participation</th>
<th>Funding Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate 73</td>
<td>Literature 62</td>
<td>Active 30</td>
<td>School based 70</td>
</tr>
<tr>
<td>Integrated 6</td>
<td>Visual arts 36</td>
<td>Passive 21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performing arts 16</td>
<td>Combined 27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Music 8</td>
<td>No response 1</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* *Four courses at Pennsylvania State University of Medicine listed partial exterior funding; one at South Illinois University School of Medicine received a grant.*

**Figure A.3b:**

Table 3. *Extracurricular Arts-Related Activities: Frequency of Characteristics (52 Schools)*

<table>
<thead>
<tr>
<th>Activities</th>
<th>Art Forms</th>
<th>Participation</th>
<th>Funding Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate 106</td>
<td>Literature 38</td>
<td>Active 69</td>
<td>School based 70</td>
</tr>
<tr>
<td></td>
<td>Visual arts 29</td>
<td>Passive 20</td>
<td>Student fees 19</td>
</tr>
<tr>
<td></td>
<td>Performing arts 29</td>
<td>Combined 14</td>
<td>Fund raising 18</td>
</tr>
<tr>
<td></td>
<td>Music 27</td>
<td>No response 3</td>
<td>Endowments 2</td>
</tr>
</tbody>
</table>

**Figure A.3c:**
Figure A.4a:  
Cover Letter and Survey Form  
The Visual Arts in Medical Education: A Survey of U.S. Medical Schools  
Conducted by W. Taylor Johnson, M.F.A.  
November-December, 2009  

GEORGETOWN UNIVERSITY  

Office of Biomedical Graduate Education  
Biomedical Graduate Research Organization  

November 30, 2009  

THE VISUAL ARTS IN MEDICAL EDUCATION  
A Survey of U.S. Medical Schools  

Dear Medical School Dean:  

Thank you for taking the time to complete the accompanying questionnaire!  

Published studies suggest contention within the medical community that physical diagnosis skills of doctors are waning, particularly as technological resources have become increasingly sophisticated and accessible. Medical school curricula is often perceived as too narrowly focused on the practical science of medicine at the expense of those cultural values that inform and support ethical behavior and humanism.  

A number of recent studies have demonstrated that the integration of the visual arts into medical curricula may enhance the quality and durability of diagnostic skills.  

This survey is intended to assess the extent to which U.S. medical schools have incorporated visual arts education into their curricula for the purpose of increasing student's observational skills, improving student well-being, and enhancing humanism. This survey is being conducted as research for my doctoral dissertation, in partial fulfillment of requirements for the degree Doctor of Liberal Studies at Georgetown University. Survey data will be shared with all deans responding to this questionnaire.  

The accompanying questionnaire is formatted as an Excel spreadsheet. I would kindly request that completed questionnaires be emailed to me no later than December 31, 2009 at: johnsonw@georgetown.edu.  

IMPORTANT: For the purposes of this questionnaire, VISUAL ARTS is defined as creative works that are predominantly visual in nature, including: painting, drawing, printmaking, sculpture, photography, and film; this may also be expanded to include architecture, performing arts, ceramics, and textiles.  

Again, thank you for your time and attention!  

Sincerely,  

W. Taylor Johnson, M.F.A.  
Director, Biomedical Graduate Education  
Doctoral Candidate, Liberal Studies Program  
202/687-1379 (phone)  202/687-2359 (fax)  
johnsonw@georgetown.edu (email)
### SECTION FOUR
**ASSESSMENT** OF COURSES AND ACTIVITIES THAT EMPHASIZE/INCORPORATE THE VISUAL ARTS

Have any of the visual-arts related courses or activities noted herewith been assessed for effectiveness in terms of:

<table>
<thead>
<tr>
<th></th>
<th>(Yes or No)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved student well-being:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased observational diagnostic skills of medical students:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased observational diagnostic skills of physicians in clinical practice:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enhanced humanism:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### SECTION FIVE

**ATTITUDES & OPINIONS REGARDING COURSES AND ACTIVITIES THAT EMPHASIZE/INCORPORATE THE VISUAL ARTS**

Cognizant of the fact that attitudes and opinions may vary among your faculty and administrators, what do you believe is the general consensus of your medical school with regard to the relationship between visual arts-related courses and activities and medical education? Specifically, what (if any) value is added? What are the drawbacks (if any)?

| Enhances/improves student's observational/diagnostic skills: (Yes / No / Unsure) |
| Improves student well-being: (Yes / No / Unsure) |
| Enhances humanism, empathy, and ethical behavior in clinical practice: (Yes / No / Unsure) |

Additional Comments may be noted below:

Assuming a general consensus of value added, would you say your medical school favors an additive approach (additional, independent course options), or an integrative approach (integrated into existing medical courses), or a combination of the two? In your response, please address whether or not arts-related courses and/or activities should be required, and to what extent? What are the potential curricular implications?

| ADDITIVE Approach ONLY Favored: (Yes / No / Unsure) |
| INTEGRATIVE Approach ONLY Favored: (Yes / No / Unsure) |
| COMBINED Additive/Integrative Approach Favored: (Yes / No / Unsure) |
| Arts-related courses should be REQUIRED: (Yes / No / Unsure) |

Additional Comments may be noted below:
Assuming a general consensus of value added, would you say your medical school favors an active approach (direct creative involvement on the part of the student), or a passive approach (appreciation and understanding, without creative activity on the part of the student), or a combination of the two? What are the potential curricular implications?

- ACTIVE Approach ONLY Favored: [Yes / No / Unsure]
- PASSIVE Approach ONLY Favored: [Yes / No / Unsure]
- COMBINED Active/Passive Approach Favored: [Yes / No / Unsure]

Additional Comments may be noted below:

Other comments regarding attitudes and opinions toward arts-related courses and activities and medical education.

THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY!

Please email completed survey to: johnson@georgetown.edu

NOTE: This questionnaire is modeled (by permission) after 2001 and 2002 surveys conducted by Paul Rodenhauser, M.D., Professor of Psychiatry Emeritus, Tulane University School of Medicine.
Figure A.4b:
131 accredited M.D.-granting U.S. medical schools represented by the Association of American Medical Colleges
As of November 30, 2009
Source: http://services.aamc.org/memberlistings/index.cfm?fuseaction=home.search&search_type=MS& wildcard_criteria=&state_criteria=CNT%3AUSA&image=Search (accessed November 30, 2009).

<table>
<thead>
<tr>
<th>State</th>
<th>School</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>University of Alabama School of Medicine</td>
<td>Birmingham</td>
</tr>
<tr>
<td></td>
<td>University of South Alabama College of Medicine</td>
<td>Mobile</td>
</tr>
<tr>
<td>Arizona</td>
<td>University of Arizona College of Medicine</td>
<td>Tucson</td>
</tr>
<tr>
<td>Arkansas</td>
<td>University of Arkansas for Medical Sciences College of Medicine</td>
<td>Little Rock</td>
</tr>
<tr>
<td>California</td>
<td>Keck School of Medicine of the University of Southern California</td>
<td>Los Angeles</td>
</tr>
<tr>
<td></td>
<td>Loma Linda University School of Medicine</td>
<td>Loma Linda</td>
</tr>
<tr>
<td></td>
<td>Stanford University School of Medicine</td>
<td>Stanford</td>
</tr>
<tr>
<td></td>
<td>University of California, Davis, School of Medicine</td>
<td>Sacramento</td>
</tr>
<tr>
<td></td>
<td>University of California, Irvine, School of Medicine</td>
<td>Irvine</td>
</tr>
<tr>
<td></td>
<td>University of California, Los Angeles David Geffen School of Medicine</td>
<td>Los Angeles</td>
</tr>
<tr>
<td></td>
<td>University of California, San Diego School of Medicine</td>
<td>La Jolla</td>
</tr>
<tr>
<td></td>
<td>University of California, San Francisco, School of Medicine</td>
<td>San Francisco</td>
</tr>
<tr>
<td>Colorado</td>
<td>University of Colorado Denver School of Medicine</td>
<td>Aurora</td>
</tr>
<tr>
<td>Connecticut</td>
<td>University of Connecticut School of Medicine</td>
<td>Farmington</td>
</tr>
<tr>
<td></td>
<td>Yale University School of Medicine</td>
<td>New Haven</td>
</tr>
<tr>
<td>District of Columbia</td>
<td>George Washington University School of Medicine and Health Sciences</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td>Georgetown University School of Medicine</td>
<td>Washington</td>
</tr>
<tr>
<td></td>
<td>Howard University College of Medicine</td>
<td>Washington</td>
</tr>
<tr>
<td>Florida</td>
<td>FIU Herbert Wertheim College of Medicine</td>
<td>Miami</td>
</tr>
<tr>
<td></td>
<td>Florida State University College of Medicine</td>
<td>Tallahassee</td>
</tr>
<tr>
<td></td>
<td>University of Central Florida College of Medicine</td>
<td>Orlando</td>
</tr>
<tr>
<td></td>
<td>University of Florida College of Medicine</td>
<td>Gainesville</td>
</tr>
<tr>
<td></td>
<td>University of Miami Leonard M. Miller School of Medicine</td>
<td>Miami</td>
</tr>
<tr>
<td></td>
<td>University of South Florida College of Medicine</td>
<td>Tampa</td>
</tr>
<tr>
<td>Georgia</td>
<td>Emory University School of Medicine</td>
<td>Atlanta</td>
</tr>
<tr>
<td></td>
<td>Medical College of Georgia School of Medicine</td>
<td>Augusta</td>
</tr>
<tr>
<td></td>
<td>Mercer University School of Medicine</td>
<td>Macon</td>
</tr>
<tr>
<td></td>
<td>Morehouse School of Medicine</td>
<td>Atlanta</td>
</tr>
<tr>
<td>Hawaii</td>
<td>University of Hawaii, John A. Burns School of Medicine</td>
<td>Honolulu</td>
</tr>
<tr>
<td>Illinois</td>
<td>Chicago Medical School at Rosalind Franklin University of Medicine &amp; Science</td>
<td>North Chicago</td>
</tr>
<tr>
<td></td>
<td>Loyola University Chicago Stritch School of Medicine</td>
<td>Maywood</td>
</tr>
<tr>
<td></td>
<td>Northwestern University The Feinberg School of Medicine</td>
<td>Chicago</td>
</tr>
<tr>
<td></td>
<td>Rush Medical College of Rush University Medical Center</td>
<td>Chicago</td>
</tr>
<tr>
<td></td>
<td>Southern Illinois University School of Medicine</td>
<td>Springfield</td>
</tr>
<tr>
<td></td>
<td>University of Chicago Division of the Biological Sciences The Pritzker School of Medicine</td>
<td>Chicago</td>
</tr>
<tr>
<td></td>
<td>University of Illinois College of Medicine</td>
<td>Chicago</td>
</tr>
<tr>
<td>State</td>
<td>School</td>
<td>City</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Indiana</td>
<td>Indiana University School of Medicine</td>
<td>Indianapolis</td>
</tr>
<tr>
<td>Iowa</td>
<td>University of Iowa Roy J. and Lucille A. Carver College of Medicine</td>
<td>Iowa City</td>
</tr>
<tr>
<td>Kansas</td>
<td>University of Kansas School of Medicine</td>
<td>Kansas City</td>
</tr>
<tr>
<td>Kentucky</td>
<td>University of Kentucky College of Medicine</td>
<td>Lexington</td>
</tr>
<tr>
<td></td>
<td>University of Louisville School of Medicine</td>
<td>Louisville</td>
</tr>
<tr>
<td>Louisiana</td>
<td>Louisiana State University School of Medicine in New Orleans</td>
<td>New Orleans</td>
</tr>
<tr>
<td></td>
<td>Louisiana State University School of Medicine in Shreveport</td>
<td>Shreveport</td>
</tr>
<tr>
<td></td>
<td>Tulane University School of Medicine</td>
<td>New Orleans</td>
</tr>
<tr>
<td>Maryland</td>
<td>Johns Hopkins University School of Medicine</td>
<td>Baltimore</td>
</tr>
<tr>
<td></td>
<td>Uniform Services University of the Health Sciences F. Edward Hebert School of Medicine</td>
<td>Bethesda</td>
</tr>
<tr>
<td></td>
<td>University of Maryland School of Medicine</td>
<td>Baltimore</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>Boston University School of Medicine</td>
<td>Boston</td>
</tr>
<tr>
<td></td>
<td>Harvard Medical School</td>
<td>Boston</td>
</tr>
<tr>
<td></td>
<td>Tufts University School of Medicine</td>
<td>Boston</td>
</tr>
<tr>
<td></td>
<td>University of Massachusetts Medical School</td>
<td>Worcester</td>
</tr>
<tr>
<td>Michigan</td>
<td>Michigan State University College of Human Medicine</td>
<td>East Lansing</td>
</tr>
<tr>
<td></td>
<td>University of Michigan Medical School</td>
<td>Ann Arbor</td>
</tr>
<tr>
<td></td>
<td>Wayne State University School of Medicine</td>
<td>Detroit</td>
</tr>
<tr>
<td>Minnesota</td>
<td>Mayo Medical School</td>
<td>Rochester</td>
</tr>
<tr>
<td></td>
<td>University of Minnesota Medical School</td>
<td>Minneapolis</td>
</tr>
<tr>
<td>Mississippi</td>
<td>University of Mississippi School of Medicine</td>
<td>Jackson</td>
</tr>
<tr>
<td>Missouri</td>
<td>Saint Louis University School of Medicine</td>
<td>St. Louis</td>
</tr>
<tr>
<td></td>
<td>University of Missouri-Columbia School of Medicine</td>
<td>Columbia</td>
</tr>
<tr>
<td></td>
<td>University of Missouri-Kansas City School of Medicine</td>
<td>Kansas City</td>
</tr>
<tr>
<td></td>
<td>Washington University in St. Louis School of Medicine</td>
<td>St. Louis</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Creighton University School of Medicine</td>
<td>Omaha</td>
</tr>
<tr>
<td></td>
<td>University of Nebraska College of Medicine</td>
<td>Omaha</td>
</tr>
<tr>
<td>Nevada</td>
<td>University of Nevada School of Medicine</td>
<td>Reno</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>Dartmouth Medical School</td>
<td>Hanover</td>
</tr>
<tr>
<td>New Jersey</td>
<td>University of Medicine and Dentistry of New Jersey-New Jersey Medical School</td>
<td>Newark</td>
</tr>
<tr>
<td></td>
<td>University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School</td>
<td>Piscataway</td>
</tr>
<tr>
<td>New Mexico</td>
<td>University of New Mexico School of Medicine</td>
<td>Albuquerque</td>
</tr>
<tr>
<td>New York</td>
<td>Albany Medical College</td>
<td>Albany</td>
</tr>
<tr>
<td></td>
<td>Albert Einstein College of Medicine of Yeshiva University</td>
<td>Bronx</td>
</tr>
<tr>
<td></td>
<td>Columbia University College of Physicians and Surgeons</td>
<td>New York</td>
</tr>
<tr>
<td></td>
<td>Mount Sinai School of Medicine of New York University</td>
<td>New York</td>
</tr>
<tr>
<td></td>
<td>New York Medical College</td>
<td>Valhalla</td>
</tr>
<tr>
<td></td>
<td>New York University School of Medicine</td>
<td>New York</td>
</tr>
<tr>
<td></td>
<td>State University of New York Downstate Medical Center College of Medicine</td>
<td>Brooklyn</td>
</tr>
<tr>
<td></td>
<td>State University of New York Upstate Medical University</td>
<td>Syracuse</td>
</tr>
<tr>
<td></td>
<td>The School of Medicine at Stony Brook University Medical Center</td>
<td>Stony Brook</td>
</tr>
<tr>
<td>State</td>
<td>School</td>
<td>City</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>New York (continued)</td>
<td>University at Buffalo State University of New York School of Medicine &amp; Biomedical Sciences</td>
<td>Buffalo</td>
</tr>
<tr>
<td></td>
<td>University of Rochester School of Medicine and Dentistry</td>
<td>Rochester</td>
</tr>
<tr>
<td></td>
<td>Weill Cornell Medical College</td>
<td>New York</td>
</tr>
<tr>
<td>North Carolina</td>
<td>Duke University School of Medicine</td>
<td>Durham</td>
</tr>
<tr>
<td></td>
<td>The Brody School of Medicine at East Carolina University</td>
<td>Greenville</td>
</tr>
<tr>
<td></td>
<td>University of North Carolina at Chapel Hill School of Medicine</td>
<td>Chapel Hill</td>
</tr>
<tr>
<td></td>
<td>Wake Forest University School of Medicine</td>
<td>Winston-Salem</td>
</tr>
<tr>
<td>North Dakota</td>
<td>University of North Dakota School of Medicine and Health Sciences</td>
<td>Grand Forks</td>
</tr>
<tr>
<td>Ohio</td>
<td>Case Western Reserve University School of Medicine</td>
<td>Cleveland</td>
</tr>
<tr>
<td></td>
<td>Northeastern Ohio Universities Colleges of Medicine and Pharmacy</td>
<td>Rootstown</td>
</tr>
<tr>
<td></td>
<td>Ohio State University College of Medicine</td>
<td>Columbus</td>
</tr>
<tr>
<td></td>
<td>The University of Toledo College of Medicine</td>
<td>Toledo</td>
</tr>
<tr>
<td></td>
<td>University of Cincinnati College of Medicine</td>
<td>Cincinnati</td>
</tr>
<tr>
<td></td>
<td>Wright State University Boonshoft School of Medicine</td>
<td>Dayton</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>University of Oklahoma College of Medicine</td>
<td>Oklahoma City</td>
</tr>
<tr>
<td>Oregon</td>
<td>Oregon Health &amp; Science University School of Medicine</td>
<td>Portland</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>Drexel University College of Medicine</td>
<td>Philadelphia</td>
</tr>
<tr>
<td></td>
<td>Jefferson Medical College of Thomas Jefferson University</td>
<td>Philadelphia</td>
</tr>
<tr>
<td></td>
<td>Pennsylvania State University College of Medicine</td>
<td>Hershey</td>
</tr>
<tr>
<td></td>
<td>Temple University School of Medicine</td>
<td>Philadelphia</td>
</tr>
<tr>
<td></td>
<td>The Commonwealth Medical College</td>
<td>Scranton</td>
</tr>
<tr>
<td></td>
<td>University of Pennsylvania School of Medicine</td>
<td>Philadelphia</td>
</tr>
<tr>
<td></td>
<td>University of Pittsburgh School of Medicine</td>
<td>Pittsburgh</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>Ponce School of Medicine</td>
<td>Ponce</td>
</tr>
<tr>
<td></td>
<td>San Juan Bautista School of Medicine</td>
<td>Caguas</td>
</tr>
<tr>
<td></td>
<td>Universidad Central del Caribe School of Medicine</td>
<td>Bayamon</td>
</tr>
<tr>
<td></td>
<td>University of Puerto Rico School of Medicine</td>
<td>San Juan</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>The Warren Alpert Medical School of Brown University</td>
<td>Providence</td>
</tr>
<tr>
<td>South Carolina</td>
<td>Medical University of South Carolina College of Medicine</td>
<td>Charleston</td>
</tr>
<tr>
<td></td>
<td>University of South Carolina School of Medicine</td>
<td>Columbia</td>
</tr>
<tr>
<td>South Dakota</td>
<td>Sanford School of Medicine The University of South Dakota</td>
<td>Sioux Falls</td>
</tr>
<tr>
<td>Tennessee</td>
<td>East Tennessee State University James H. Quillen College of Medicine</td>
<td>Johnson City</td>
</tr>
<tr>
<td></td>
<td>Meharry Medical College</td>
<td>Nashville</td>
</tr>
<tr>
<td></td>
<td>University of Tennessee Health Science Center College of Medicine</td>
<td>Memphis</td>
</tr>
<tr>
<td></td>
<td>Vanderbilt University School of Medicine</td>
<td>Nashville</td>
</tr>
<tr>
<td>Texas</td>
<td>Baylor College of Medicine</td>
<td>Houston</td>
</tr>
<tr>
<td></td>
<td>Texas A&amp;M Health Science Center College of Medicine</td>
<td>College Station</td>
</tr>
<tr>
<td></td>
<td>Texas Tech University Health Sciences Center Paul L. Foster School of Medicine</td>
<td>El Paso</td>
</tr>
<tr>
<td>State</td>
<td>School</td>
<td>City</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Texas (continued)</td>
<td>Texas Tech University Health Sciences Center School of Medicine</td>
<td>Lubbock</td>
</tr>
<tr>
<td></td>
<td>The University of Texas School of Medicine at San Antonio</td>
<td>San Antonio</td>
</tr>
<tr>
<td></td>
<td>University of Texas Medical Branch School of Medicine</td>
<td>Galveston</td>
</tr>
<tr>
<td></td>
<td>University of Texas Medical School at Houston</td>
<td>Houston</td>
</tr>
<tr>
<td></td>
<td>University of Texas Southwestern Medical Center at Dallas</td>
<td>Dallas</td>
</tr>
<tr>
<td></td>
<td>Southwestern Medical School</td>
<td></td>
</tr>
<tr>
<td>Utah</td>
<td>University of Utah School of Medicine</td>
<td>Salt Lake City</td>
</tr>
<tr>
<td>Vermont</td>
<td>University of Vermont College of Medicine</td>
<td>Burlington</td>
</tr>
<tr>
<td>Virginia</td>
<td>Eastern Virginia Medical School</td>
<td>Norfolk</td>
</tr>
<tr>
<td></td>
<td>University of Virginia School of Medicine</td>
<td>Charlottesville</td>
</tr>
<tr>
<td></td>
<td>Virginia Commonwealth University School of Medicine</td>
<td>Richmond</td>
</tr>
<tr>
<td></td>
<td>Virginia Tech Carilion School of Medicine</td>
<td>Roanoke</td>
</tr>
<tr>
<td>Washington</td>
<td>University of Washington School of Medicine</td>
<td>Seattle</td>
</tr>
<tr>
<td>West Virginia</td>
<td>Marshall University Joan C. Edwards School of Medicine</td>
<td>Huntington</td>
</tr>
<tr>
<td></td>
<td>West Virginia University School of Medicine</td>
<td>Morgantown</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Medical College of Wisconsin</td>
<td>Milwaukee</td>
</tr>
<tr>
<td></td>
<td>University of Wisconsin School of Medicine and Public Health</td>
<td>Madison</td>
</tr>
</tbody>
</table>
Section One: Required Courses that Emphasize/Incorporate the Visual Arts (13 Schools, 24 Courses)

<table>
<thead>
<tr>
<th>Participation</th>
<th>Courses</th>
<th>Funding Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active – 14</td>
<td>Separate – 7</td>
<td>School based – 17</td>
</tr>
<tr>
<td>Passive – 4</td>
<td>Integrated – 4</td>
<td>Student fees – 4</td>
</tr>
<tr>
<td>Active &amp; Passive – 4</td>
<td>Inconsistent Response – 8</td>
<td>Other – 5</td>
</tr>
<tr>
<td>Not Specified – 2</td>
<td>Not Specified – 5</td>
<td>Not Specified – 1</td>
</tr>
</tbody>
</table>

Note: 8 courses were noted as having been offered for at least five years; 1 course was noted as having been offered since the 1970's.

Figure A.5a:
Required Courses that Emphasize/Incorporate the Visual Arts (13 Schools, 24 Courses)

Section Two: Elective Courses that Emphasize/Incorporate the Visual Arts (9 Schools, 19 Courses)

<table>
<thead>
<tr>
<th>Participation</th>
<th>Courses</th>
<th>Funding Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active – 7</td>
<td>Separate – 16</td>
<td>School based – 12</td>
</tr>
<tr>
<td>Passive – 7</td>
<td>Integrated – 0</td>
<td>Student fees – 3</td>
</tr>
<tr>
<td>Active &amp; Passive – 3</td>
<td>Inconsistent Response – 1</td>
<td>Endowed Funds – 2</td>
</tr>
<tr>
<td>Not Specified – 2</td>
<td>Not Specified – 2</td>
<td>Not Specified – 5</td>
</tr>
</tbody>
</table>

Note: One school noted that an art and anatomy project won the national William B. Bean Osler Society award for 1999/2000.

Figure A.5b:
Elective Courses that Emphasize/Incorporate the Visual Arts (9 Schools, 19 Courses)
<table>
<thead>
<tr>
<th>Humor/Fluid</th>
<th>Organ</th>
<th>Personality/Temperament</th>
<th>Quality</th>
<th>Element</th>
<th>Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>Heart</td>
<td>Fiery</td>
<td>Heat</td>
<td>Fire</td>
<td>Summer</td>
</tr>
<tr>
<td>Phlegm</td>
<td>Brain</td>
<td>Calm</td>
<td>Moistness</td>
<td>Water</td>
<td>Spring</td>
</tr>
<tr>
<td>Yellow Bile</td>
<td>Spleen</td>
<td>Bad Tempered</td>
<td>Cold</td>
<td>Earth</td>
<td>Winter</td>
</tr>
<tr>
<td>Black Bile</td>
<td>Liver</td>
<td>Melancholic</td>
<td>Dryness</td>
<td>Air</td>
<td>Autumn</td>
</tr>
</tbody>
</table>

**Figure A.6:**
Hippocrates’ theory of the four humours.
Table of differences comparing Newton’s and Goethe’s theories on the qualities of light.

<table>
<thead>
<tr>
<th>Qualities of Light</th>
<th>Newton (1704)</th>
<th>Goethe (1810)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homogeneity</td>
<td>White light is composed of coloured elements (heterogeneous).</td>
<td>Light is the simplest most undivided most homogeneous thing (homogenous).</td>
</tr>
<tr>
<td>Darkness</td>
<td>Darkness is the absence of light.</td>
<td>Darkness is polar to, and interacts with light.</td>
</tr>
<tr>
<td>Spectrum</td>
<td>Colours are fanned out of light according to their refrangibility (primary phenomenon).</td>
<td>Coloured edgias which arise at light-dark borders overlap to form a spectrum (compound phenomenon).</td>
</tr>
<tr>
<td>Prism</td>
<td>The prism is immaterial to the existence of colour</td>
<td>As a turbid medium, the prism plays a role in the arising of colour.</td>
</tr>
<tr>
<td>Role of Refraction</td>
<td>Light becomes decomposed through refraction, inflection, and reflection.</td>
<td>Refraction, inflection, and reflection can exist without the appearance of colour.</td>
</tr>
<tr>
<td>Analysis</td>
<td>White light decomposes into seven pure colours.</td>
<td>There are only two pure colours – blue and yellow; the rest are degrees of these.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Just as white light can be decomposed, it can be put back together.</td>
<td>Colours recombine to shades of grey.</td>
</tr>
<tr>
<td>Particle or Wave?</td>
<td>Particle</td>
<td>Neither, since they are inferences and not observed with the senses.</td>
</tr>
<tr>
<td>Colour Wheel</td>
<td>Asymmetric, 7 colours</td>
<td>Symmetric, 6 colours</td>
</tr>
</tbody>
</table>
APPENDIX B:

ILLUSTRATIONS
Figures B.1a-b:
Eric Avery, M.D.
Plastic surgery resident Dr. Jane Petro (et al.) performing hand reattachment surgery at the Pennsylvania University College of Medicine in Hershey, October 1977
Reprinted with permission from Eric Avery, M.D.
Figures B.1c-d:

Eric Avery, M.D.

Plastic surgery resident Dr. Jane Petro (et al.) performing hand reattachment surgery at the Pennsylvania University College of Medicine in Hershey, October 1977

Reprinted with permission from Eric Avery, M.D.
Figure B.2:
Giotto di Bondone (Italian, 1267-1337)
Funeral of St. Francis (detail), 1325
Basilica di Santa Croce, Bardi Chapel Entrance, Florence
Fresco, 280 x 450 cm
Source: ARTstor (accessed November 3, 2009)
Figures B.3a-b:

*The Wilton Diptych:*

*Saint Mary and the Choir of Angels*, 1395-99
National Gallery, London, England
Egg tempera on wood, 57 x 29.2 cm overall
Source: ARTstor (accessed March 1, 2010)
Figure B.4a:
Rogier van der Weyden (Flemish, 1399-1464)
*Deposition (The Descent From the Cross)*, c. 1436
Museo del Prado, Madrid
Oil on wood panel, 220 x 262 cm
Source: ARTstor (accessed December 14, 2009)
Figure B.4b:
Rogier van der Weyden (Flemish, 1399-1464)
Deposition (The Descent From the Cross), c. 1436 (detail)
Museo del Prado, Madrid
Oil on wood panel, 220 x 262 cm
Source: ARTstor (accessed December 14, 2009)
Figure B.5a:
Jean Auguste Dominique Ingres (French, 1780-1867)
*Odalisque in Grisaille*, 1824-34
The Metropolitan Museum of Art, New York
Oil on canvas, 83.2 x 109.2 cm
Source: ARTstor (accessed November 3, 2009)

Figure B.5b:
Jean Auguste Dominique Ingres (French, 1780-1867)
*The Grand Odalisque*, 1814
Musée de Louvre, Paris
Oil on canvas, 91 x 182 cm
**Figure B.6a:**
Albrecht Dürer (German, 1471-1528)
*Study for Perspective Drawing*, 1525
Public Domain
Woodcut
Source: ARTstor (accessed November 12, 2009)

**Figure B.6b:**
Albrecht Dürer (German, 1471-1528)
*Man Drawing a Lute (The Draughtsman of the Lute)*, 1525
Fine Arts Museum of San Francisco
Woodcut, 13 x 18.3 cm (image)
Source: ARTstor (accessed November 12, 2009)
Figure B.7a: (above left)
*Treatise on the Human Body: Nerves*, ca. 1292
Bodleian Library, University of Oxford, England
Parchment
Source: ARTstor (accessed December 1, 2009)

Figure B.7b: (above right)
*Treatise on the Human Body: Veins*, ca. 1292
Bodleian Library, University of Oxford, England
Parchment
Source: ARTstor (accessed December 1, 2009)

Figure B.7c: (right)
*Treatise on the Human Body: Arteries*, ca. 1292
Bodleian Library, University of Oxford, England
Parchment
Source: ARTstor (accessed December 1, 2009)
Figure B.8:
Johannes de Katham (German, 15th century)
*Fascicolo di Medicina (The Dissection)*, 1493
The Metropolitan Museum of Art, New York
Printed book with woodcut illustrations, 31.6 x 21.5 x 1.5 cm
Source: ARTstor (accessed December 1, 2009)
Figure B.9a: (above left)
Workshop of Titian; attributed to Jan Stephan van Calcar (Netherlands/Italian, 1499-1546?)
Fonticepiece: Portrait of Vesalius, 1543
From Seven Books on the Fabric of the Human Body
Woodcut, 19.7 x 14.5 cm
Source: ARTstor (accessed December 1, 2009)

Figure B.9b: (above right)
Workshop of Titian; attributed to Jan Stephan van Calcar (Netherlands/Italian, 1499-1546?)
Title Page: Vesalius Teaching Anatomy, 1543
From Seven Books on the Fabric of the Human Body
Woodcut, 83 x 24.9 cm
Source: ARTstor (accessed December 1, 2009)
Figure B.10a: (above right)
Leonardo da Vinci (Italian, 1452-1519)
*Study of an Embryo in the Womb*, c.1510
Royal Library, Windsor Castle, Windsor, England
Pen and ink, 12 x 8.5 inches
Source: ARTstor (accessed December 1, 2009)

Figure B.10b: (above right)
Leonardo da Vinci (Italian, 1452-1519)
*Female Vascular System*, c.1508
Royal Library, Windsor Castle, Windsor, England
Pen, brown ink and wash over black chalk
on paper, 476 x 332 mm
Source: ARTstor (accessed December 1, 2009)

Figure B.10c: (right)
Leonardo da Vinci (Italian, 1452-1519)
*Anatomical Study of a Human Skull*, c.1489
Royal Library, Windsor Castle, Windsor, England
Pen, brown ink and wash over black chalk
on paper, 188 x 134 mm
Source: ARTstor (accessed December 1, 2009)
Figure B.11:
Leonardo da Vinci (Italian, 1452-1519)
*Canon of Human Proportions (Vitruvian Man)*, c.1485/90
Gallerie dell’Accademia, Venice, Italy
Pen and ink wash over metalpoint on paper, 34.3 x 24.5 cm
Source: ARTstor (accessed October 28, 2009)
Figure B.12a: (top)
Joseph Wright of Derby (English, 1734-1797)
*An Experiment on a Bird in the Air Pump*, 1768
National Gallery, London, England
Oil on canvas, 182.9 x 243.9 cm
Source: ARTstor (accessed October 27, 2009)

Figure B.12b: (bottom)
Joseph Wright of Derby (English, 1734-1797)
*A Philosopher Giving a Lecture on the Orrery*, 1766
Derby Museum and Art Gallery, Derby, England
Oil on canvas, 147.3 x 203.2 cm
Source: ARTstor (accessed October 27, 2009)
Figure B.13:
A relief from the Sixth Dynasty Tomb of Ankhmahor, Saqqara, Egypt, depicting male circumcision.
This image is in the public domain, and is not copyrightable in the U.S. as per *Bridgeman Art Library v. Corel Corp.*, 36 F. Supp. 2d 191 (S.D.N.Y. 1999).
Figure B.14:
Abu al-Qasim Khalaf ibn al-Abbas Al-Zahrawi (Arab, 936-1013)
Al-Maqlatun Salasun (Thirtieth Treatise), Kitab Al-Tasrif, 1000
© Institute of Manuscripts of Azerbaijan National Academy of Sciences (IMANAS), Baku, Azerbaijan
Manuscript Detail
Figure B.15:
*House of the Sirico; Wounded Aeneas Attended by a Doctor Between Venus and Ascanius, or Aeneas Having Arrowhead Removed from His Thigh with Cross-Legged Forceps, 1st Century A.D.*
Museo Archeologico Nazionale di Napoli, Italy
Fresco, 45.1 x 47.8 cm
Source: ARTstor (accessed December 22, 2009)
Figure B.16:
Joseph Cornell (American, 1903-1972)  
*Untitled: Life of King Ludwig of Bavaria*, c. 1941-52  
Paperboard valise, paper materials  
Source: ARTstor (accessed February 1, 2010)
Figure B.17:
Gravettian culture; Palaeolithic
*Venus of Willendorf, Front View*, c.30,000-25,000 B.C.
Naturhistorisches Museum, Vienna, Austria
Limestone, 11.5 cm
Source: ARTstor (accessed January 17, 2010)
Figure B.18a: (left)
Greek, Attic
*Statue of a Kouros (Youth)*, c.590-580 B.C.
The Metropolitan Museum of Art, New York
Marble, Naxian
Source: ARTstor (accessed March 12, 2010)

Figure B.18a: (right)
Greek, Late Archaic
*Ephebe (Kritios Boy)*, c.480 B.C.
Acropolis Museum, Athens
Marble
Source: ARTstor (accessed March 12, 2010)
Figure B.19:
Michelangelo Buonarroti (Italian, 1475-1564)
*Night: Medici Chapel, Tomb of Giuliano de Medici*, c.1520-34
Medici Chapel, Church of San Lorenzo, Florence, Italy
Marble
Source: ARTstor (accessed January 15, 2010)
Figure B.20a: (left)
Michelangelo Buonarroti (Italian, 1475-1564)
*Awakening Captive*, c.1516-19
Galleria dell’Accademia, Florence, Italy
Marble
Source: ARTstor (accessed February 15, 2010)

Figure B.20b: (right)
Michelangelo Buonarroti (Italian, 1475-1564)
*St. Matthew*, c.1506
Galleria dell’Accademia, Florence, Italy
Marble
Source: ARTstor (accessed February 15, 2010)
Figure B.21:
Rembrandt van Rijn (Dutch, 1606-1669)
*Self-portrait with Beret and Turned up Collar*, 1659
National Gallery of Art, Washington, DC
Oil on canvas, 84.4 x 66 cm
Source: ARTstor (accessed February 18, 2010)
Figure B.22a: (top left)
Rembrandt van Rijn (Dutch, 1606-1669)
Self-portrait with a Gorget, 1629
Mauritshuis, The Hague, Netherlands
Oil on canvas, 38.2 x 31 cm
Source: ARTstor (accessed February 18, 2010)

Figure B.22b: (top center)
Rembrandt van Rijn (Dutch, 1606-1669)
Self Portrait, 1633
Musée de Louvre, Paris
Oil on oak panel, 60 x 47 cm
Source: ARTstor (accessed February 18, 2010)

Figure B.22c: (top right)
Rembrandt van Rijn (Dutch, 1606-1669)
Self-portrait, 1645
The Hague, Mauritshuis
Oil on panel, 69 x 56 cm
Source: ARTstor (accessed February 18, 2010)

Figure B.22d: (bottom left)
Rembrandt van Rijn (Dutch, 1606-1669)
Large Self Portrait, 1652
Kunsthistorisches Museum, Vienna
Oil on canvas, 112.1 x 81 cm
Source: ARTstor (accessed February 18, 2010)

Figure B.22e: (bottom center)
Rembrandt van Rijn (Dutch, 1606-1669)
Self-portrait with Beret, 1659
National Gallery of Scotland, Edinburgh
Oil on canvas, 52.7 x 42.7 cm
Source: ARTstor (accessed February 18, 2010)

Figure B.22f: (bottom right)
Rembrandt van Rijn (Dutch, 1606-1669)
Self Portrait, 1669
Mauritshuis, The Hague, Netherlands
Oil on canvas, 60 x 50.8 cm
Source: ARTstor (accessed February 18, 2010)
Figure B.23a: (above left)
Théodore Géricault (French, 1791-1824)
*Portrait of a Kleptomaniac*, 1822
Museum voor Schone Kunsten, Ghent, Belgium
Oil on canvas, 61.2 x 50.2 cm
Source: ARTstor (accessed October 28, 2009)

Figure B.23b: (above right)
Théodore Géricault (French, 1791-1824)
*Portrait of Lord Byron*, early 19th century
Musee Fabre, Montpellier, France
Oil on canvas
Source: ARTstor (accessed October 28, 2009)
Figure B.23c: (above left)
Théodore Géricault (French, 1791-1824)
*Portrait of a Woman with Gambling Mania*, 1820
Musée du Louvre, Paris, France
Oil on canvas, 0.77 x 0.65 m
Source: ARTstor (accessed October 28, 2009)

Figure B.23d: (above right)
Théodore Géricault (French, 1791-1824)
*Portrait of a Woman Suffering From Obsessive Envy*, 1822
Musée des Beaux-Arts, Lyons, France
Oil on canvas, 72 x 58 cm
Source: ARTstor (accessed October 28, 2009)
**Figure B.24:**

Henry Gray (English, 1825-1861)

*Superficial dissection of the right side of the neck, showing the carotid and subclavian arteries, 1918*

Lithograph from “Anatomy of the Human Body”

This image is in the public domain, and is not copyrightable in the U.S. as per *Bridgeman Art Library v. Corel Corp.*, 36 F. Supp. 2d 191 (S.D.N.Y. 1999).
Figure B.25a: (above left)
Matthias Grünewald (German, 1470-1528)
Isenheim Altarpiece: Crucifixion (detail), ca. 1515
Musée d’Unterlinden, Colmar, Alsace, France
Oil on wood, 269 x 307 cm
Source: ARTstor (accessed October 28, 2009)

Figure B.25b: (above right)
Matthias Grünewald (German, 1470-1528)
Isenheim Altarpiece: Deposition (detail), ca. 1515
Musée d’Unterlinden, Colmar, Alsace, France
Oil on wood, 269 x 307 cm
Source: ARTstor (accessed October 28, 2009)

Figure B.25c: (right)
Matthias Grünewald (German, 1470-1528)
Isenheim Altarpiece: Resurrection (detail), ca. 1515
Musée d’Unterlinden, Colmar, Alsace, France
Oil on wood, 269 x 141 cm
Source: ARTstor (accessed October 28, 2009)
**Figure B.25d: (left)**
Matthias Grünewald (German, 1470-1528)
*Isenheim Altarpiece: Mary Magdalene (detail), ca. 1515*
Musée d’Unterlinden, Colmar, Alsace, France
Oil on wood, 269 x 141 cm
Source: ARTstor (accessed March 1, 2010)

**Figure B.26: (right)**
David Seymour (Polish, 1911-1956)
*Pablo Picasso and detail of ‘Guernica’, France (detail), 1937*
The Minneapolis Institute of Arts, Minneapolis, Minnesota
Gelatin silver print photograph
Source: ARTstor (accessed March 1, 2010)
Figure B.27:
Rembrandt van Rijn (Dutch, 1606-1669)
The Anatomy Lesson of Dr. Nicolaes Tulp, 1632
Mauritshuis, The Hague, Netherlands
Oil on canvas, 170 x 217 cm
Source: ARTstor (accessed October 28, 2009)
Figure B.28:
Andrew Wyeth (American, 1917-2009)
Christina’s World, 1948
Museum of Modern Art, New York
Tempera on gessoed panel, 81.9 x 121.3 cm
Source: ARTstor (accessed October 27, 2009)
Figure B.29a: (upper left)
Jackson Pollock (American, 1912-1956)
*Reflection of the Big Dipper (Detail), 1947*
Stedelijk Museum, Amsterdam
Oil on canvas, 111 x 92 cm
Source: ARTstor (accessed January 31, 2010)

Figure B.29b: (upper right)
Jackson Pollock (American, 1912-1956)
*Convergence (Detail), 1952*
Albright-Knox Art Gallery, Buffalo, New York
Oil on canvas, 238.75 x 396.23 cm
Source: ARTstor (accessed January 31, 2010)

Figure B.29c: (lower left)
*Clinical Photograph of Staph Infection*
Source: SpringerImages
(at accessed January 31, 2010)

Figure B.29d: (lower right)
*Clinical Photograph of Psoriasis*
Source: SpringerImages
(at accessed January 31, 2010)
Figure B.30a:
Photograph of Frida Kahlo Painting at Home “Naturaleza Viva,” 1952
Source: ARTstor (accessed February 24, 2010)

Figure B.30b:
Photograph of Vicente Artur Carneiro Drawing “Crossroads” While Recovering From Thyroidectomy, 1986
Reprinted with permission from Vicente Artur Carneiro
Figure B.31: (top)
Frida Kahlo (Mexican, 1907-1954)
*Henry Ford Hospital, 1932*
Museo Dolores Olmeda, Mexico City, Mexico
Oil on sheet metal, 30.5 x 38 cm
Source: ARTstor (accessed February 24, 2010)

Figure B.32: (bottom)
Frida Kahlo (Mexican, 1907-1954)
*Few Small Nips, 1935*
Museo Dolores Olmeda, Mexico City, Mexico
Oil on sheet metal and wood frame, 30 x 40 cm
Source: ARTstor (accessed February 24, 2010)
Figure B.33:
Frida Kahlo (Mexican, 1907-1954)
The Two Fridas, 1939
Museo de Arte Moderno, Mexico City, Mexico
Oil on canvas, 173.5 x 173 cm
Source: ARTstor (accessed February 24, 2010)

Figure B.34:
Frida Kahlo (Mexican, 1907-1954)
The Broken Column, 1944
Museo Dolores Olmeda, Mexico City, Mexico
Oil on masonite, 42 x 33 cm
Source: ARTstor (accessed February 24, 2010)
Figure B.35:
Frida Kahlo (Mexican, 1907-1954)
*Without Hope*, 1945
Museo Dolores Olmeda, Mexico City, Mexico
Oil on masonite, 28 x 36 cm
Source: ARTstor (accessed February 24, 2010)
Figure B.36:
Vicente Artur Carneiro (Brazilian-American, 1954-present)
*Crossroads (Detail)*, 1986
Private collection
Mixed media on paper, 40.63 x 50.79 cm
Reprinted with permission from Vicente Artur Carneiro
Figure B.37:
Joel-Peter Witkin (American, 1939-present)
*Woman in the Blue Hat*, 1985
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.38a: (left)
Joel-Peter Witkin (American, 1939-present)
First Casting for Milo, 2004
Photograph
Reprinted with permission of Joel-Peter Witkin

Figure B.38b: (right)
Aphrodite, called the Venus de Milo, c.100 B.C.
Musée du Louvre, Paris, France
Marble
Source: ARTstor (accessed February 25, 2010)
Figure B.39a:
Joel-Peter Witkin (American, 1939-present)
Portrait of Greg Vaughan, 2004
Photograph
Reprinted with permission of Joel-Peter Witkin

Figure B.39b: (right)
Hermes with the Infant Dionysus (copy after Praxiteles?), c.300-320 B.C.
Archaeological Museum, Olympia, Greece
Marble
Source: ARTstor (accessed February 25, 2010)
Figure B.40a: (left)
Michelangelo Merisi da Caravaggio (Italian, 1573-1610)
Saint Francis in Meditation, 1606
Chiesa dei Cappuccini, Rome, Italy
Oil on canvas, 125 x 93 cm
Source: ARTstor (accessed February 25, 2010)

Figure B.40b: (right)
Georges du Mesnil de La Tour (French, 1593-1652)
Magdalene at the Mirror, c.1635
National Gallery of Art, Washington, DC
Oil on canvas, 113 x 92.7 cm
Source: ARTstor (accessed February 25, 2010)
Figure B.41a:
Cornelis de Heem (Dutch, 1631-1695)
*Fruit*, 1650
Provenance: Sale, Christie’s, London, May 7, 1926, lot 39 (to Pollak)
Oil on canvas, 39.3 x 52 cm
Source: ARTstor (accessed February 27, 2010)

Figure B.41b:
Joel-Peter Witkin (American, 1939-present)
*Feast of Fools*, 1990
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.42:
Joel-Peter Witkin (American, 1939-present)
*Portrait as a Vanité*, 1994
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.43:
Joel-Peter Witkin (American, 1939-present)
*Woman on a Table*, 1987
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.44:
Joel-Peter Witkin (American, 1939-present)
*Abundance, Prague, 1997*
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.45:
Joel-Peter Witkin (American, 1939-present)

*Man with Dog, Mexico*, 1990
Photograph
Reprinted with permission of Joel-Peter Witkin
Figure B.46a:
Joel-Peter Witkin (American, 1939-present)
Leda and the Swan, 1986
Photograph
Reprinted with permission of Joel-Peter Witkin
**Figure B.46b: (left)**
Roman marble possibly reflecting lost work by Timotheos (4\(^{th}\) century B.C.); restored *Leda and Zeus (as a Swan)*
Museo Nacional del Prado, Madrid, Spain
Marble
Source: Creative Commons Attribution-Share Alike 2.5 Generic license (accessed February 27, 2010)

**Figure B.46c: (right)**
Copy after Leonardo da Vinci (Italian?)
*Leda and the Swan, after 1510-15*
Galleria Borghese, Rome, Italy
Tempera on panel, 112 x 86 cm
Source: ARTstor (accessed February 27, 2010)
Figure B.47a:
Jacques Fabien Gautier d’Agoty
(French, 1717-1785)
Anatomie des parties de la génération de l’homme et de la femme, 1773
National Library of Medicine, Bethesda, MD
Public Domain
Colored mezzotint
Source: National Library of Medicine
(accessed March 11, 2010)
Figure B.47b-c:
Jacques Fabien Gautier d’Agoty (French, 1717-1785)
*Anatomie des parties de la génération de l’homme et de la femme*, 1773
National Library of Medicine, Bethesda, MD
Public Domain
Colored mezzotint
Figure B.48:
Michelangelo Buonarroti (Italian, 1475-1564)
Pietà, c.1498-1500
Basilica di San Pietro in Vaticano, Rome, Italy
Marble
Source: ARTstor (accessed March 2, 2010)
Figure B.49:

*Before-and-After drawings of an entire five-day class, held in Seattle, August 4, 1997, to August 8, 1997.*


Reprinted with permission from Penguin Group
Figure B.50a: (shown right side up on the left, and inverted on the right)
From: Betty Edwards, *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. 2nd rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999), 58, Fig. 4-7. This image is in the public domain in the United States.
Figure B.50b:
Inverted drawing. Forcing the cognitive shift from the dominant left-hemisphere mode to the subdominant right-hemisphere mode.
Reprinted with permission from Penguin Group (USA) Inc.
Figure B.50c:
Above left: The Picasso drawing mistakenly copied right side up by a university student.
From: Betty Edwards, *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. 2nd rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999), 60, Fig. 4-11.
Reprinted with permission from Penguin Group (USA) Inc.

Figure B.50d:
Above right: the Picasso drawing copied upside down the next day by the same student.
From: Betty Edwards, *The New Drawing on the Right Side of the Brain: A Course in Enhancing Creativity and Artistic Confidence*. 2nd rev. ed. (New York: Jeremy P. Tarcher/Putnam, 1999), 60, Fig. 4-12.
Reprinted with permission from Penguin Group (USA) Inc.
Figure B.51: (right)
Example of Josef Albers Theory of the Interaction of Color

The smaller squares in the center of the two larger squares appear to be the same shade of blue. Shown independently, each blue is of differing value, hue, and intensity. This demonstrates how colors interact and affect one another. In similar examples, the two smaller squares in the center of the larger squares will appear to be different shades of a particular color; shown independently, the shades in the smaller squares are actually of identical value, hue, and intensity.

NOTE: Print or electronic versions of the image above may be affected by the quality of printer or computer monitor used to view the image.
APPENDIX C:

PERMISSIONS
License Details

This is a License Agreement between Walter T Johnson ("You") and Springer ("Springer"). The license consists of your order details, the terms and conditions provided by Springer, and the payment terms and conditions.

Get the printable license.

| License Number | 33690905612066 |
| License date   | Nov 25, 2009   |
| Licensed content publisher | Springer |
| Licensed content publication | Journal of General Internal Medicine |
| Licensed content title | Formal Art Observation Training Improves Medical Students’ Visual Diagnostic Skills |
| Licensed content author | Sheila Naghshineh |
| Licensed content date | Jan 1, 2008 |
| Volume number | 23 |
| Issue number | 7 |
| Type of Use | Thesis/Dissertation |
| Article | No |
| Order reference number | DGW7315K |
| Title of your thesis / dissertation | Shaping Better Physicians: The Role of the Visual Arts in Medical Education |
| Expected completion date | Apr 2010 |
| Estimated size (pages) | 350 |
| Total | 0.00 USD |

Copyright © 2009 Copyright Clearance Center, Inc. All Rights Reserved. Privacy statement.
Comments? We would like to hear from you. E-mail us at customerservice@copyright.com

McAfee SECURE
TSTED DAILY -01-DEC
Title:  Arts-Related Activities Across U.S. Medical Schools: A Follow-Up Study
Author:  Paul Rodenhauser, Mathew A. Strickland, Cecilia T. Gamba
Publication:  Teaching and Learning in Medicine
Publisher:  Taylor & Francis
Date:  Jan 7, 2004
Copyright © 2004 Routledge

Thesis/Dissertation Reuse Request

Taylor & Francis is pleased to offer reuse of its content for a thesis or dissertation free of charge contingent on resubmission of permission request if work is published.

BACK CLOSE WINDOW

Copyright © 2009 Copyright Clearance Center, Inc. All Rights Reserved. Privacy statement. Comments? We would like to hear from you. E-mail us at customerance@copyright.com

McAfee SECURE
TESO EAY 08-DEC

1 of 1 12/8/09 3:51 PM
February 4, 2010

Joel-Peter Witkin
1707 Five Points Road, SW
Albuquerque, NM 87105

Dear Mr. Witkin:

I am writing to kindly request your permission to reprint the following material:

- First Casting for Milo (2004)
- Abundance, Prague (1997)
- Portrait as a Vanity (1994)
- Feast of Fools (1990)
- Man with Dog, Mexico (1990)
- Woman on a Table (1987)
- Leda and the Swan (1986)
- Woman in the Blue Hat, New York (1985)

This material is to appear as originally published in the following work that I am presently preparing for publication:

**Author:** Walter Taylor Johnson, M.F.A.

**Type of Work:** A Dissertation submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Doctor of Liberal Studies

**Working Title:** Shaping Better Physicians?: The Role of the Visual Arts in Medical Education

**Proposed date of publication:** April/May 2010
Joel-Peter Witkin
February 4, 2010
Page Two

As you are listed as the copyright holder, may I have your permission to reprint the above material in my dissertation? If you do not indicate otherwise, I will use the usual scholarly form of acknowledgement, including artist, title, and year, followed by: Reprinted with permission from Joel-Peter Witkin.

If you are not the copyright holder, or if additional permission is needed from another source, please indicate so.

Thank you for your consideration of this request.

Sincerely yours,

W. Taylor Johnson, M.F.A.
Director, Biomedical Graduate Education
Doctoral Candidate, Liberal Studies Program
202/687-1379 (phone)
202/687-2399 (fax)
johnsonw@georgetown.edu (email)

The above request is hereby approved on the conditions specified on the attached sheet (if applicable), and on the understanding that full credit will be given to the source.

Approved by (please print name): Joel-Peter Witkin

Approved by (signature):

Date: 2.8.10

* That I receive a copy of your approval!
February 24, 2010

Vicente Artur Carneiro
Bethesda, MD

Dear Mr. Carneiro:

I am writing to kindly request your permission to reprint the following material:

- *Crossroads* (1986)
- *Photograph of Vicente Artur Carneiro Drawing While Recovering From Thyroidectomy* (1986)

This material is to appear as originally published in the following work that I am presently preparing for publication:

**Author:** Walter Taylor Johnson, M.F.A.

**Type of Work:** A Dissertation submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Doctor of Liberal Studies

**Working Title:** Shaping Better Physicians?: The Role of the Visual Arts in Medical Education

**Proposed date of publication:** April/May 2010

May I have your permission to reprint the above material in my dissertation? If you do not indicate otherwise, I will use the usual scholarly form of acknowledgement, including artist, title, and year, followed by: Reprinted with permission from Vicente Artur Carneiro.
Thank you for your consideration of this request.

Sincerely yours,

[Signature]

W. Taylor Johnson, M.F.A.
Director, Biomedical Graduate Education
Doctoral Candidate, Liberal Studies Program
202/687-1379 (phone)
202/687-2359 (fax)
johnsonw@georgetown.edu (email)

The above request is hereby approved on the conditions specified on the attached sheet (if applicable), and on the understanding that full credit will be given to the source.

Approved by (please print name): VICENTE ARTUR CARNEIRO

Approved by (signature): [Signature]

Date: 2-25-10
March 11, 2010

Eric Avery, MD
c/o Lt. Blenders
1202 Post Office Street
Galveston, TX 77550

Dear Dr. Avery:

I am writing to kindly request your permission to reprint the following material:

Selected black-and-white photographs of plastic surgery resident Dr. Jane Petro (et al.) performing hand reattachment surgery at the Pennsylvania University College of Medicine in Hershey, October 1977.

This material is to appear as originally published in the following work that I am presently preparing for publication:

Author: Walter Taylor Johnson, M.F.A.

Type of Work: A Dissertation submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Doctor of Liberal Studies

Working Title: Shaping Better Physicians?: The Role of the Visual Arts in Medical Education

Proposed date of publication: April/May 2010
As the copyright holder of these photos, may I have your permission to reprint the above material in my dissertation? If you do not indicate otherwise, I will use the usual scholarly form of acknowledgement, as follows:

Eric Avery, MD
Plastic surgery resident Dr. Jane Petro (et al.) performing hand reattachment surgery at the Pennsylvania University College of Medicine in Hershey, October 1997
Reprinted with permission from Eric Avery, MD

If you are not the copyright holder, or if additional permission is needed from another source, please indicate so.

Thank you for your consideration of this request.

Sincerely yours,

[Signature]

W. Taylor Johnson, M.F.A.
Director, Biomedical Graduate Education
Doctoral Candidate, Liberal Studies Program
202/687-1379 (phone)
202/687-2359 (fax)
johnsonw@georgetown.edu (email)

The above request is hereby approved on the conditions specified on the attached sheet (if applicable), and on the understanding that full credit will be given to the source.

Approved by (please print name):  Eric Avery

Approved by (signature):  [Signature]

Date:  3/12/10
March 10th, 2010

Walter Johnson
Georgetown University
3900 Reservoir Road, NW
NE 317 Medical-Dental Bldg.
Washington, DC 20057-1411

Re: THE NEW DRAWING ON THE RIGHT SIDE OF THE BRAIN by Betty Edwards/web request #9884039

Dear Mr. Johnson,

We have no objection to your use of the above material in your dissertation/thesis, as requested in your letter, subject to the following conditions:

1. Such material must be reproduced exactly as it appears in our publication;

2. Full acknowledgment of the title, author, translator, illustrator, copyright and publisher is given;

3. If you ever have your dissertation published, you must reapply for permission.

4. Storage and publication by University Microfilms, Inc./Proquest is herewith granted.

Please note that Penguin Group (USA) claims no rights to the Picasso drawing on page 58.

Best wishes for the success of your paper.

Sincerely,

[Signature]

Sam Moore
Assistant Manager
BIBLIOGRAPHY


Ciaglia, P. “The ‘David’ of Michelangelo or (Why the Foreskin?).” *Journal of the American Medical Association* 218, no. 8 (November 22, 1971): 1304.


Da Vinci, Leonardo. A treatise on painting, by Leonardo da Vinci. Translated from the original Italian. Illustrated with a great number of cuts. To Which IS Added The Life of the Author, And a Portrait from a Picture in the Duke Of Tuscany's


______. “Should Medical Humanities be a Multidisciplinary or an Interdisciplinary Study?” *Journal of Medical Ethics: Medical Humanities* 30 (2004): 1-4.


Macnaughton, J. “’Arts and Humanities’: A New Section in Medical Education.” *Medical Education* 36, no. 2 (2002): 106-7.


McCallum, Dennis, ed. The Death of Truth: What’s Wrong with Multiculturalism, the Rejection of Reason and the New Postmodern Diversity. Grand Rapids, MI: Bethany House, 1996.


Pellegrino, Edmund D. “Humanities and Human Values in Medical Education.” *National Forum* 58, no. 2 (Spring 1978): 13-17.


Sarton, George. *Introduction to the History of Science.* Baltimore: Published for the Carnegie Institution of Washington by the Williams & Wilkins Company, c.1927.


Triana, J. E. “Humanistic and Social Education for Physicians: The Experience of the Colombian School of Medicine.” *Journal of Medicine and Philosophy* 21, no. 6 (December 1996): 651-57.


