Volume 51 Index

Articles

Culture and Society

Implicit Normativity in Scientific Advice: Values in Nutrition Scientists' Decisions to Give Public Advice **199**
Anna Paldam Folker, Hanne Andersen, and Peter Sandøe

Taking the Devil into Your Mouth: Ritualized American Weight-Loss Narratives of Morality, Pain, and Betrayal **207**
April Michelle Herndon

Ethics and Philosophy

Parasites and Progress: Ethical Decision-Making and the Santee-Cooper Malaria Study, 1944–1949 **103**
Leo Slater and Margaret Humphreys

Two Faces of Death: Fatalities from Disease and Combat in America's Principal Wars, 1775 to Present **121**
Vincent J. Cirillo

Mortal Exposure: On the Goodness of Writing Medical Ethics **163**
Geoffrey Rees

History and Biography

Mao Zedong's Fight Against Schistosomiasis **176**
Kawai Fan and Honkei Lai

The First Pharmacoepidemiologic Investigations: National Drug Safety Policy in the United States, 1901–1902 **188**
David E. Lilienfeld

The Changing Face of "Real Research" **464**
Howard Hiatt

Medical Education and Practice

Training for Fitness: Reconsidering the 80-Hour Work Week **134**
Catherine V. Caldicott and James W. Holsapple

The Afterbirth of the Clinic: A Foucauldian Perspective on "House M.D." and American Medicine in the 21st Century **220**
Leigh E. Rich, Jack Simmons, David Adams, Scott Thorp, and Michael Mink

An Epidemic of Depression or the Medicalization of Distress? **238**
Roger T. Mulder

Drug Reps and the Academic Medical Center: A Case for Management Rather than Prohibition **251**
Thomas S. Huddle

Beyond Empathy **471**
Richard Sobel

Toward Reducing the Prevalence of Chronic Disease: A Life Course Perspective on Health Preservation **616**
Jeremiah A. Barondess

Science and Medicine

From Body to Brain: Considering the Neurobiological Effects of Female Genital Cutting **84**
Gillian Einstein

Survival Advantage of the Hemochromatosis C282Y Mutation **98**
Eugene D. Weinberg

ESSAY REVIEWS

Historical Fine-Mapping **144**
Angela N. H. Creager

Understanding the Complexity of the U.S. Health Care System: Can Free-Market Ideology Respond to a Current Challenge? **149**
William P. Gunnar

Surgically Shaping Children **261**
Henri Wijsbek

Expanding Immunology: Defensive versus Ecological Perspectives **270**
Alfred I. Tauber

Universal Health Insurance: Will It Control the Cost of U.S. Health Care? **285**
William P. Gunnar

Response to Dr. Gunnar **292**
David F. Drake

When Less Is More in Public Health **479**
Christopher Masi

The Natural History of the Sexual Genome: Proactive Drivers and Passive Drifters **484**
John C. Avise

Babies by (Intelligent) Design? **629**
Mary B. Mahowald

Integrating Evolution and Development: From Theory to Practice **636**
Ehud Lamm and Eva Jablonka

BOOK REVIEWS

Medical Lives in the Age of Surgical Revolution **155**
by M. Anne Crowther and Marguerite W. Dupree / reviewed by Solveig C. Robinson

How Doctors Think **158**
by Jerome Groopman / reviewed by Michel Shamy and Ross Upshur

When Illness Goes Public: Celebrity Patients and How We Look at Medicine **295**
by Barron H. Lerner / reviewed by John C. Bailar III

Children in Medical Research: Access versus Protection **299**
by Lainie Friedman Ross / reviewed by Christopher Church and Raymond C. Barfield

Strange Harvest: Organ Transplants, Denatured Bodies, and the Transformed Self **302**
by Lesley A. A. Sharp / reviewed by Edward R. Garrity, Jr.

To Die Well: Your Right to Comfort, Calm and Choice in the Last Days of Life **304**
by Sidney Wanzer and Joseph Glenmullen / reviewed by Michael Marschke

The Intelligibility of Nature: How Science Makes Sense of the World **309**
by Peter Dear / reviewed by Richard Olson

Culturing Life: How Cells Became Technologies **312**
by Hannah Landecker / reviewed by Henning Schmidgen

Contagious: Cultures, Carriers, and the Outbreak Narrative **648**
by Priscilla Wald / reviewed by Elinor L. Baron

Laws of Men and Laws of Nature: The History of Scientific Expert Testimony in England and America **650**
by Tal Golan / reviewed by William P. Gunnar

Elizabeth Blackburn and the Story of Telomeres: Deciphering the Ends of DNA **655**
by Catherine Brady / reviewed by Jane Maienschein

Plan B 3.0: Mobilizing to Save Civilization **658**
by Lester R. Brown / reviewed by Theodore L. Steck

Searching Eyes: Privacy, the State, and Disease Surveillance in America **660**
by Amy L. Fairchild, Ronald Bayer, and James Colgrove / reviewed by Peter Tuteur

NEW TECHNOLOGIES AND MEDICAL EDUCATION

Edited by Morton Arnsdorf

New Technologies and Medical Education: Introduction **1**
Morton Arnsdorf

E-Learning: Is There Anything Special about the "E"? **5**
David A. Cook and Furman S. McDonald

Computer-Assisted Medical Education: Current and Potential Roles **22**
Scott Stern

Simulation in Health Care Education **31**
S. Barry Issenberg and Ross J. Scalese

Medical Simulation: The New Tool for Training and Skill Assessment **47**
John D. Carroll and John C. Messenger

Internet-Based Medical Education **61**
Alfred A. Bove

Improving the Quality of Care via Maintenance of Certification and the Web: An Early Status Report **71**
Eric S. Holmboe, Lorna Lynn, and F. Daniel Duffy

PHILOSOPHY OF MEDICINE

Edited by Alfred I. Tauber

Introduction **317**
Alfred I. Tauber

Risk and Disease **320**
Peter H. Schwartz

Mental Illness from the Perspective of Theoretical Neuroscience **335**
Paul Thagard

Constructive Realism and Medicine: An Approach to Medical Ontology **353**
Jeremy R. Simon

Do We Need Theory to Study Disease? Lessons from Cancer Research and Their Implications for Mental Illness **367**
Harold Kincaid

Philosophy of Medicine Is What Philosophers of Medicine Do **379**
William E. Stempsey

Reflections on Humanizing Biomedicine **392**
James A. Marcum

Epistemological Reflections on the Art of Medicine and Narrative Medicine **406**
Miriam Solomon

Evidence and Ethics in Medicine **418**
John Worrall

Health as Intra-Systemic Integrity: Rethinking the Foundations of Systems Biology and Nanomedicine **432**
George Khushf

Medicine and the Call for a Moral Epistemology, Part II: Constructing a Synthesis of Values **450**
Alfred I. Tauber

MEDICAL PROFESSIONALISM

Edited by Holly J. Humphrey

Medical Professionalism: Introduction **491**
Holly J. Humphrey

Teaching Humanism **495**
David T. Stern, Jordan J. Cohen, Ann Bruder, Barbara Packer, and Allison Sole

Professionalism Education: The Medical Student Response **508**
Troy Leo and Kellene Eagan

The YouTube Generation: Implications for Medical Professionalism **517**
Jeanne M. Farnan, John A. M. Paro, Jennifer Higa, Jay Edelson, and Vineet M. Arora

Medical Professionalism: One Size Fits All? **525**
James N. Woodruff, Peter Angelos, and Sandra Valaitis

Teaching Professionalism: A Tale of Three Schools **535**
Nirav Shah, Jeffrey Anderson, and Holly J. Humphrey

Medical Professionalism and the Doctor-Patient Relationship **547**
Lydia S. Dugdale, Mark Siegler, and David T. Rubin

Medical Professionalism: Crossing a Generational Divide **554**
Colin Walsh and Herbert T. Abelson

The Short History and Tenuous Future of Medical Professionalism: The Erosion of Medicine's Social Contract **565**
Matthew K. Wynia

Expectations and Obligations: Professionalism and Medicine's Social Contract with Society **579**
Richard L. Cruess and Sylvia R. Cruess

Moving Beyond Nostalgia and Motives: Towards a Complexity Science View of Medical Professionalism **599**
Frederic W. Hafferty and Dana Levinson

Medical Professionalism

introduction

Holly J. Humphrey

Perhaps no topic has consumed physician leaders and medical educators in the 21st century as much as the idea that the profession of medicine is under threat. Many of us have wrestled with what must be done to protect the values on which our profession was founded and how we might best inculcate these core values in our students and residents so that they are well-prepared to withstand the stormy waters ahead. The Medical Professionalism Project—a collaborative initiative of the American Board of Internal Medicine Foundation, the American College of Physicians, and the European Federation of Internal Medicine—culminated with the publication of the Physician Charter in 2002, with the intended goal of defining medicine's 21st-century obligations under the social contract—preserving medicine's traditional values but adapting them to contemporary reality.

If anyone expected the Physician Charter would be the last word on the topic, it is clear from the more than 1,500 publications in the medical literature on professionalism published in the intervening six years that the complicated and controversial issues of professionalism—defining it, teaching it, measuring it—continue to absorb and occupy our attention. Therefore, when the editors of *Perspectives in Biology and Medicine* invited me to serve as the guest editor for a

Professor of Medicine and Dean for Medical Education, University of Chicago Pritzker School of Medicine, 924 East 57th Street, Chicago, IL 60637.
E-mail: dean-for-meded@bsd.uchicago.edu.

The author would like to thank Morton Arnsdorf for suggesting a special issue on professionalism in medicine; Dana Levinson and Kelly Smith for their editorial and organizational talents; and Roberta Sonnino for providing the cover photograph *Fragile Beginnings*, which beautifully captures the weighty and meaningful responsibility of what is entrusted to a physician's hands.

Perspectives in Biology and Medicine, volume 51, number 4 (autumn 2008):491–94

special issue devoted to this topic, I was eager to ensure that the subject would be discussed from a variety of perspectives and across a spectrum of approaches.

I was challenged and inspired by two recent and valuable publications that addressed the topic of professionalism in medicine: *Professonalism in Medicine: Critical Perspectives*, edited by Delese Wear and Jule Aultman (2006), and a special issue of *Academic Medicine* published in November 2007. I wanted to ensure that the articles in this issue provided the useful examples and models that we found in the issue of *Academic Medicine*, and I also wanted to incorporate voices that had not traditionally been heard in this discussion—including those of residency program directors, as well as the approaches taken by other professional schools—and thereby provide an even more robust context through which individuals and institutions could engage in this dialogue. I was impressed by the high level of critical theorizing employed by the authors in *Professionalism in Medicine*, and I wanted this issue of *Perspectives in Biology and Medicine* to similarly challenge readers to consider professionalism from critical vantage points ranging from individual obligations to the context in which medical professionalism must be considered, and to link these critical perspectives to specific recommendations and suggestions.

The articles in this issue are organized in four main groups. The first group explores strategies, responses, and potential issues in educating our students and residents for professionalism. The second looks at professionalism in terms of the doctor-patient relationship. The third section considers how the social contract of medicine or medicine's obligations to society have evolved. The issue ends with a consideration of how we might frame inquiries into professionalism in the future, in order to take into account the complexity and highly interactive nature of the factors affecting professionalism and further advance our discourse and dialogue on this important topic.

As dean for Medical Education at the University of Chicago Pritzker School of Medicine, I am engaged in institutional efforts to ensure that faculty, residents, and students both understand the core values of our profession and reflect those values in their behavior and daily interactions. Until now, the primary response to the perceived threat to the profession of medicine has been to focus on improving the way in which we educate students for professionalism. In fact, all of us who are involved in medical education are grappling with mandates from oversight organizations—including both the Liaison Committee on Medical Education and the Accreditation Council for Graduate Medical Education—that we educate our physicians to "learn the importance of demonstrating the attributes (attitudes, behavior, professional identity) of a professional and understand the balance of privileges and obligations that the public and the profession expect of a medical doctor" (LCME 2007, p. 24).

In the special issue of *Academic Medicine* on professionalism, Jordan Cohen (2007) wrote that "professionalism denotes a way of behaving in accordance with certain normative values, whereas humanism denotes an intrinsic set of deep-

seated convictions about one's obligations toward others. Viewed in this way, humanism is seen as the passion that animates professionalism" (p. 1029). Bearing that wisdom in mind, our issue begins with a presentation of "best practices," or innovative curricula and strategies for teaching professionalism and humanism drawn from medical schools across the country, by David Stern and Jordan Cohen.

If medical education is the primary method by which we hope to address the threat to medical professionalism, what do we know about the effectiveness of this approach? From my own experience as clinician-teacher and through my interactions with my own students, I have been surprised to learn that many students experience our intense focus on professionalism training as being "browbeaten" on the topic and unfairly singled out. Therefore, I have asked two senior students (now graduates of our school), Troy Leo and Kelly Eagan, to consider why a group of individuals as altruistic and other-directed as medical students—those individuals, in fact, who ought to be the most receptive audience and participants in a conversation about the core values of the profession—often feel alienated by the way in which the conversation is taking place.

As we consider how to adapt medicine's traditional values to contemporary reality, we also need to consider the changing landscape of technology and how it is impacting not only our educational system but the social and communication landscape in which our students reside. Using a real-life incident from the University of Chicago, the article by Jeanne Farnan and colleagues looks at some of the unexpected consequences of the widespread use of digital media and how such use interfaces with professional standards and behaviors that are expected of our students.

Do core values of medical professionalism apply across disciplinary boundaries? What might medicine learn from how other professional schools define professionalism and how they teach it? Two articles, by James Woodruff and Peter Angelos and by Nirah Shah, Jeffrey Anderson, and myself, look at cross-disciplinary issues in educating for professionalism, both within medicine and across professions.

Professionalism charters increasingly recognize the social and community roles of physicians as well as their individual obligations to their patients. Balancing the tension between the doctor-patient relationship and its demands with the demands of serving society are addressed in an article by Lydia Dugdale, Mark Siegler, and David Rubin, who look at professionalism from the context of the doctor-patient relationship and the challenging environment in which doctors practice. Another article, by Colin Walsh and Herbert Abelson, looks across the past, present, and future of the physician-patient relationship to consider how core values of the profession might be best exemplified in a changing world and practice environment.

Professionalism is expressed not just on an individual level to our individual patients, but at a societal level—a concept referred to as "civic professionalism."

In the minds of some health-care consumer groups and patients, there is a perception that "professionalism" places too much emphasis on the loyalty of the profession to its own interests, rather than serving the interests of the public. Consumer groups have increasingly asked for physicians to be more transparent, for example, by publishing board scores, patient satisfaction ratings, physician choices for family referrals, and patient outcomes. Two important pieces by leaders in the field explore medical professionalism from the context the profession of medicine's contract with society. The first, an historical overview of medical professionalism and the social contract by Matthew Wynia, details the social forces that led medical professionalism away from civic responsibilities and towards individual ones. The second, by Richard and Sylvia Cruess, examines the origin of the term *social contract*, defines what this means to medicine in contemporary terms, and outlines the implications and applications of a reciprocal contract between medicine and society.

As stated earlier, our primary response to threats to the profession have largely been through educational interventions with our students—in other words, at the individual level with the idea of imbuing core values of the profession so effectively as to influence actions and behaviors to reflect these values. While this has been an important aspect of the modern-day professionalism movement, our last paper, by Fred Hafferty and Dana Levinson, considers how we might move beyond a focus on physicians as individual actors to consider professionalism via the prism of "complexity science"—or as a dynamic system in which the individual and the environment are seen as interactive and interdependent variables.

I hope that these essays will contribute to and inform the ongoing and lively discussion on what it means to be a physician in the 21st century and how concepts of professionalism may be best taught, learned, and understood.

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Teaching Humanism

David T. Stern,* Jordan J. Cohen,†‡ Ann Bruder,†
Barbara Packer,† and Allison Sole†

ABSTRACT As the "passion that animates authentic professionalism," humanism must be infused into medical education and clinical care as a central feature of medicine's professionalism movement. In this article, we discuss a current definition of humanism in medicine. We will also provide detailed descriptions of educational programs intended to promote humanism at a number of medical schools in the United States (and beyond) and identify the key factors that make these programs effective. Common elements of programs that effectively teach humanism include: (1) opportunities for students to gain perspective in the lives of patients; (2) structured time for reflection on those experiences; and (3) focused mentoring to ensure that these events convert to positive, formative learning experiences. By describing educational experiences that both promote and sustain humanism in doctors, we hope to stimulate the thinking of other medical educators and to disseminate the impact of these innovative educational programs to help the profession meet its obligation to provide the public with humanistic physicians.

Patients have two fundamental expectations of physicians: clinical competence and humanism. Physicians have historically met these expectations through rigorous study, deep commitment, and earnest effort to promote these elements of the profession. Since the emergence of scientific medicine in the mid-1800s and the explosive growth of scientific knowledge, physicians became knowledge managers and translators for the use of science to benefit human health, and our system of medical education evolved to achieve this goal of clin-

*Division of General Medicine, University of Michigan Medical School, and the VA Ann Arbor Healthcare System, Ann Arbor, MI.
†The Arnold P. Gold Foundation for Humanism in Medicine, Englewood Cliffs, NJ.
‡George Washington University School of Medicine, Washington, DC.
Correspondence: David T. Stern, M.D., Ph.D., 300 North Ingalls, 7E02, Ann Arbor, MI 48109-0429.
E-mail: david.t.stern@mssm.edu.

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ical competence. However, with the growth in consumer culture, the simplification and routinization of many medical treatments, the patient empowerment movement, and the growth of the internet, scientific knowledge and medical treatments are no longer the sole purview of physicians. Perhaps for these reasons, or perhaps as a reconsideration of our social contract, the profession has refocused on the expectations for humanism. In this article, we discuss a current definition of humanism in medicine, describe examples of medical school programs intended to promote humanism, and consider why these programs work. Our aim is to describe educational experiences that both promote and sustain humanism in doctors, and to identify the aspects of these programs that make them effective.

HUMANISM DEFINED

One of us (JJC) recently proposed a distinction between professionalism and humanism. While professionalism is connected to a set of actions and behaviors, humanism is connected to a set of beliefs that influence actions and behaviors:

> Humanism is the passion that animates authentic professionalism. Humanism is a way of being. It comprises a set of deep-seated personal convictions about one's obligations to others, especially others in need. Humanistic physicians are intuitively and strongly motivated to adhere to the traditional virtues and expectations of their calling. Professionalism and humanism are best considered not as separate attributes of a good doctor, but rather as being intimately linked. (Cohen 2007, p. 1031)

As evidence of the profession's longstanding consideration of humanism, the Hippocratic Oath defines a portion of the humanistic expectations of physicians, including core ethical principles of beneficence, non-maleficence, justice, confidentiality, and inter-professional respect:

> I will neither give a deadly drug to anybody who asked for it, nor will I make a suggestion to this effect. . . . In purity and holiness I will guard my life and my art. I will not use the knife, not even on sufferers from stone, but will withdraw in favor of such men as are engaged in this work. Whatever houses I may visit, I will come for the benefit of the sick, remaining free of all intentional injustice, of all mischief and in particular of sexual relations with both female and male persons, be they free or slaves.

Although influential physicians through the years have strongly advocated a continued emphasis on the humanistic attributes of physicians (Dodds 1993; Engel 1977), medical societies and regulatory organizations have only recently brought this aspect of medical care to the fore. Their definitions are sometimes labeled as "ethical responsibilities," as in the American Medical Association's Code of Ethics, and sometimes as "professionalism" as in the American Board of

Internal Medicine's (ABIM) Project Professionalism and the Accreditation Council for Graduate Medical Education's (ACGME) Outcome Competencies. The word *humanism* reemerged in academic circles in the early 1980s, with the ABIM's Subcommittee on the Evaluation of Humanistic Qualities in the Internist. This group used *humanism* as a term to subsume the "non-cognitive" characteristics of the physician, and it promoted the assessment of these behaviors along with "cognitive" ones.

The trend to recognize humanism was reflected in the inauguration of the Arnold P. Gold Foundation in 1988. The Foundation was created in response to the perceived need to refocus on the humanistic aspects of the physician, both those in training and those in practice. It adopted the definition of humanism in medicine as "demonstrated respect for a patient's concerns and values and compassionate consideration for a patient's physical and emotional well-being." In this context, humanism represents the principles of respect, compassion, empathy, honor, and integrity.

The professionalism movement in the United States brought humanism along with it, but only as one of a set of competencies expected of the professional physician. The expectations expressed in the ACGME core competency on professionalism includes many dimensions that could be considered humanistic, including: compassion, integrity and respect for others; a responsiveness to patient needs; respect for patient privacy and autonomy; accountability to patients, society and the profession; and sensitivity to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation (ACGM 1999). In the definition of professionalism proposed by Arnold and Stern in *Measuring Medical Professionalism* (Stern 2006), humanism was described as one of four pillars of professionalism to which all physicians should aspire—the others being accountability, altruism, and excellence.

Despite some nuanced differences in definition, most educators agree that humanistic physicians demonstrate respect, empathy, and integrity in patient-doctor interactions, and that these attributes must be infused into medical education and clinical care.

PROMOTING HUMANISM: EXPECTATIONS, EXPERIENCES, AND EVALUATION

Humanism can be promoted through setting expectations, creating experiences, and evaluating expected behaviors. Setting expectations can be achieved by public declarations of professional codes and oaths, as well as by more explicit requirements for evidence of humanistic attributes in medical school admissions and graduation. The state medical licensing acts written in the 1920s and 1930s made "decorum," "fitness for practice," and "professional demeanor" a formal part of the licensing process, reflecting both implicit and explicit ideals of the behaviors expected of physicians.

Most U.S. medical schools have adopted the "White Coat Ceremony," a ritual developed in 1993 by the Arnold P. Gold Foundation that welcomes incoming students and explicitly extols the virtues of the humanistic physician through oath-taking and an inspirational address. Through this ceremony, medical schools profess core values of the institution and the expectations and responsibilities of the profession. In addition to rites of initiation during orientation, medical trainees learn to value humanism through other explicit institutional "messages." For example, the Gold Foundation's Leonard Tow Humanism in Medicine Awards, Humanism and Excellence and Teaching Awards, and chapters of the Gold Humanism Honor Society are proliferating because educational leaders and students see the value in identifying and rewarding those who demonstrate the most humanistic qualities.

While setting expectations of humanism has thus been a longstanding tradition through public declarations and oaths, developing experiences that promote humanism is a more recent phenomenon. Curricula for ethics education have been formally part of medical education since the 1970s, yet most of these have focused on issues such as end-of-life decisions, allocation of scarce resources, and the like. Some ethics training programs have moved beyond moral decision-making to the domain of professional identity development, but this trend has been seen largely as a secondary effect (Miles et al. 1989). The biopsychosocial model of George Engel, adopted by the University of Rochester, is focused on the comprehensive understanding of the patient, but not as much on the development of the student. Some schools have created explicit curricular events with music, art, and literature inspired by experiences in medicine with the assumption that exposure to the humanities and the human condition will promote humanism. All U.S. medical schools have a version of the patient-doctor course, which include discussions of humanistic principles, communication skills, and cultural competence. Some of the medical schools founded in the late 1960s and 1970s were expressly designed to meet community needs, and thus have experiential and service learning formally incorporated into their curricula. Though there are no data to support the claim, many of these educational experiences are assumed (and intended) to promote humanism.

In the past decade, the focus on humanism has moved from setting expectations and designing experiences to creating evaluations of humanistic and professional behavior. Hojat and colleagues at Jefferson Medical School have developed a scale for measuring empathy. The ACGME has a toolbox of measurement instruments to be used in assessing professionalism in residents. *Measuring Medical Professionalism* (Stern 2006) provides practical advice on a wide array of instruments available for the assessment of humanism and professionalism. Assessment is in and of itself educational; students naturally value what we evaluate and put great effort into learning those things we test.

Of the broad array of expectations, experiences, and evaluations, which ones are effective at promoting humanism in developing physicians? We cannot

assume that even a perfect measurement tool administered at matriculation would identify students with the most humanistic tendencies, because expressions of humanism are so integrally context-dependent. So, while we should continue to profess our aspirations for humanism and evaluate students' humanistic attributes in the medical school admissions process and throughout formal medical training, it is the experiences students have that can either support or detract from their daily expression of humanism.

How We Teach Humanism

In an effort to learn more about recent innovations in the teaching of humanism, the Gold Foundation issued a call for abstracts to medical schools and residency programs in March 2007. The Foundation received 80 submissions from 46 training organizations across 26 states, as well as from Canada and the United Kingdom. A review committee of 12 medical educators and evaluators chose 50 submissions, and the Foundation invited the author-educators to a two-day meeting to explore effective methods for teaching humanism. Invited experts in the field of humanistic medical education presented key strategies, research, theories, and practices to the group.

The abstracts reported on several types of interventions to create learning environments that teach and enhance humanism. The most frequently cited strategies included: the study of humanities; training in communication and cultural competency; experiential and service learning; and reflection and reflective practice. We provide a few illustrative examples here, and then will discuss why we believe these programs work.

The Study of Humanities

Alan Bleakley teaches at Peninsula Medical School in the United Kingdom, where the curriculum was designed to integrate clinical experiences with medical humanities. Workshops are co-taught by supportive physicians paired with an artist or a humanities expert. They involve creative sensory, literary, and dramaturgical approaches to patient care and clinical acumen. Unlike programs that inject humanities-related electives into the curriculum, Peninsula's program is deeply integrated into the fabric of the entire school.

Students are exposed to the dual perspectives of the scientist and the artist. They integrate aesthetics into science-based medical training and help students bring humanity into their day-to-day activities. For example, students practice auscultation with a physician and a musician to simultaneously educate hand and ear, and they attend a ward round with an experienced physician and a visual artist, whose perspectives and ways of looking/seeing are then compared, in order to educate the senses for clinical judgment. Students also work with a writer to compare the patient's own illness narrative and the medical narrative, in order to focus on such issues as use of rhetoric and the dialogical imagination,

developing sensitivity towards patients' stories. Students also choose from electives including a wide range of humanities and arts topics with tailored assessment modes such as development and performance of a drama script. Ongoing research projects, such as investigation of the use of medical metaphors in education of clinical acumen, inform such practices.

Training in Communication and Cultural Competency

Jennifer Barnhill, a fourth-year medical student at the University of Texas Medical Branch (UTMB) in Galveston, TX, presented SUCCESS: *Students Unite to Collaborate, Contribute, Excel and Speak Spanish*. This project brings together medical, nursing, allied health, and graduate students at UTMB to learn medical Spanish. Spanish-speaking patients comprise approximately 25% of the Galveston population. This volunteer activity was designed to increase cultural sensitivity and Spanish communication skills for health professional students to help facilitate compassionate and sensitive health care.

Participants attend large group meetings with a Spanish instructor, small group peer-tutoring sessions, cafés during which students practice history-taking and physical exam skills, and community outreach experiences. The community outreach experiences include: *Frontera de Salud*, a program where students travel to the Rio Grande Valley to provide medical care in an underserved Mexican community; *Amigos en Salud*, a program where students escort underserved Spanish-speaking patients from South Texas to their appointments at UTMB; and St. Vincent's, a free student-run clinic that serves indigent patients within Galveston. In end-of-year surveys, participants rated SUCCESS as an effective program for learning Spanish, increasing their appreciation for language barriers, and improving their cultural sensitivity in health care.

Experiential and Service Learning

David Deci (West Virginia University) maintains that service learning can transform students and "ignite the passion for compassion." Driven by student interest and a deep commitment to extend care and compassion beyond the walls of the West Virginia University School of Medicine, the Family Medicine Interest Group established MUSHROOM, the *Multidisciplinary UnSheltered Homeless Relief Outreach Of Morgantown*. MUSHROOM was patterned after the highly successful "Operation Safety Net" developed by James S. Withers of Pittsburgh. The program's goals include: providing basic life-sustaining social, nutritional, and medical outreach to the unsheltered; serving as an advocacy and educational force for local homeless issues; coordinating care for homeless who enter the local healthcare system; fostering a sense of compassion and social commitment for health professional students; and expanding service learning more broadly into the Morgantown community.

Trained volunteer health professional students accompany physicians and social workers on "street rounds" in Morgantown, serving the unsheltered

homeless. Many of these individuals suffer from mental illness, have limited access to traditional care, and are mistrustful of the health-care system. They typically suffer from both acute and chronic life-threatening conditions.

Volunteers bring basic clothing items and deliver food. In addition, they provide critical medical assessment and first-aid treatment. Perhaps most importantly, volunteers bring compassion, caring, and conversation to marginalized clients who often go unseen in today's society. Through service learning, concepts such as health-care access, coordination of care, and compassionate, nonjudgmental, and comprehensive care are brought to life for students in ways that are both meaningful and visceral.

Reflection and Reflective Practice

At Columbia University College of Physicians and Surgeons, Michael Devlin uses facilitated group and self-reflection to enhance patient-physician relationship skills and professionalism. Third-year students are divided into teams of 15 with a designated preceptor, and they rotate as a group through a particular sequence of 10 five-week clerkships and attend facilitated group reflection sessions. The sessions and themes are based in the specific clerkship. For example, in pediatrics, the assigned theme is Conflict Resolution; in neurology, Balancing Empathy, Hope and Realism; and in anesthesiology, Professional and Unprofessional Behavior in the OR. Prior to each session, students write a brief reflection about a clinical encounter on the assigned theme. In addition to the reflective group experience, each student has two individual meetings with the preceptor at the beginning and end of the year, where they discuss initial adjustments, review their writings and experiences, and chart a course for ongoing professional growth.

Following the first year of the program, over 80% of student respondents rated reflection on assigned themes and discussion as somewhat or very important to their learning. A majority of students responded that the course enhanced their ability to resolve conflicts, to manage physician-patient relationships, to deal with intense emotional response, and to differentiate between professional and unprofessional behavior.

At the University of California, Irvine, Johanna Shapiro designed a course, "The Art of Doctoring," for third- and fourth-year students to counteract perceived frustration and stunted moral development among students. This longitudinal elective consists of 15–18 sessions, as well as an all-day Healer's Art experience, based on the work of Rachel Naomi Remen. The format of the sessions consists of mini-lectures by faculty-mentors, followed by case-based presentations by students, in-class exercises and role-plays, and discussion. Brief written assignments focus on student-resident-attending difficulties; problematic student-patient interactions; burn-out; compassion, fatigue, and self-care; and loss and grief. A final project consists of either a personal self-change project or an original creative project focusing on personal transformations experienced dur-

ing medical school. The course received a highly favorable reaction from students both for achieving learning objectives and for faculty performance, and is always fully subscribed.

WHAT WORKS IN TEACHING HUMANISM

All of the described initiatives incorporate to some degree each of the following strategies: (1) they provide students an opportunity to gain *perspective* in the lives of patients; (2) they allow structured time for *reflection* on these experiences; and (3), because perspective-taking and unguided reflection could lead to negative or even damaging consequences for students, they offer focused *mentoring* to ensure that these events convert to positive, formative learning experiences.

Perspective-Taking

The AAMC has stated in its publication *Learning Objectives for Medical Student Education: Guidelines for Medical Schools* that "Physicians must be compassionate and empathetic in caring for patients" (AAMC 1998, p. 4). The literature suggests, however, that as medical students and residents progress through training they become increasingly cynical and are at risk of losing perspective and their ability to identify with the suffering of their patients (Bellini, Baime, and Shea 2002; Bellini and Shea 2005; Diseker and Michielutte 1981; Hojat et al. 2004). Factors cited for this decrease in empathy include such things as the stress of long hours, working in a highly competitive environment, and the "hidden" or "informal" curriculum taught and demonstrated by physicians in the hospital environment.

To counterbalance the decrease in this essential humanistic attribute, medical educators are instituting interventions that attempt to sharpen the medical learner's awareness of how illness, injury, death, and the health-care system itself impact on their patients' health and daily lives. By moving beyond the boundaries of their own perspective, students and residents begin to incorporate the viewpoints of the other stakeholders in their world, building the foundation for greater empathic concern (Haidet et al. 2002).

Analyzing a medical situation from varied perspectives, medical students can learn to appreciate the underlying values, needs, and concerns of the patient and family. For example, they may consider such situations as the family of a patient in a persistent vegetative state who refuses to discuss taking him off of life support, due to strongly held moral views; a geriatric patient who cannot fill a prescription because she is on a limited income and must choose between groceries and medication; or a young patient who is fearful of undergoing routine surgery because his uncle died unexpectedly on the operating table several years ago. To broaden students' perspectives on the effects of illness and the patient experience, educators have involved patients as witnesses and as teachers. These initiatives help students place a greater emphasis on valuing the patient's perspective.

At Weill-Cornell, Lyuba Konopasek teaches medical students, residents, and

faculty strategies for humanistic practice by exploring effective patient-centered care in the setting of chronic pediatric illness. Konopasek uses video, audio clips, memoirs, and the poetry of Laura Rothenberg, a young woman with cystic fibrosis who died of complications after a lung transplant. Objectives are tailored according to the developmental stage of the learners. Participants are introduced to the patient's perspective and consider how physician behavior might change to improve patient care.

Konopaskek's intervention promotes rich and reflective discussions among students, residents, and faculty. Formal assessments of learner satisfaction through survey instruments have been very positive, and Konopasek is currently developing qualitative evaluation tools to better understand the program's influence on patient care.

Reflection

According to Schon (1983): "Through reflection, [practitioners] can surface and criticize the tacit understandings that have grown up around the repetitive experiences of a specialized practice, and can make new sense of the situations of uncertainty or uniqueness, which he may allow himself to experience" (p. 61). Without reflection, an experience that allows perspective-taking may be lost in the daily work of the hospital. As a practice, reflection leads to self-awareness and an enhanced understanding of others; as a learning tool, it provides opportunities to analyze, assess, and interpret experiences from multiple perspectives and to explore beliefs, opinions, and values. Some of the outcomes of successful reflective learning include: gaining new perspectives, changing behaviors, clarifying issues, becoming receptive to new data or challenges, and forming and refining a professional identity. According to Plack and Greenberg (2005): "reflection is particularly important in medicine, in which evidence-based practice and client-centered care require the physician to analyze best evidence while considering his or her values and assumptions vis-à-vis the values, beliefs, and goals of each patient" (p. 1546). The British psychiatrist Michael Balint (1964) has long suggested the use of small group debriefing of physicians to reflect on the patient-doctor relationship.

At the University of Rochester School of Medicine and Dentistry, Ron Epstein and colleagues have created the Mindful Practice Program, a required curriculum for students and residents. Epstein (1999) has written that "the goal of mindful practice is to become more aware of one's own mental processes, listen more attentively, become flexible, and recognize bias and judgments, and thereby act with principles and compassion" (p. 835).

While it is possible for learners to reflect on their experiences without formal instruction, most educators agree that reflection requires training and practice. Using structured and safe reflective opportunities to enhance learning and humanism, programs can be designed to enable students to reevaluate their clinical experiences. In addition to making time for reflection within the required

coursework, educators can provide: a safe space where confidentiality is respected; a method—often through narrative writing or journaling—that allows a student to describe a clinical experience or critical incident; and facilitated discussion by a role-model mentor to encourage trainees to delve deeper into the meaning of the experience. The facilitator's goal is for students to become more mindful of what has transpired, to examine their assumptions and reactions to a particular event, to explore what others with different perspectives might bring to the same experience, and to learn how to incorporate these insights into their future interactions. Not surprisingly, many of the programs presented at the symposium teach reflection during the clinical years.

At Indiana University School of Medicine, T. Robert Vu (2007) fosters mindfulness to counteract the often negative effect of the informal curriculum. Students in their medical clerkship maintain journals, recording descriptions of events that express professionalism (or its lack) on a password-protected website. Students indicate what they have learned from these events by selecting terms from a checklist of professional domains. For example, one student wrote:

> Our team and the ICU team were rounding and we all entered a patient's room. There were at least 15 of us in the room. Our teams spoke about the patient, examined him, adjusted the ventilator settings, and then left—all oblivious to the family member who was in the room the entire time. After we had all left, I noticed that the intern—who had just started the service that morning—kneeled down beside the patient's wife and began explaining what the team had just done. No one else noticed what she had done, but I was very impressed by her behavior.

Each month, students and faculty meet to read and discuss edited and de-identified journal entries. Dr. Vu reported that journaling wasn't compulsory at first, but so many powerful stories emerged that the faculty incorporated journaling into the formal curriculum. This activity is steadily spreading through other clerkships in the medical school, including surgery and ObGyn. The narratives have also been used for discussion at conferences and teaching retreats.

Mentoring

As implied above, reflection without mentoring leaves students alone in the critical process of making sense of the often traumatic experiences of medical care. Mentors help organize, guide, and facilitate discussions about formative experiences. This activity allows medical students and residents an opportunity for reflective learning and the potential to internalize humanistic values, attitudes, and behaviors.

At Albert Einstein College of Medicine, Alex Okun mentors pediatric residents through challenging home visits to foster humanistic, family-centered care. Under the supervision of a faculty-mentor, residents make house calls to patients whom they follow in their continuity practices or care for on the inpatient service.

Residents are encouraged to choose children with special health-care needs, with a history of child protective service involvement, from parts of the world with cultural or religious backgrounds unfamiliar to the residents, and from children with teenage mothers or from families with many children—all in an attempt to acquire understanding about various cultural and socioeconomic contexts.

Okun accompanies residents on home visits and mentors them while they commute between patient homes and over a meal following each outing. Residents' narrative excerpts of these experiences are rich with evidence of their concern for families' well-being, a desire to relate to what matters to their patients, and attempts to understand the emotional context of their lives. Guided by Okun's thoughtful mentoring, trainees express pride in their relationships with families and delve into family dynamics through contrasts with their own. Resident feedback shows lessons learned about culture, related health beliefs, and community structure.

Conclusion

The responsibility to educate professionals who demonstrate humanism in practice has resulted in creative and important training initiatives. Many of those depicted here follow in a long tradition of outstanding physician educators who focus on the humanistic dimension of care. The teachers who described these educational interventions at the Gold Foundation conference were convinced that participating students had a more humanistic outlook as a result of their experiences. Although many had confirming data on student satisfaction or teaching quality, there is little data to substantiate that either these or other programs designed to promote humanism have had the desired effect on the care of patients. That said, we cannot sit idly by and wait for unequivocal evidence for the educational effectiveness of programs like these. For now, we must trust the testimonials and personal experiences of these dedicated and experienced teachers to show us the way forward. While each of these programs is unique in its setting, objectives, and content, they are effective because they provide opportunities for perspective-taking, reflection, and mentoring. Replicating initiatives like these throughout the medical education community can help the profession meet its obligation to provide the public with practitioners who truly care for their patients.

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IT WON'T BE MY FAULT WHEN I DIE

by Laura Rothenberg (transcribed by Lyuba Konopasek)

It won't be my fault when I die.
True I didn't always wash my central line with alcohol upon opening it.
But living is not fearing,
It's not sterile.
Oh, and I did forget to take that antibiotic a few times.
True I didn't always wash my central line with alcohol upon opening it.
Will the prednisone doses I have cause harm?
Oh, and I did forget to take that antibiotic a few times.
The alterase I missed only gave me an aching stomach.
Will the prednisone doses I have cause harm?
And the chest PTs I rush through, not coughing after each position, they won't kill me.
The alterase I missed only gave me an aching stomach.
Some IV doses were cut to go out to dinner.
And the chest PTs I rushed through,
Not coughing after each position, they won't kill me.
Nights I went to bed in the morning
Don't matter.
Some IV doses were cut to go out to dinner.
And there were some tobra nebs I didn't do.
Nights I went to bed in the morning
Excuses as to why, living on my desk with papers and pens.
There were some tobra nebs I didn't do,
Admissions when I left the hospital early or postponed an arrival,
I was just too busy.
Excuses as to why, living on my desk with papers and pens.
Because, living is not fearing, it's not sterile.
The admissions when I left the hospital early or postponed an arrival,
I was just too busy.

I don't think it will be my fault when I die.

Professionalism Education

the medical student response

Troy Leo* **and Kellene Eagen†**

ABSTRACT We present the medical students' perspective on the hotly contested topic of professionalism in medical education and explore why students are often hostile to education in professionalism. We then suggest ways to improve professionalism education in the medical curriculum.

Cringe. . . . This is the reaction that many medical students have to the word *professionalism*. The discourse on professionalism, prominent over the last few decades, has become a central topic of conversation in the world of medical education. Numerous studies, papers, and initiatives address the education and evaluation of professionalism in medicine. Despite all the effort and resources devoted to professionalism education, however, students commonly react to this subject with disdain, frustration, and hostility. The profession of medicine is rooted in service, respect, and integrity. Why are students, who are the future of our profession, at their wits' end when it comes to this topic? We will explore the history of professionalism in medical education, investigate the reasons for student hostility towards the topic, and suggest solutions to improve how all medical providers are educated about professionalism.

*Department of Medicine, Stanford University.
†Department of Family Medicine, University of California–San Francisco.
Correspondence: Troy Leo, M.D., Department of Medicine, Stanford University, 300 Pasteur Drive, S101, Stanford, CA 94305.
E-mail: troyleo@gmail.com.

This paper was written while the authors were students at the University of Chicago Pritzker School of Medicine.

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BACKGROUND

The role of professionalism in medicine is a long and storied one. Beginning with the works of John Gregory and Thomas Percival in the 18th century, scholars have discussed the physician's responsibility to his or her patients, profession, and society (McCullough 2004). Professionalism in medicine gained prominence over the last few decades when the topic of professional behavior—or lack thereof—came to the forefront in medical journals and the popular media. Studies showed that unprofessional behavior as a medical student correlated with disciplinary action by a medical board later in one's career (Papadakis et al. 2004). Consequently, schools actively worked to include a formalized curriculum to address professionalism. The Association of American Medical Colleges asked that schools evaluate students' professionalism by assessing their performance relative to their peers in the area of professional attributes that are specifically and systematically observed, evaluated, and reported upon by medical school faculty members (AAMC 2002).

The momentum to incorporate professionalism into medical education was strong. Schools performed surveys to study professional behaviors among medical students and conducted focus groups to investigate the reasoning behind their behaviors. Many papers reflected on the development of students' professionalism and suggested ways to teach and improve it. At the same time, there was heated debate about whether the medical community should be having this discussion at all (Cohen 2006; Talbott 2006; Wear and Kuczewski 2004).

While the world of medicine was taking strides to improve professionalism education, something seems to have gone awry. The American Board of Internal Medicine offers a definition of professionalism that includes the ideals of altruism, compassion, respect, duty, honor, integrity, and excellence (ABIM 1995). Although these ideals are inherently positive characteristics, the reaction of some medical students to the subject has become distinctively negative and hostile (Brainard and Brislen 2007). This is a troubling reality. How can medical students, who are hopefully the proponents of professionalism, be so hostile towards the subject? And if this is the reality of the current situation, would the world of medicine be better off today if professionalism and its formalized inclusion in a medical school curriculum had never been addressed at all?

DISCUSSION

We write this paper as senior medical students on the cusp of our graduation—a position from which we can reflect on our past four years and our peers' attitudes and reactions to professionalism education. The situation in our school is consistent with reports from other schools: students are tiring of the subject (Brainard and Brislen 2007). We believe that there are several reasons for this negative reaction to an inherently positive ideal. First, the disproportionate focus on criticizing unprofessional behaviors rather than on promoting professional

behavior leads to an aura of negativity whenever the word *professionalism* is mentioned. Closely related, the conversation surrounding professionalism offers an abstract view of what constitutes professionalism, but the only concrete examples are of how not to act, rather than specific examples of positive behavior. Second, students are dissatisfied by the student-centered nature of the topic, which implies that they are the only ones who need this education. Third, students interpret the professionalism component of their medical education as teaching them how to be "good people" rather than "good doctors," and they are personally affronted by any corrective suggestions. Lastly, students are frustrated with the double standard that exists when they witness the very behaviors they are taught to avoid taking place among their attending physicians and residents.

Disproportionate Emphasis on Negative Behaviors

A major component of the frustration that students feel towards professionalism is the nature and focus of professionalism curricula. To many students, the topic and teaching of professionalism has become a persecutory environment focusing on the shortcomings of medical students. While this is clearly not the impetus for the efforts to improve professionalism, this reaction has occurred.

Professionalism education in medicine is focused on unprofessional behaviors. Many articles cite examples of untoward behavior needing elimination and note that unprofessional behavior leads to disciplinary actions. Thus, professionalism education becomes more about avoiding unprofessional behavior than striving for greatness (Brainard and Brislen 2007). The prominent focus on unprofessional behavior has also created a dichotomous atmosphere that suggests that students must be perfect or else be deemed unprofessional, creating an unrealistic and therefore frustrating goal for students (Ginsburg et al. 2000). The negative language surrounding professionalism causes students to expect to be scolded or told they are not living up to expectations. This becomes extremely frustrating, as most students do not personally engage in unprofessional behaviors. Furthermore, the abstract ideals of altruism, compassion, respect, duty, honor, integrity, and excellence are often presented without examples of what students can and should do to exhibit these guiding principles.

Student-Centered Focus

The majority of the articles, discussions, and curricular innovations about professionalism have focused on student behavior. Students are surveyed regarding their participation in and perception of various unprofessional acts, asked numerous questions about unprofessional behaviors, and shown countless examples of how their misbehavior can lead to unwanted consequences. However, students do not see similar efforts to target the same behaviors among residents, faculty, or nursing staff, and there is also a relative paucity of nonstudent-based professionalism research. Students feel they are being persecuted as the only ones having issues with professionalism and in need of "correcting." Even more frus-

trating, perhaps, is that when students do behave in a professional manner, they are rarely rewarded.

"Good People" versus "Good Doctors"

Another reason for the hostile attitude of students towards professionalism is that students feel as if educators are criticizing their persons and trying to teach them how to be "good people" instead of how to be "good doctors." By the time students begin medical school, they believe themselves to be "good people." They feel patronized when they are subjected to topics such as classroom etiquette, dress codes, personal behavior, and respect, things they feel are beyond the scope of medical school education. In light of busy schedules and numerous demands, many students view the professionalism curriculum as a waste of their already stretched time, and they fail to appreciate its relevance to their medical education.

Double Standard

Students are frustrated by the double standard of being subjected to professionalism education while witnessing overtly unprofessional behavior among medical colleagues. This often causes them to ask, "What's the point?" This reaction is strongest when the unprofessional behaviors occur among those people on the upper rungs of the medical world's hierarchical ladder. Hafferty and Franks (1998) and Stern (1998) write of the "hidden curriculum" of professional education that indirectly results in the erosion of students' definitions of professional behavior. Surveys conducted at the beginning and end of clinical rotations reveal a change in what is deemed professional (Reddy et al. 2007). This change cannot be attributed to the overt professionalism curriculum, but rather to attitudes taught in the clinical setting through negative role modeling. Wear and Kuczewski (2004) suggest that students should be made to believe that they have power to speak up and change their environment when they witness unprofessional behavior; if granted such liberty, students will not lose their own personal ideals. But how likely is it that students, who have the least power in medicine's hierarchy, will feel thus empowered? Brainard and Brislen (2007) point out that there is a good deal of frustration among students when they are taught one thing but see another. No matter how good a professionalism curriculum might be, if it is not adhered to and promoted by those at all levels of training and status, it will never hold its weight. Students see no credibility in the argument for professionalism when some of the very people that teach its values do not practice what they preach.

Although not all students share the feelings of hostility and the negative sentiments towards professionalism education, the fact that such feelings exist among many students means that this discussion of why they exist and what can be done to improve them is crucial to improving professionalism in medicine. If we want a professionalism curriculum to succeed, we must understand the causes

of this hostility. Much like a disease, we should investigate the pathology in order to effectively tailor our treatment. We hope that these explanations will help faculty and administrators better understand why students are frustrated by the topic and help faculty rethink professionalism education.

Recommendations

Much has been written about how to successfully implement professionalism into medicine; we will highlight several of these ideas in the paragraphs that follow. While we outline some specific suggestions to address the hostility that students have towards the topic, the critical element of any intervention must be one of commitment—commitment from every student, resident, faculty member, and administrator. Without a cross-sectional commitment by the profession and accountability at all levels, the effort will become an academic exercise and the passion of a vocal minority but not the reality of the majority.

We offer several suggestions to guide further incorporation of professionalism education into a medical curriculum.

Reiterate the Rationale Behind a Professionalism Curriculum

No one questions the inclusion of anatomy, physiology, pharmacology, or pathology in a medical school curriculum. Students are motivated to study these disciplines because the direct application to their work as physicians is self-evident. Yet the importance of professionalism education is less clear because of the relatively subjective nature surrounding the discourse. Medical students find themselves prioritizing the basic science subjects over perceived "fluffy" topics, such as professionalism, ethics, and the social context of medicine. To avoid the relegation of professionalism to a second-tier position in students' studies, educators must continuously reinforce why this topic is of utmost importance to a physician's education. At the end of the day, medicine will still be about the physician-patient relationship. The professionalism discourse directly addresses this relationship—a relationship that is in some ways deteriorating (Cohen 2006). Although students should be made aware of studies such as those that document the implications of unprofessional behavior on their future careers, they should never lose sight of the fact that the true impetus behind a professionalism curriculum rests in the goal of preserving the trust of patients and society. If this broader goal is constantly reinforced, students will be able to see the forest through the trees and be less irritated by being taught "how to behave."

Focus On and Reward Concrete, Positive Behaviors

We must refocus the discussion of professionalism on promoting the positive ideals of our profession instead of focusing on its shortcomings. Professionalism education should promote positive ideals, guiding physicians by giving students specific examples of how to act, as suggested by Ginsburg and Stern (2004). One

way of doing this is to make sure that faculty who exemplify professionalism are acknowledged and rewarded. Students are often notified when a faculty member publishes groundbreaking basic science research, but they rarely hear of the attending physician who exemplifies professionalism. We call for a system-wide dedication to rewarding professionalism as suggested by Cohen (2006). We also agree with Talbott (2006) that most students exemplify professionalism and should be recognized for this. This can be done individually or in a group; what is important is that we positively reinforce this behavior and encourage its continuation. We also need to make professionalism as important to residency programs and medical school admission committees as grades, standardized test scores, and other academic accomplishments. We agree with Cohen's (2006) assertion that students will not give professionalism a high priority until we hold them accountable by means of a high-stakes assessment akin to the weight of standardized test scores to residency programs. Not receiving disciplinary action for unprofessional behavior during school should not be thought of as "good enough." Instead, we should strive to exemplify professionalism and look upon it as favorably as an honors grade or published research. By changing the culture of medical education, professionalism will become something students actively strive to achieve, instead of trouble they try to avoid.

Include Residents, Faculty, and Community Physicians

The majority of published literature focuses on student behaviors and attitudes towards professionalism. In the eyes of the public, however, a decline in professional behavior in the field of medicine is seen most clearly among practicing physicians. We recommend that future attention be given to more concretely documenting resident and attending behaviors and their attitudes towards the subject. While there are several compelling reports about programs on professionalism for housestaff (University of Texas Medical Branch, Virginia Commonwealth University, University of Washington School of Medicine), more needs to be done (Goldstein et al. 2006). Integral to the success of a professionalism curriculum is the need for its application not only to students but also to residents, academic attending physicians, and community physicians. We believe students will be more responsive to the discussion of professionalism if they see the same discussion taking place amongst their superiors.

A commitment from all members of the medical community will be required to change students' negative perceptions of professionalism. When students overtly witness residents and attendings exhibiting unprofessional behavior, they become frustrated with the hypocrisy in a curriculum that asks for professional behavior from them but tolerates unprofessional behavior in those very people meant to be role models to the students. As Cohen (2006) suggests, we must purge our learning environments of unprofessional practices. Until we do that, our progress will be stalled. Admittedly, it can be more difficult to address unprofessional behavior in practicing physicians. Regardless, academic institutions

must recognize that students will naturally follow the lead of their teachers, and that it is unfair to ask of students what is not asked of others.

Clearly Delineate the Subjects of Humanism, Ethics, and Professionalism

We also suggest that professionalism be separated from other movements in medical education, such as humanism in medicine and ethics. As they are all important to the betterment of medicine, we want to make sure that grouping such subjects does not confound the situation. While they share similar qualities, their foci and goals are not the same. Professionalism is not just about being humanistic and being humanistic is not just about being professional. We should educate, reward, and remediate them separately in order to give students more concrete definitions of each and show that each is worth its own conversation.

Involve Students in Curricular Development and Revision

McCullough (2004) calls for the professionalism movement to be rooted in its historical discourse and argues that students should not redefine professionalism. We agree that the historical context of professionalism must be vital to its current implementation and education. However, we believe that students, residents, and attendings should be able to contribute to the definition of professionalism and help develop its curricular implementation. We do not believe that the opinions of past students, faculty, and physicians about professionalism should become a mantra. Their opinions should be honored and understood, but professionalism cannot be a static entity. Many aspects of our society have changed since the first definitions of professionalism. While we do not suggest that one should merely "go with the times," we do think it is prudent to reflect on current societal factors when defining what is best for the future of medicine. As Wear and Kuczewski (2004) discuss, changes in gender, race, and socioeconomic status have greatly altered the profession of medicine for the better. By not taking into account these factors, we would be doing ourselves a disservice and hindering progress. Therefore, we suggest that professionalism education study and take root in the history of the topic, but also be open to debate and change from the current members of our profession. We agree that the reflective practice by students and physicians alike, as discussed by Lachman and Pawlina (2006), should be an integral part of this discussion. Just like any aspect of medicine, we need to reflect and criticize our work at all times, instead of resting on the laurels of our past.

Obtain Student Commitment to Uphold Ideals of Professionalism

While we have outlined recommendations for administrators and faculty to improve the professionalism environment, it is critical for students to do their part to change the culture of professionalism. We have discussed some of the reasons why students are frustrated with the professionalism curriculum; this does not mean, however, that they cannot play a vital role in recouping patient trust and strengthening the practice of medicine. Students must push themselves

towards excellence in professionalism. While the foundation must be laid by their superiors' commitment, students will be the ones creating a healthier attitude about the subject, as they will shape the future of medicine. In order to regain the trust that the medical community has lost, it is imperative that they believe in the aspects of professionalism, strive for continued personal growth, and hold each other accountable.

CONCLUSION

The education of professionalism in medicine has been quite controversial, especially in regards to its history with medical students. While it is clear that the professionalism discussion is legitimate, we have suggested explanations for students' frustration with the current situation. Central to being a professional is the ability to give and receive constructive feedback. We hope that this article offers constructive feedback regarding professionalism education from the view of the students.

We end with a pearl about being a successful manager from Eric Wedge of Major League Baseball's Cleveland Indians: "Never forget how hard it is to play the game" (Pluto 2006). The preceding quote is not an excuse for the frustration or lack of professionalism that students may exhibit. We understand that students have lapses in judgment, and we are not trying to justify them. Instead, it is a plea to all physicians to be patient with us. Remember how hard it is to be a medical student and remember that, as impressive as we can sometimes be, we are still students at the beginning of a long journey. Just as you have patience with us when we cannot recall the treatment for meningitis, be patient with us as we learn to be professional. Please be our role models: do not just show us how to avoid being unprofessional, show us how to live by the ideals that brought us to this profession in the first place.

Much of students' frustration with professionalism is that, like every other topic in medicine, we are just beginning our education in it. Any new subject brings frustrations and sobering moments. Our frustration is not a sign of rejection; instead, it is a signal that we have much to learn and need help and guidance to learn it. Please be our teachers: show us what it is to be professional, and we will follow.

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The YouTube Generation

implications for medical professionalism

Jeanne M. Farnan,* John A. M. Paro,† Jennifer Higa,‡
Jay Edelson,** and Vineet M. Arora*

ABSTRACT While medical education has remained relatively constant over the past century, the rising popularity of internet-based technologies, such as applications for social networking, media sharing, or blogging, has drastically changed the way in which physicians-in-training interact with educators, peers, and the outside world. The implementation of these new technologies creates new challenges and opportunities for medical educators. Representation, the absence of established policies and legal precedents, and the perception of the lay public exemplify some of the issues that arise when considering the digital images used by trainees. While some of these issues affect higher education generally, medical schools are faced with additional challenges to ensure that graduates exemplify the ideals of medical professionalism. We present a case vignette with subsequent discussion to highlight the complexities of ensuring medical professionalism in the digital age.

The Case

Late in the fall of 2007, first-year medical students gathered to discuss their collective experience and to reflect upon such milestones as their white coat cere-

*Department of Medicine, University of Chicago.
†Pritzker School of Medicine, University of Chicago.
‡New York Medical College, Valhalla, NY.
**KamberEdelson, LLC, Chicago, IL.
Correspondence: Jeanne M. Farnan, M.D., 5841 S. Maryland Avenue, MC 2007, B226A Chicago, IL 60637.
E-mail: jfarnan@medicine.bsd.uchicago.edu.

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mony, their first standardized patient interview, and, of course, their experience during anatomy dissection lab. The students were preparing to participate in a talent show that would reflect on the humor of their burgeoning medical careers. Championed by a student with prior experience in music and video production, one group of students prepared a video in which the entire class participated. The video was a parody of the anatomy lab experience, set to the tune of a popular rap song, and it depicted first-year students dancing in the anatomy lab and lying inside of body bags, plastic skeletons traversing the hallways, and the drinking of "blood" (actually chocolate) from plastic skulls. The video was enthusiastically received by colleagues at the show, and a number of students approached the director about posting the video on YouTube to share with friends and family. The video included identifying information (name of medical school, use of university emblems). Prior to taking any action, the student director approached a member of the medical school administration who had viewed the video and received oral permission to proceed with posting it. In addition, a faculty member who specializes in medical ethics viewed the video and made suggestions prior to its posting, namely the removal of a portion that portrayed the students consuming beef jerky in the anatomy lab, as it conjured issues of cannibalism. These scenes were removed, and the video was deemed suitable for internet posting. Finally, verbal consent was obtained from all video participants and the video was subsequently posted on YouTube and the director's personal MySpace page.

This case, and the subsequent discussion, provide a platform for review of regulations for the use, and misuse, of digital media within undergraduate medical education. Medical education has seen a resurgence in the discussion of professionalism and, more specifically, of the representation of trainees consistent with the public expectation of the conduct becoming of a physician. As students enter medical school, they participate in formal training regarding clinical skills, such as history taking and physical exams. Through the informal or "hidden" curriculum, they also acquire the demeanor of a medical professional. This demeanor includes basic behaviors such as dress or personal grooming, but it also includes communication and personal interaction with patients, peers, and faculty. This interaction takes many forms, particularly with a new generation of students who are increasingly facile with technology and digital media.

The consequences of the use of such technologies by members of the medical community has only just begun to be explored. The greater use of technologies such as podcasts, media sharing, and social networking sites in medical education has both positive and negative ramifications. While these ramifications are similar to those that have been described in higher education generally (Howard 2007), some have warned that the use of these new technologies could create additional complications for the field of medical education, which is charged with the teaching and training of medical professionals (Lokyer et al. 2006; Ozuah 2002). On the one hand, embracing such technologies in the class-

TABLE 1 DEFINITIONS AND EXAMPLES OF TYPES OF DIGITAL MEDIA

Type of media	*Definition and examples*
Blog	A journal that is frequently updated and intended for general public consumption; generally represents the personality of the author or the site. **EXAMPLES:** www.studentdoctor.net; www.wearestudentdoctors.com; www.share.studentdoctor.net
Social networking site	Allows users to create profiles for themselves, to upload pictures, and to become "friends" with other users; most social networking sites have privacy controls that allow users to choose who can view their profiles or contact them. **EXAMPLES:** Facebook; MySpace
Media-sharing site	Enables users to share media (videos, music, photos) with other users. **EXAMPLES:** *Music:* Napster; LimeWire. *Video:* YouTube, GoogleVideo. *Photos:* Snapfish
Podcast	A digital media file distributed over the internet using syndication feeds for playback on portable media players and personal computers; podcasts are not real-time: material is prerecorded and can be accessed offline. **EXAMPLES:** www.podcast.com; www.podcast.net

room could lend a cutting edge advantage to students, and convenience, cost effectiveness, and the desire for technological literacy all support the decision to incorporate digital media into medical teaching through podcast lectures, helpful hints in recruitment, and digital classroom databases (Friedl et al. 2006; Potomkova, Mihal, and Cihalik 2006). On the other hand, it is clear that liberal use of internet media may compromise professionalism (Brown 2006). Regardless of one's stance, the medical education community must be prepared to address this interface between technology and education, in addition to any issues that arise from the ubiquity and proliferation of digital media usage.

NAVIGATING THE DIGITAL DOMAIN

In an effort to fuel discussion about the types of available digital media and their potential use, we present here a digital media primer (Table 1). The most basic of all available digital media is the weblog, or *blog*, which is a noninteractive web-based journal in which individuals post opinions regarding any topic from celebrities to politics. The views of the author are often reflected in the content of the postings. *Social networking sites*, such as MySpace and Facebook, allow registered users to create an electronic profile that includes personal information such as age, gender, and occupation; such sites may also allow the exchange of video clips and instant messages. Individual users' profiles are controlled by the users, such that the viewing of their personal "pages" can only be done by those deemed as "friends." Additional privacy controls exist for underage users, given

legal authorities' concerns for predatory behavior. *Media-sharing sites*, such as YouTube and Napster, enable users to exchange files, either video, audio, or photos, that are uploaded to the site by the user. The registered user then has access to any of the media that has been uploaded by other users. Music piracy and copyright infringement have increased the policing of these sites. Finally, *podcasts* are individual files, or series of files, with audio, video, or both, that consist of prerecorded content and that may be viewed directly from a personal computer or downloaded to a device such as an MP3 player.

THE AFTERMATH

Shortly after the initial posting of the video on YouTube, it was viewed by a senior medical student who brought it to the attention of the dean of the medical school. This student was concerned about "the representation of the medical students' insensitive behavior with respect to the treatment of those who had donated their bodies to science." Although the students who prepared the video had taken care not to use any material that was cadaveric in origin, the complaint resulted in the immediate removal of the video from both YouTube and MySpace. The complaint also prompted discussion among the faculty about how to proceed with the material, given the lack of existing policy on how to handle such matters.

The director of the video complied with the dean's request for the immediate removal of the video, despite outrage from fellow first-year students over infringement of their free-speech rights. The students discussed the potential for petitioning the medical school administration to repost the material.

The faculty convened to review the content of the video and to discuss not only how to manage the issue in question, but also to address formalizing a digital media policy for the university. They were struck by what they found. After 25,000 hits and four and half stars on YouTube, the comments posted by potential students were surprising: "I have only one thought after seeing this video . . . I'm so glad I applied to this medical school. Brilliant!~ A fan from the future class of 2012 =)." Clearly, this new digital "ambassador" was striking a chord with potential students. However, alumni and more senior clinical faculty reacted with shock and disgust. Although they conceded that private viewing of such a video, in a setting such as a senior skit or an end-of-the-year show, might be appropriate, the content of the video was felt to be unacceptable for public consumption. Critics expressed concern that those in the general public, with little knowledge of the details of undergraduate medical education and residency training, would find the content offensive and unprofessional.

After extensive discussion with leadership, both within the medical school administration and among clinical faculty and the interested student parties, a compromise was reached. Any content that made specific reference to the university was removed, including the crest and medical school name, and a disclaimer was added: "This video was created for entertainment purposes only and in no way reflects actual conduct in the lab. We maintain the utmost respect and

gratitude for those who donate their bodies to science." These measures were felt to be important to protect the school and its students from any liability. The dean of admissions endorsed the continued use of the video in the school's recruitment strategy, and a formal policy is under development.

The increasing popularity of digital media with the millennial generation is likely to present new opportunities and challenges to current paradigms in medical education. Technology such as social networking and other technologically enhanced solutions can enhance learning opportunities outside of the classroom and can be especially helpful to promote self-directed learning. However, the ease with which such material can be distributed for public consumption through the internet can also present serious challenges to professional behavior.

HUMOR, PROFESSIONALISM, AND PUBLIC CONSUMPTION

The use of humor in medical training has been thought to serve an important role in the "psychological well-being" of trainees; humor is perceived by students as having an "inclusionary nature" and facilitating their entry into the clinical team and profession (Parsons 2001). The perception as to whether the behavior in question is unprofessional certainly is dependent upon the content and nature of the humor employed. Derogatory humor in reference to patients, regardless of the level of physical or psychologic stress of the trainee, is never acceptable, and indeed is not a victimless crime. The nature of the learning environment, and the role-modeling behavior of attending and resident physicians, including derogatory humor directed at patients and colleagues impacts the perception of and participation in unprofessional behaviors by student trainees (Reddy 2006). The sophomoric humor portrayed by the students in question may be the natural result of medical training itself, in which students remain in a "long period of adolescence during which they are asked to show adult competence" (Becker 1961, p. 5). In this new digital age, we must remain cognizant of the fact that this humor, harmless or heinous, may reach an unintended audience.

Until recent years, the media's portrayal of the physician has largely been one of beneficence, intelligence and altruism (Gerbner et al. 1981). In fact, early television physicians were often portrayed with positive personal qualities, including ethical behavior, and programs like *Dr. Kildare* and *Marcus Welby, M.D.* received AMA approval (Turow 1989). Over time, however, these positive depictions of the medical profession gave way to the current prime-time programming landscape, in which physicians are portrayed with many negative personal attributes, including unprofessional behavior, more risk-taking, and even unethical behavior (Chory-Assad 2001; Pfau et al. 1995). The lay perception of the medical community, especially those relying almost exclusively on electronic media for their exposure to the medical profession, may be negatively impacted by such offerings as *Grey's Anatomy* and *House M.D.*, in which the trainees and attending physicians routinely participate in such unprofessional behavior as disparaging patients and

colleagues. As media evolve beyond television programming into the digital domain, representation of the medical profession and its potential impact on patients' perceptions of physicians must be examined. A cursory search of YouTube yields many amateur videos of student trainees, similar to that presented here, which depict the rigors of medical training in an irreverent light. However, as one potential patient comments on a YouTube medical student video—"so that is what you *actually* do in medical school"—the accessibility of such offerings, albeit light-hearted in nature, may open a portal to the inner workings of medical training and have the unintended consequence of impacting public perception of the profession.

As stated above, the internet is often the vehicle by which unprofessional behavior is disseminated to an unintended audience. Representation and often employment may be negatively impacted by the behavior conveyed on an individual's personal social networking page. Numerous instances have been described in which disgruntled employees, spouting off on personal blogs, have been terminated from their positions. In addition, the content depicted on a blog or social networking site may negatively influence the opinions of potential employers or schools. For example, as described in the *New York Times*, a Brooklyn nanny was fired after her employer viewed descriptions of her sexual exploits on her blog, and a cheerleading coach at a high school in Illinois came under parental fire for photos referred to as "lewd" on her MySpace page (Johnson 2005; Masterson 2007). Nearly 30% of current job applicants in the business world have been denied employment because of information discovered via internet search engine via potential employers (Parker 2007). In order to protect their students, medical educators must familiarize themselves with the potential pitfalls of this new technology in order to prevent misrepresentation and misjudgment.

Material may be posted on the internet without a student's explicit knowledge; in these instances, it is our responsibility to empower students to protect themselves and their reputations. Just as medicine as a field is struggling to evolve at the same pace as technology, the law is rapidly attempting to create rules of conduct in this new age of digital media. YouTube is currently facing class-action litigation from plaintiffs who allege that the site has posted unauthorized videos that depict them in an unflattering light. According to the site's terms of service, users may upload videos only if they have the permission of the copyright holder and of the depicted persons (Sandoval 2007; YouTube 2008); however, the stringency with which this term of use is upheld is questionable. As educators, we are charged with making students aware of their rights and of encouraging safe practices and professional behavior on social networking sites.

Most medical schools and residency training programs share a tradition of end-of-the-year shows involving skits produced by students and residents that usually serve to poke gentle fun at the faculty and their colleagues. A history of the medical skit can be traced as far back as 1918, to the first "Galens Smoker" at the University of Michigan, which "featured a program of skits and was fol-

lowed by refreshments and talks by professors" (Galens Medical Society 2007). Although the long and irreverent history of the medical show has not been closely studied, recent work champions such events, "claiming they serve several important functions," including fostering a communal spirit, developing teamwork skills, and providing "ventilation to the emotional reaction of becoming doctored" (Hayter 2006). Despite these positive attributes, up until this point the medical show has been exactly that—medical: produced and performed for a medical audience with a distinct appreciation for the in-jokes portrayed. The digital age has brought these shows out of the lecture halls and onto the desktops of potential patients worldwide. Will these individuals, without intimate knowledge of the rigors of medical training, appreciate and understand the humor and the need for the "ventilation to the emotional reaction of becoming doctored"?

The internet represents a particular threat to professionalism, that of the ability to make personal contributions to the collective media oftentimes in the absence of a code of professional behavior. This threat is exemplified by a recent YouTube posting, in which surgeons posted an unauthorized video from a surgery while removing a foreign body from a patient's rectum (AP 2008). Physicians can be seen laughing and joking, and others are seen shooting camera phone pictures with medical and nursing students present. Technology may be a dangerous tool, regardless of the level of training of the physician.

This case, and many others like it, illustrate the power and influence that digital media is gaining in medical education. It is our responsibility as educators to familiarize ourselves with these advances not only to take advantage of the vast educational opportunities provided, but also to understand the interface with medical professionalism. As technology continues to advance in leaps and bounds, education and continued discussion will help to bridge the digital divide.

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Teaching Professionalism

a tale of three schools

Nirav Shah,[*] Jeffrey Anderson,[†] and Holly J. Humphrey[‡]

ABSTRACT This article compares professionalism education from the vantage points of three different disciplines: medicine, law, and business. In particular, it asks how each of these professions conceives of "professionalism," and how these different conceptions affect what is taught to graduate students. The object of professionalism education differs among these three disciplines, as do the specific challenges to professionalism and professionalism education. The article offers examples of how professionalism is taught in medicine, law, and business, and what each profession might learn from the others in developing their professionalism education and pedagogy.

Meno: *Can you tell me, Socrates, whether virtue is acquired by teaching or by practice; or if neither by teaching nor practice, then whether it comes to man by nature, or in what other way?*

Socrates: *I confess with shame that I know literally nothing about virtue.*

Meno: *Are you in earnest, Socrates, in saying that you do not know what virtue is?*

Socrates: *Not only that, but you may say further that I have never known of any one else who did, in my judgment.*

—Plato, *The Meno*

[*]Associate, Sidley Austin LLP, Chicago, IL.
[†]Associate Dean of Leadership Development, University of Chicago Graduate School of Business.
[‡]Dean for Medical Education, University of Chicago Pritzker School of Medicine.
Correspondence: Holly Humphrey, M.D., Dean for Medical Education, University of Chicago Pritzker School of Medicine, 924 East 57th Street, Chicago, IL 60637.
E-mail: dean-for-meded@bsd.uchicago.edu.

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Were Socrates with us today, he would no doubt be just as perplexed by the debate surrounding issues of professionalism as he was by the debate about virtue. Across business, medicine, and law, the topic of professionalism has received much press—both popular and academic. Yet despite this extensive coverage, the way in which these different professions conceive of professionalism has not been explored. Moreover, little has been written specifically comparing the ways in which professionalism is taught in medicine, law, and business.

This article surveys the landscape of professionalism across these three disciplines. In particular, it asks how graduate schools in each of those fields conceive of professionalism and, by extension, how they teach it to their students. It focuses on the historical roots of each field's educational mandate and how that history informs different approaches to teaching professionalism. In doing so, it identifies how each field conceives of its own professional ethic. The article also compares professionalism education across the three schools to glean insights into how each discipline might improve its own educational approach.

We begin by asking the baseline question of how professionalism is conceived in each field. Next, we survey how professionalism is taught in each school and how these approaches vary from one another. In keeping with the Meno, we examine how different conceptions of professionalism influence each school's approach to pedagogy. We then discuss the possible challenges to professional education and offer insight into how professionalism education might actually achieve its goal of fostering a professional ethic and engendering professional behavior within a field. Finally, we conclude with thoughts about whether and to what extent professionalism can be taught at all. Do our current professional school curricula actually make any impact on students? If not, then what do such courses achieve? If professionalism, like virtue, cannot actually be taught, then does it, as Meno postulated, "come to man by nature"? And if it can be taught, what methods work most effectively and make measurable lasting differences?

What Is Professionalism?

Not surprisingly, there are as many definitions of *professionalism* as there are definers. Most commentators agree that professionalism invokes a sense of duty, certainly to other practitioners in the field (the guild element) and often to the public as a whole (the social contract element).

Some define *professionalism* ostensively and through its consequences. For example, a group at Vanderbilt University Medical Center suggests that a large component of professionalism can be assessed by patient satisfaction (Hickson et al. 2007). This group tracks the number of complaints lodged against each physician and offers those results to the individual physician in the hopes of spurring more "professional behavior" and ultimately higher levels of patient satisfaction.

Similarly, the legal profession, through state bar associations, tracks complaints filed against individual attorneys and makes those complaints available to the public. Indeed, it should come as no surprise that most professional societies both monitor and censure their members as complaints come in.

The Concept of a Profession

The Middle Ages saw the emergence of the concept of a profession. Historically, medicine, law, and the clergy were the three classical professions. They earned this status partly because of their organization into self-regulating guilds, but also because they, unlike merchants, dedicated themselves to what Pellegrino (2002) describes as "something other than self-interest while providing their services" (p. 387). Neither was medicine unique in this regard. Pellegrino also suggests that other early fields, such as the military, encompassed a notion of both profession and professionalism based on their desire to serve others. By making altruism their organizing principle, these fields defined the early concept of a profession. Unlike all other fields, in order to join the ranks medicine, law, or the clergy, one had to "profess" publicly a devotion to others apart from one's own self. As a result, these pursuits had both a private and a public dimension—an ethic that remains to this day.

Today, the notion of a profession is that of a discrete group of practitioners who possess a specialized body of knowledge allowing them to engage in a narrow field of work. Sociologists have identified other prerequisites before a field can reasonably be called a profession, including an identified social need, an internal ethical framework, internally set standards for admission into the field, and a social mandate allowing the field to set these admissions standards (Freidson 2001). Given these various criteria, it is not surprising that several fields lay claim to being "professions" today. Yet only a subset has a well-developed ethic of professionalism.

From Profession to Professionalism

Starting in the 20th century, professionalism became a watchword for the concept of a standardized, normative ethic within a field, coupled with a degree of self-regulation necessary to enforce those norms. Over the years, fields like medicine and law distilled the concept down to its essence: self-regulation plus an aspirational ethic. Both fields evolved in response to societal demands and the demands of their own members. But the struggle between those competing ideals has, sadly, often seen the needs of the public relegated to the self-interest of the profession (Starr 1982). For example, many scholars see the American Medical Association's vehement fight against national health care in the 1960s as a triumph of self-interest over professionalism.

Recognizing the need to balance the forces of self-interest and the public interest, medical and law schools began responding to calls for more professional-

ism within their ranks. Medical professionalism and education have undergone several notable shifts in the past two centuries, and corresponding shifts have occurred in the legal field (Gerber 1989).

At the beginning of the 20th century, medical education was fragmented and still followed the guild-based apprenticeship model of the prior 400 years. Medicine was still a "trade," and its education followed that model closely: admission requirements were low, and instruction emphasized practice and experience over theory and experimentation. Abraham Flexner's (1910) landmark report on medical education radically altered this landscape. Medical schools across the country instituted strict admission requirements, and substandard schools shut their doors. At the same time, medicine metamorphosed from a trade into a profession (Starr 1982). The Flexner Report advocated for an alliance between medical schools and state regulators, with the aim of creating a cohesive regulatory body that would address the needs of the public through alterations in the medical education system. Finally, Flexner recognized that physicians are "social instruments," whose training comes at great cost to the state and thus requires them to function in a "social and preventive" role. These changes ushered in the first wave of "medical professionalism" and charged medical schools with educating young physicians in these norms.

Teaching Professionalism: Graduate Schools Compared

Medical Professionalism

Although Hippocrates is credited with advancing the first notion of medical professionalism, the concept wasn't properly recognized until the British historian Thomas Percival (1803) codified the subject and promulgated his own code. Only then did the term *professionalism* take on its own meaning. Percival argued that physicians occupied a position of "public trust" and, as a result, had obligations to society that transcended those of typical workers. Despite a chilly reception to this early social contractarian approach in Britain, Percival's ideas gained credence in the United States and later became the basis for the AMA's first code of medical ethics in 1847. His ideas were revolutionary at the time: gone was the concept of medicine as a cloistered guild whose primary aim was to protect fellow physicians. Percival advocated a public-goods approach to medicine, arguing that the public trust it inspires sets it apart from all other fields. To this day, that code forms the basis for much of the current thinking on medical professionalism.

Professional education in U.S. medical schools has existed, in some form or another, almost as long as medical schools have. But the modern, social contract–based concept of medical professionalism has only been taught since the early 20th century. This model holds that physicians owe a debt to society in exchange for the training they receive and the intimate details they learn about

their patients. Many physicians and educations feel that this level of intimacy is what makes medicine different from other professions (Starr 1982).

The teaching of medical professionalism is distinctly different from both law and business professionalism. For the most part, professionalism is taught partly through aspirational lectures, but also through example and mentorship. Unlike law, there is no widely agreed upon code of professionalism that all medical students are told to strive for. Indeed, the vagaries of the physician-patient relationship mean the proper course of action in any situation will be up for debate. The absence of such a code makes the aspirational quality of medical professionalism unique. This is not to say that medical professionalism is entirely without concrete principles. To be sure, notions of benevolence, nonmaleficence, informed consent, and confidentiality are bedrock notions taught to every medical student. But to many medical educators, these principles are necessary but not sufficient for professional behavior. Medicine aspires to "more" without being clear on what that additional "more" is.

The Teaching of Legal Professionalism

The American Bar Association is charged with accrediting the nation's law schools. It does so based on various curricular requirements, one of which is a course on legal professionalism. The ABA's "Standards for Approval of Law Schools" (2007–2008) gives guidance to law schools on what elements of professionalism should be included in their curricula and the extent to which the topic should figure into a legal education. Standard 302(a) addresses curricular issues in particular and notes that "A law school shall require that each student receive substantial instruction in . . . (4) other professional skills generally regarded as necessary for effective and responsible participation in the legal profession; and (5) the history, goals, structure, values, rules and responsibilities of the legal profession and its members." This vague language is clarified later in the publication, for Interpretation 302-9 states that Standard 302(a)(5)'s mandate "includes instruction in matters such as the law of lawyering and the Model Rules of Professional Conduct of the ABA."

Law schools typically fulfill this requirement by offering a required course on "The Legal Profession." These courses cover such topics as the creation of an attorney-client relationship, the attorney-client privilege, the limits of zealous representation, and conflicts of interests between clients. Though the class is often called an "ethics" class, the notion of a "legal ethic" is typically not to be found. The course focuses on the ABA's "Model Rules of Professional Responsibility," various analogous state codes, and the court opinions interpreting them. Usually, such courses do not situate legal professionalism in any larger ethical or philosophical context. As a result, there are no "ethical" dilemmas—only legal ones that require the conflicted lawyer to research the law on point and follow precedent just as he or she would for any other legal issue. For a practicing attorney faced

with a quandary, the ethical course of action is secondary to the legally allowed course of action.[1] Unlike in medicine, where physicians attempt to hold themselves to a higher standard than merely "what the law allows," lawyers are focused primarily on a body of legal opinion, created by judges, that circumscribes the limits of their actions. It comes as no surprise to many physicians, then, that "law often represents the lowest acceptable measure of morality" (Sokol 2007).

This disconnect between the ethical path and the legal one carries consequences. Because of its focus on rules and legal opinions, the enterprise of "legal professionalism" is focused on protecting the attorney from censure as opposed to putting the needs of the public first. Judging by the rhetoric and aims of medical professionalism, however, physicians aim for a higher standard: to do whatever is best for the patient regardless of its consequences for the physician. To be sure, this "patient-centric" approach may not always be followed by practicing physicians—indeed, tales of greedy physicians are just as common as stories of public-interest attorneys fighting for indigent clients. But what's notable here is that medical professionalism, as taught in medical school, aims for a higher standard. In law, no such aspirational goal is even introduced in the first place: the focus of legal professionalism is not about choosing the most appropriate *ethical* path when facing a dilemma, but about charting the proper *legal* path. While in medicine what is considered ethical behavior is not necessarily what is legal, in law the two are often synonymous. This divide is perhaps best illustrated by the thorny problem of disclosure of an error to a patient or family. Some physician-ethicists argue in favor of disclosure even where the error was without consequence (Gallagher et al. 2003). Malpractice law, however, typically requires no such disclosure (Rosner et al. 2000).

At the same time, the legal field has formalized professionalism education more than business or medicine. To be admitted to the bar in any state, an applicant must pass the Multistate Professional Responsibility Exam, a standardized, nationwide professional responsibility exam that covers issues of conflict, communication, duties to a client, and confidentiality of information. It consists of multiple-choice questions designed to test applicants on the nuances of conflicts that can arise in the course of legal practice. While the value of measuring professionalism through a multiple-choice exam is debatable, the process does ensure that all recently minted attorneys have some passing familiarity with the "law of lawyering."

Finally, law stands in stark contrast to medicine with respect to the "object" of its professionalism. Indeed, the American Board of Internal Medicine's Phys-

[1] This devotion to what is "legal" as opposed to what might be "ethical" also stems from the fact that attorneys can be quickly disbarred for even the slightest ethical transgression. Physicians, however, cannot have their license revoked for unethical behavior unless it coincides with gross negligence or is otherwise flagrant. Thus, when deciding a course of action, an attorney is more likely to follow a path already approved of by a judge.

ician Charter on medical professionalism in the new millennium begins by underscoring professionalism as the basis for medicine's social contract (ABIM 2002). The very next sentence continues that "[professionalism] demands placing the interests of patients above those of the physician" (p. 244). In medicine, it seems, the beneficiary of the professional ethic should always be the patient. Law, by contrast, does not necessarily elevate the interests of the client above those of the attorney. In a sense, the object of legal professionalism is manifold: in some cases, it is the client. Yet in others, professionalism demands that the attorney's interests take precedence. And in other situations still, some courts have held that the interests of the legal system as a whole should trump. Thus, there is no consistent beneficiary or object of legal professionalism.

The Business School Case for Professionalism Education

The concept of "business professionalism" is more difficult to define than for either medicine or law. To a large degree, this difficulty stems from the fact that business schools do not teach professionalism in the sense recognized by physicians or lawyers. "Business" is not a traditional guild-based profession, charged with its own self-regulation. Rather, business school graduates go into fields as diverse as the students themselves. As such, there is no monolithic, agreed-upon concept of business professionalism.

Yet business schools do offer courses in leadership, social responsibility, and nonprofit management, each of which embodies the notion that the business community is part of a larger social framework and should conform to certain standards of behavior and carry out its obligations to the public: in short, an ethic of professionalism. For decades, the business community has embraced the concept of "corporate social responsibility." Often criticized for its vagueness, this concept suggests that corporations should take the broader interests of society into account when charting a particular course of action. A corporation accounting for the "interests of society" stands in stark contrast to the views of many lawyers and economists, who argue that the only interests that should be taken into account are those of the shareholders (Friedman 1970). Yet, the ethic of corporate social responsibility is, in many ways, the analog of the altruism model taught in medical schools and the pro bono spirit espoused in many law schools. Indeed, data from Christensen et al. (2007) show that the majority of top business schools in the United States teach some form of ethics or corporate social responsibility in their curricula. Of the world's top 50 business schools, a full 84% require students to take at least one course addressing either ethics or corporate social responsibility. And if the definition of an ethics course or corporate social responsibility course is expanded to include topics such as sustainability and corporate leadership, each of the top 50 schools requires at least one such course. Much of the drive for inclusion of such courses into the mandatory curriculum comes from students themselves, perhaps spurred in part by recent corporate accounting scandals (Adler 2002).

Indeed, organizations explicitly devoted to engendering an ethic of social responsibility within the business community are flourishing. One of the largest of these organizations, Net Impact, has seen explosive membership growth over the past 15 years, to over 20,000 members today. The organization strives to "make a positive impact on society by growing and strengthening a community of new leaders who use business to improve the world" (Net Impact 2008). Notably, much of the demand driving the growth of such organizations comes from business school students themselves. Each chapter is largely student-driven and assists the business community in finding socially conscious ways to achieve their business goals. At the University of Chicago Graduate School of Business, student membership in the local Net Impact chapter has more than doubled in the past three years alone. And the number of solo chapters of Net Impact worldwide has gone from six in 1993 to 159 chapters today. This suggests that most of the demand for professionalism exposure in the young business community is coming from the students themselves and not being imposed by the business schools, a stark contrast to medical professionalism education, where in some schools students report "professionalism fatigue."

Business leaders, too, must grapple with serious ethical challenges in their professional lives. These quandaries are in many cases no different from those experienced by physicians and attorneys. For example, a case discussed during the University of Chicago's Graduate School of Business's LEAD (Leadership Effectiveness and Development) program highlights these difficult decisions:

> You are the CEO of a corporation making portable baby cribs. You recently received a letter from the Consumer Products Safety Commission informing you that a baby had died when its neck became caught in the side rails of the crib. The letter did not allege a product deficiency, and no additional details are available about the incident. To date, the company has sold approximately 12,000 units. What steps should you take, if any? You can issue a recall of all cribs, a move that will cost your company millions of dollars and likely force layoffs. Or you can do nothing, in which case more babies may die. Do you issue a recall of all cribs?

Discussion on this point varied. Some students adamantly felt that a recall should be issued, regardless of the costs to either the company or the workers. In their view, it is the customers who come first. But others saw the discussion differently: to issue a recall would be to harm employees immediately. But since the chance of further injuries is speculative, it would be unwise to trade off an unknown harm to consumers against a known harm to employees. The point of the discussion, of course, was not to arrive at the "right" answer (as it might have been in a law classroom), but to examine all sides of the argument and appreciate the difficulty of making such a decision without a handy code of ethics.

Conclusion

Taking Stock of Professionalism Education

Socrates himself probably would not be surprised with the state of professionalism education in America's graduate schools. Each discipline exists in a changing world, with a rapidly evolving definition of professional behavior. For example, there is a push among medical educators to expand the purview of professionalism education to include both instruction and evaluation in behavior, manners, and integrity (AAMC 2002). The University of Chicago itself has announced a new "roadmap" to professionalism that hopes to foster professionalism from day one of medical school and extend through residency (Humphrey et. al. 2007).

Sadly, debates about professionalism don't always yield clear or consistent answers to the question of why professionalism matters at all. And failure to produce a cogent, well-argued answer to this basic question has led critics of the enterprise to claim that it is either an unfruitful endeavor or, worse, rooted in hypocrisy (Brainard and Brislen 2007). But experience from the accounting profession demonstrates what can happen when self-regulated fields fail to scrutinize their own internal practices. For many years, accounting, like medicine and law, enjoyed the privilege of self-regulation and internal standard setting. In the wake of the Enron corporate accounting scandals, the accounting profession came under heavy fire from the public and Congress for failing to police itself. The Sarbanes-Oxley legislation of 2003 ushered in an onerous regulatory scheme that federalized a corporate accounting system previously entrusted to private accountants, and the accounting firm Arthur Andersen was found to be complicit in Enron's hijinks and was itself found guilty of obstructing justice—a verdict that ultimately spelled the end of the giant firm (Beltran, Gering, and Martin 2006). By all accounts Arthur Andersen's troubles stemmed largely from a failure of professionalism. Individual accountants were willing to engage in "creative accounting" in clear violation of the accounting profession's own internal standards.

It is not inconceivable that medicine and law could likewise lose the same privilege of self-regulation if a similar scandal rocked either profession. Indeed, physicians in the United Kingdom have already experienced this pressure in the wake of the Alder Hey scandal. A hospital in Liverpool, England, was found to have taken the organs of children post-mortem without the parents' consent. A swift investigation found abuse and, again, a failure to abide by professional standards. The commission conducting the investigation recommended that a new oversight committee be established to monitor organ procurement and retention in U.K. hospitals and to ensure that pathologists did not enjoy the same degree of free reign over organ procurement and research as they previously did (Hall 2001).

More empirically, Maxine Papadakis and colleagues (2005) have observed a link between unprofessional behavior during medical school and subsequent disciplinary complaints by state licensing boards. Their results call attention to the fact that the proper point of intervention for distressed students is during medical school and not after. If professionalism education can both screen for potentially problematic students and provide them with counseling and coaching, it could potentially save these students their careers and save patients the distaste (or worse) of being treated by an unprofessional physician. In this spirit, a collective effort at Vanderbilt University Medical Center has made strides in identifying and addressing the unprofessional behavior of physicians (Hickson et al. 2007). Their approach uses reports from staff and patients and intervenes in gradual increments. Further, it uses social sanctions as a way to compare publicly the number of reports lodged against any particular physician with his or her cohort. The group's early results suggest that physicians—even chronic offenders—do change their behavior when presented with the proper mix of carrots and sticks.

Opportunities for Professionalism Education

Can education itself change students' notion of what constitutes acceptable behavior within a chosen field? And if so, is there any evidence to suggest that their actual behavior has changed as a result? If the answer to these questions is "yes," then curricular changes should be instituted across the board in an attempt to engender such a response and further research should be undertaken to shed light on what pedagogical methods can actually induce behavioral change (Phelan, Obenshain, and Galey 1993; Weber 1990).

Each of the three fields discussed here can benefit from the others' varied experiences in teaching professionalism. Both medicine and law can benefit from business schools' focus on leadership and social responsibility. Likewise, business schools could benefit from the codified approach to professional ethics that both law and medicine offer.

But despite the atmosphere of optimism surrounding professionalism education, many challenges remain. Of prime concern is a general failure to educate students on the nature and type of professional dilemmas they will actually face in practice. Too often, professionalism education focuses on "hard cases" at the expense of leaving basic guidance and instruction by the wayside. Spending educational time on dilemmas that are exceedingly rare means that students may not learn clear answers to common quandaries. Professionalism education can falter, too, if its agenda becomes (or is perceived to have become) politically tinged. Students will surely bristle if they feel that their education has been coopted by a political agenda.

Professionalism education can make itself both useful and relevant if it focuses on teaching the tools that students can use to discern good policies from bad. In the medical context, for example, that would involve teaching students to filter good studies from bad. If students are blindly told that studies supplied by phar-

maceutical companies are unreliable (and that, therefore, relying on them is unprofessional), rather than being taught how to parse and understand the validity of a study, the entire goal of professionalism will be upended. In business and law, professionalism education involves preparing students for real-world dilemmas they are likely to solve and highlighting the ethical tradeoffs inherent in those dilemmas. This point is crucial: professionalism education can easily fail if, instead of teaching students *how* to think about difficult issues, it merely teaches them *what* to think.

Finally, professionalism educators should interact with colleagues from other graduate schools to learn about curricular innovations across different disciplines. At the University of Chicago, for example, the Dean of Medical Education and coauthor of this paper (HJH) attended several sessions of the LEAD program at the Graduate School of Business to learn how that school teaches leadership skills to its students. Such cross-campus collaboration can foster the needed dialog across different professional schools.

In the end, Socrates' skepticism toward moral education is probably misplaced. Evidence from a diverse array of fields suggests that professional behavior can be engendered through a difficult balance of carrots and sticks. Nevertheless, educators should strive for more than just incentivizing professionalism. The educational model should aspire to something greater: it should spur students to better behavior for the sake of the profession, not just to avoid sanction. Socrates was correct, though, in noting that virtue must be defined before it can be discussed. And the fields of medicine, business, and law have done an admirable job on that score. What remains is to determine the best way to instill professional virtue across the disciplines—if such a thing can be taught at all.

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Medical Professionalism and the Doctor-Patient Relationship

Lydia S. Dugdale,* Mark Siegler,† and David T. Rubin‡

ABSTRACT The practice of medicine increasingly poses obstacles to the cultivation of strong relationships between physicians and their patients. The current discussion of medical professionalism aims to identify some of these obstacles and to improve both the doctor-patient relationship and the quality of medical care. In this essay, we explore professionalism within the context of the relationship between physician and patient and examine the concrete actions, behaviors, and qualities that medical professionalism requires of physicians in today's challenging environment.

In his 1925 address to Harvard medical students Dr. Francis Peabody cautioned that the practice of medicine was changing in ways that threatened to compromise patient care. Peabody noted that these changes were occurring at both educational and institutional levels. "The most common criticism made at present by older practitioners," he remarked, "is that young graduates have been taught a great deal about the mechanism of disease, but very little about the practice of medicine" (Peabody 1927). The problem, according to Peabody, was not simply that the emphasis in clinical education had shifted from patient to disease,

*Department of Medicine, Yale–New Haven Hospital.
†MacLean Center for Clinical Medical Ethics and Department of Medicine, University of Chicago.
‡Department of Medicine, University of Chicago.
Correspondence: Mark Siegler, M.D., University of Chicago, MacLean Center for Clinical Medical Ethics, 5841 S. Maryland Avenue, MC 6098, Chicago, IL 60637.
E-mail: msiegler@medicine.bsd.uchicago.edu.

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but also that the very institutions in which physicians learned and practiced had become less intimate: "When a patient enters a hospital, one of the first things that commonly happens to him is that he loses his personal identity. He is generally referred to, not as Henry Jones, but as 'that case of mitral stenosis in the second bed on the left.'" Perhaps the central question Peabody raised was this: can physicians form personal doctor-patient relationships in impersonal institutions? The answer to that question is vitally important to the current discussion of medical professionalism which aims to improve the doctor-patient relationship and the quality of medical care in the United States.

Over the last century medicine has grown increasingly specialized, mechanized, and impersonal, and the warnings issued by Peabody ring even truer today. Although Peabody did not coin the term "medical professionalism," he extolled many of the qualities that have come to be associated with it, namely, altruism, compassion, empathy, primacy of the patient, and commitment to medical expertise. In this essay, we explore medical professionalism within the context of the relationship between doctor and patient by examining the concrete actions, behaviors, and qualities that medical professionalism requires of physicians in a contemporary environment. Overall, we aim to understand and infuse new life into Peabody's words from three-quarters of a century ago: "Medicine is not a trade to be learned but a profession to be entered."

What Does Professionalism Require of Medical Practitioners?

As heirs to the ancient Hippocratic legacy, we believe that professionalism requires more from the medical profession and from individual physicians than rhetoric and simple oath-taking. Instead, medical professionalism demands a continued renewal of both the profession's and the individual physician's commitment to clinical excellence and to caring for the patient.

From the perspective of the profession as a whole, medical professionalism requires a commitment to providing patients with the best possible care. This can be achieved by maintaining high standards of student selection; by a rigorous and appropriate period of education and training; by processes of certification and recertification to assess standards of clinical competence; by maintaining outcome databases against which professional performance can be evaluated; by developing efficient electronic medical record systems that allow more time for patient care; by formalizing strategies to ensure patient safety during physician hand-offs; and by a commitment to pursuing research studies that will benefit individual patients and society. At present, these essential elements are easily defined, well recognized, and routinely implemented and evaluated through formal examinations and systems-level electronic databases. In fact, despite the formidable challenges involved in developing these standards and systems, this component of professionalism in medicine is the low-hanging fruit.

At the level of the individual physician, professionalism requires more than a personal vow to good intentions. Medical professionalism expects concrete actions, some of which can be measured and evaluated, and some of which require an ongoing personal commitment to the highest ethical standards. This "individual" professionalism can be exemplified through the following actions. First, physicians must achieve and maintain their mastery of clinical skills and intellectual competence. This requirement extends deeper than Continuing Medical Education credits; physicians must devote themselves to keeping abreast of the current medical literature and to pursuing opportunities to learn of advancements in their fields, some of which can be evaluated through recertification exams, credentialing standards, and outcome data for individual physicians.

Second, physicians should demonstrate their commitments to the fundamental principles of medical ethics by dealing honestly with their patients, by negotiating clinically and ethically valid informed consent, and by providing excellent end-of-life care. Regarding honesty, the importance of disclosing medical error to patients and the subsequent benefits to the doctor-patient relationship have been well described (IOM 2000), as has the fact that patients have more trust in their doctors when mistakes are disclosed. But physicians must also be honest with patients about matters other than medical error. For example, if for moral reasons physicians refuse to provide patients with particular treatments or procedures, they have a duty to inform patients that they cannot provide such services (Curlin et al. 2007). Regarding informed consent, every practicing physician must be able to explain competently the risks and benefits of a particular intervention and be able to discern whether the patient truly understands. Ethically valid informed consent requires that the patient never feel coerced. In matters of end-of-life care, physicians must be able to negotiate advanced directives and "do not resuscitate" orders, and be able to provide adequate relief from pain as well as compassionate care to patients and families. Although each of these items should be incorporated into the professional's day-to-day interaction, and can be evaluated through observed performance, this occurs less often after training is completed.

Third, professionals must demonstrate a strong commitment to the welfare and safety of their patients. As examples, medical professionals can wash their hands and take the influenza vaccine. Both of these actions can be performed at essentially no cost and no risk to physicians. Hand washing may seem a basic requirement, but despite its benefit to society being undeniable, it is still not universally practiced (Fung and Cairncross 2007; Sprunt 1973). Ignaz Semmelweis first postulated in 1847 that disease could be spread through human contact, earning the title "savior of mothers" for reducing the incidence of puerperal fever in obstetrical clinics. Hand washing unquestionably reduces the spread of disease, and the influenza vaccine can do so as well. Recent studies have shown that immunized health-care workers decrease the spread of influenza, and when they refuse the vaccine, influenza spreads at much higher rates (Carman et al. 2000;

Cunney et al. 2000; Potter et al. 1997). Since 1981, the Centers for Disease Control have recommended that all medical practitioners take the vaccine, but the level of compliance among individual doctors remains low, below 40%. Physicians must recognize that actions such as hand washing or being vaccinated accomplish more than simply minimizing nosocomial spread of disease; rather, through these simple actions physicians demonstrate their beneficence and nonmaleficence toward patients, essential components of professionalism. Importantly, individual physicians can be evaluated for their compliance or noncompliance with these two practices, and many institutions are beginning to incorporate these items in their quality improvement initiatives.

Fourth, medical professionalism requires that the individual practitioner function as a good steward of society's medical resources, such that the resources are not exhausted or wasted in the moment but are available to other patients in need. Such a doctrine of stewardship evokes Thomas Jefferson's principle of *usufruct*—from the Latin *usus* (use) *fructus* (fruit)—an intergenerational principle permitting tenants or trustees to use and benefit from a thing (typically property) as long as it is not damaged for future generations. Under ancient Roman law, the *fructus* included any commodity on the property that could be replenished, including produce, livestock, and slaves. Jefferson maintained that each generation was obligated to pass on its property unburdened and intact to the next generation. If instead a particular generation "[eats] up the usufruct of the lands for several generations to come . . . then the lands would belong to the dead rather than the living, which would be the reverse of our principal" (Jefferson to James Madison, Sept. 6, 1789; in Jefferson 1999).

As physicians, we are similarly responsible for making wise decisions about the allocation of restricted medical resources. In the context of health care, "eating up the usufruct" today does not simply extinguish resources for the next generation, it has a direct impact on whether the next patient in line has access to a particular medical commodity. Recognizing that many allocation decisions are made by policy makers and political leaders, it is nevertheless the case that a substantial amount of available resources in the system at any particular time depends upon the everyday decisions of individual practitioners. Perhaps the least problematic form of rationing for physicians is the withholding of treatment from patients who will not benefit from the treatment or intervention. But as Osler observed a century ago, "Medicine is a science of uncertainty and an art of probability," and sometimes it is impossible to know for sure whether a particular intervention will prove useful. While we are not arguing for a rationed health-care system per se, we do believe that professionalism in medicine requires the appropriate use of resources based on available scientific evidence. Health systems incorporate utilization review as a check on resource allocation, but such proactive decision making by physicians should extend to the daily interactions with all patients in the inpatient and outpatient environment, and given the current health-care crisis may be even more important now than in the past.

A fifth requirement of medical professionalism is that the individual practitioner support policy initiatives designed to decrease health disparities and improve access to care. This might be considered the medical professional's equivalent to the lawyer's pro bono work. It means that all medical professionals should dedicate some portion of their practice to work that benefits the poor and uninsured, whether through writing and public speaking, teaching medical students, joining professional organizations, providing charity care to indigent patients, or volunteering at a free or mobile clinic. Such actions clearly demonstrate the doctor's commitment to social justice while simultaneously demonstrating respect of persons and beneficence. We recognize that this ideal of public service clashes with the weight and burden of debt that most graduating medical students face and the overhead costs of running a medical practice. If, however, the medical profession is serious about encouraging standards of professionalism such as this, then an approach to this issue for students would be debt forgiveness of the kind that some law schools provide, by forgiving a certain percentage of loans each year in return for public service.

Finally, professionalism requires that individual doctors make a commitment to developing and maintaining strong and effective doctor-patient relationships. Nearly 2,500 years ago, Plato recognized that good doctor-patient relationships were required to achieve the goals of medicine. He described the ineffective doctor-patient relationship as follows: "The physician never gives the slave any account of his complaints, nor asks for any; he gives some empiric treatment with an air of knowledge in the brusque fashion of a dictator, and then is off in haste to the next ailing slave" (*Laws*, Book IV 720c). In contrast, he describes the good doctor-patient relationship in this way:

> The physician treats their disease by going into things thoroughly from the beginning in a scientific way and takes the patient and his family into confidence. Thus, he learns something from the patient. He never gives prescriptions until he has won the patient's trust, and when he has done so, he aims to produce complete restoration to health by persuading the patient to comply. (*Laws*, Book IV 720d)

The best clinical medicine, Plato tells us, is practiced when scientific knowledge is combined with a personal, trusting, and professional relationship between doctor and patient. Peabody understood this ancient truth when he told the Harvard medical students in 1925:

> The treatment of a disease may be entirely impersonal; the care of a patient must be completely personal. The significance of the intimate personal relationship between physician and patient cannot be too strongly emphasized, for in an extraordinarily large number of cases both diagnosis and treatment are directly dependent on it, and the failure of the young physician to establish this relationship accounts for much of his ineffectiveness in the care of patients.

Though they lived millennia apart, both Plato and Peabody understood that the good physician strives for relationships with patients that emphasize technical competence, beneficence and nonmaleficence, trust, communication, and even shared decision-making. In this regard, the professional values described by Plato and Peabody and those that professionalism requires of contemporary physicians are remarkably similar.

Conclusion

Although we face significant challenges to the delivery of medical care in the 21st century, the primacy of the doctor-patient relationship and the fundamental principles of professionalism that are required of our profession and for the appropriate care of our patients remains constant. Only by striving to achieve the concrete standards of professionalism in our practices will we overcome the current barriers to effective medical care and be prepared for the challenges of the future.

In the conclusion to his address to the Harvard medical students, Peabody shared the fundamental principle of the doctor-patient relationship (and of professionalism):

> The good physician knows his patients through and through, and his knowledge is bought dearly. Time, sympathy, and understanding must be lavishly dispensed, but the reward is to be found in that personal bond which forms the greatest satisfaction of the practice of medicine. One of the essential qualities of the clinician is interest in humanity, for the secret of the care of the patient is in caring for the patient.

Every ideal ultimately has to be practiced by individual physicians. The goals of the medical professionalism movement are not just to improve the state of medicine as a profession, but also to improve the practice of individual doctors who care for patients.

To the shock of those who knew him, Peabody was diagnosed with metastatic leiomyosarcoma of the stomach at the age of 44, while at the height of his career. He died before his 46th birthday. In a tribute to his life published in 1928, Dr. W. T. Longcope of Johns Hopkins wrote: "He had learned to know his fellow men, to look with sympathy upon their misfortunes and to use his knowledge wisely for their benefit. He was essentially the good physician." May the same be said of us and of our professional colleagues.

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Volume 51 Index

Articles

Culture and Society

Implicit Normativity in Scientific Advice: Values in Nutrition Scientists' Decisions to Give Public Advice **199**
Anna Paldam Folker, Hanne Andersen, and Peter Sandøe

Taking the Devil into Your Mouth: Ritualized American Weight-Loss Narratives of Morality, Pain, and Betrayal **207**
April Michelle Herndon

Ethics and Philosophy

Parasites and Progress: Ethical Decision-Making and the Santee-Cooper Malaria Study, 1944–1949 **103**
Leo Slater and Margaret Humphreys

Two Faces of Death: Fatalities from Disease and Combat in America's Principal Wars, 1775 to Present **121**
Vincent J. Cirillo

Mortal Exposure: On the Goodness of Writing Medical Ethics **163**
Geoffrey Rees

History and Biography

Mao Zedong's Fight Against Schistosomiasis **176**
Kawai Fan and Honkei Lai

The First Pharmacoepidemiologic Investigations: National Drug Safety Policy in the United States, 1901–1902 **188**
David E. Lilienfeld

The Changing Face of "Real Research" **464**
Howard Hiatt

Medical Education and Practice

Training for Fitness: Reconsidering the 80-Hour Work Week **134**
Catherine V. Caldicott and James W. Holsapple

The Afterbirth of the Clinic: A Foucauldian Perspective on "House M.D." and American Medicine in the 21st Century **220**
Leigh E. Rich, Jack Simmons, David Adams, Scott Thorp, and Michael Mink

An Epidemic of Depression or the Medicalization of Distress? **238**
Roger T. Mulder

Drug Reps and the Academic Medical Center: A Case for Management Rather than Prohibition **251**
Thomas S. Huddle

Beyond Empathy **471**
Richard Sobel

Toward Reducing the Prevalence of Chronic Disease: A Life Course Perspective on Health Preservation **616**
Jeremiah A. Barondess

Science and Medicine

From Body to Brain: Considering the Neurobiological Effects of Female Genital Cutting **84**
Gillian Einstein

Survival Advantage of the Hemochromatosis C282Y Mutation **98**
Eugene D. Weinberg

ESSAY REVIEWS

Historical Fine-Mapping **144**
Angela N. H. Creager

Understanding the Complexity of the U.S. Health Care System: Can Free-Market Ideology Respond to a Current Challenge? **149**
William P. Gunnar

Surgically Shaping Children **261**
Henri Wijsbek

Expanding Immunology: Defensive versus Ecological Perspectives **270**
Alfred I. Tauber

Universal Health Insurance: Will It Control the Cost of U.S. Health Care? **285**
William P. Gunnar

Response to Dr. Gunnar **292**
David F. Drake

When Less Is More in Public Health **479**
Christopher Masi

The Natural History of the Sexual Genome: Proactive Drivers and Passive Drifters **484**
John C. Avise

Babies by (Intelligent) Design? **629**
Mary B. Mahowald

Integrating Evolution and Development: From Theory to Practice **636**
Ehud Lamm and Eva Jablonka

BOOK REVIEWS

Medical Lives in the Age of Surgical Revolution **155**
by M. Anne Crowther and Marguerite W. Dupree / reviewed by Solveig C. Robinson

How Doctors Think **158**
by Jerome Groopman / reviewed by Michel Shamy and Ross Upshur

When Illness Goes Public: Celebrity Patients and How We Look at Medicine **295**
by Barron H. Lerner / reviewed by John C. Bailar III

Children in Medical Research: Access versus Protection **299**
by Lainie Friedman Ross / reviewed by Christopher Church and Raymond C. Barfield

Strange Harvest: Organ Transplants, Denatured Bodies, and the Transformed Self **302**
by Lesley A. A. Sharp / reviewed by Edward R. Garrity, Jr.

To Die Well: Your Right to Comfort, Calm and Choice in the Last Days of Life **304**
by Sidney Wanzer and Joseph Glenmullen / reviewed by Michael Marschke

The Intelligibility of Nature: How Science Makes Sense of the World **309**
by Peter Dear / reviewed by Richard Olson

Culturing Life: How Cells Became Technologies **312**
by Hannah Landecker / reviewed by Henning Schmidgen

Contagious: Cultures, Carriers, and the Outbreak Narrative **648**
by Priscilla Wald / reviewed by Elinor L. Baron

Laws of Men and Laws of Nature: The History of Scientific Expert Testimony in England and America **650**
by Tal Golan / reviewed by William P. Gunnar

Elizabeth Blackburn and the Story of Telomeres: Deciphering the Ends of DNA **655**
by Catherine Brady / reviewed by Jane Maienschein

Plan B 3.0: Mobilizing to Save Civilization **658**
by Lester R. Brown / reviewed by Theodore L. Steck

Searching Eyes: Privacy, the State, and Disease Surveillance in America **660**
by Amy L. Fairchild, Ronald Bayer, and James Colgrove / reviewed by Peter Tuteur

NEW TECHNOLOGIES AND MEDICAL EDUCATION

Edited by Morton Arnsdorf

New Technologies and Medical Education: Introduction **1**
Morton Arnsdorf

E-Learning: Is There Anything Special about the "E"? **5**
David A. Cook and Furman S. McDonald

Computer-Assisted Medical Education: Current and Potential Roles **22**
Scott Stern

Simulation in Health Care Education **31**
S. Barry Issenberg and Ross J. Scalese

Medical Simulation: The New Tool for Training and Skill Assessment **47**
John D. Carroll and John C. Messenger

Internet-Based Medical Education **61**
Alfred A. Bove

Improving the Quality of Care via Maintenance of Certification and the Web: An Early Status Report **71**
Eric S. Holmboe, Lorna Lynn, and F. Daniel Duffy

PHILOSOPHY OF MEDICINE

Edited by Alfred I. Tauber

Introduction **317**
Alfred I. Tauber

Risk and Disease **320**
Peter H. Schwartz

Mental Illness from the Perspective of Theoretical Neuroscience **335**
Paul Thagard

Constructive Realism and Medicine: An Approach to Medical Ontology **353**
Jeremy R. Simon

Do We Need Theory to Study Disease? Lessons from Cancer Research and Their Implications for Mental Illness **367**
Harold Kincaid

Philosophy of Medicine Is What Philosophers of Medicine Do **379**
William E. Stempsey

Reflections on Humanizing Biomedicine **392**
James A. Marcum

Epistemological Reflections on the Art of Medicine and Narrative Medicine **406**
Miriam Solomon

Evidence and Ethics in Medicine **418**
John Worrall

Health as Intra-Systemic Integrity: Rethinking the Foundations of Systems Biology and Nanomedicine **432**
George Khushf

Medicine and the Call for a Moral Epistemology, Part II: Constructing a Synthesis of Values **450**
Alfred I. Tauber

MEDICAL PROFESSIONALISM

Edited by Holly J. Humphrey

Medical Professionalism: Introduction **491**
Holly J. Humphrey

Teaching Humanism **495**
David T. Stern, Jordan J. Cohen, Ann Bruder, Barbara Packer, and Allison Sole

Professionalism Education: The Medical Student Response **508**
Troy Leo and Kellene Eagan

The YouTube Generation: Implications for Medical Professionalism **517**
Jeanne M. Farnan, John A. M. Paro, Jennifer Higa, Jay Edelson, and Vineet M. Arora

Medical Professionalism: One Size Fits All? **525**
James N. Woodruff, Peter Angelos, and Sandra Valaitis

Teaching Professionalism: A Tale of Three Schools **535**
Nirav Shah, Jeffrey Anderson, and Holly J. Humphrey

Medical Professionalism and the Doctor-Patient Relationship **547**
Lydia S. Dugdale, Mark Siegler, and David T. Rubin

Medical Professionalism: Crossing a Generational Divide **554**
Colin Walsh and Herbert T. Abelson

The Short History and Tenuous Future of Medical Professionalism: The Erosion of Medicine's Social Contract **565**
Matthew K. Wynia

Expectations and Obligations: Professionalism and Medicine's Social Contract with Society **579**
Richard L. Cruess and Sylvia R. Cruess

Moving Beyond Nostalgia and Motives: Towards a Complexity Science View of Medical Professionalism **599**
Frederic W. Hafferty and Dana Levinson

The Short History and Tenuous Future of Medical Professionalism

the erosion of medicine's social contract

Matthew K. Wynia

ABSTRACT The profession of medicine is based on a shared set of tacit and explicit agreements about what patients, doctors, and society at large should be able to expect from each other, a social contract that defines the profession. Historically, the development of this set of agreements depended upon the creation of social organizations that could speak for the entire profession. Over the last several decades, however, the perceived need for these organizations, and especially the umbrella organization for the profession, the American Medical Association, has waned. The reasons for this are complex, but the consequences are significant: an eroding social contract, fragmentation, lack of cohesion and integrity, and loss of the public's confidence. The present social contract is one-dimensional, overly simplistic, and failing to sustain the public's trust. To address these problems, a renewed social contract is necessary. Although this renewed contract should be based on foundations similar to the original, it must directly confront such contemporary challenges as resource allocation and conflicts of interest. Equally as important, to reinvigorate our social contract more physicians will need to come to grips with a basic truth: to sustain professionalism we need a strong, unified professional association.

The Institute for Ethics, American Medical Association, 515 North State Street, Chicago, IL 60610. E-mail: matthew.wynia@ama-assn.org.

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THE EXACT BIRTH DATE OF MEDICINE as a profession is murky and depends on one's definition of "profession." But if one accepts a bare-bones definition—a group that publicly "professes" to share uniform training and standards of practice, which they promise to use in service to others—it is possible, roughly, to date the birth of medical professionalism. And it is much younger, and perhaps more fragile, than many might imagine it to be.

Some would date medical professionalism to the Hippocratic era. Margaret Mead has noted that Hippocratics first separated the roles of healer and sorcerer (Bulger and Barbato 2000). They famously swore an oath professing standards of conduct, and they promoted empirical observation as the basis of medical practice. Nonetheless, as the eminent historian Ludwig Edelstein (1943) has argued, the Hippocratics were a minority sect, who did not succeed in creating uniform standards of practice and behavior for all Greek physicians. Contravening some Hippocratic dicta, Greek physicians performed abortions and assisted in suicides (Baker 1993). The rich and the powerful could even hire Greek physicians as medical hit men. According to the Roman historian Tacitus, the emperor's wife, Agrippina, hired a Greek court physician, Gaius Stertinius Xenophon (ca. 10 BCE–54 CE), to poison her husband, the Emperor Claudius (*The Annals*, Book XIV, 1–16). Popular acceptance of this account suggests that the Hippocratic prohibition against harming patients was not uniformly practiced by Greek physicians. Instead, most physicians of the time were simply specialists in the uses of chemicals and botanicals, unbound by a uniform code of conduct or standards of practice. As the medical historian Albert Jonsen (2000) put it, in Hippocratic times "there does not appear to have been anything like a medical profession" (p. 9).

Others might date medical professionalism to the Middle Ages or to the Renaissance, when standard curricula in medical schools, novel public-health efforts, and the hiring of "plague doctors" by towns began to clarify some of the social obligations that medical doctors should take on. For instance, in 1666 William Boghurst, a London apothecary, asserted that physicians were obliged to treat patients during epidemics. Yet these obligations and social roles were neither clearly articulated nor widely accepted—indeed, the standard advice of physicians facing the plague in this era, both for themselves and their wealthy patients, was *cito*, *longe*, *tarde*: go quickly, go far, and don't come back too soon. The fact that towns had to hire specific doctors to stay and care for patients during epidemics suggests that a commitment to continue providing care was not acknowledged as part of the physician's role.

The term *medical ethics* and the modern use of *profession* first appeared in the early 19th century, when an English physician, Dr. Thomas Percival of Manchester, introduced them in his book, *Medical Ethics* (1803). Percival (1803) clearly articulated specific social roles for all physicians and hoped to see these widely adopted. While it is tempting, therefore, to date the birth of medical professionalism to 1803, Percival's efforts to get the British medical profession to agree to a written set of ethical standards for all physicians were, unfortunately,

sharply rebuffed. The sentiment in England at the time was that proper gentlemen didn't need written ethical standards, because they already knew how to behave. In fact, as Baker et al. (1999) put it, codes of ethics were considered "undesirable" because they were "useful only to persons who, lacking decent character, wish to pretend that they had one."

In the end, it was the American medical profession that, in the mid-19th century, created the first national set of ethical and practice standards. Eventually, similar standards were almost universally accepted, thereby creating the modern concept of the medical profession. American physicians were primed for the task of creating a full-fledged profession for several reasons. Perhaps most important was the Americans' attraction to the notion of a social contract—a notion conceived by French, English, and Scottish Enlightenment thinkers, but implemented most fully in the young American republic, created by rebels against inegalitarian classism. In the United States, people were to relate as equals. Social relations were to be built upon more-or-less explicit contracts between willing parties, not such nebulous notions as noblesse oblige or gentlemanly honor. This way of thinking led to the desire to specify the terms of social relations. In medicine, this specification would take the form of a written code of ethics.

In 1847, American medicine was in disarray. There were no uniform standards for medical education, medical practice, or medical ethics. Most medical care was ineffective and often life-threateningly dangerous. Caveat emptor ruled the field. The free market was leading to the rampant production of a wide variety of uneducated and unorthodox practitioners. The survival of scientific medicine was under threat—at risk of dying before it had been fully born, let alone produced any of the miraculous cures it would later deliver. In this environment, a group of "orthodox" practitioners met to draw up a set of educational and ethical standards, by which they might define—and defend—the nascent "profession" of scientific medicine. The document they produced, the 1847 Code of Medical Ethics of the American Medical Association (AMA), was the first national code of ethics for any profession.

This code of ethics, which was hailed at the time for being as revolutionary as the Declaration of Independence (Baker et al. 1999), was clearly derived from the work of Percival, the Hippocratics, and others. Yet it was also quintessentially American. It laid out a three-part social contract, with reciprocal obligations spelled out between physicians and patients, physicians and other physicians, and physicians and their communities. In many cases these obligations were significant and specific. The three chapters of the code were drawn along the lines of these reciprocal obligations. With regard to community-physician obligations, for example, a physician is "required to expose his health and life for the benefit of the community, [and] he has a just claim, in return, on all its members, collectively and individually, for aid to carry out his measures." In relations with individual patients, physicians were to "be ever ready to obey the calls of the sick," "secrecy and delicacy" should be "strictly observed," and so on. But in return,

patients were to select only properly trained physicians and to "faithfully and unreservedly communicate to their physician the supposed cause of their disease" (yet a patient should not "weary" the physician with "tedious detail"!), and, of course, "the obedience of a patient to the prescriptions of his physician should be prompt and implicit" (Baker et al. 1999, appendix B and C).

These reciprocal obligations did not depend on the personal virtue of the practitioner, though it was certainly hoped that virtuous individuals would join the profession. Instead, the obligations of medical professionals were laid out, explicitly and in writing, so that patients, the community, and physicians all would be aware of these standards. The profession aimed to make uniform claims about the quality of its practitioners, which would be the basis of public trust and improved public health (and—not coincidentally—the foundation for the establishment of self-regulation and monopoly power).

One can certainly argue about the extent to which these reciprocal sets of obligations were lived out, and the degree to which physicians, in particular, lived up to the ideals they espoused in the code. One can also raise questions about the extent to which patients were a willing party to this new contract. Nonetheless, the general notion that all physicians have specific and unique obligations, and a special, privileged role in society, became widely accepted only after this new group of professionals was willing to (1) put these matters in writing and (2) develop mechanisms for self-regulation to encourage adherence to its new code (Wynia 2006). Indeed, the social status of physicians was eventually raised to near-stratospheric heights, based in part on this explicit social contract that demanded altruism, civic-mindedness, devotion to scientific ideals, and a promise of competence and quality assurance through self-regulation.

The Role of Professional Associations

Since professions are group-based social entities, being part of a collegial community is an essential feature of professionalism. In particular, when a profession is based on a written social contract—a code of ethics—the organization that writes this code becomes very important. If a practitioner wants to affect the social contract, the way to do so is through the professional association. And participation in local, state, and national professional associations became important for many other reasons as the medical profession became socially recognized and successful—that is, as the social contract played out.

Some activities of the early AMA were guild-type activities, such as the fact that bank loans and malpractice insurance were often contingent upon AMA membership. Other activities and standards more clearly promoted the public good, or were plainly altruistic—such as the obligation specified in the AMA Code that "when pestilence prevails," physicians must continue to care for patients despite the risk to their own health and even (after 1912) "without regard" to remuneration (Huber and Wynia 2004).

Being a member of one's professional association was also how one kept up-to-date on the evolving science of medicine, a special challenge to far-flung solo practitioners in the United States. It was how one forged collegial relations—needed for referrals and assistance during surgery, for example. The famous physician Sir William Osler repeatedly noted the importance of professional societies as the fertile ground in which professionals grew: "You cannot afford to stand aloof from your professional colleagues in any place. Join their associations, mingle in their meetings, gathering here, scattering there; but everywhere showing that you are faithful students, as willing to teach as be taught" (Bryan 1997, p. 51).

As this quote suggests, professional associations played an important role in developing the non-monetary reward system of early medicine. According to early sociologists of the medical profession, monetary rewards were scant and a surprisingly rare motivator for those entering the medical profession. Talcott Parsons, for example, suggested that people who became doctors tended to be driven less by money than by a desire to look good in front of their peers (Latham 2002). Insofar as this was true, presenting work to one's peer group was important not only to science, but to the development of a cohesive, collegial professional community.

Participation in professional associations was also an ethical obligation. For medical leaders in particular, participation was seen as a core altruistic obligation to the future of the profession. Again, according to Osler: "no physician has a right to consider himself as belonging to himself; but all ought to regard themselves as belonging to the profession, inasmuch as each is a part of the profession" (Bryan 1997, p. 50). Once, when Osler was asked by a medical student whether he (the student) should attend a local medical society meeting, because he wasn't sure what he would get out of it, Osler responded, "Do you think I go for what I can get out of it, or what I can put into it?" (Bryan 1997, p. 49).

Advances in Science, Loss of Humility

By the turn of the century, scientific medicine was beginning to show its promise. While previous generations of doctors had believed, often falsely, that they had something of medical benefit to offer the ill, the generation of doctors that understood public hygiene and inoculation actually did save lives, and dramatically so. Between 1900 and 1920, deaths from typhoid, diphtheria, and gastritis were cut by more than half, and tuberculosis deaths dropped by one-third. By the 1940s, with the introduction of penicillin and streptomycin, influenza deaths plummeted, and tuberculosis deaths were falling so rapidly that the disease was widely expected to be eliminated. When books like DeKruif's *The Microbe Hunters* (1926) noted both the self-sacrifice and success of physicians in combating infectious diseases, many Americans came to see physicians as heroes.

Sadly, one effect of gaining heroic status was the loss of any remnants of

humility that doctors might have retained from their Hippocratic roots. Interestingly, the Hippocratics' emphasis on humility had been based on an awe of the gods' powers over human life and a belief that physicians would be guilty of hubris if they intervened contrary to the gods' plans. Later generations of physicians saw the human body as mechanistic, amenable to manipulation and measurement, and the subject of scientific scrutiny and learning. They should have (and some had) derived humility from their belief in scientific questioning—recognizing that scientific knowledge is always tenuous and subject to further refinement (Wynia and Kurlander 2007). John Gregory (1724–1773), for instance, called such scientific humility "diffidence" and held that "candor, which makes him open to conviction, and ready to acknowledge and rectify his mistakes," is a moral duty for physicians, urging that errors in care be used to study and improve medical practice (Gregory 1772, pp. 209–10). Samuel Bard, founder of the Columbia College of Physicians and Surgeons, told graduating medical students in 1769: "Whenever you shall be so unhappy as to fail, in your Endeavors to relieve; let it be your constant Aim to convert, particular Misfortunes into generaly Blessings, by carefully inspecting the Bodies of the Dead, inquiring into the Causes of their Diseases, and thence improving your own Knowledge, and making further useful Discoveries" (pp. 13–14). Scientific humility, insofar as it drove scientific inquiry and the development of new treatments, was tremendously successful. But, perhaps predictably, as science made advances and medicine had greater success, it became harder for physicians to remain humble. Those physicians who sought out errors to learn from them, brave pioneers of quality improvement like Richard Cabot (1868–1939) and Ernest Codman (1869–1940), were often vilified by other practitioners.

Some of this vilification reflected basic human nature—the reluctance to admit error or have one's errors exposed. But it might also have reflected an ongoing divide early in the development of the profession, between the science and art of medicine: researchers were more interested in science, while clinicians were more devoted to art. To be sure, many believe that this divide was, and remains, largely artificial, since practicing medicine without attention to science would be foolish, and caring for human beings without attention to art would be cruel: both are necessary to good medical practice. In effect, however, in some of these debates the term *art* was code for the notion that individual practitioners should be allowed to practice according to their own best judgment, often uninformed by the latest science and without meaningful oversight from colleagues or anyone else.

Defining Professional Autonomy

In a way, this early fight about science versus art was about the definition of something we would now call "professional autonomy." At least since the found-

ing of the AMA, there had been an undercurrent of concern amongst practitioners over the following question: would professional autonomy mean that the profession, as a group, was to establish standards (rather than having them established by the state or through the marketplace) and ensure that all members lived up to them? Or would it mean that each individual professional, once found to be qualified, would be allowed to establish their own patterns of practice?

We'll return to this question momentarily, but early on—certainly throughout the Progressive Era (ca. 1890–1913)—it appeared that the debate was being resolved in favor of professionals, as a group, establishing standards and mechanisms of self-regulation (Burrow 1977). For example, within a year of its founding, the AMA established committees to set standards on medical education, medical sciences, practical medicine, surgery, obstetrics, and medical literature and publications. Committees on anatomy, physiology, materia medica, chemistry, forensic medicine, vital statistics, hygiene, and sanitary measures soon followed (Haller 1981). The proposed arrangement was clear: individual practitioners would benefit from professional social privileges garnered by the AMA, but in return they were expected to follow the dictates of the profession, as set by AMA committees.

As science advanced, the divide between clinicians and scientists seemed to narrow. New scientific measurement tools, such as the stethoscope, various blood tests, and microscopy, became part of the medical care armamentarium. The clinicians' preference for artful rather than scientific practice looked to be on the wane. Dr. John H. Musser, President of the AMA in 1904, remarked, "With the incoming of scientific precision there is the outgoing of so-called art. Diagnosis by intuition, by careless 'rule of thumb'. . . is as little trustworthy as the shifting sand of the Sahara" (King 1983, p. 2478).

Other Perils of Scientific Success and Authority

Linking practice to science led to great advances in patient care and public health. Sadly, however, the downsides of this success-linked-to-science were substantial: physicians not only came to lose humility and respect for "the art," but their customer service orientation as well. Medicine became increasingly complex, and microscopic phenomena weren't always easy to explain. Perhaps more important, a mechanistic understanding of the human body meant that medicine could provide tremendous benefits whether or not the patient understood or believed in how these benefits came about (such as with inoculations). So physicians pushed for public-health mandates at the population level and adopted a highly paternalistic attitude towards patients at the individual level.

But pride, paternalism, and the loss of art and customer service were, sadly, not the only negative consequence of this focus on scientific competence as the

source of physicians' social authority. Another was that physicians' civic obligations eventually came to be taken for granted, seen as unimportant, or misconstrued; and many were nearly abandoned.

First, in the wake of vaccination, antibiotics, cardiac surgery, organ transplantation, and other miracles, any professional obligations beyond scientific competence no longer seemed necessary. Saving lives was sufficient to garner high levels of public respect. Second, some civic obligations, such as the professional duty to continue caring for patients during epidemics, were eventually seen as "anachronistic," because the achievements of scientific medicine had made them so. As the U.S. Surgeon General put it in 1970, "the era of infectious diseases is coming to an end" (Huber and Wynia 2004). It's not hard to imagine a profession with this level of hubris feeling little need for any ethical regulations—after all, what could be more ethical than eliminating disease?

Third—and more complex—is that the profession accrued so much credibility there was no longer any question that it should be self-regulatory. At first blush, this development might seem to promote the civic obligation of self-regulation, but gaining the unquestioned capacity to self-regulate created an unfortunate backlash. From the time of its founding, a goal of the AMA had been to develop a heavy mantle of credibility around physicians that would create a professional monopoly, or "professional closure," with the assistance of the state. That is, those who were not qualified, according to standards established by the profession, would be closed out of practice by the state. If successful, professional closure would protect the public from unscrupulous and unscientific practitioners. It would also raise the status, and presumably the pay, of qualified practitioners. (It is, in my view, impossible to fully disentangle these altruistic and self-serving motivations.) As physicians delivered on their promises to improve medical care, and risked their own lives in doing so, the profession became extremely successful in arguing for regulatory closure. In fact, medicine was *so* successful in this regard that many of our self-regulatory mechanisms, such as medical licensure, accreditation bodies, and various other professionally derived structures and processes, were accepted as legally binding—which blurred the lines between the state and the profession. Victims of our own success, many physicians no longer recognized these various regulatory structures as a part of professional self-regulation and necessary to maintaining our social credibility over the long term; instead, they came to be perceived as meddlesome outside bodies, sent in by the state to scrutinize us and disrupt our practice.

Finally, though it pains me to admit it, the burgeoning field of medical ethics also contributed to the loss of physicians' sense that professionalism entails civic responsibilities. Early bioethics, responding to legitimate concerns—ranging from paternalism, as noted above, to physician participation in Nazi crimes against humanity under the guise of obligations to society—strongly stressed the importance of autonomy as a principle of biomedical ethics and deemphasized

or even denigrated physicians' civic duties. Some urged physicians to ignore civic considerations altogether and think only of the welfare of the individual patient before them. For instance, in 1984 Norman Levinsky wrote in the *New England Journal of Medicine* that "physicians are required to do everything that they believe may benefit each patient, without regard to costs or other societal considerations" (p. 1573). Such a statement reflects the domination of medical ethics by respect for individual autonomy, but it also illustrates the loss of a cardinal facet of the social contract that had grounded physician professionalism, and which the sociologist Talcott Parsons had described: the obligation of physicians to serve as mediators between private and community interests (Latham 2002; Wynia et al. 1999).

In sum, in the late 20th century there developed a very different sense of professionalism, epitomized by the notion that one should care only about the patient sitting in the exam room. As a simple, one-dimensional ethics, this notion of strict individual advocacy appealed to patients' immediate interests, and it seemed easy for doctors. But it could hardly be more different from the initial understanding of professionalism as comprising a complex set of reciprocal obligations between physicians, patients, and the community.

The Physician as Trustee

Under the original social contract for the medical profession, doctors had obligations to patients but also obligations to the community—and it was recognized that these could come into conflict. While stewardship of shared financial resources was not an obvious issue early on (before health insurance came into existence), conflicts arose around patient wants and desires, and the hope of the community for those patients to be productive members of society. When these responsibilities conflicted, a good professional would serve as a mediator, seeking to do the best possible for all concerned.

Even more than for other professions, this mediator role was an important part of the social contract for physicians. In simple, practical terms today, the agreement is the following: physicians are given certain social privileges to protect the ill (such as by allowing time off work) in exchange for a collective promise to help society by working to return the ill to productive life. So, ethically, physicians cannot sell notes to excuse otherwise healthy people from work, despite the fact that there might be a ready market for them.

This was recognized in the 1847 Code of Medical Ethics, which noted that a physician's skills "are qualities which he holds in trust for the general good." And our commitment to serving the larger public good played a crucial part in the professional standing that medicine first achieved during the 19th century. As Cruess and Cruess (1997) put it: "[19th-century] legal measures for the first time granted medicine a broad monopoly over health care—along with both indi-

vidual and collective autonomy—with the clear understanding that in return medicine would concern itself with the health problems of the society it served and would place the welfare of society above its own" (p. 943).

Problems with a One-Dimensional Social Contract

Under a simplified, autonomy-centric view, however, physician ethics came to look something like lawyerly ethics. Namely, zealous advocacy for one's client became the primary, if not only, duty of the physician. But the practical and conceptual problems with such a simplistic stance are substantial (Sage 1999), and they are playing out today.

The main problem is that a zealous advocate cannot also serve as the opposing counsel and the judge. But in medicine, unlike in the legal system, there is no opposing counsel. And even if there were, there is no impartial judge to weigh the physician's arguments against those of this hypothetical advocate for the larger community. To make zealous advocacy work as the physician's sole ethical responsibility, and to produce just outcomes when the needs of individuals and communities came into conflict, there would need to be a system in place to which the physician would have to plea—and in which the physician would not have the final word.

This scenario is not very appealing to most physicians. An adversarial medical care system would be profoundly inefficient and frustrating for patient and doctors alike. Yet it is what *must* evolve if physicians insist on adopting a one-dimensional advocacy role. And indeed, we are developing just such a system today, with control over medical decisions devolving to health plans and purchasers, to which physicians and their patients must plea.

Simple Contract, Complex Problems

This new social contract, based only on advocacy for individual patients, has other ramifications as well. For instance, professional closure weakens. New groups of practitioners arise, unqualified according to the old professional standards but free to practice according to the dictates of the market that an autonomy-centric social contract promotes. We are not there yet, but we are experiencing a slow reversion towards the days before 1847, when anyone could hang a shingle and call themselves a "doctor."

Also, in the long-running dispute over what professional autonomy means, a simplified social contract decisively tilts the playing field towards those who would redefine professional autonomy to mean the right of individual doctors to treat patients according to individual preference, rather than the right of the group to self-regulate by setting and enforcing practice standards.

As the contract devolves away from groups and towards individuals, there has been a reversion away from codes of ethics and back towards an ethics of individual virtue. Incidentally, this is not to be confused with "the virtues" à la Aristotle, who believed virtue to be habitual and based upon carefully following rules over a long period of time, until they become ingrained. Rather than emphasizing that physicians are bound by a shared set of behavioral standards, which students should embrace until they become second nature, ethics courses in medical schools today tend to focus on training students to think things through for themselves. This, of course, is laudable and a necessary brake against professional group-think, but it's hard to believe we should depend completely on each individual's analysis. Such reliance will predictably lead some physicians to take wrong actions that they believe they can justify, and others will start out with a very different understanding of acceptable actions. To put this in colloquial terms: the problem with teaching ethical analysis and then relying on the "red-face test" to maintain professionalism is that some people don't embarrass easily. Sometimes, we'd be better off with clear rules and a meaningful obligation to follow them.

Finally, with a one-dimensional, individually focused contract, there is less perceived need for organizations like the AMA that wrote and enforced the old, more nuanced and group-oriented, social contract. This is hardly the only cause of the AMA's membership woes, but it is a key part of a negative membership spiral. Ironically, AMA members—comprising practicing physicians—largely bought into the simplified social contract, in which the association itself became less important. With its loss of stature among physicians came losses in membership and social prestige, and a reduced ability to influence the environment of medical practice. Then, more doctors chose to abandon the organization, because it came to be seen as ineffectual even in its more limited role. Organizational leaders facing such a situation can easily become desperate, casting about for ways to please the remaining members. In their efforts to serve them, it is easy to further alienate those on the margins, by moving even further from the core mission around which the AMA was created: writing the social contract for medicine and ensuring that all physicians are living up to it.

Specialty associations have tried to inherit some of the AMA's power to establish their own, independent social contracts with some success, since they can better focus on negotiating for a relatively homogeneous membership. Sadly, however, these efforts often result in the increasing fragmentation of the profession and frequent episodes of internecine conflict. As cohesion in the professional community declines, so does professional social capital, resilience, and effectiveness.

WHERE TO GO FROM HERE?

Given recent history and current trends, it seems that relatively few physicians might weep over the passing of the AMA, but since no alternative organization is being proposed to take its place, the alternative is to have no national association for all physicians. Most of us probably know, intuitively, that "every one for oneself" is not a solid basis on which to maintain a profession. "Every specialty for itself" isn't much better. In short, without a unified professional association we cannot have a profession.

Can we rebuild medicine's social contract to meet the challenges of the new century? Can we create a new progressive era for medicine, retaining our commitment to science while building back in and reinforcing our obligations of service to society, artful practice, humility, and professional autonomy (in its original sense)? Is it possible to rehabilitate old institutions, such as the AMA, to help accomplish this task?

We don't want or need the same social contract today that we developed in 1847. A contemporary social contract should focus far more attention on matters of resource distribution, quality measurement, and the interactions of the various players in the health-care system. (It's not just patients and doctors anymore: purchasers, regulators, and other practitioners must be brought into the contract.) And, in fact, these ideas are gaining traction within the AMA (Ethical Force Program 2008).

Many progressive physicians, however, have lost hope for the AMA and its capacity for evolution, even though most know little of how the AMA actually works. In my view, rumors of the AMA's demise are premature. The fundamental role of professional associations is to write the social contract for the profession. Our options are to have multiple organizations perform this task—with different social contracts for each specialty—or to have a uniform social contract for all physicians. There are good reasons to favor the latter.

Second, the AMA remains engaged in this task, and the process through which it works (though imperfect), is, on the whole, fairly solid. The AMA is a representative democracy, with representatives from all major specialties and every state. Naturally, democratic structures reflect the majority thinking of those who are involved. So the profession of medicine, and the AMA in particular, faces something of a Pogo problem: we have met the enemy . . . and he is us.

Finally, American medicine exists within a democratic society. Physicians are not alone in establishing our social contract, we do so in constant negotiation with various communities. Often, these negotiations take place through democratic processes, and our professional associations are the means we have of projecting the voice of medicine into public policy debates. If certain physicians don't like the tenor or content of the voice of American medicine, it is not enough to leave. There is, as Osler understood, a professional obligation to be engaged and help change what the voice is saying or how it is being said.

Nevertheless, some of us have become inured to political polarization over the last 40 years. Some might see all of organized medicine as beyond redemption—too much in hock to corporate interest, too attached to a political party, too reactive. As a result, the AMA might have lost large segments of two or more generations of physicians, who are so cynical about organized medicine that they cannot imagine an evolved AMA, one that might (at least sometimes) reflect their values and help orient the profession towards public service. Sadly, in my experience many leaders of academic medicine—though progressive at heart and generally not lacking a sense of empowerment—are in this position. They hold a deep-seated cynicism about the AMA and its ability to change—or their ability to help change it.

We should not give up on these leaders: their skills and knowledge can be invaluable. At the same time, though, we need to directly engage young professionals who haven't yet adopted this cynical attitude. Activism among young physicians is rising, as is AMA membership, even while it continues to fall among more senior members of the profession. In the last year, membership in the AMA among physicians under 40 rose 2.2%, while membership among those older than 40 fell 2.8% (Julie Gill, AMA Membership and Marketing, personal communication, May 15, 2008). Perhaps the best we can hope for from some medical leaders will be a bemused silence, as the young progressives under them learn how to use our professional association to reinvigorate the social contract of the medical profession.

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Moving Beyond Nostalgia and Motives

towards a complexity science view of medical professionalism

Frederic W. Hafferty* **and Dana Levinson†**

ABSTRACT Modern-day discourse on medical professionalism has largely been dominated by a "nostalgic" view, emphasizing individual motives and behaviors. Shaped by a defining conflict between commercialism and professionalism, this discourse has unfolded through a series of waves, the first four of which are discovery, definition, assessment, and institutionalization. They have unfolded in a series of highly interactive and overlapping sequences that extend into the present. The fifth wave—linking structure and agency—which is nascent, proposes to shift our focus on professionalism from changing individuals to modifying the underlying structural and environmental forces that shape social actors and actions. The sixth wave—complexity science—is more incubatory in nature and seeks to recast social actors, social structures, and environmental factors as interactive, adaptive, and interdependent. Moving towards such a framing is necessary if medicine is to effectively reestablish professionalism as a core principle.

THIS ARTICLE REVIEWS the evolution of the modern-day professionalism movement in organized medicine. What started in the early 1980s with fears related to loss of professional stature and concerns about the corrosive forces of commercialism on core professional values has evolved into a broad-

*University of Minnesota Medical School–Duluth.
†University of Chicago Pritzker School of Medicine.
Correspondence: Frederic W. Hafferty, Department of Behavior Sciences, University of Minnesota Medical School–Duluth, Duluth, MN 55812.
E-mail: fhaffert@d.umn.edu.

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based and formal social movement. This movement encompasses efforts that range from defining and measuring professionalism to developing curricular interventions to promote professionalism during medical training and beyond. More recently, work on professionalism has begun to consider how organizational structures might affect the ability of individuals to manifest core professional values and behaviors.

Clearly, no movement—particularly one that is taking place in an area as complex and rapidly changing as medicine—functions in isolation. Organized medicine's formal "professionalism project" is actually one of three social movements currently underway within medicine (the other two are evidence-based medicine and patient safety), all of which fall under a broader rubric of quality of care. Related to these movements is the nascent exploration of complexity science as a conceptual framework for understanding medicine and medical practice (Ahn et al. 2006; Bell and Koithan 2006).

This article traces the evolution of medicine's professionalism movement, focusing on the contemporary margins of the movement. We consider the potential for professionalism to move beyond its current focus as a discourse that stresses individual motives and behaviors to one that includes a more macro-perspective on how systems and structures affect individuals and how organizations themselves might embody professional principles. We then consider how a complexity science perspective might apply to medicine's professionalism project and use the hidden curriculum literature to frame an example of how this might take place.

The modern-day (1980s to present) discourse on medical professionalism has been dominated by a "nostalgic" view of professionalism (Castellani and Hafferty 2006). This discourse has unfolded through a series of waves. The first four—discovery, definition, assessment, and institutionalization—have been highly interactive and overlapping sequences that continue to unfold to the present. The fifth wave—linking structure and agency—is nascent, while a sixth—viewing the medical professionalism movement and medical education as taking place within a complex adaptive system—is more incubatory in nature. The sixth wave would consider professionalism through the prism of complexity science, by which we mean the study of dynamic adaptive systems consisting of interacting and interdependent variables. We view this final wave as a necessary evolution, if the stated goal of organized medicine's professionalism movement, the reestablishment of professionalism as a core principle of medical practice, is to reach fruition.

The First Four Waves in Medicine's Modern Professionalism Movement

Medicine has only recently become preoccupied with how best to define and promote "professionalism." For centuries, the Hippocratic Oath was considered a sufficient ethos to guide physicians and therefore had a commanding influence, even as modern codes of ethics were being implemented. The first American

Medical Association Code for Medical Ethics (1847) focused on the moral authority and independence of physicians in service to others, affirmed the profession's responsibility to care for the sick, and emphasized individual honor (Riddick 2003). With this code serving as a normative anchor and as a point of social legitimization, organized medicine began its evolution into the type of organizational structure that social scientists would come to label "professional" (Starr 1982). Nonetheless, and in spite of organized medicine's tenacious pursuit of professional powers and privileges, which reached its zenith in the 1950s, there was little formal emphasis within the medical training process on the tenets of professionalism. Furthermore, outside the rather limited purview of state medical boards, there was little oversight of physician work. This lacuna was fed by medicine's desire for occupational autonomy (for example, restricting the evaluation of medical work to insiders) along with a persistent vagueness about what exactly might constitute professional or "unprofessional" behaviors (Hafferty 2006b). Instead of critical scrutiny and ongoing refinement, medicine came to treat the idea of its own professionalism as something so routine and obvious as to be taken for granted. Being a professional meant having completed one's training—nothing less, but certainly nothing more. Even the "automatic attribution" linking professionalism to a degree was considered too extreme by some guild members, particularly those who believed that the core attributes of professionalism were an inherent part of one's character and therefore beyond the influence of medical training. For these people, the solution to any problems of professionalism lay not in training, but in the recruitment of applicants with exceptional character, particularly those who would prove resilient to the attenuating aspects of medical training. From this vantage point, and taken to its logical extreme, professionalism is a quality that precedes, rather than emerges from, medical training.

How then, did medical professionalism—what it means and how to teach and evaluate it—become such a hotly debated topic at the end of the 20th and the beginning of the 21st centuries? The answer, albeit simplified, is that medicine underwent a number of significant challenges to its powers and privileges during the latter half of the 20th century (Starr 1982). As summarized in Eliot Freidson's *Professionalism: The Third Logic* (2001), organized medicine had acquired both professional dominance and professional autonomy based on claims that it had developed an esoteric body of knowledge, an occupationally controlled division of labor and related labor market, the control of new member entry and their training, and an "ideology serving some transcendent value." By the 1960s and 1970s, however, these powers and privileges began to unravel, fueled by a post–World War II economic boom, the emergence of information technologies (which allowed for, among other things, the monitoring of physician practice patterns), advances in the scientific basis of medical practice, government interference in health care delivery and financing (particularly with the creation of Medicare and Medicaid), and most importantly the rise of commercialism and a substantial for-profit health-care industry (Hafferty 2006a).

One early and internal warning shot about these changes came in 1980, when Arnold Relman, then editor-in-chief of the *New England Journal of Medicine*, wrote a lead editorial expressing profound concerns about the rise of the "medical industrial complex" and its impact on the autonomy and integrity of physicians. Citing the rise in business influences on physician practice, Relman cautioned about new constraints on physician autonomy, as well as the potential for conflict of interest should physicians' financial interests affect their clinical decision-making. In many respects, Relman was eerily prophetic—for the real boom in medical commercialism would not begin to unfold until 1982, when the American stock market eased into what would evolve into this country's second longest bull market (1982–2000). Across the 1980s and 1990s, billions of dollars flowed into new and established medical companies—each promising investors a solution to the nation's health-care woes.

Relman's admonitions were echoed (although not immediately) by a bevy of other medical leaders including subsequent *New England Journal of Medicine* editors-in-chief Jerome Kassirer (1995, 1997) and Marcia Angell (1993, 2000), and long-time *JAMA* editor George Lundberg (1985, 1988, 1990, 1997). By the early to mid-1990s, evidence of unease about the growing threat of "commercialism," along with calls for physicians to "rediscover" or "return to" their "core professionalism ideals" were in full bloom (Barondess 2003; Burnham 1982; Davis 1988; McLeod 1982). This unease, with its identification of a common enemy (commercialism) and a generic solution (professionalism), constituted the first wave of the modern professionalism movement (Hafferty 2006a). By the late 1990s, Relman's warning that commercial influences were making a "hollow mockery of professional oaths" had been elevated from a solitary voice to an occupation-wide consensus (Relman 1998).

This maelstrom of concerns about the corrosive effects of industry soon gave way to a new perspective—that many of these warnings and rallying cries were vague and sometimes internally contradictory. Thus was born a second wave in the professionalism movement, as medical insiders called for more formal and succinct definitions of professionalism and related concepts (Cruess and Cruess 1997b; Swick 2000; Wynia, Latham, and Kao 1999). One notable product of this second wave was Herbert Swick's "Toward a Normative Definition of Medical Professionalism" (2000), with its set of nine requisite behaviors (such as that "Physicians respond to societal needs and their behaviors reflect a social contract with the communities served"), including a framing of altruism ("Physicians subordinate their own interests to the interest of others") as core to what it means to be a professional. Swick's definitions and conceptual framework became the basis for work on professionalism by a number of medical organizations, including the American Board of Internal Medicine (ABIM), the American Medical Association (AMA), the Association of American Medical Colleges (AAMC), and the National Board of Medical Examiners (NBME).

The ink was hardly dry on these definitional credos and charters before yet

another cry erupted from within the movement—this time to measure and assess professionalism (Arnold 2002; Arnold et al. 1998; Stern 2005; Veloski et al. 2005). Many of the concerns in this third wave were pragmatic and tied to the emergence of professionalism curricula within medical schools. Advocates advanced two related arguments. First, they claimed that any initiatives to teach professionalism in medical schools would be undermined unless students were formally assessed as a part of this effort. Advocates noted that assessment drives learning, and furthermore (in a null curriculum message), that avoiding assessment would send a message to students not to take any such professionalism initiatives seriously. The second argument (albeit related) focused more on the broader theory of professionalism, including medicine's social contract with society and the role of peer review and organizational self-assessment in that overall framing. This argument transcended pedagogical pragmatics and went to the very heart of professionalism as a social practice. As a consequence of these and related concerns, efforts surged to assess professionalism along a number of fronts. Literature reviews of assessment efforts were compiled with a focus on admissions and on linking medical school experiences to later clinical behaviors (Etienne and Jullian 2001; Ginsburg et al. 2000; Lynch, Surdyk, and Eiser 2004; Papadakis et al. 1999, 2005; Stern, Frohna, and Gruppen 2005). All the while, discussions as to whether professionalism could be *taught*, let alone *measured*, continued unabated (AAMC 1999; Cruess and Cruess 1997a, 2006; Rowley et al. 2000; Whitcomb 2005b).

The fourth wave in medicine's professionalism movement, and one concomitant with the definition and measurement crests, has been the rise of institutionalization initiatives across a broad constellation of medical organizations. Led by the ABIM's Medical Professionalism Project, a number of medical organizations, specialty groups, and private organizations such as the AAMC (2004), the NBME (2005), and the ABIM Foundation (Veloski et al. 2004) began sponsoring conferences and allocating resources in what amounts to a collective "professionalism project" (Cohen 2006). Efforts to define and assess professionalism have been core to this overall effort. Examples of products included the Physician Charter created by the ABIM Foundation, ACP-ASIM Foundation, and European Federation of Internal Medicine, and the ACGME's identification of professionalism as one of its six "core competencies" (ABIM 2002; ACGME 1999). While much of the professionalism reflected in these documents is decidedly nostalgic" in nature, some novel elements are beginning to percolate within medicine's overall professionalism discourse. For example, in addition to the more traditional calls to place the welfare of patients ahead of provider welfare (altruism) and to promote patient autonomy, the Physician Charter included "social justice" ("The medical profession must promote social justice in the health care system, including the fair distribution of health care resources") as one of its three "fundamental principles." In this way, the Charter identified (normatively) medicine's responsibility to look beyond the physician-patient dyad in framing its professional responsibilities.

A second (and already mentioned) aspect of this institutionalization wave has been the overall effort to create formal coursework on professionalism, particularly for undergraduate medical students (Curry and Makoul 1998). In short order, a wide variety of course materials were developed and implemented at medical schools throughout the United States and Canada—often in addition to curricula on medical ethics (Makoul, Curry, and Novack 1998). Researchers, in turn, began to examine the influence of such formal training experiences on student conceptions of professionalism and on subsequent practice behaviors (Ginsburg, Kachan, and Lingard 2005; Ginsburg, Regehr, and Lingard 2004; Haidet and Stein 2006).

This gaggle of discovery, definition, measurement, and institutionalization has not been without its critics. Concerns have included the lack of a curricular theory of professional development; the lack of attention to the overall learning environment for professional development (which would extend beyond the usual and customary focus on the formal curriculum); the lack of linkages between formal curricular efforts and current professionalism practices, including peer review and state medical board actions; and the lack of consistent and focused calls from within the movement to include a duty to advocate for the well-being of society and the betterment of the public health (Coulehan 2005; Wear and Kuczewski 2004). Finally, critics have cautioned that efforts to measure professionalism were creating a de facto set of implicit definitions—sometimes complementing, but sometimes clashing with, already established definitions.

Wave Five: Reconciling Professionalism at the Micro and Macro Levels

While both sociology (theoretically) and medicine (in principle) recognize that there are essential differences between conceptualizing professionalism at the level of the individual versus the organization, most discussion of professionalism generated within academic medicine during the 1980s and 1990s focused on defining, assessing, and institutionalizing professionalism at the individual level—thus promoting an agency-based framing of professionalism (Stark 1989; Todd and Horan 1989). As a consequence, relatively little attention was directed toward understanding how organizations (medical schools, clinics, hospitals, or medical centers) might enable or constrain the motives and behaviors of trainees and practitioners. Still further removed from consideration was the related question of how organizations themselves might behave in a professional or unprofessional manner.

There is, however, evidence that this conceptual cul-de-sac is beginning to change as medical education begins to explore the interactive and interdependent nature of the individual-setting relationship. One example is the aforementioned Physician Charter. The Charter opens its statement on social justice by calling upon the profession to manifest this principle; physician behavior is treated as a secondary concern. Nonetheless, the overall content of the Charter,

including materials in its Preamble and Conclusions, and the wording of all three "core principles" and 10 "commitments," is firmly embedded in a tradition that establishes professionalism as a matter of individual (physician) responsibilities.

A second and more substantial reframing of professionalism as a collective/organizational responsibility is the high profile currently being accorded issues of conflict-of-interest (COI) within organized medicine (Ross et al. 2007; Stelfox et al. 1998). COI issues are not new to medicine. The Prayer of Maimonides (1135/38–1204), for example, exhorts physicians not to "allow thirst for profit, ambition, for renown and admiration, to interfere with my profession." Nor is COI *the* defining professionalism issue. There are a number of other themes, including confidentiality and honesty with patients, that command attention under the rubric of professionalism. Nonetheless, COI does showcase the influence of business/industry on medical work, including research, education, publishing, and clinical decision-making. COI also highlights a "primacy of patient" message, which includes the call to place altruism and the welfare of patients ahead of provider welfare ("selfless-service"), something many medical leaders continue to identify as the sine qua non of medical professionalism (Cohen 2006).

While it is true that earlier calls by key medical organizations to address COI issues did focus on physicians and their responsibility to differentiate between acceptable and unacceptable gifts and to "manage" their relations with industry (AMA 1991), this traditional framing appears to be shifting. In February 2006, *JAMA* published a "policy proposal" authored by a constellation of medical luminaries that called for academic medical centers to take the lead in adopting policies to eliminate COI within medical learning environments (Brennan et al. 2006). The proposal unequivocally challenges prior COI "myths," including the myth of small gifts (that any gift can be small enough not to evoke social norms of reciprocity) and the myth of full disclosure (that disclosing a conflict of interest neutralizes that conflict), and it urges medical schools and AHCs to adopt a series of recommended steps to eliminate a hidden curriculum of COI practices. The report's focus is clearly on organizations and organizational responsibilities with respect to COI, not on the individual, and some critics have cited the report's "sterile environment" approach to ensuring professional behavior. Several medical schools already have adopted key aspects of the report, highlighting a shift in professionalism orientations from the individual to a more macro-level focus on context.

Three months later, the American Medical Students Association issued a "report card" grading all U.S. and Canadian allopathic and osteopathic medical schools on their COI policies (AMSA 2007). Much to the chagrin of many deans and faculty schools, failures far outnumbered stars, with 42 schools receiving an "F" and 19 a "D"; only five received a grade of "A." This report has nudged many schools (including those who refused to provide AMSA with initial data) to begin developing formal COI statements governing what pharmaceutical and like companies can do within the walls of medical education.

Another framework for viewing professionalism as more than the motivations and behaviors of individual physicians is laid out in a recent article lead-authored by Jordan Cohen, former president of the AAMC and a coauthor of the *JAMA* policy article on COI (Cohen, Cruess, and Davidson 2007). The article focuses on the nature of setting and structure as barriers to the manifestation of professionalism principles by individuals, and as such points to the interactive nature (if only uni-directional) between settings and individuals. Cohen and colleagues point out that many of the principles detailed in the Physician Charter are not under the control of individual physicians, and that practices and policies of organizations often function as insurmountable barriers to individuals who might otherwise wish to manifest appropriate professional behaviors. The article also notes that some of the principles articulated in the Charter (universal access, meaningful patient safety efforts, and safeguarding patients from COI) may even fall beyond the province of medicine as a whole—with still broader social forces (such as funding streams) casting a definitive pall over the ability of organized medicine to advance professionalism as a core orienting value. Instead, the article calls for "system wide change" and a functional partnership (a "medical-societal alliance") between the medical profession and society.

Cohen's article is notable in two respects. First, his call for a partnership between society and medicine evokes a somewhat overlooked literature on professionalism—one that stands just outside the two major literatures (sociology and medicine) and is sometimes referred to as the "new professionalism" (Epstein 1999; Frankford and Konrad 1998; Irvine 2004, 2006; Mechanic 2000; Sullivan 2005; Whitcomb 2005a). Appearing under several different labels—"civic professionalism," "democratic professionalism," "responsive medical professionalism," "patient centered professionalism"—this body of literature is fairly small, at least relative to the more voluminous professionalism literature, and it is most often published in journals that are (strictly speaking) neither sociological nor medical. Within this subgenre, a common theme is the need to engage the public, proactively and systemically, in any move toward reestablishing a necessary trust between medicine and the public. Thus, when medical insider Troyen Brennan (2002) calls for a professional responsibility grounded in "civic professionalism" and "activist professionalism" and grounds his call within quality of care, we are beginning to see a shift from a professionalism conceived as "just" a matter of individual provider motives or organizational policies to one that resides within the relationships among system participants, including physicians and the public, medical and nonmedical organizations, industry and government. This more encompassing professionalism takes in other medical movements, including patient safety, evidence-based medicine, and quality of care, and extends across such broader social forces as health disparities, an aging population, and, in the United States, tens of millions of uninsured.

The Sixth Wave: A Complexity Science Approach to Professionalism

Despite an emergent recognition within the medical professionalism movement that settings, organizations, and broader social forces play a critical role in the advancement of professionalism, the operationalization of this perspective into future policies and organizational change is far from certain. As reflected in medical coursework, in documents such as the Physician Charter, and in parallel symbols of professionalism such as ethics codes, the professionalism movement's primary focus continues to be the individual—with a basic call for physicians to "just say no" to the corrosive forces that besiege it.

One problem with these calls is that they have not worked—at least to date. In spite of a decade of professionalism coursework, legions of articles, and the development of definitions, competencies, and assessment tools, evidence of problems and disjunctures continue to riddle what is assumed to be a comprehensive and coordinated professionalism initiative. For one, traditional definitions of professionalism, which often seat altruism and selfless behavior at their core, appear to be at odds with emerging conceptions of an appropriate ("professional") physician-patient relationship and issues of lifestyle and "balance" amongst the newest generation of physicians (Croasdale 2003; Dorsey, Jarjoura, and Rutecki 2003; Tholhurst and Stewart 2004). Further, there is some evidence that saturating students with curricula around this topic has had the unintended consequence of creating hostility toward professionalism education in general and a sense on the part of students that they are being "harassed" (Humphrey et al. 2007). Other tensions include a physician population that appears to endorse core ethics of professionalism in principle, including the importance of peer review, but that fails to act when it encounters impaired or incompetent colleagues (Campbell 2007). Meanwhile, medical school faculty persist in modeling unprofessional behavior—leaving students feeling "genuinely and tragically confused" (Brainard and Brislen 2007).

COI data reflect similar inconsistencies and dissonances. While clinicians and researchers appear willing to acknowledge that outside interests might influence their decision-making or behaviors, such an influence, they still insist, happens only to "the other guy." Despite operating within an occupational culture that touts "scientific evidence" and scientific decision-making, despite ample data documenting the direct evidence of industry gifts and inducements on clinical decision-making and research outcomes, and despite more generic social science research on how even the smallest of gifts can create feelings of obligation, many physicians continue to insist that their clinical decision-making stands above such influences (Alpert 2005; Brett, Burr, and Moloo 2003; Chimonas, Brennan, and Rothman 2007; Steinman, Shlipak, and McPhee 2001). Medical students, meanwhile, express a similar social invulnerability (Fein, Vermillion, and Uijtdehaage 2007). Meanwhile, relations with industry have become the rule rather

than the exception. A majority (77%) of second-year medical students have received gifts from industry (Fein, Vermillion, and Uijtdehaage 2007), and a larger majority (80.2%) believe they are entitled to such gifts (Sierles et al. 2005). Ninety-four percent of all physicians have some type of relationship with the pharmaceutical industry, including food in the workplace, drug samples, reimbursement for attending professional meetings, and payments for consulting, giving lectures, or enrolling patients in clinical trials (Campbell et al. 2007a). The same is true for departments as administrative units (67%), department chairs (60%), and members of institutional review boards (33%) (Campbell et al. 2006; Campbell et al. 2007b). Similar statistics exist for the relationships between medical school research and industry (Bekelman, Li, and Gross 2003).

The overall picture is anything but coincidental when we recognize that drug companies religiously track (on a weekly basis) the prescription-writing behaviors of physicians, by combining prescription data sold by pharmacies to specialized pharmacy-information companies with Drug Enforcement Agency numbers sold by the AMA (which makes millions per year on these information-leasing arrangements). Pharmaceutical companies, in turn, send these data to their salespeople, who, so armed, adjust their inducements accordingly. This more nuanced (and real) picture is not well countered by having organized medicine urge physicians to "embrace the principles of professionalism" or by academic medical centers adopting a set of "sterile environment" COI policies (Carlat 2007).

It is with recognition of this complexity that we suggest reframing the issue of professionalism (which, in all likelihood is not a singular issue at all) from a matter of individual motives, or even as an object of remedial actions at the organizational level, to that of a complex, adaptive system where social actors, organizational settings, and environmental factors interact. As noted in one of the few articles on professionalism and complexity science, there is a considerable benefit to viewing health organizations as "complex adaptive systems [that operate] in a professional milieu," rather than as bureaucracies in need of rational administration (Anderson and McDaniel 2000).

THE MEDICAL SCHOOL AS A COMPLEX SYSTEM

Building on Anderson and McDaniel's point, but refocusing on a particular setting, we wish to highlight the medical school as a complex system. In doing so, we wish to situate professionalism within the multitude of learning environments that make up this system. Specifically, we wish to focus on the impact of three such forces—the formal, informal, and hidden curricula—on medical student learning.

There are three major benefits in adopting this framework. First, this framework recasts the formal curriculum from a singular focus to one of three environmental systems, all of which impact on how students learn about and practice professionalism. Second, this shift from a singular to a multiple learning

environment perspective helps to focus on the dynamic interplay that exists among those learning environments. Third, this focus on system dynamics and interactions underscores a point basic to complexity science, namely that medical student learning is more than the sum of the respective system's parts.

Speaking to our first point, if our goal is to understand (and possibly shape) student learning with respect to professionalism, then it is both counterproductive, and ultimately distorting, to treat the formal curriculum as the sole—or even principal—seat of student learning. There are other learning domains at work that are far more influential, both overall and at certain times and in certain settings, than that formally provided to students in the classroom or at the bedside (Hafferty and Franks 1994; Haidet and Stein 2006). This point stresses the importance of conceptually grounding medical student learning within the full range of experiences that comprises the educational experience.

Our second, and more fundamental, point is that these multiple learning environments function within a web of interdependent relationships, each with its own distinctive identity, yet each dependent upon and shaped by the others. Thus, the learning that takes place in the classroom or at the bedside is shaped by what takes place within the informal social interactions among and between faculty and students as they come together in hallways, cafeteria, and on call rooms—and vice versa. This second point is about the power of interactions.

Our third benefit to adopting a complexity science perspective is that the totality of learning that takes place within the space created by these interactions and intersections is greater than the sum of its constituent parts. Just as the formal curriculum is so much more than the sum of individual courses, medical student learning involves more than stacking what takes place within the formal, informal, and hidden curricula, one on top of the other. This is a point about synergy—a key concept within complexity science.

The fact that medical student learning is both dynamic and interdependent is reflected in a frequently raised "hidden curriculum" question—how medical schools might "do away with" the hidden curriculum, with the question usually phrased so that the hidden curriculum is cast as a singular alternative to the formal curriculum. The very phrasing of this question, while admirable in its recognition of how inconsistent and contradictory messages may negatively impact student professionalism, is incorrect in depicting the hidden curriculum as a thing that can be changed in isolation—and thus changed without altering the content and structure of the other domains of learning. One can no more get rid of the hidden curriculum than one can get rid of protons, both in an absolute sense and in the sense of disrupting the fundamental nature of the overall system. One certainly can target the hidden curriculum, but one must also be willing to track the impact of these changes in the hidden curriculum as they play out within the formal and informal curricula. Furthermore, if one resists changing the formal curriculum after purposefully altering the hidden, then the overall system is placed under an additional stress, thus further distorting overall stu-

dent learning. In sum, medical student learning is multi-dimensional, multi-situational, multi-contextual, and interdependent, and to treat it otherwise is to create a false and misleading picture of the overall educational environment.

CLOSING COMMENTS: LIMITS AND LIMITATIONS

Our framing of professionalism as a complex system grounded in social interactions and in the dynamics of multiple learning environments is distressingly incomplete. We have not, for example, even mentioned other occupations (health or otherwise) that are enveloped in their own professionalism movements. Furthermore, we have given short shift to the social dynamics of professionalism itself, including the successful entry of women into medicine and failed efforts to increase the number of underrepresented minorities into physician ranks. We have also neglected to discuss how professionalism, as a social movement, is heavily dependent on the broader socioeconomic and political context in which it evolves. One should thus expect important differences between the professionalism movements in the United Kingdom, Canada, and the United States (Hafferty and Castellani 2006). While one can define a system using different units of analysis (a given medical school class, a given school, all U.S. medical schools), it is also true that professionalism functions as an overall attractor point within medicine. Thus, one can take the professionalism thread, begin to pull, and eventually reach any topic within the medical sciences. Pull a little more and one can move beyond medicine into the broader sociopolitical arena. Everything is interconnected.

This is not, however, a paper "about everything." Our goal is more targeted. We seek to outline medicine's professionalism project as a social movement, and in doing so, capture the evolution of this movement as it shuffles and stutters towards recognizing its inherently complex nature. Even the call to recognize professionalism as a complex system is not, in and of itself, a solution to the "problem of professionalism" (at least as defined by medicine). There is no one problem of professionalism, any more than there is one professionalism (Castellani and Hafferty 2006). While professionalism can be depicted as an ideal type for analytical purposes as did Freidson (2001), there is no ideal solution, nor can professionalism adequately be conceptualized from the viewpoint of any one participant in the system. Finally, professionalism does not reside in the motives of individuals (although such motives, particularly the internalization of core professionalism values, are a core element in any understanding of professionalism), or within organizational structures and policies (although structure and process are inherent elements in any professionalism movement). Instead, professionalism exists within the dynamic interplay of system actors, system structures, and broader environmental influences.

Also important to note is that medicine's modern-day professionalism movement is in its infancy—and continuing with this metaphor, we see medicine just

beginning to recognize the existence of other players and other sandboxes outside its own. We also believe that the modern professionalism movement is shaped by its defining conflict (the dynamic interplay between commercialism versus professionalism) and that this conflict will continue to evolve. We feel quite comfortable (although not sanguine) in concluding that the discourse of professionalism 30 years from now will be a much different discourse than the one we currently face—just as today's discourse differs from that of the 1970s. Finally, we want to reemphasize that professionalism is not a thing. Rather it is a dynamic. In this respect, professionalism is much like those illusive and evanescent particles in physics that have no mass except in movement. In short, professionalism has no meaningful existence independent of the interactions that give it form and meaning. There is great folly in thinking otherwise.

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Toward Reducing the Prevalence of Chronic Disease

*a life course perspective on health preservation**

Jeremiah A. Barondess

ABSTRACT Chronic disease is now hyper-endemic in the United States and is the central problem to be addressed in efforts to enhance the health of the American population. Efforts to reduce the prevalence of chronic disease through diminished exposure to risk factors have achieved significant success in recent decades, but most have been expressions of secondary or tertiary prevention. Current knowledge suggests it would be more effective to extend efforts directed at reduction of risk to earlier phases in the biology of chronic diseases, and to maintain them over the life course. This approach lends itself to a health preservation perspective—in other words, to an orientation around protection of the future health of the individual across the lifespan, from preconception to old age. This will require linked efforts of the clinical, public health, and policy communities, together with private-sector collaborators in information management, marketing, and other areas of expertise.

President Emeritus, New York Academy of Medicine, 1216 Fifth Avenue, New York, New York 10029.
E-mail: jbarondess@nyam.org.
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REDUCING THE PREVALENCE of chronic diseases is the central problem to be addressed in efforts to enhance the health of the American population. Although successes have been achieved, such as reductions in deaths from heart disease and stroke (Thom and Rosamond 2006), significant additional progress will require more effective efforts to apply knowledge about risk factors and their determinants, to interfere with the pathogenetic pathways involved, and to take advantage of the prolonged time courses followed by most chronic diseases before they become clinically evident. Health-protective efforts should be moved to earlier stages in disease biology. We should, in other words, orient ourselves more clearly around efforts to preserve health, to interfere with the erosion of health by chronic disease beginning with the earliest germane events. Success would be marked by health improvement of two kinds: first, by reduction in the prevalence of the clinical manifestations of chronic disease or delay in the appearance of clinical manifestations until progressively later in the life course, the so-called "compression of morbidity" formulation (Fries 1980); second, at a more fundamental level, by prevention or slowing of the rate of progression of the underlying pathologic processes.

Over the past 100 years or so, as a result of the development of science-based public health and clinical practice, a real ability to preserve health has emerged, and life expectancy in the developed world has increased at an extraordinary rate. From the beginning of the 20th century to the present, life expectancy in the United States has been extended by some 30 years. It has been estimated that about 75% of the overall gain reflects various public health measures, and about 25% has been due to clinical interventions (CDC 1994). Early efforts were concerned with the dominant disease pattern of the time, acute infections, and were reflected especially in reductions in childhood mortality, while most of the gains in the past 50 years have occurred toward the end of life (Fried 2000), with clinical advances contributing to an increasing degree, for example with relation to coronary heart disease (Hunink et al. 1997).

These trends have resulted in a remarkable paradox, namely a sharp increase in life expectancy and the parallel emergence of hyper-endemic chronic disease as the major morbidity pattern, currently responsible for some 80% of deaths in the United States (Mokdad et al. 2004). Chronic disease presents a set of challenges and opportunities strikingly different from those of acute infections. As Fries has noted (Fries 1980, 2005), infectious diseases tend to have unitary causes and relatively short courses. They are frequently preventable through immunization or other public health modalities, and in many instances are susceptible of cure. Chronic diseases, on the other hand, tend to have multifactorial causes and are characterized by risk factors as well as preclinical courses that in general last for years, and are usually not amenable to cure. In addition, because of the ubiquity of chronic disease, individuals do not vary so much in terms of whether they have particular chronic diseases, but rather in terms of the rate at which their diseases progress: every individual has the likelihood of gradually progressive silent

atherosclerosis, as well as an increasing statistical possibility of malignant disease, osteoarthritis, and degeneration of articular cartilages (Fries 2005). Finally, chronic disease risk is more tightly tied to personal behaviors than are most infections. For all these reasons, in most instances chronic disease prevention is difficult to achieve. Even though lung cancer and acute myocardial infarction can be prevented in many—ultimately perhaps most—instances, the complexities of dealing effectively with the relevant behavioral and environmental forces make delay or mitigation of clinical expression of most chronic diseases through reduction of risk a more realistic approach. Most current efforts reflect secondary or tertiary prevention, often applied only after years of health-adverse personal behaviors and environmental factors have threatened health, and too often in the face of overt or longstanding clinically inapparent but progressive disease. As a result, much of our clinical effort is now directed at late-stage expressions of atheromatosis, cancer, chronic lung disease, diabetes, and musculoskeletal disorders. Greater effectiveness would likely be achieved through linked age-appropriate interventions applied across the life course, organized conceptually as efforts to move closer to primary prevention—in other words, to preserve health.

The health preservation paradigm derives from a number of basic concepts:

- Each individual possesses at birth a certain "dose," or quantum, of health expectancy, determined by the health of the parents prior to conception, by genomic factors, and by environmental forces, especially the quality of the intrauterine environment in which the fetus develops, determined in turn largely by the health of the mother and her health-related behaviors during the pregnancy.
- The health quantum is affected over the life course by the individual's biologic, psychologic, and behavioral characteristics as they interact with environmental, socioeconomic, and educational factors, and with the timeliness and quality of health care received. These determinants expose the individual from birth through old age to a variety of modifiers, some of which may act to preserve or even enhance health, while others have an erosive effect. The risks of encountering erosive forces and their nature, dimensions, and effects all vary with life stages. In addition, mechanisms of effect vary, and disease outcomes may be long delayed. For example, increasing evidence suggests that the health impacts of some adverse events occurring during critical periods of development may reach clinical expression only years later; low birth weight and early childhood growth rates, and their impacts on adult cardiovascular and metabolic disease are powerful examples (Forsén et al. 2000; Singhal and Lucas 2004). Other health-adverse forces, appearing later and acting through continuing environmental and behavioral exposures, are superimposed on such early determinants. In some instances, health-erosive mechanisms are synergistic, coalescing toward final common pathways,

for example the combined effects on atherogenesis of smoking, dyslipidemia, and diabetes (Biondi-Zoccai et al. 2003; Fuster and Gotto 2000). The net erosive load at any time in the life trajectory, expressed through varieties of pathologic processes, reflects the accumulated impacts of prior health-adverse exposures and events.

- Important chronic diseases may arise very early and exhibit long latency, progressing for long periods of time before reaching clinical expression, and may therefore provide multiple opportunities for initiation of effective interventions. This is strikingly true, for example, in the case of atheromatous disease, in regard to which there is evidence that the lesions may arise very early in life: human fetuses have been found to display aortic fatty streak formation, greatly enhanced by maternal hypercholesterolemia (Napoli et al. 1997); early atheromas have been identified in the aortas and coronary arteries of six-year-olds in the Bogalusa Heart Study in Louisiana (Berenson 2002); and established atheromatosis was found to be common in American combat casualties in Korea and Vietnam, largely men in their late teens or early twenties selected for military service on the basis of their apparent good health (Enos, Beyer, and Holmes 1955; McNamara et al. 1971). One implication of such observations has to do with our conception of health, traditionally framed as the absence of overt, clinically expressed disease. The health preservation paradigm suggests that if we are to develop health-protective programs that relate more closely to the biology of disease, those ideas should be revised to include clinical latency.

A clearer and more vigorous age-sensitive orientation of efforts to preserve health across the life course would allow a more coherent and linear approach to the way determinants and precursors of chronic disease arise throughout life, coapt in their impacts, erode the health quantum, and contribute to ill health and reduction in life expectancy. These considerations begin *prior to conception*. Higher maternal age and a history of smoking, for example, have been associated with higher newborn systolic pressure, and both early and late maternal age are associated with low birth weight (Oken et al. 2005; Yang, Greenland, and Flanders 2000). Maternal pre-pregnancy BMI is of potential importance as a risk factor for gestational diabetes, which is associated in turn with high birth weight and consequent adolescent overweight in the offspring, a predictor of adult obesity, and fetal risk and adverse pregnancy outcomes have been linked to preconception maternal hypertension and use of alcohol, tobacco, and illicit drugs (Chatenoud et al. 1998; Gillman et al. 2003; Rosenberg et al. 2005; Salsberry and Reagan 2005). Because of especially high risks to the fetus during the first weeks of gestation, pre-pregnancy counseling is particularly important. For example, for optimal reduction of the risk of neural tube defects, folic acid supplementation should start at least three months before conception (Werler, Shapiro, and

Mitchell 1993). The contributions of preconception paternal health are less clear, although there is a significant association between advancing paternal age and the risk of low birth weight, congenital anomalies, autism, Down syndrome, and perhaps schizophrenia, and paternal HIV and hepatitis C infection threaten both prospective mother and fetus (Fisch et al. 2003; Friedman 1981; Malaspina et al. 2001; Reichenberg et al. 2006; Reichman and Teitler 2006; Savitz, Shwingl, and Keels 1991). Overall, while pre-pregnancy and inter-pregnancy counseling are of clear importance, only 16% of obstetricians/gynecologists or family physicians provide this preconception care to most patients (Henderson, Weisman, and Grason 2002).

During pregnancy, maternal smoking, heavy use of alcohol, and exposure to illicit drugs are associated with adverse fetal outcomes (Huestis and Choo 2002; Maconochie et al. 2007). Low birth weight, a reflection of an adverse intrauterine environment and/or shortened gestation, may result from multiple factors and appears to be a significant determinant of health over the life course; low rates of fetal growth are associated with higher risk and higher mortality from cardiovascular disease in adult life, as well as higher rates of type 2 diabetes, hypertension, the metabolic syndrome, and adult obesity (Barker 1993; Forsén et al. 2000).

In the *neonate and infant*, low growth rates as well as small body size at one year are predictors of coronary heart disease in adult life (Forsén et al. 2004). Paradoxically, underweight neonates tend to bounce back quickly and ultimately suffer an increased risk of overweight amounting to some 25 to 30% at age seven (Chen et al. 2006). Unusually rapid postnatal growth in low birth weight babies appears to program later cardiovascular risk, insulin resistance, and obesity (Forsén et al. 2000; Hovi et al. 2007), suggesting that very early events are important in determining organ capacities and in setting a number of chronic disease–related metabolic clocks in the fetus or neonate.

Breastfeeding, especially more prolonged breastfeeding, appears to be associated with a reduced incidence of childhood obesity in a dose-response manner (Harder et al. 2005; Mayer-Davis et al. 2006). Current infant feeding patterns in the United States show a strong socioeconomic gradient. For example, only 4% of infants in the WIC program remain exclusively breastfed at six months of age, compared with 17% of nonparticipants, a potential contributing factor in socioeconomic disparities in overweight and obesity in adult life (Gidding et al. 2006). In addition, compared with parents who bottle feed, mothers who breastfeed appear to allow infants to take a more active role in controlling intake, and this in turn may promote later feeding practices that can foster better self-regulation of energy intake (Taveras et al. 2004). But distortions in early eating patterns abound; for example, some 28% of one-year-olds have consumed sweetened beverages, and at age two years French fried potatoes are the most commonly consumed vegetable (Gidding et al. 2006). Training infants and children to seek quality nutrient intake and to avoid excess calories is important in the development

of health-protective eating patterns, since childhood feeding behaviors appear to be major determinants of eating patterns later in life (Whitaker et al. 1997).

In addition to these early determinants of adult chronic disease, increasing evidence indicates that important disease appears in *childhood*. The Bogalusa Heart Study identified fatty streaks and fibrous plaques in the aortas and coronary arteries of children and young adults. The lesions not only appeared early, but they were significantly more marked in older children and were correlated with obesity, high systolic blood pressure, and high serum triglyceride and low-density lipoprotein cholesterol concentrations, risk factors that tended to cluster in individuals (Berenson 2002; Li et al. 2003). As noted above, the early appearance of atheromatous disease has been underlined by the demonstration of established and often severe atheromatosis in young U.S. combat fatalities in Korea and Vietnam. In light of the known risk factors, the correlations observed to date, and the demonstrated progression of atheromatous lesions in the young, the strong inference is that heart disease prevention should be a lifelong effort, beginning in childhood (Graziano 1998). The importance of ongoing monitoring is plain, since obesity, elevated blood pressure, and dyslipidemia tend to track over time from childhood into adult life, and since lifestyle choices influence these risk factors. Parental health literacy relative to these factors is crucial.

Adolescence is characterized by behaviors with major implications for future health. The 2005 Youth Risk Behavior Survey, covering students in grades 9 to 12, found that 23% were cigarette smokers, 13% were overweight, 43% were current alcohol users, and 25% had drunk heavily on at least one of the 30 days preceding the survey (Eaton et al. 2006). Some 20% were characterized as current marijuana users, more than 3% as current cocaine users, and 2% had used a needle to inject an illegal drug into themselves on at least one occasion. A third were sexually active, and one-third of those reported that neither they nor their partner had used a condom during last intercourse. Most were not eating recommended levels of key foods, and sedentary behaviors were common; for example, 37% were watching three or more hours of television on an average school day. Overall, it is fair to say that effective individual or parental concern for optimization of health is already widely compromised in the teen years, and that clinical and public health efforts in the interest of future health require bolstering.

In the years immediately following adolescence, individuals emerge from pediatric care and begin an irregular interface with adult clinical caregivers. Health insurance coverage is uneven in these years, as young people leave the umbrella of parental coverage, often see little need to purchase health insurance, and begin to enter the labor force at levels that may not include employer coverage. The health risks of this period of life are not trivial, and a number have important implications for chronic disease later, especially health-adverse behaviors. Screening for current disease and monitoring for potential precursors of later health erosion, for example, hyperlipidemia, obesity, type 2 diabetes melli-

tus, and hypertension, are important, but opportunities for both become fragmented during this life stage.

In *adulthood*, the major health-protective issues relate to immunizations, reduction of health-adverse behaviors, screening for disease precursors or silent disease, and management of clinically emergent disorders, especially cancer, ischemic heart disease, hypertension, diabetes mellitus, obesity, depression, and musculoskeletal disease. The 2006 Health Behaviors Surveillance Survey (CDC 2006a) indicated that about 20% of American adults still smoke cigarettes, only a quarter engage in vigorous physical activity three or more times weekly, and two-thirds are overweight or obese. More intense efforts to mitigate health-adverse behaviors are justified by data linking improved health and survival to cessation of smoking, control of body weight, and increased physical activity even after long periods of neglect (Anthonisen et al. 2005; Wang et al. 2002). With regard to screening, the Survey found substantial underuse: the national median figure among adults for never having had a sigmoidoscopy or colonoscopy was 43%, and while most women had had a cervical pap smear at some time, some 24% of women over the age of 40 had never been undergone breast cancer screening. Adult immunizations also lagged: among individuals over the age of 65, about a third lacked influenza vaccination in the current year, and the same proportion had never received pneumococcal vaccine.

Among the *elderly*, erosion of health accelerates as multiple diseases reach clinical expression and functional importance and are superimposed on physiologic senescence (Fries 2005). Subjective well-being is further compromised as exposures to adverse social circumstances, including financial pressures and the inevitable narrowing of social networks, are added, and as chronic feelings of stress, depression, loss of autonomy, and reduced social utility further compromise functionality. In addition, physical activity is often reduced due to social isolation, physical limitations, and inadequate opportunities in the environment. The importance of an active stance relative to the incapacities of old age is often lost on both informal caregivers and the clinical community. Physical activity, cognitive involvement, and social engagement are generally feasible, frequently produce sharp enhancements of mood, and contribute to vigor and mental acuity. Innovations such as the Experience Corps, in which inner-city elderly are assigned, after indoctrination and training, to fixed and significant responsibilities in elementary schools in their areas, have demonstrated sharp enhancements in subjective well-being and levels of physical activity, as well as reduced hours of television watching and increased feelings of usefulness and social engagement (Fried et al. 2004).

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Review of the health risks emergent in the various life stages creates the image of a crescendo of health impacts, of an accumulating net erosive effect on the health expectations possessed by each individual at birth. The accumulated risks

are summative in their impacts and would be more effectively approached by considering them from a life course perspective.

The concept of a life course approach to health preservation has significant harmonics with the compression of morbidity construct first advanced by Fries in 1980. In essence, this idea focuses on reduction of the interval between the appearance of clinically evident disease and death, with consequent preservation of function and reduction in the necessity for clinical care. The compression of morbidity hypothesis, like the health preservation paradigm, revolves around the fact that our dominant health problem is chronic disease.

Progress is occurring with regard to compression of morbidity. Largely due to the application of effective screening procedures, clinical advances, increasing emphasis on risk factors, and rising educational levels, postponement of clinically evident chronic disease and reductions in disability have shown progressive widening over time compared with control groups in some studies (Fries 2005; Manton and Gu 2001; Willcox et al. 2006). An important aspect of this malleability relates to the fact that some 40% of deaths in the United States are currently associated with potentially modifiable health-adverse personal behaviors (Mokdad et al. 2004), suggesting that efforts to engage individuals more effectively in managing their own health is critically important. A key corollary of this approach going forward will be marketing the idea of increased personal responsibility for the management of health preservation.

In a linked set of considerations, there are now convincing studies indicating that even the limitations imposed by universal phenomena of senescence in tissues and in organ function, the factors that ultimately determine the biologic limits of life expectancy, are also modifiable to a significant degree, a phenomenon sometimes referred to as the plasticity of aging (Fries 2005). Cardiac reserve, glucose tolerance, intelligence test performance and memory, osteoporosis, strength and physical endurance, pulmonary reserve, and reaction time are modifiable by the individual, even at advanced age. Modification in most instances results from training and practice in the specific faculty; there is relatively little crossover from training in one attribute to another. Compression of morbidity and the plasticity of aging are related concepts; the ideal outcome would be compression of morbidity inside a life span closer to the biological limit, both functionally and chronologically.

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In addition to appropriate management of identified disease at any age, powerful further impacts on health and its preservation would result from earlier, more vigorous, and longitudinally maintained management of risk factors, disease precursors, and health-adverse behaviors, and wider application of screening procedures, an orientation that would be facilitated through emerging electronic records and management systems. In the case of atheroma, for example, efforts in childhood toward the avoidance of overweight and excessive saturated fats and

salt in the diet, as well as the adoption of good exercise habits, should be supplemented in adolescence by intensive efforts to deter the adoption of health-adverse behaviors, and periodic screening for hypertension, diabetes, and dyslipidemia should be started or continued. This array of efforts should be maintained throughout the adult years and old age, with special attention to groups at particularly high risk, notably the poor and racial and ethnic minorities. A key conceptual shift is needed, more clearly framing the health of the individual over the long term as an active concern of the current caregiver, beyond dealing with immediate clinical or developmental issues. For example, it is increasingly clear that the health of the emergent adult is to a substantial degree in the hands of the pediatrician, and in fact, that the future health of the individual is in every instance to an important degree in the hands of the current caregiver. In each clinical encounter, the clinician is confronting the health needs not only of the individual as he or she is presenting at the time, but the health of that individual in every era of his or her subsequent life. The inculcation of such attitudes among physicians should begin during undergraduate medical education and should be emphasized and extended during residency training in every clinical specialty, interwoven with the disease-oriented material that is the primary focus of educational efforts during these years, and should be recurrently introduced, especially by clinical teachers. Analogous emphases and linkages are needed in education, training, and practice in public health, nursing, social work, and the other health professions.

A corollary of enhanced and more effective clinical and public health efforts is a more muscular individual sense of responsibility for the protection of health. Awareness of the need for personal efforts has heightened in recent years: witness, for example, the decrease in cigarette smoking among adults, the widespread adoption of running and other exercise programs, and widening concerns about fat and salt consumption (CDC 2006a). To help in promoting active individual stewardship of health, a serious effort toward enhancing health literacy is needed. The health sector will need to join with others, and should turn, for example, to the corporate community for alliances relating to the work force and retirees, a very large sector of the adult population (Okie 2007). In addition, we should link with experts in marketing, advertising, and electronic information management in efforts to go beyond addressing the needs of individuals seeking information relevant to specific health issues. A broader approach would introduce health-protective information in a wide variety of settings with no necessary relation to immediate health or disease concerns. Presenting reminders concerning screening procedures, diet, exercise, smoking, and immunizations in supermarkets, shopping malls, coffee shops, and other venues frequented by large numbers of individuals, and presenting such information in brief, attractive, tested formats on monitor screens or on health kiosks, and doing so persistently over long periods of time, would blend modern electronic communication techniques with a massive national need. Making common cause with experts in

advertising and marketing makes good sense: the health professions can identify and validate the issues, behaviors, and interventions to be "sold," but providing the message in an effective manner in ordinary life contexts requires the special talents of people familiar with the techniques needed.

Broadening support in the policy community for health preservation activities and related research will depend to a significant degree on quantifying the likely enhancement of population health and the reduction in health-care costs that would result, as well as developing more clearly the opportunity costs of lives that are shorter and sicker than they have to be. Such costs are measured in blunted job and career prospects, reduced productivity, and lost wages and tax revenues. The pattern of current health-related expenditures is markedly unbalanced and should be revised to encourage more vigorous efforts to protect health. Currently some 83% of the national investment in health goes for personal health care, with prevention in the remaining 17%, along with administrative costs, research, and physical infrastructure (CDC 2006). The health professions should proselytize for tax and conditional spending incentives by government to encourage private-sector health-protective activities (Gostin, Boufford, and Martinez 2004). Changes that would encourage individuals to pursue health-positive behaviors, perhaps in the form of insurance premium reductions or other financial rewards, should be promoted and extended, a kind of pay for performance at the individual level. In addition, policy efforts should be developed with clearer and stronger links to upstream health determinants, including socioeconomic and racial and ethnic forces such as disparities in health-care access and quality, housing quality, segregation, and job training, as well as the minimum wage.

Important gradients are to be considered in promoting a stronger orientation around health, including difficulties in developing consensus on the relevant measures of population health, the need to make clinical and other silos more permeable, resistance to reallocation of resources, and difficulty in allocating significant resources to upstream determinants (Kindig 2006). Federal and state efforts to blunt the obesity epidemic, especially in relation to the eating patterns of children, have demonstrated the complexity of such issues (Mello, Studdert, and Brennan 2007). Gerberding (2005) has noted as additional problems the lack of near-term direct financial benefits in the protection of health, the coordination of multiple funding streams that integrated health promotion programs require, diffusion of accountability for health, the lack of a single unifying message, counter-marketing by other powerful agents, and social preferences. A more proximate issue is that the structure and organization of the personal clinical care system make it difficult for the public health enterprise to rely on the private sector to deliver preventive and therapeutic services essential to protecting community health, a health services issue of the first magnitude.

One of the most powerful factors in shaping funding priorities is largely lacking in the case of health, namely a vocal and affected advocacy group. Unlike systemic lupus, end-stage kidney disease, or Alzheimer's dementia, for example, no

analogous group in the general population has emerged to champion health and its protection. That is a striking paradox—no group advocating for the thing everyone wants. Health in our society is an assumed good. Its absence—disease—is heavily and appropriately pursued, but its protection is seen as a lesser priority.

We perhaps need a new definition of preventive medicine; better than that, we should abandon the term in favor of a more comprehensive stance organized around the preservation of health. For a long time we have accepted health as the norm and disease as the aberrancy, and our funding patterns and priorities reflect those perceptions. It may be time to modify this framework: disease, in a real sense, and because of its ubiquity, might be thought of as the "norm," and health, or at least good health extending somewhere close to the biologic limits of human life, as the aberrancy. Such a changed orientation might facilitate rearranging our priorities and our advocacy.

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Essay Review

Babies by (Intelligent) Design?*

Mary B. Mahowald

ABSTRACT Advances in reproductive technology and genetic interventions raise questions about the possibility of using these procedures to promote the birth of children with socially advantageous conditions. In *Babies by Design*, Ronald M. Green supports this goal and accuses its opponents of a "status quo bias." Unfortunately, some of Green's own arguments also show a status quo bias. Moreover, although he attempts to avoid the thorny issue of the moral status of human embryos, he implicitly takes a stand on it by endorsing prenatal interventions that inevitably entail the creation and loss of some human embryos. This essay identifies these and other flaws in Green's account.

Ronald M. Green probably rejects the theory of intelligent design as an alternative to evolution, but he clearly believes that using our intelligence to produce babies with superior traits is acceptable, possibly even commendable—at least in some cases. The title of his recent book, *Babies by Design*, could thus be readily expanded to *Babies by Intelligent Design*—without altering its content. Green is professor of ethics at Dartmouth, founding director of the Office of Genome Ethics at the National Human Genome Research Institute, and former president of the Society of Christian Ethics. He also serves as chair of the Ethics Advisory Board of Advanced Cell Technology, Inc.

Department of Obstetrics and Gynecology and the MacLean Center for Clinical Medical Ethics, University of Chicago, 5841 South Maryland Avenue, MC 2050, Chicago, IL 60637.
E-mail: mm46@midway.uchicago.edu.

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At some point in their lives, most adults would like to have children. Typically, they plan to fulfill their desire through sexual intercourse, fertilization, and gestation within the body of the woman. We might call this the traditional recipe for making babies. For a substantial number of people, however, crucial ingredients for the traditional recipe are unavailable or undesired, and an alternative recipe may be followed. Some people choose instead to remain childless and others pursue adoption, but most potential parents still want to have a child who is biologically related to at least one of them, whether through genetics, gestation, or both. Reproductive endocrinologists refer to the various procedures by which to accomplish this through a veritable cookbook of acronyms, such as IVF (in vitro fertilization), ET (embryo transfer), ED (embryo donation), OD (ovum donation), AID (artificial insemination by donor), AIH (artificial insemination by husband), ICSI (intracytoplasmic sperm injection), GIFT (gamete interfallopian tube transfer), ZIFT (zygote interfallopian tube transfer), and PGD (preimplantation genetic diagnosis). Usually, the selected recipe calls for a number of the procedures identified by these acronyms.

Because the desire to have biologically related children is a natural and fulfilling human tendency, engaging in the ordinary means for doing so is not only defensible but commendable. Some people consider parenthood a privilege—even when the recipe followed is the traditional one. Others, however, regard it as a basic human right that should be guaranteed through provision of whatever technological means are necessary to its fulfillment. For most people, the pursuit of biological parenthood is questioned only when a nontraditional recipe is followed. The more closely the alternative resembles the traditional recipe, the less the controversy. For example, IVF with gametes of married partners, with one of them gestating and giving birth to the desired infant, is broadly accepted and practiced. Using the genetic or gestational contributions of third parties is more controversial.

Another source of controversy regarding nontraditional recipes is that they usually require the creation and loss of some human embryos. Deliberate destruction of these embryos is, for some, morally equivalent to killing born human beings. Others find the destruction of in vitro embryos unproblematic because they do not consider embryos persons who, as such, have a right to life.

Among those for whom loss of embryos is morally acceptable, concerns still surface when a nontraditional recipe is intended to produce not just a baby, but one who has traits unrelated to health. As with sex selection, the selection of other traits evokes graver moral concern than efforts to avoid disease or disability. For example, prenatal interventions to promote social advantages such as superior intelligence or appearance are troubling to many people. Most troubling are efforts to ensure that a child has the same socially disadvantageous conditions that parents themselves possess (for example, dwarfism or deafness). In *Babies by Design*, Green analyzes both types of intervention.

While developing his views about "The Ethics of Genetic Choice" (his subtitle), Green explicitly distances himself from the "more natural bioethics" of the Bush administration, its "conservative religious base," and the President's Council of Bioethics. He particularly targets the latter. "Under the direction of the conservative bioethicist Leon Kass," he writes, "the President's Council has issued a series of reports largely seconding the president's views and questioning whether biomedicine had not already gone too far" (p. 3). The Council's positions, for Green, proceed from a "status quo bias" that has triggered "biomedical and bioethical retreat" from scientific and medical progress.

In his introduction, Green summarizes the framework from which he resists the alleged retreat and "status quo bias": "I disagree profoundly with this conservative direction. . . . I have dedicated myself to supporting new technologies aimed at assisting people faced with infertility, helping us understand and prevent the causes of birth defects, and using human embryo research to develop new approaches for tissue regeneration and organ replacement" (p. 4). Green believes "we should begin considering deliberate interventions in our own and our children's genetic makeup—to both prevent disease and enhance human life" (p. 4).

Because the question of the moral status of human embryos is interminably controversial and apparently irresolvable, it is understandable that Green avoids this issue. Nonetheless, his general endorsement of prenatal technologies for enhancement necessarily implies approval of the destruction or loss of embryos that occurs through these interventions. Despite his attempt to avoid the issue, therefore, Green implicitly takes a stand on the moral status of embryos: they do not have the right to life that is attributed, both legally and morally, to persons as such.

In chapter 1, Green introduces the topic of genetic enhancement through an analogy with steroid use by athletes. The two reasons he cites for opposing use of steroids to improve athletic performance involve safety and fairness. Green worries about safety mainly because the rewards of athletic success are highly seductive to potential steroid users. On the unfairness their use may bring to sports, however, he is ambivalent. Fairness, he observes, is already affronted in competitive sports by the genetic lottery through which some people are athletically advantaged even before they are born. Although he says he himself was "athletically challenged" in grade school (he couldn't catch or hit baseballs), he acknowledges that this is hardly a problem for the professor of bioethics that he has become. "In athletics," he says, "life's not fair," but those who are challenged in that regard can generally be successful in other ways (p. 28). Ironically, Green's rationale that "life's not fair" suggests the same status quo bias that he challenges elsewhere.

Green's second chapter—"How Do We Do It?"—is an impressive example of the interdisciplinarity that is indispensable to credibility in bioethics. His account relies heavily on extensive interviews and correspondence with scientists whose research has contributed to pivotal advances in genetics. Of particular interest is

the work of Nobel laureate Mario Capecchi, who developed the technology of homologous recombination. This technology, Green says, "could change our world," because it makes gene alteration and site-specific gene targeting possible through utilization of the body's own gene repair mechanisms (p. 33). While explaining this and other relevant research accurately and accessibly, Green intersperses some concerns or reservations articulated by scientists themselves about ethical issues raised by their research. Capecchi, for example, told Green of his uneasiness about actively modifying the human genome. As yet, Capecchi said, "we're not close enough to understanding the issues to make wise decisions or predict the outcomes" (p. 33).

In chapter 3, Green considers two distinctions, one between therapy and enhancement, and the other between somatic cell and germline interventions. Therapy, or treatment that restores an individual's health, is routinely viewed as appropriate, even commendable, whereas moral justification for enhancement beyond that level is dubious. Similarly, somatic cell interventions that affect a single individual are more easily justified than germline interventions, because the latter affect the individual's posterity, who could not have consented to the intervention in the first place. By combining the distinctions between therapy and enhancement, and between somatic cell interventions and germline interventions, we can create a spectrum of options that range from somatic cell treatment, which is easily justified, to germline interventions for enhancement, which is least justifiable, and perhaps condemnable. Between these is somatic cell enhancement, which is closer to the defensible end of the line, and therapeutic gene modification, which is closer to the other end. Between therapy and enhancement, however, there are different degrees of impact regarding both somatic cell and germline interventions. Whether this impact is based on biology or societal structure, some interventions provide effective therapy for very disadvantageous conditions or less disadvantageous conditions, and the same interventions may promote relatively advantageous or very advantageous conditions for particular individuals.

Several additional factors make line drawing problematic with regard to genetic interventions. First, some somatic cell conditions can only be effectively treated through therapies that involve gene modification. Second, combinations of different conditions, coupled with how "normal range" is defined and the life choices of individuals, influence where they fall along the spectrum. Third, the range defined as "normal" is a legitimate matter of debate; the same condition, such as intelligence or athletic ability, can occur anywhere along the spectrum, whether within a "normal range" or not.

In his critique of sharp line-drawing in genetics, Green proposes a role for "prevention" as an intermediary between the two distinctions. Through widespread endorsement of vaccine use, he says, society already regards some types of prevention as therapeutic. These preventions, he says, are a kind of enhancement because their goal "is to surpass normal levels of functioning now to prevent them

from ever occurring" (p. 61). That prevention through genetic manipulation may also be seen as therapeutic is clear from recent work on a potential cure for sickle-cell anemia. Through research with a humanized mouse model, Rudolf Jaenisch and his colleagues have demonstrated "proof of principle" that genetic reprogramming can prevent the onset of this condition (Hanna et al. 2007).

In chapter 4, Green begins his examination of the medical as well as social risks and challenges of genetic interventions by discussing "Sisters," a science-fiction story by Greg Bear. The story takes place 60 years from now in a world where "genetic engineering" of children has become commonplace. The main character, Letitia, lacks the superior traits that the majority of her peers possess and blames her parents for having "refused to use the new genetic technology before she was born" (p. 82). As events unfold, however, Letitia's supposedly advantaged classmates develop fatal illnesses, while she enjoys continuing health. While using this story to show how methods of gene therapy now available may cause serious but unpredictable harms, Green considers the possible reversibility of genetic changes as a means by which to achieve benefits without such risks. Capecchi's research involving gene modification in mice is cited as a strong indicator of this possibility in humans.

The title of chapter 5, "Parents: Guardians or Gardeners," aptly suggests Green's ambivalence about whether potential parents should follow whatever recipe they choose to produce the offspring they desire to raise. While repeating his criticisms of the conservative positions of the President's Council on Bioethics and its alleged status quo bias, Green acknowledges that he cannot now offer unarguable counter-positions on prenatal genetic modification. He fully expects, however, that if we move in that direction, we will know enough to answer the relevant ethical questions in a matter of years. These answers, he believes, need to be pursued now in order to show us "what kind of preparations are likely to maximize their values to children and families" (p. 121).

Like many bioethicists, Green's main worry about prenatal genetic interventions involves the principle of distributive justice or fairness. As he puts it in chapter 6, such techniques could create a "genobility"—a class of individuals who are genetically programmed to enjoy advantages that are missing from the lives of those who are not similarly programmed. While attempting to calm fears about this potential genobility, he discusses the difference principle of John Rawls. This is the principle by which Rawls proposed that the advantages enjoyed by a limited number of people should be permitted only if the disadvantages of others are simultaneously reduced. Green regards the difference principle as outdated, because it was based on the notion that genetic differences are unchangeable, and now we know otherwise. If Rawls had known that genetic differences were changeable, Green believes, he would have been open to interventions through which genes may be redistributed in the interest of fairness. He even sees Rawls's theory as disposed "to rehabilitate the concept of eugenics" that Green himself attempts to rehabilitate in chapter 7 (p. 153).

Since Green is a religious ethicist, it is not surprising that his discussion of eugenics involves a critique of the notion that efforts to produce babies by design is equivalent to "playing God." In this regard he cites a question posed by William Hurlbut, a physician member of the President's Council on Bioethics: "Is the world good either by the benevolent purposes of a creator or by the harmonious balance of a subtle evolutionary force or both" (p. 181). To Green, Hurlbut's question encapsulates the view that "both evolution *and* God have conspired to perfect the human genome," and this belief makes it seem "morally and spiritually dangerous to tamper with it" (p. 185). Because the human genome is *not* perfect, Green embraces an alternative religious view—that human beings are co-creators with God, each charged with the role of making the whole of creation better. He thus views human beings as fulfilling their God-given role by pursuing the perfection of the human genome through genetic modification.

Green's concluding chapter proposes four policy guidelines that would be acceptable to many of those who might disagree with his relatively strong endorsement of prenatal genetic modification. By using the term "guidelines," he avoids the force of regulatory language and allows for exceptions that may or should be permitted. Whether this latitude is desirable is of course debatable. In addition, the generality of key terms in his guidelines allows for different and conflicting interpretations. The first guideline, for example, says that "genetic interventions should always be aimed at what is reasonably in the child's best interests" (p. 216). But what counts as "reasonable" to some may be unreasonable to others, and what counts as the "best interests" of someone is often impossible to ascertain with any definitiveness. His second guideline asserts that "genetic interventions should be almost as safe as natural reproduction" (p. 218). But "almost" for some is far from "almost" for others, and whose safety is the focus of concern remains unspecified. Even if safety is defined only in medical terms, the risks of intervention are different for the parties involved—not only the potential mother, potential father, and potential child or children, but also, in some cases, the gamete providers or gestators.

The remaining guidelines are apparently intended to limit the injustice or inequity that prenatal genetic interventions may introduce. Green's third guideline says "we should avoid and discourage interventions that confer only positional advantage" (p. 223). By "positional advantage" he means an advantage that places those with whom one is playing the game of life at disadvantage. It is difficult to see, however, how mere "discouragement" could effectively prevent the positional advantage that those who have access to prenatal genetic modification might obtain for their children. In the fourth guideline, Green avers that "genetic interventions should not reinforce or increase unjust inequality and discrimination, economic inequality, or racism" (p. 225). He thus articulates a sentiment with which few would disagree, even while disagreeing about whether specific inequalities are unjust.

Not surprisingly, Green's interpretation of his own guidelines supports his overall endorsement of prenatal genetic modifications. Although my own interpretation of his guidelines would not support that endorsement, it would take more than this brief essay to develop an adequate explanation and defense of this interpretation. Suffice it to say that Green's neglect of three major issues leaves me dissatisfied. First is the unavoidable and morally relevant link between prenatal or preimplantation interventions and the destruction of human embryos; as indicated earlier, Green does not address this issue but implicitly takes a stand on it without acknowledging or defending his stand. Second, he doesn't adequately identify or address the different and potentially inequitable medical and social impacts of the procedures he supports on those who are immediately affected. And third, Green's proposed guidelines include no practical suggestions on how to avoid the exacerbations of discrimination against people with disabilities that are, I think, bound to occur if his recommendations regarding the creation of babies by design are followed. In a pluralistic society such as ours, this last neglect is regrettable even if it is unavoidable.

Finally, Green's repeated criticisms of a so-called status quo bias is at odds with some of the positions he supports on grounds that society is already engaging in comparable activity without challenging its moral legitimacy. Green doesn't seem to recognize a possible bias on his own part when he invokes the status quo in support of some of his positions. Rigid adherence to the status quo can, and sometimes does, thwart progress, but whether it does so depends on what is meant by "progress." Presumably, Green would agree that what has already proved effective has an a priori validity when compared with possibilities whose effectiveness has not been tested.

Despite my serious reservations about some of Green's positions and arguments, I believe his defense of interventions to produce babies by (intelligent) design deserves a careful reading. Not only is it well-informed and well-written; it is also generously interspersed with discussions of relevant popular sources, mainly science fiction, that make it highly readable for those who are otherwise unfamiliar with the topics addressed. Most readers of *Perspectives* are likely to join both Green and me in approval of his guidelines, even while they may disagree with both of us in their interpretation and application to genetic interventions to ensure the birth of advantaged offspring.

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Essay Review

Integrating Evolution and Development

*from theory to practice**

Ehud Lamm and Eva Jablonka

ABSTRACT This volume joins a growing list of books, monographs, and proceedings from scientific meetings that attempt to consolidate the wide spectrum of approaches emphasizing the role of development in evolution into a coherent and productive synthesis, often called *evo-devo*. Evo-devo is seen as a replacement or amendment of the modern synthesis that has dominated the field of evolution since the 1940s and which, as even its architects confessed, was fundamentally incomplete because development remained outside its theoretical framework (Mayr and Provine 1980). As the volume attests, there is now a strong feeling that the time is ripe for the consolidation of evo-devo, and that the field is mature enough so that mapping the theoretical terrain and experimental approaches is both feasible and scientifically productive. Now is an appropriate time to try to weave the strands of reasoning leading to the developmental perspective and offer a synthesis.

Integrating Evolution and Development: From Theory to Practice is a collection of papers by central researchers in the field of evo-devo, ranging from conceptual high-level surveys to applications of the evo-devo perspective to cur-

The Cohn Institute for the History and Philosophy of Sciences and Ideas, Tel Aviv University, Tel Aviv 69978, Israel.
E-mail: ehudlamm@post.tau.ac.il.

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rent debates. The first two papers (Laubichler and Maienschein, and Callebaut, Müller, and Newman) frame the subject and position it relative to other contending attempts to relate development and evolution. The last two papers on evolutionary psychology (Griffiths) and the evolution of culture (Wimsatt and Griesemer) use the evo-devo perspective to shed light on contentious current debates (specifically, evolutionary psychology and the meme theory of cultural evolution). These papers employ a set of concepts central to the evo-devo discussion that have been the focus of the work of the authors for many years, among them homology (Griffiths), generative entrenchment (Wimsatt), and the notion of reproducer as an alternative to Dawkins's replicator/vehicle model (Griesemer). The middle three papers (by Nijhout, Schlosser, and Sansom) try to extend and elaborate the evo-devo framework in various ways and will mostly be of interest to those already familiar with the field.

Although this wide range of topics makes it difficult to discuss the collection as a whole, we agree with the editors that it is necessary to explore the scope of the revision that a developmentally focused perspective presents to evolutionary theory. We therefore concentrate on the major themes running throughout the book.

WHAT IS INCLUDED IN EVO-DEVO?

While no paper in the collection is devoted to formulating a fully fleshed-out, self-contained, conceptual framework for evo-devo (the description of the organismic systems approach [OSA] by Callebaut et al. comes closest to this goal), between them the papers in this collection offer a wide range of conceptual resources. Before considering this conceptual apparatus it is useful to consider the fundamental question: what is evolutionary developmental biology? Griffiths's paper provides a useful characterization:

> Evo-devo is associated with the idea that paying attention to development problematizes both the idea that form is shaped in a one-sided manner by the demands of the environment and the idea that the unit of selection is the individual gene. Evo-devo problematizes the lock-and-key model of adaptation because the developmental biology of organisms is an input to the evolutionary process as well as an output. . . . Evo-devo also problematizes the idea that the unit of selection is the individual gene because it describes emergent levels of organization in the developing phenotype . . . [that] retain their identity when they are constructed using different developmental resources. (pp. 195–96)

What remains in the wake of such conceptual upheaval? Callebaut et al. give a list of elements of a conceptual framework for evo-devo: bauplan, canalization, developmental constraints (Schlosser's paper in the collection is devoted to explicating a notion of constraints), inherency, evolvability, developmental modularity, evolutionary origination, innovation, and novelty (the OSA "innovation

triad"), homology (one of the main topics of Griffiths's paper), robustness, and developmental mechanism. As Callebaut et al. note, evo-devo is still in search of a comprehensive conceptual framework, and they do not attempt to provide an exhaustive list. For example, they do not mention generative entrancement and scaffolding, the two coordinating concepts used by Wimsatt and Griesemer in their paper in the collection, nor do they mention the crucial notion of genetic accommodation and related phenomena.

The attention given to the developmental perspective in evolutionary theory calls for a historical perspective. Although being in the thick of things is arguably not the best perspective for historical analysis, relating current views to groundbreaking work and hypotheses of previous generations is an integral part of defining and legitimating a new field. Laubichler and Maienschein open the collection by offering a historical overview focusing on the relation between development and evolutionary theory. They outline the sources of the developmental approach to evolution during the 19th and early 20th centuries, and the separation of heredity and development following the establishment of classical genetics. A return to the developmental perspective, they argue, requires an elucidation of the relationship between evolution and development. Is evolution necessary in order to better understand development (evo-devo), or are developmental considerations needed in order to understand phenotypic evolution (devo-evo)? This is an important question but before it is addressed, one must know what exactly should be included in an evo-devo or devo-evo synthesis, and identify research lines that are included (or excluded) from present synthesis attempts.

We identify five major lines of development-oriented research that were relevant to evolutionary issues and have been studied before and during the establishment of the modern synthesis, but that were seen as peripheral or relatively unimportant until recent years. Some of these are central to the evo-devo framework presented in this volume, while others are neglected. The first line, which had little impact on the synthesis, was that pursued by people like Gavin de Beer, who used the comparative anatomy of adults, embryos, and fossils to study the relationship between ontogeny and phylogeny, and which was revived by Gould (1977). The second was developmental genetics, which was studied by Richard Goldschmidt and other more conventional geneticists, like Hans Gruneberg. Goldschmidt investigated the effects of chromosomal changes and gene mutations that had very dramatic effects on development (e.g., homeotic mutations), and from these studies tried to extrapolate to evolutionary transformations. Gruneberg studied the "pedigree of causes" during development, attempting to map genetic changes onto ontogenetic changes. This line of research is central to the evo-devo synthesis, as books such as those by Carroll (2005) and Wilkins (2002) show.

The third line of research that remained marginal was that of epigeneticists like Conrad Waddington and Ivan Schmalhausen, who focused on canalization

and plasticity and who were interested in the evolution of adaptations and norms of reaction. Today this direction of research is represented by Schlichting and Pigliucci (1998), who stress that it is reaction norms rather than genes that are units of evolution; by West-Eberhard (2003), who focuses on the mechanisms and evolutionary effects of plasticity; and by Gilbert (2001), who highlights the intersection of developmental biology and ecology. West-Eberhard's seminal book provides a general framework for integrating developmental plasticity and evolution, because it introduces a set of helpful theoretical concepts and argues convincingly that evolutionary change usually originates as a developmental response to changed environmental conditions, with genetic fine-tuning following later.

The fourth line of research was the structuralist line, which focused on the generic physical and chemical properties of biological matter and on fundamental biological processes, a traditions whose roots can be found in Goethe and D'Arcy Thomspon, and which is well represented in the evo-devo literature in general and in this volume (in the second paper by Callebaut, Müller, and Newman, and in the fourth paper by Schlosser). The fifth was that of cell biologists such as Ruth Sager, Boris Ephrussi, and Tracy Sonneborn and his school, who were interested in non-Mendelian or nongenetic (epigenetic) transmission in microorganisms, and Harris (1982), who studied heritable variations in cells in culture. Some of these scientists were also interested in the evolutionary implications of such variations, but in general their work was ignored by evolutionists. Jablonka and Lamb (1995, 2005) have focused on this research perspective and discussed the way in which it challenges the modern synthesis. Both this last line of research, which is concerned with nongenetic inheritance, as well as the third line of research, especially the direction taken by West-Eberhard and Gilbert, are peripheral to the discussions in the volume and are not included in the historical discussion of Laubichler and Maienschein.

We believe that it would have been helpful if Laubichler and Maienschein had explicitly discussed these five lines and explained how they became incorporated (or failed to be incorporated) in the attempts to construct a new developmental synthesis. This would have enabled them to discuss the tenets of specific theoretical frameworks that were proposed in recent years and that try to straddle the divide between development and evolution. For example, the proponents of developmental systems theory (DST) argue that it is logically impossible to separate the various inputs leading to the development of the phenotype, such as genes and environmental inputs (the so-called parity principle); West-Eberhard presents a plasticity-focused conception of evolution; and Jablonka and Lamb suggest a view of evolution that is centered on a developmental notion of heredity. All these frameworks suggest concrete answers to the important questions raised by Laubichler and Maienschein.

Callebaut et al. devote more attention to DST (referred to as the developmental systems perspective, or DSP) and make several important observations. First,

while they reject the parity principle of DSP according to which genes do not have a privileged role in ontogenetic development, they argue that DSP fails to provide a full causal picture of development and evolution by neglecting to explore the generative potential resulting from the physical constitution and organizational structure of the phenotype. Second, they highlight the opposing notions of plasticity and canalization, two fundamental concepts required for the phenotypic-level view. It is important to stress, however, that plasticity and canalization are complementary and interdependent. Every case of canalized development (in the face of genetic and environmental "noise") requires plasticity at underlying levels of organization. For example, a knockout mutation that does not lead to a phenotypic effect may be the result of a dynamic reorganization of a developmental gene network. An increase in the number of red blood cells at high altitudes, which is a plastic response if we look at the number of red blood cells (which changes), is an illustration of canalization if we look at the concentration of oxygen in the blood (which remains constant). It is the plasticity at the level of adjusting the number of red blood cells that allows the invariance at the level of oxygen concentration. Griffiths mentions a similar relation when he discusses "levels of homology": a structure can be preserved on one level while the underlying mechanisms generating it may change, and vice versa. Third, Callebaut et al. convincingly argue that distinguishing between developmental and evolutionary biology based on the distinction between "how?" questions (proximate causes) and "why?" questions (ultimate causes) is an oversimplification, since the developmental-causal perspective of developmental biology is necessarily incomplete in the absence of epigenetic and environmental determinants, and the functional-teleological analysis remains incomplete in the absence of the causal mechanisms leading to phenotypic variation.

In spite of the focus on development, the authors do not discuss the role of genomic mechanisms that create genetic variability, an additional developmental layer that is related to but distinct from the mechanisms they discuss. Genomic plasticity, especially as a response to environmental stress (e.g. heat shock, starvation) and genomic stress (e.g., hybridization, polyploidization), may result from epigenomic coping mechanisms that create increased variation in times of need (Kidwell and Lisch 2001; Lamm and Jablonka 2008; McClintock 1984). The study of the machinery underlying genomic organization highlights the fact that the genome is itself a developmental unit that changes during ontogeny in response to environmental cues, and that the very same ontogenetic reorganization mechanisms may operate during phylogeny. The relations between the genomic environment and the outside environment, as well as the borderline between the plasticity of the genome and the plasticity of the organism, raise conceptual as well as empirical questions that should be addressed by a contemporary new synthesis of evolutionary and developmental ideas.

The "organismic systems approach" championed by Callebaut et al. introduces the concept of *inherency*, the propensity of biological materials to assume

preferred forms. This structuralist notion is used effectively by Newman and Müller (2006) to argue that many fundamental properties of organisms—such as compartmentalization and segmentation—emerged as a result of the inherent properties of biological materials. Although inherency is defined with reference to the physical/chemical properties of biological materials, fundamental evolved biological processes may have similar emergent effects. For example, once a mechanism such as RNAi comes into being, it begins to influence the types of regulation and variability that are generated and tolerated, and these become more and more an inherent property of the system. This is close to the notion of *generative entrenchment* (which is applied to the cultural context by Wimsatt and Griesemer in the last paper in the book), which is a measure of how many things depend on a constituent element (structure or process) and are thus likely to need to change if this element changes. The more generatively entrenched a constituent element, the harder it is to change. Inherent properties of materials do not need entrenchment to have a constraining effect, since they reflect essential physical and chemical properties of biological materials, rather than evolved properties. On the other hand, some types of evolved, entrenched, or functionally important properties are not only resistant to evolutionary change but also determine "preferred forms" (act as attractors) for the organization of the system. In other words, they have an effect similar to inherency. Hence, while the notions of inherency and entrenchment are distinct, both emphasize related aspects of developmental and evolutionary robustness.

As the volume attests, the evolutionary aspects of epigenetic inheritance and the control mechanisms that participate in the restructuring of the genome are still generally ignored by most evo-devo biologists, although Sansom discusses one aspect of the generation of genetic variations. Clearly, the discovery of the molecular nature of the gene has been a major breakthrough in the study of heredity, but there are many additional basic discoveries that have to be incorporated into the new evo-devo synthesis if it is to provide an adequate alternative to the modern synthesis. We suggest that in order for this to happen a new view of inheritance is necessary. We will briefly outline what such a view entails and how the relations between genetic variation and phenotypic traits are treated in this volume.

A DEVELOPMENTAL VIEW OF INHERITANCE

Given the goals of evo-devo, it is unsurprising that both development and evolutionary change are problematized by most papers in the book. In contrast, the view of heredity throughout most of the papers is conservative. Nijhout's account of the relation between genotype and phenotype is based on the classical view of genes—the complexity he introduces to the traditional picture is the result of the incorporation of interactions between proteins that are the products of genes. Since these interactions are complex and often nonlinear, selection of

phenotypes that result from such interactions must result in complex evolutionary dynamics. Nijhout suggests a mathematical model that attempts to capture this complexity. In this model the genotype-phenotype relationship is represented as a multidimensional graph called a phenotypic surface. By considering how variation in one gene affects the phenotype, in the context of specific values for other genes, it is possible to show the correlation between genetic and phenotypic variation, as well as how the genetic background influences the effect of gene changes and provides constraints. Although Nijhout suggests a sophisticated and dynamic picture of evolutionary change, he does not question the basic assumptions of the modern synthesis about the origin of genetic variations, nor does he incorporate into his evolutionary view genome-wide systemic change that occur under conditions of stress.

It seems to us that while the modern synthesis black-boxed development, compartmentalizing developmental processes as immaterial to evolution, it is now inheritance that is being black-boxed. The "generic" properties of the mechanisms of inheritance are at the focus of much recent research in genetics, which should inform the evo-devo discussion but is as yet largely absent. The mechanisms we have in mind are mechanisms that lead to genome-wide changes during ontogeny. Many of these mechanisms are epigenetic control mechanisms and, as such, also underlie cellular epigenetic inheritance (for example, chromatin remodeling, persistent silencing by micro RNAs).

Genome restructuring can be developmentally induced, and some of the mechanisms involved in this restructuring are involved in epigenetic inheritance. Epigenetic inheritance allows the formation of new foci for selection (heritable epigenetic variations), and the mechanisms underlying it are central to the regulation of development. This confluence not only shows how heredity, far from being an independent process, is interwoven with development in terms of mechanisms, but that black-boxing it in order to better understand evolution misses an important factor of evolutionary change.

One result of ignoring the way heredity and development are mechanistically intertwined is that the border between a developmental change and an evolutionary change is for the most part assumed to be fixed and inherent. While questioning what happens *at* this boundary is fundamental for evo-devo, the boundary itself remains in its traditional modern synthesis location, with genes and development each operating on their own level. The discussion of what Callebaut et al. call the "pre-Mendelian" world (an ancient world where the relation between genotype and phenotype was not yet fixed), however, does problematize the border between heredity and development. It suggests that morphological plasticity is a primitive, physically based property, carried over to a limited extent into modern organisms. While this is an important idea, it remains to be explained how maintaining plasticity influenced the dynamics and trajectory of the evolutionary process (e.g., by influencing selection pressure). Moreover, although the relation between heredity and development has evolved and the

matching between genotype and phenotype has become, in some ways, more fixed, the interaction between the two remained close, flexible, and reciprocal, and our present world is, in fact, far less "Mendelian" than we have been led to believe.

The discussion of the Goldschmidtian notion of hopeful monsters by Sansom concentrates on Stephen Jay Gould rather than Goldschmidt and ignores central parts of Goldschmidt's careful discussion. Goldschmidt (1940) applied the evo-devo–like notion of norm of reactivity—according to which "the genotype is . . . the inherited norm of reactivity to the ensemble of conditions which may influence phenotypic expressions" (p. 250)—to the discussion of macro-evolutionary change. Goldschmidt observed that the range of modifiability of one species under conditions of developmental stress is on a similar scale as the range of phenotypic differences between related species under natural conditions (p. 253), and he argued that such differences were the result of systemic mutations (a term by which he meant chromosomal repatterning). Based in part on the observation that new species are usually chromosomally different from their parental species, he suggested that evolution above the species level usually involves chromosomal restructuring. McClintock (1984) suggested that genomic repatterning occurs under conditions of stress and that transposable elements play a major role in this process. Recent data on the response of organisms to stress by recruiting epigenetic control mechanisms that lead to genome-wide changes suggest that a synthesis of Goldschmidt and McClintock suggestions is needed (Jorgensen 2004; Lamm and Jablonka 2008).

Goldschmidt's analysis of macro-mutations was in the context of how new developmental systems arise (reaction norms), a question that was also of central importance to Waddington. How genetic changes lead to new integrated developmental systems is central to the evo-devo research program, but the strategy of genomic changes—which is employed, for example, by many organisms in conditions of stress—is hardly discussed by its practitioners, including the authors of the present volume. While Sansom argues in his paper for the adaptive advantage of traditional micro-mutations leading to gradual change and acknowledges the role of environmental stress leading to increased variation, he does not go beyond proposals that suggest that the amount of variation is simply increased under stress. However, stress-induced variational processes often involve specific genome coping mechanisms and lead to targeted genome-wide effects. For example, nutritional stress causes epigenetic and genetic changes in r-RNA genes and repetitive sequences in flax, heat shock has some similar effects in *Brassica*, and hydrostatic pressure causes genome-wide changes in methylation patterns in rice (Cullis 2005; Long et al. 2006; Waters and Schaal 1996). Radiation seems to induce both genetic and epigenetic genome-wide instabilities that last for several generations in both animals and plants (Dubrova 2003; Molinier et al. 2006). Transposable elements—usually relatively silent—are activated as a result of various stresses, such as wounds and pathogen attacks, just as

McClintock suggested, and the activity is in many cases restricted to germ cells and hence transgenerational (reviewed in Kidwell and Lisch 2001). Such repatternings problematize many of the received views regarding directed mutational change, genomic organization, and plasticity.

Although their main focus is cultural rather than genetic heredity and evolution, the discussion of cultural evolution by Wimsatt and Griesemer is based on a nuanced view of the relationship between heredity and development. According to their approach, information has to be developmentally integrated by carriers in order to be assimilated, used, or transferred. This requires *scaffolding*, or a supporting framework, which has to be propagated alongside the information. This argument favors the multiple channels account of both cultural and biological transmission, with extra channels being used to propagate the scaffolding. Wimsatt and Griesemer stress this by noting that the "statistical independence" test—according to which there are no multiple channels since a "parity argument" shows different inheritance channels not to be statistically independent (one of the tenets of DST)—fails to take into account physical separation between the channels which, according to them, is crucial for the analysis of developmental systems. The separation of channels is a claim about their physical separation, not about their statistical independence. Wimsatt and Griesemer emphasize the large number of channels and the role of sequential acquisition that are involved in the transmission of cultural information. This approach may be applied to other ways of generating and transmitting information that involve multiple transmission channels and sequential acquisition, such as those involved in the sequential unfolding of information in the zygote.

CONSTRAINTS AND AFFORDANCES

The role of developmental constraints, and hence attention to constraints on evolutionary change in general, is central to evo-devo. Schlosser's paper in this collection attempts to provide a framework for understanding developmental and functional constraints. Schlosser rightly points out that while constraints are often presented as opposed to selection, the former being understood as internal and the latter as external, constraints can arise from the need to maintain a stable/functional organization after variation has been introduced. He thus describes constraints generically as the "boundary conditions on a process whose dynamics (under certain conditions) are described by selection."

Schlosser makes a distinction between physical impossibility (e.g., elephant-sized mice) and constraints. He argues that the notion of universal constraints is not productive. Rather, he argues, constraints should be conditions that prohibit the realization of certain states or events that are physically possible. According to Schlosser, what is physically possible is determined by a set of universal and immutable laws of transformations and a set of initial and boundary conditions permitted by our theories of the universe. Schlosser notes that according to his

definition of constraints, gaps in the morphospace cannot be used to infer the presence or absence of constraints, since such gaps may be due to physical impossibilities, which Schlosser prefers not to regard as constraints. A different point of view is suggested by McGhee (2007), who defines the notions of geometric constraint, functional constraint, phylogenetic constraint, and developmental constraint, and illustrates how analysis of the morphospace can be used to distinguish between the different types of constraints. Clearly, physical impossibility (which can manifest itself as a geometrical or functional constraint) is a useful starting point when analyzing form, and being extrinsic to the systems, it is not part of the constraints that result from system organization. Furthermore, it can be assumed to be a constant boundary that did not change during the time span of the evolution of life. These observations explain why physical possibility may provide a clue as to what can constitute a "theory of the possible," which Schlosser argues is necessary for recognizing constraints. But while physical possibility is a boundary, so are chemical properties of organic molecules, the structure and properties of DNA (once it becomes the repository of genetic information), the composition of proteins, and—as we suggested—the mechanisms of genome organization and reorganization. Clearly, elements such as these constrain the realm of possibility, in a way similar to that in which physical reality determines the realm of possible shapes of organisms. When considering shape it is tempting to privilege physics, but when delving into the internal organization of organisms, it becomes hard to justify why some divisions in the realm of possibility should be understood as constraints while others should not. Many of the constraining attributes we just listed are as hard to change for contemporary organisms as are the laws of physics.

Modularity is another central concept in the evo-devo world, and one around which there is a lively discussion. Both Schlosser and Griffiths contribute to this discussion. Schlosser defines units of evolution as units of constituents that tend to coevolve because they constrain each other's evolution. Units of evolution, so defined, act as modules of evolutionary transformation that operate above the level of the gene. Schlosser argues that modules can only be analyzed relative to a specified set of permitted perturbations in the face of which the module is stable, in the sense that the constituents of the module operate in an integrated and context-insensitive manner with high probability. The types of perturbations that help define developmental modules (e.g., environmental noise) are different from the types of perturbations defining evolutionary modules (e.g., mutations). Schlosser argues, however, that given certain conditions, units of evolution will be congruent with developmental modules. Developmental modularity can thus be used to study units of evolutionary modularity. This analysis is helpful in pointing out that the units of phenotypic evolution are not equivalent to the units of genetic variation: they can be higher-level complexes that are stable as groupings in the context of the relevant types "noisy" inputs. However, Schlosser does not consider genomic perturbations that operate beyond the level of individual genes.

Griffiths is concerned with a different distinction, that between developmental modules and functional modules. Developmental modularity is a tool for understanding the matrix of developmental resources responsible for the development of the organism, while functional modularity attempts to capture the architecture of the system at a give stage. Using these distinctions, Griffiths argues that "mental modules" of the type posited by evolutionary psychology need not be neural-functional modules. He maintains that evolutionary psychologists' argument that selection will favor many domain specific modules rather than a few general cognition mechanisms relies on a "thin" notion of modules, according to which any architecture that produces dissociations between performances in different domains is "modular." The thin notion of modules is irrelevant from the point of view of neuropsychology, Griffiths argues, and mental modules should not be assumed to be neural modules.

Griffiths's paper also explores the notion of homology and argues convincingly for its relevance to psychology, as a science focused on mechanisms. The interest of philosophers in homology has increased in recent years, and Griffiths shows the importance of the homology concept for evolutionary discussion of psychology and argues for an analysis of evolution in which history and homology, rather than adaptation, are central. He maintains that such an analysis can uncover intrinsic developmental processes and deep similarities among organisms.

The wide-ranging issues discussed in this collection show clearly why the evo-devo research program is relevant for biologists working in a variety of domains, and how evo-devo practitioners are engaged with the rest of biology. The book is, however, too specialized to convince outsiders of the importance of the evo-devo perspective and the impact it can have on the way evolutionary science is being done, and given its eclectic nature, it cannot serve as an introduction to the field. Nor does the book as a whole engage critically with related approaches, although some papers make more of an effort on this front than others. Practitioners in the field, however, will find a lot to discuss and argue about. As expected from a rapidly evolving field such as evo-devo, establishing the boundaries of the field remains an ongoing process. The papers in this collection point to areas of active research, open questions, and new research directions. Exciting times—conceptually and empirically—lie ahead.

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