



# As Far as the Eye Can See

The Promises and Perils of Research and  
Scholarship in the Twenty-First Century

edited by Stephen J. Pradarelli

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*edited by*  
STEPHEN J. PRADARELLI

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*To the future*



*When I dipt into the future far as human eye could see;  
Saw the Vision of the world and all the wonder that would be.*

—ALFRED TENNYSON

*A poem, a symphony, a painting, a mathematical truth, a  
new scientific fact, all bear in themselves all the justification that  
universities, colleges, and institutes of research need or require.*

—ABRAHAM FLEXNER, 1939



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## ◀ Foreword

AS SO ELOQUENTLY described in this volume, *As Far as the Eye Can See: The Promises and Perils of Research and Scholarship in the Twenty-First Century*, faculty at the University of Iowa have contributed mightily to the public good. It is hard to imagine what the state would be like without the talents of the great writers and artists, scientists, healers, specialists in educational testing, historians, and more, who have roamed the campus, educated Iowa's children, made groundbreaking discoveries, nourished our souls, and stimulated a robust economy. This vibrant economic and educational engine holds the public faith by being a good steward of public funds while at the same time attracting new support from a variety of private entities. It is incumbent upon all of us to understand the trajectory of our public universities and to clearly explain why they are so vital to our global competitiveness in the twenty-first century.

For three years, beginning in 2013, I had the pleasure of working alongside Robert Birgeneau, former chancellor at the University of California, Berkeley, and collaborating with superb advisors—from higher education, corporations, financial institutions, foundations, and government—to examine the causes and consequences of reduced state investment in public research universities. These universities, of which the University of Iowa is one, are institutions of higher education that receive a portion of their funding from state and local appropriations and are Carnegie-classified as Very High and High Research Activity universities. Supported by the American Academy of Arts and Sciences, our project, titled *The Lincoln Project: Excellence and Access in Public Higher Education*, delved into the challenges and opportunities for these elemental insti-

tutions, which educate millions of students, contribute significantly to the cultural and economic vitality of their states, and generate research that drives the discovery and technological development critical for the advancement of our nation.

Sadly, we documented that state funding of public research universities, including the University of Iowa, has declined precipitously over the past decade, shrinking an average of 34 percent nationwide. Rather than being the consequence of a dramatic change in political philosophy, the withdrawal of state subsidies for education reflects decades-long structural changes in state finances. The best way to describe this dilemma is that funding for research universities is most often the “balance wheel” of state budgets since such institutions are more flexible than most state agencies. When cuts have to be made, a higher percentage of budgetary excisions happen to higher education and specifically to research universities because they are perceived to have “other sources of revenue,” such as tuition, donations, and access to competitive grants. Although they have such revenue sources, that average of a 34 percent decrease in state support over a decade represents a huge hit.

In most states, higher education (including research universities) is the third largest priority, but it is a distant third, behind K–12 education and Medicaid spending. Corrections spending has also grown very rapidly in some states. All these competing demands will continue to put enormous pressure on funding available to support higher education.

The reality is that public research universities, like the University of Iowa, find themselves in an increasingly perilous financial situation. While universities can and do raise tuition, shifting the burden of higher education from the state to individual families is eventually self-defeating. If access becomes more and more limited due to the high cost of public education, the benefits of having an educated citizenry will diminish. As it is, without question, in the interest of the state to encourage and foster an educated populace, so it is incumbent on all of us to work toward solutions. Clearly, universities have a responsibility continually to strive to reduce cost through efficiency targets and regional partnerships. With the increasing importance of philanthropy, universities must make the case for individuals and foundations to invest in exciting endeavors. Corporations have a role to play, as do state and federal governments,

since the talented young people being educated will be vital to the future of these entities. In short, each of us shares the responsibility for securing the future of our state research universities.

As a first step, it is critically important that those of us in universities convey to everyone the excitement and awe that we all experience when learning about the latest discovery in a laboratory, reading a novel or poem, seeing a new work of art, or hearing about a life saved through an Iowa-generated medical advance. The University of Iowa is a magical place; and this volume helps to explain why it is so. Enjoy—and join those of us who treasure and champion the goals of this wonderful institution.

*Mary Sue Coleman, PhD*

President Emerita, University of Michigan

Former President, University of Iowa

President, Association of American Universities



## ◀ Acknowledgments

A PROJECT OF THIS magnitude takes many capable hands. In addition to the contributors, who were incredibly gracious and patient with me as this book moved from idea to print, I want to give a special thanks to several people who carried me, as much as this project, with their brilliant insight, deep knowledge, collegiality, and good humor.

Rebekah Tilley helped shape initial essay proposals during meetings with contributors before the project got underway and lent her keen eyes to reviewing early drafts of the essays. When Rebekah left for another position, Leslie Revaux took over and kept track of the constellation of myriad pieces required to publish a book (from artwork to permissions). In addition to helping prepare some of the images for the book, Modei Akyea migrated the content of the book online so it could be shared as widely as possible, as was always Dan Reed's vision. And Noreen O'Connor-Abel provided valuable feedback on the initial draft of the manuscript. I'd also like to thank the University of Iowa Press for partnering with us on this book.

Finally, I'd like to thank Dan Reed for his leadership, inspiration, and confidence in me while serving as vice president of our organization. His belief in the immense personal and societal value of university research and scholarship and his own enthusiasm about discovery for discovery's sake have made a lasting impression on me. I'm grateful to have had the opportunity to work with him and to have played a small part in bringing his idea for this book to fruition.

*Stephen J. Pradarelli*



## ◀ Introduction

FEW SCIENTISTS IN the history of the University of Iowa embody the American spirit of discovery and innovation as vividly as the late James Van Allen. Born on a small farm near Mount Pleasant, Iowa, Van Allen—an avid reader of *Popular Mechanics* and *Popular Science* magazines—was fascinated by mechanical and electrical devices. In the 1990 issue of the *Annual Review of Earth and Planetary Sciences*, Van Allen wrote that he loved to tinker as a child, building elementary electrical motors, crystal radios, and, once, to his mother’s horror, a Tesla coil that discharged foot-long electrical ribbons and caused his hair “to stand on end.”

That tinkering led, in time, to Van Allen’s making some of the most important twentieth-century discoveries in space science while a researcher at the University of Iowa. A device he designed and helped build for Explorer I—America’s first satellite—enabled him to detect a zone of energetic charge particles that originated from the solar wind and were held around Earth by its magnetic field. The finding of what was later dubbed the Van Allen Radiation Belts landed him on the cover of *Time* magazine in 1959, when the United States badly needed a PR boost after the Soviet Union’s successfully launched Sputnik. It also led to the establishment of a new research domain, magnetospheric physics, and demonstrated that brilliant scholarship takes place in big cities and small, coastal Ivy League institutions and Midwest public universities.

In the same way that the thirty-one-pound Explorer I needed a rocket to reach space, researchers—scientists and scholars—depend on financial and public support to seek answers to the universe’s most intriguing questions and to explore and elucidate the human condition. With public and

political backing, universities have, over the past fifty years, blazed a path of discoveries that have reshaped the world, translating basic research and scholarship into new cancer treatments and smartphones, life-changing public health policies, and social science insights. Despite this progress, support for research and scholarship has been in short supply during the first part of the twenty-first century. Flagging faith in the value and necessity of basic research, what some have called a “miracle machine,” is deeply troubling, particularly the concomitant and steady erosion of public funding.

And yet, the universal human drive of curiosity—the thirst not just for information, but for deep *understanding*—has survived all manner of challenges over the centuries. That’s certainly true at the University of Iowa, whose medical research, writing programs, and space exploration have been providing fresh insights into the nature of the universe and the human experience since the school’s founding in 1847, just fifty-nine days after the state of Iowa was admitted to the Union.

This book highlights some of the current research and scholarship taking place at the University of Iowa, not just from an academic perspective, but from a *human* one. We asked the contributors to write about their work in language accessible to a general audience, to help readers understand why such work is important to the public, and to share what attracted them to their chosen fields of study. Research is about the systematic exploration of the unknown. Of course, not every line of inquiry leads to a great breakthrough; in fact, there’s value in having one’s expectations confounded. But as James Van Allen has said about science, “pure investigation has enormous benefit. . . . I can’t tell you what this might be good for, but learning about nature is important. And lovely things turn up.”

In these twenty-five essays, which represent a thin but richly diverse slice of Iowa’s research and scholarship portfolio, you’ll learn about some of the lovely things turning up in Iowa City: how universities like ours work to promote student success, community understanding, and interdisciplinary research among, for example, scientists and artists or engineers and urban planners (Part 1: The Role of the University); the unique and often groundbreaking role Iowa has played in studying, cultivating, and expressing creative work (Part 2: The Arts); the preeminence of inclusive education, literacy, and communication scholarship (Part 3: Reading,

Speech, and Language); the latest discoveries in the basic sciences, applied medicine, and public health that may lead to longer, healthier, and safer lives for individuals here and across the globe (Part 4: Health and Environment); and scholarship that explores the idea of social groups defined by geography, occupation, ethnicity, or—in one case—a shared love of singing (Part 5: Community).

Despite the sober challenges facing publicly funded research and scholarship today, my wish is that this collection of essays builds understanding about the value of academic inquiry and inspires hope for the future. If nothing else, you should take away a sense of the passion, dedication, and vision the University of Iowa's researchers and scholars bring to work each day.

Happily, for those of us who parlayed youthful curiosity about the world into a lifelong profession, there is no end to the mysteries to solve. In her Pulitzer Prize-winning novel, *Gilead*, author and longtime Iowa Writers' Workshop faculty member Marilynne Robinson writes, "This is an interesting planet. It deserves all the attention you can give it." Indeed. To solve some of the most challenging mysteries and to better comprehend and celebrate what it means to be human—discovering how the world works, exploring how and why we respond to it in the ways we do, and expressing the fruit of those inquiries in bold and creative ways—we need renewed public trust, support, and vision for the role of public research universities like ours.

May this book help persuade you to join us on this journey of discovery.

**THIS BOOK BEGAN** with a vision—to capture the spirit and passion that pervade research and scholarship and share just a bit of that wonder and unbridled excitement with you, the reader. Research and scholarship touch our deepest desires, to probe and illuminate the human condition, to fathom life and its processes, and to understand the physical world around us. It is a deeply human quest, one pursued with both vigor and rigor in our country's great public research universities.

No one has done more to bring this book's vision to fruition than Stephen Pradarelli, the dedicated and indefatigable editor of this volume. Without him, the vision would have remained just a dream, rather than

the tangible reality you now hold in your hands. To Steve, I want to convey my deepest thanks and heartfelt appreciation for helping the book's authors find their voices.

Finally, I will forever be indebted to my partners and friends in the Office of the Vice President for Research at the University of Iowa. To Ann Ricketts, Cheryl Reardon, Jennifer Lassner, Marie Kerbeshian, Rich Hichwa, Steve, and the rest of the dedicated staff, words cannot express my appreciation for all you have done and continue to do. You truly see the vision of the world—and the wonder that would be.

*Daniel A. Reed, PhD*

Senior Vice President for Academic Affairs, University of Utah  
Vice President for Research and Economic Development, 2012–2017,  
University of Iowa

PART

1

THE ROLE OF THE UNIVERSITY



## Campus as Incubator

### How Colleges and Universities Promote Success for Students and Society

EACH FALL, JUST OVER three million US students enroll in college for the first time. In Iowa, about three hundred thousand students enroll annually in some form of postsecondary education in the state. Students' decisions to attend college are based on a hope that the time and costs associated with their attendance will ultimately help them learn, grow, and gain the skills for a prosperous and meaningful future. Today's campuses serve a range of students, many of whom are enrolled full-time, right out of high school. But undergraduates are an eclectic group—30 percent are over the age of twenty-five, 38 percent are enrolled part-time, and 26 percent of all undergraduates are raising children while enrolled. Across contexts, all students deserve to know what they can expect to gain from the substantial time, effort, and money that they invest in their college education.

As researchers of higher education at the University of Iowa, we have dedicated our careers to figuring out what works in college and why it matters. The desire to understand the college experience comes, in part, from our own experiences as undergraduates. Both of us attended public flagship universities in our home states, but our individual college experiences allowed us to develop our unique talents and interests.

I (Barnhardt) am from a small midwestern town and had a strong desire to maintain a sense of a close-knit community even on a large college campus. Correspondingly, campus activities and leadership development experiences created these important connections for me. Inside the classroom, as an arts major, I was presented with many opportunities

for feedback from faculty and felt encouraged to integrate material across various classes, which I did with a keen sense of self-awareness. These college experiences affirmed my commitment to helping others realize their potential.

As a psychology major minoring in education, I (Bowman) learned about the importance of good teaching and the psychological processes of learning. My coursework sparked a long-term interest in these topics, and I sought experiences that would allow me to develop as a teacher by pursuing opportunities to assist professors with several courses and then by working in a job where I helped students improve their studying and learning strategies.

These formative undergraduate experiences are still linked to our present-day work as higher education researchers, where we aim to answer critical questions: How does college affect students while they are in school? What role does the experience have in preparing individuals for meeting the demands they will face throughout their adult lives and careers? And, how does college shape communities and society?

As it turns out, our research has shown that colleges and universities promote success for both students and society by acting as agents of transformation. Universities improve students' lives by cultivating their learning, which then opens doors of opportunity for their personal, professional, and civic well-being. Universities also advance societies by providing communities with expertise and new discoveries and by tackling collective challenges with new insights, solutions, processes, and technologies, or ways of making sense of the world. Unlike many other organizations, universities do not generate a single distinct outcome or product. Rather, as former University of California chancellor Clark Kerr described it, the modern American university is a "multiversity" because it fulfills the varied expectations and demands of a range of different stakeholders.

Across the range of outcomes that universities seek to advance, facilitation of learning is the means by which colleges pursue their objectives. Exactly what individuals and society need to learn is a matter of both critical public interest and debate. The Association of American Colleges and Universities (AAC&U), a group that includes fourteen hundred accredited public and private member campuses, has worked to establish

consensus on essential learning outcomes of college. AAC&U has brought together higher education leaders, researchers, public officials, employers, and philanthropic foundations to identify learning objectives for which universities need to aim, based on their broad usefulness and social relevance.<sup>1</sup> Outcomes include students acquiring subject matter or cognitive competence, being adept at synthesizing and applying content knowledge, and demonstrating intellectual and practical skills. AAC&U's efforts to identify college learning outcomes further convey the expectation that colleges should help students become personally and socially responsible. This outcome in particular highlights the role of universities to equip communities—and society broadly—with the human resources to address the evolving ethical and civic challenges in a diverse world characterized by rapid social and economic change.

With these broad educational aims in mind, an important task of higher education researchers is to measure and understand results that are attributable to the efforts of colleges and universities. Researchers examine the intended learning outcomes of college, but they also analyze the secondary, unplanned, or unanticipated effects of college. The researcher's task is to explain how and when learning outcomes are produced. Such insights reveal the ways in which students, faculty, and universities (or others, such as high school counselors, parents, campus staff, and state lawmakers) can take particular actions, based on evidence, to promote the desired learning.

In the robust field of higher education research, we have discovered a great deal about the impact of college on students and society. The federal government collects data on high school students and follows them well beyond high school, allowing research studies to compare the life outcomes of people who attended and did not attend college. Higher education researchers collect data on thousands of students at different colleges and universities and examine changes over time. One of the most important examples is the Wabash National Study; the quantitative component of this research is led by the Center for Research on Undergraduate Education at the University of Iowa.<sup>2</sup>

## How College Affects Students

University of Iowa faculty and alumni (among others) recently reviewed more than eighteen hundred recent studies to understand the short-term and long-term effects of college.<sup>3</sup> This work produced several overall conclusions. First, *attending college promotes many outcomes*, including overall gains in math, reading, writing, and knowledge; critical thinking; moral reasoning; and an increase in religious commitment, a finding that is perhaps contrary to popular belief. After graduation, college contributes significantly to employment and earnings, mental well-being, physical health outcomes and behaviors, and possibly civic and political engagement. Moreover, receiving a postsecondary degree or certificate is still an effective financial investment even when considering the rising costs of college attendance, such as tuition and fees, potential student loan interest, and reduced employment during the college years (since most undergraduates do not work full-time while attending school).

Second, *it matters where you attend college, but not as much as many people would think*. The number of students enrolled, whether the institution is private (versus public), and whether it is a research university (versus a regional university or liberal arts college) are generally irrelevant for student outcomes. However, graduating from a selective or prestigious college boosts earnings a great deal more than graduating from a less selective college. In addition, institutions with racially diverse student bodies are at least as effective in promoting desired outcomes (including civic and political engagement, positive self-image, and overall personal development) as less diverse institutions. And financial resources definitely matter: spending more money per student leads to higher graduation rates, especially if that funding is used for need-based financial aid, instructional costs, or student services. Increases in state funding for higher education also contribute to increases in degree attainment within that state, which shows the impact of public support.

Third, *students' experiences during college are essential for determining their outcomes*. Many forms of engagement are influential, but perhaps the two most important types are good teaching and diversity experiences. Good teaching includes specific classroom practices (such as collaborative learning that involves small-group interactions), clear and organized

instruction, detailed feedback on assignments, high expectations for the quality of work, and the level of academic challenge. Diversity experiences include interpersonal interactions across difference (whether by race, socioeconomic status, political orientation, or other factors), coursework that focuses on issues of diversity or inequality, diversity workshops, and ethnic or cultural student organizations. These two broad types of engagement offer many benefits, such as learning, critical thinking, overall intellectual ability, leadership, various attitudes and values, intercultural competence, self-confidence, and well-being. Importantly, experiences both inside and outside of coursework play a useful role, since student-to-student interactions, student clubs or groups, community engagement, and part-time paid employment all promote desired outcomes.

### **How College Affects Society**

Universities contribute to society's learning needs by providing educational and knowledge services. Historically (and currently), a state's higher education system cultivates human capital through education to serve key social roles. Flagship universities like the University of Iowa prepare lawyers, doctors, teachers, scientists, and others to fulfill the local, regional, and national functions of public administration and planning, health care, education, commerce, and so on. At the same time, community colleges prepare individuals in technical or trade crafts to serve local and regional needs as well. Campuses also supply communities with knowledge by sharing expertise, discoveries, evaluations, or process improvements.

Educational researchers have characterized universities as "hubs," because they attract partners to address their mutual problems and challenges.<sup>4</sup> Although some hubs consist of formal research parks or incubators designed to move basic research discoveries from universities into commercial products and services, hubs can also emerge as networks of partners among universities, industry, government, and the community, collaborating to address mutual concerns about transportation and infrastructure, food safety, energy, public health, social issues, or technological capabilities. Such cooperation can operate at the city, state, regional, or global level. University of Iowa educational researchers have partnered with policymakers and governments, private foundations, and campus

administrators to improve equity and inclusion on campus for students and employees, to extend and enhance techniques for global learning and exchange, and to identify educational programs and interventions that promote ethics and integrity.

Because universities frequently function as magnets, providing a range of experiences and resources for communities and regions, researchers often describe them as “anchor” institutions. Universities often operate as centers that provide the community with artistic and cultural events, entertainment and sports, libraries and museums, a stable housing market, employment opportunities, quality health care, high-quality city life, and a steady flow of inward migration of talented people from other states or nations to affiliate with the university—thereby also increasing the communities’ appeal to desirable industries.<sup>5</sup>

Anchor institutions can have downsides, too. For example, a local community may perceive the university as contributing to gentrification or not adequately addressing nuisances it creates, like rowdy students in local housing or parking problems. However, the anchoring nature of universities has positive effects on regions. In many states, flagship universities are among the largest employers.<sup>6</sup> After their initial development, the industries or jobs that flow from university-business incubators often remain in the region or in the same municipality as the university.<sup>7</sup> Because universities both contribute to educating the people of the region and attract individuals to the area, the higher concentration of people with college degrees leads to positive regional economic performance.<sup>8</sup> Further, higher rates of college participation and attainment have many positive consequences for communities. Greater college attendance corresponds with higher earnings and lower rates of unemployment, higher rates of voting, better health outcomes and longer life expectancies, lower rates of incarceration, and greater participation in community service and volunteerism.<sup>9</sup>

In sum, by understanding student learning outcomes and how universities contribute to society, we can see that campuses have a profound influence. Researchers at the University of Iowa are committed to generating new discoveries about students and the colleges and universities that they attend, which can help all campuses become sites for making a positive difference in the world.

## Notes

1. See Association of American Colleges and Universities, “LEAP—Liberal Education and America’s Promise,” n. d. Retrieved from <https://www.aacu.org/leap/essential-learning-outcomes>.

2. See “Wabash National Study 2006–2012,” Center of Inquiry in the Liberal Arts at Wabash College, <http://www.liberalarts.wabash.edu/study-overview/>.

3. See Matthew J. Mayhew, Alyssa N. Rockenbach, Nicholas A. Bowman, Tricia A. Seifert, and Gregory C. Wolniak, with Ernest T. Pascarella and Patrick T. Terenzini, *How College Affects Students*, Vol. 3, *21st-Century Evidence That Higher Education Works* (San Francisco: Jossey-Bass, 2016).

4. Read more on hubs in “Public Research Universities: Serving the Public Good,” 2016, and “Public Research Universities: Why They Matter,” 2015, (Cambridge, MA: American Academy of Arts and Sciences), <https://amacad.org/content.aspx?d=22190>.

5. See M. Harris and K. Holley, “Universities as Anchor Institutions: Economic and Social Potential for Urban Development,” *Higher Education: Handbook of Theory and Research* 31 (2016): 393–439.

6. See American Academy of Arts and Sciences, “Public Research Universities: Serving the Public Good,” <https://amacad.org/content/publications/publication.aspx?d=22104>.

7. See I. Lendel and H. Qian, “Inside the Great Recession: University Products and Regional Economic Development,” *Growth and Change* 48, no. 1 (2017): 153–173.

8. See J. R. Abel and T. M. Gabe, “Human Capital and Economic Activity in Urban America,” *Regional Studies* 45, no. 8 (2011): 1079–1090.

9. Unemployment statistics available at [https://www.bls.gov/emp/ep\\_chart\\_001.htm](https://www.bls.gov/emp/ep_chart_001.htm). For voter participation by education level, see E. H. Kirby and K. Kawashima-Ginsberg, *The Youth Vote in 2008*, CIRCLE (Center for Information and Research on Civic Learning and Engagement), Jonathan M. Tisch College of Citizenship and Public Service, Tufts University, Medford, MA, [https://www.civicyouth.org/PopUps/FactSheets/FS\\_youth\\_Voting\\_2008\\_updated\\_6.22.pdf](https://www.civicyouth.org/PopUps/FactSheets/FS_youth_Voting_2008_updated_6.22.pdf). For education and health outcomes see US Department of Health and Human Services, *Higher Education and Income Levels Keys to Better Health, According to Annual Report on Nation’s Health*, 2012, [https://www.cdc.gov/media/releases/2012/p0516\\_higher\\_education.html](https://www.cdc.gov/media/releases/2012/p0516_higher_education.html). For incarceration and education see C. W. Harlow, *Bureau of Justice Statistics Special Report, Education and Correctional Populations* (NCJ 195670) (Washington, DC: US Department of Justice, 2003), <https://www.bjs.gov/index.cfm?ty=pbdetail&iid=814>. For volunteerism see Bureau of Labor Statistics Economic News Release, “Volunteering in the United States, 2015,” <https://www.bls.gov/news.release/volun.nr0.htm>.

## Big Ideas

### The Role of Interdisciplinary Teaching at a Research University

AS AN ASTRONOMER and a biologist at the University of Iowa, we both remember when we were first captured by the excitement of looking out at faraway galaxies through a telescope or seeing tiny organisms moving under a microscope. That sense of wonder and passion is something we've never lost. It fuels our curiosity as we work in our labs on research that we hope will make a lasting impact for the good. And it's something we try to impart to the students in our classrooms, the student researchers in our labs, and the mentees in our offices.

As professors, we strive to bring the same innovative thinking we employ in our research into our classrooms. One exciting way we've done that here at the University of Iowa is by piloting a new course format that draws from the diverse research interests of faculty in different departments to create interdisciplinary classroom learning environments. We call these the "Big Ideas" courses.

Several elements combine to make Big Ideas courses stand out from other undergraduate classes. First, Big Ideas courses cover topics that no single faculty member could reasonably teach alone. We present far-reaching ideas that bridge disciplines and that can be approached from several angles. For the students, this means they get a broad perspective on the topic in question and witness firsthand how scholars from very different fields approach the same real-world problems. As an example, in our Origin of the Universe, Earth, and Life course, our section on the origin of life explores the perspective of the biologist along with input from our geoscientist, who helps the students understand the conditions on early Earth under which life arose, and the astronomer, who posits



University of Iowa professor of physics and astronomy Cornelia Lang addresses one of her Big Ideas classes. Photograph by Jill Tobin, University of Iowa College of Liberal Arts and Sciences.



A replica fossil of *Compsognathus*, a genus of small, bipedal, carnivorous theropod dinosaurs of the late Jurassic period, which grew to the size of a turkey, shares table space with other fossils in a Big Ideas class at the University of Iowa. Photograph by Jill Tobin, University of Iowa College of Liberal Arts and Sciences.

that some hypotheses suggest life began elsewhere in the solar system and traveled to Earth.

Second, the Big Ideas courses align with a goal of inquiry-based instruction to help students actively engage with ideas while they are in class. Faculty do not just come to the class and lecture for the duration. Instead, they introduce a topic and then challenge the students to think about that topic in some productive way. Students might prepare a debate, do some research online, work through a simulated experiment, or make a piece of art. Faculty and graduate teaching assistants then act as facilitators for that learning experience, guiding the students as they struggle with an idea or encounter a challenge.

Third, the collaborative interactions among faculty members and graduate student teaching assistants (TAs) in Big Ideas courses model the way that interdisciplinary work is carried out. During class, faculty and TAs question each other, offering insight and perspectives from their own disciplines, while simultaneously asking “big questions” of the other course faculty and TAs. A Big Ideas student recently commented that it was helpful to her when the course faculty questioned each other, often asking “simple” questions of their colleagues—questions that the students were too shy to ask but that opened the conversation to deeper exploration of the topic.

Perhaps most important, Big Ideas courses help the university accomplish some of the primary goals of what has been called a “liberal education”: training students to read, write, think critically, and make arguments. As educators, we must empower students with the ability to “deal with complexity, diversity, and change,” as included by the Association of American Colleges and Universities (AAC&U) in its definition of a liberal education. A survey conducted by AAC&U found that 90 percent of employers of recent college graduates said they give hiring preference to college graduates with skills that will enable them to “contribute to innovation in the workplace” and favor graduates “with a demonstrated capacity to think critically, communicate clearly, and solve complex problems.”<sup>11</sup>

As of early 2018, the University of Iowa offers seven Big Ideas courses. Faculty members find colleagues on campus with similar research and teaching interests and assemble Big Ideas teams that include three to four faculty from different departments as well as several graduate teach-

ing assistants. The enrollments for these courses range from 80 to 150 participants. Big Ideas courses being taught at the University of Iowa in 2017 (table 1) have come together in a variety of ways: (1) current issues and student interest, (2) internal research collaborations facilitated by University of Iowa academic centers such as the Obermann Center for Advanced Studies, and (3) support from and use of affiliated research centers such as the UI Public Policy Center.

Table 1. A listing of the Big Ideas courses offered during the 2017–2018 academic year.

<b>BIG IDEAS COURSE TITLE</b>	<b>APPROVED GE</b>	<b>FACULTY CONTRIBUTORS</b>
Big Ideas: Origins of the Universe, Earth, and Life	Natural Sciences	Physics and Astronomy; Biology, Earth, and Environmental Sciences
Big Ideas: People and Environment: Technology, Culture, and Social Justice	International and Global Issues	Anthropology; Gender, Women’s, and Sexuality Studies; Urban and Regional Planning; Geographical and Sustainability Sciences; College of Engineering
Big Ideas: Equality, Opportunity, and Public Policy in America	Social Sciences	History; Sociology; Political Science; Public Policy Center; outside guest speakers and visitors, including public forums
Big Ideas: History and Science of Oil	Historical Perspectives	Earth and Environmental Sciences; History; outside guest speakers and visitors (oil industry), including Ida Beam lecturer
Big Ideas: Evolution and Life in the Universe	Natural Sciences (w/ Lab Section)	Physics and Astronomy; Biology, Earth, and Environmental Sciences; Anthropology
Big Ideas: Creativity for a Lifetime	Values, Society, and Diversity	School of Art and Art History; Rhetoric; and College of Education
Big Ideas: Information, Society, and Culture	Quantitative and Formal Reasoning	Religion; Classics; Political Science; Computer Science and the Informatics research cluster

Source: University of Iowa Department of Physics and Astronomy.

The experience of designing, teaching, or taking Big Ideas courses embodies the very nature of a research university and should be a hallmark of the faculty and student experience at such a university. Students who participate in Big Ideas courses are taught how to synthesize concepts and are often able to excel across many careers, regardless of what specific topics they studied for their major. Many of humanity's challenges can be addressed only by crossing boundaries, disciplines, and continents. To develop innovative solutions to problems as pressing as climate change, food insecurity, and clean water and to develop new technologies, we need to collaborate and cooperate more than ever before.

*This essay was written in collaboration with the Center for Teaching's Faculty Learning Community on Big Ideas.*

## Note

1. *It Takes More Than a Major: Employer Priorities for College Learning and Student Success* (Washington, DC: Association of American Colleges and Universities and Hart Research Associates, 2013), accessed October 10, 2017, <https://www.aacu.org/leap/presidentstrust/compact/2013SurveySummary>.

## Higher Education Institutions as a Fertile Environment for Interdisciplinary Research That Can Solve Complex Biological Problems

AS A RESEARCHER in the University of Iowa College of Pharmacy, I have always felt that the willingness of talented scientists from different disciplines to work together in solving a research problem is a particular strength of the University of Iowa. If left alone to plug along in our individual silos, UI scientists wouldn't have been able to make the advances we have in cancer therapies, allergy treatments, or corn growth enhancements. This willingness to collaborate and move the projects forward is a reflection of the broader midwestern culture and work ethic. Public research universities like UI are the only environments where this type of multidisciplinary scientific work for the public good could take place.

One example of this kind of collaboration deals with cancer research. According to the National Cancer Institute, Iowa has higher incidence and mortality rates than the national average for melanoma (15 percent greater), non-Hodgkin lymphoma (16 percent greater), and uterine cancer (21 percent greater). Working together with physician scientists in the Carver College of Medicine who have expertise in these three cancers, my research group in the College of Pharmacy has developed a series of nanoparticle-based therapies that are showing significant promise in preclinical studies. My own expertise in nanoparticle preparation and characterization meshes well with that of each of these disease experts, allowing us to make progress in treating these cancers in a way that I could not have achieved had I been working alone.

The nanoparticles we develop are engineered to target the cancer while reducing accumulation of the toxic chemotherapy in healthy tissues and organs. Ultimately, this will allow us to reduce adverse side effects and

increase the effectiveness of the drugs we are delivering. These nanoparticles can provide extended release of targeted drugs once they reach their target site, thereby reducing the potential need for multiple injections. For a nine-year-old child suffering from non-Hodgkin lymphoma, this could mean not only successfully surviving a cancer diagnosis but also living a more normal life during treatment.

Another fruitful collaboration at the University of Iowa is research into dust mites, one of the most common triggers for year-round allergies and asthma and a prevalent condition throughout Iowa and globally. Current treatments are limited to getting temporary relief from inhalers or undergoing regular exposure to build up tolerance, which is a long-term proposition and holds no guarantee of success. I am working with an expert in dust-mite allergies from the UI College of Public Health to develop a nanoparticle-based vaccine that prevents the significant allergic responses generated in response to dust mites. The vaccine works because it contains the dust-mite allergen and an immune-stimulating booster derived from bacterial DNA, called CpG, that alters the body's inflammatory response to the dust-mite allergens. The CpG acts as a fire alarm to immune cells, and it responds strongly to the allergen with which it is packaged. This process triggers the formation of allergen-specific antibodies and dampens the formation of harmful immune responses. The vaccine serves to treat the underlying disease rather than just the symptoms and has the potential to free dust-mite allergy sufferers from a lifetime of allergy pills and inhalers.

My expertise in developing controlled-release drug formulations has recently extended to improving crop output. Corn is a major agricultural product in Iowa and is critical to the state's economy, in addition to being a crop of global importance. A research team, led by professors of chemistry and biology and me, has started developing controlled-release granules that slowly discharge chemical compounds to generate a low dose of hydrogen sulfide in the soil in which the corn is grown. The ability to accurately control the concentration of hydrogen sulfide released from the pellet at any one time is critical because hydrogen sulfide is a highly toxic gas. Exposure to moderate levels of hydrogen sulfide in the air can lead to negative health effects—such as headaches or breathing problems for people who suffer from asthma—and exposure to high levels in the

air is immediately dangerous to life and health. Early results indicate that this approach is leading to larger corn crops at earlier time points. We anticipate that this strategy could significantly improve the yield and quality of corn crops.

The diversity of projects that faculty at the University of Iowa work on would likely never happen in a commercial company. A scientist with formulation expertise working in a pharmaceutical company would rarely have a reason or opportunity to extend his skills to improving corn products. Rather, in order to build their own contributions, for-profit companies rely on the pioneering and collaborative research breakthroughs coming out of public research universities. “Basic research,” as it’s known, forms the building blocks of scientific innovation.

With its unique culture, the University of Iowa is a fertile environment to develop collaborative, multidisciplinary projects that solve problems with a huge impact on the state of Iowa. Problems that are significant in Iowa are also issues throughout the nation and the world. Thus, the solutions that University of Iowa research teams discover have the potential to make a national and global impact for the good.

## Stronger Together

### How Public-Private Partnerships Strengthen Scientific Literacy

AMERICAN UNIVERSITIES are increasingly run more like businesses, with greater reliance on fundraising and less investment from traditional sources of support like taxes and public funds. This change in strategy, while often viewed harshly by the academic community, can also be considered in a more positive light. In particular, while basic research is crucial for the advancement of knowledge, the academic community should also be considering a service model of scholarship.

Who, after all, does the academic community serve? The general public. What service do we provide? Access to, and agency regarding, human knowledge.

Scientific literacy is of unprecedented importance to the public's understanding of and engagement with civic life. Even so, levels of scientific literacy remain low compared to other developed countries. This deficit makes academic outreach and engagement more important than ever. In this essay we discuss a private-public partnership between the University of Iowa (UI) and the National Center for Science Education (NCSE) that has worked to capitalize on recent shifts in the academic paradigm to increase community impact, build relationships between people and institutions, and prepare UI students for diverse postgraduate careers.

We, the authors of this essay—Maurine Neiman, PhD, an evolutionary biologist and associate professor in the Department of Biology at the University of Iowa, and Emily Schoerning, PhD, director of research with the National Center for Science Education—had a common goal: increase the public's knowledge of evolutionary biology and climate science. Though this is unmeasurable from a scientific standpoint, we also hoped

to spark the same wonder and excitement for science that drives us, as well as our students and volunteers. Going beyond the current outreach paradigm, which often focuses simply on the number of people reached, we intended to assess how effective the programs were in changing community science literacy.

We have brought unique strengths to the partnership. Schoerning contributed nine years of research-based experience in communicating about science with underserved communities, along with the flexibility, reach, and media connections of an established nonprofit organization with a national scope. Neiman contributed cutting-edge knowledge in evolutionary biology and gave her undergraduate and graduate students unique opportunities to intern with NCSE. These student interns received national-level publicity through NCSE channels, specialized training in interaction with the general public on the potentially high-conflict topic of evolution, and significant grant-writing experience. From a practical perspective, Neiman also provided access to the UI Institutional Review Board, allowing Schoerning, Neiman, and the student interns to carry out high-quality survey work that would measure literacy impacts in communities.

What came out of this partnership? A striking level of public service. NCSE's Science Booster Club program reached more than 54,000 Iowans in 2016 alone on potentially high-conflict topics, including evolution and climate change. Through this partnership, which combined extraordinary content knowledge with research-based communication strategies, tens of thousands of Iowans enjoyed positive, engaging, hands-on opportunities to learn about evolution and climate change in ways that mattered to them. Our shared expertise allowed us to make these topics relevant to people in a nonpartisan way that helped bring people together around these issues and increase knowledge, rather than increase conflict.

One element of our approach was increasing public access to science by bringing science into low-conflict public spaces, such as farmers' markets, county fairs, and libraries. These community spaces are frequently used by people who are not seeking out scientific information, which allows us to reach a different audience than a traditional science outreach program. By bringing a voice for science into these public spaces, we set a very different tone than traditional outreach, which often seeks to bring the

public into scientific spaces. Even with the best of intentions, the latter can still create tension and feelings of exclusivity and may unintentionally strengthen community perceptions that science is an enterprise separate from and outside community life. By contrast, the act of bringing science into the public sphere shows community members in a different way how eager scientists are to engage with them, on their terms and in their space.

The introduction of science and scientists into public life gives scientists the unique and important chance to interact with people who are not seeking out science: that is, people who are not confident that they will be able to understand and engage with scientific material.



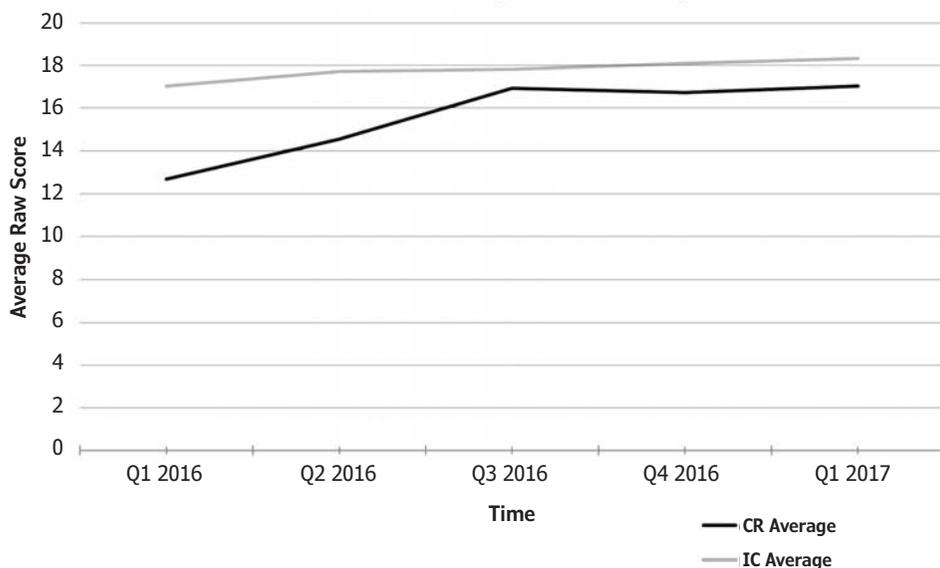
Jorge Moreno and Laura Bankers at the Science Booster Club booth at the Iowa State Fair in 2016. Photograph by Emily Schoerning, National Center for Science Education.

Once in the public sphere, the interactional style with which we engaged the public was also subtly and significantly different from traditional outreach. While many outreach programs focus on distributing information, our program is centered instead on personal connection. To accomplish this goal, Schoerling has developed a no-conflict approach to science education, based on years of academic research into language use and science learning. Volunteers and club leaders are trained to engage with the public using an informal engagement approach that has been empirically demonstrated to help individuals from diverse communities engage with and master scientific topics at high Bloom's levels. (The Bloom's Taxonomy is a classification system used to help teachers recognize levels of students' comprehension, from the least complex to the most complex.) Besides training staff to use our open, friendly, deliberately crafted approach, we prepare them to minimize and avoid conflict, whether through debates on controversial topics or heated conversations. We instead teach people how to reach out and connect with empathy to those who are different from them, to deflect conflict with connection, and to keep a sense of fun at the heart of the scientific experience.

Use of this relational style in this space created a different type of outreach experience for the public: one that was dynamic, engaging, and most of all, enjoyable. We also recognize, however, that these soft qualitative measures, while important, do not tell the whole story of the impact our program has had.

In particular, because the NCSE-UI partnership allowed for a quality of ongoing research and survey work that is beyond the reach of most non-profit organizations, we have been able to gather data demonstrating that our services measurably and significantly increase scientific literacy over time in the communities we serve. For example, in January 2016 we were able to establish baseline literacy scores in Iowa City and Cedar Rapids. By mid-2017, we had collected more than one year of longitudinal literacy data on these areas. While these two communities had statistically significant and markedly different initial literacy scores—and subsequently remain measurably distinct—we have seen meaningful literacy increases in both communities. These increases are statistically significant in our Cedar Rapids population, where the public score on these instruments has improved by an astonishing 25 percent over a twelve-month period.

### CR and IC Average Science Literacy Scores



This chart shows the growth in science literacy among Iowa City and Cedar Rapids, Iowa, high school students following the formation of the NCSE-UI partnership. Chart by Maurine Neiman, University of Iowa Department of Biology, and Emily Schoerning, National Center for Science Education.

In Iowa City, which had much higher initial scores, we also see a trend of steady improvement (8 percent), though we are still too early in the survey period for these differences to translate into statistically detectable outcomes. Given the steadiness of the direction of the trend, we predict that within another year or so, we will also see statistically significant improvement in scientific literacy in Iowa City.

These results highlight the importance of access to scientific information. We have found strong evidence that people are interested in getting scientific information on these potentially high-conflict topics and that laypeople in our communities can rapidly increase their understanding of scientific topics when given that access. It has been both exciting and meaningful to discover how important access to these topics is to communities, how engaged communities are with these topics when access is provided, and how access to these topics measurably impacts community knowledge.

Another outcome of our collaborative project is the use of lessons provided by the development of this new program to shape a general plan for Science Booster Club formation that can be applied to other communities across the nation. The starting point for this key component of the outreach program was reflection back to the genesis of our collaboration, which in turn generated the broader partnership between NCSE and UI. In a nutshell, I (Schoerning) reached out to UI faculty whose web profiles and community reputations pointed to a distinct focus on community engagement and public service as well as a research focus that included some of NCSE's main interests in evolution and climate change. I found a willing partner in Neiman, who was eager to leverage the national reach that NCSE had established to further her own active efforts in a variety of outreach and community engagement activities.

A new twist that I (Neiman) proposed and that has become a critical driver of Science Booster Club success was the central involvement of my graduate and undergraduate students. These students provide the on-the-ground support needed to organize and run booster club activities and have also provided valuable networking and connections to new communities. An exciting and important benefit of student involvement is the unique opportunity for career training in service, outreach, and community engagement, an increasingly central component of even academic careers and the basis of many jobs outside of the academy. This model—whereby new booster clubs are kick-started by the initial connection of club participants to science and a service-oriented community—is simple, cheap, and can be easily exported around the country.

As the University of Iowa looks to the future, we should consider the core service we offer the people of Iowa: the uplifting power of human knowledge. Our example of a successful public-private partnership demonstrates that the university can greatly expand its reach on the ground and gain partners with specialized skills in disseminating information and connecting with communities. We also show that by looking at the lessons of a service-oriented economy, we can find unexpected and exciting ways to grow our own scholarship and service as academics.



PART  
2

THE ARTS



## Backing History

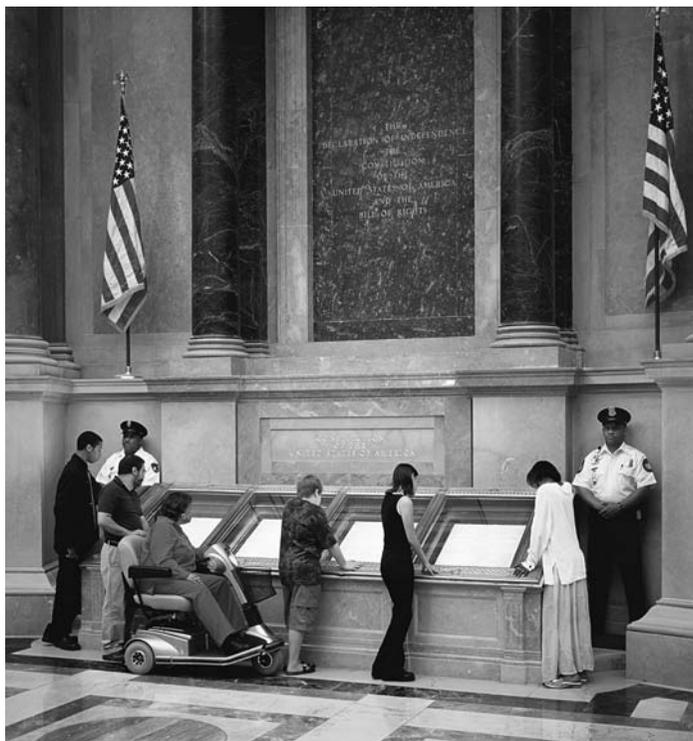
### Iowa's Role in Protecting the United States' Founding Documents

EACH YEAR THOUSANDS of people from around the world visit the rotunda of the National Archives in Washington, DC, to see up close the original documents upon which the United States is founded. The “Charters of Freedom”—the Declaration of Independence, the Constitution, and the Bill of Rights—are sealed in special casements and illuminated in a bath of soft, cool, white light. The atmosphere in the space is quiet, reverent, and filled with a sense of grace. When you arrive at each document, you can lean in closely for a surprisingly intimate encounter with American history.

While the words of these documents belong to posterity, their survival as perishable records of history is owed in part to the state of Iowa. Just under the parchment lies paper specially made by hand at the University of Iowa to help preserve the documents. How did handmade paper from Iowa end up beneath America's most cherished historical documents? And what does papermaking have to do with a large public research university?

It was in the 1950s that the Charters of Freedom were sealed in the special encasements and placed on display in the National Archives Rotunda. But in the 1990s, problems began to develop.

The Declaration of Independence had to be viewed by climbing a short staircase leading up to its display, making it inaccessible to visitors in wheelchairs and to others unable to negotiate steps. More important, the glass protecting the documents had developed bubbles, and there were concerns about the encasements' ability to maintain their seal and hold an inert protective gas in the space between the glass plates. With a special allocation from Congress, the National Archives embarked in 2001 on a



Visitors to the rotunda in the US Capitol in Washington, DC, view the “Charters of Freedom,” which now rest on special paper produced by the University of Iowa Center for the Book. Photograph by Earl McDonald, National Archives and Records Administration.

two-year, \$100 million project to build new state-of-the-art encasements for the documents and undertake a major renovation of the rotunda. The completed project opened in 2003 and was well received by visitors.

While the Charters of Freedom help tell the story of the founding of the United States, another interesting story lies behind the University of Iowa program that has helped ensure those historical documents will survive for many generations to come, a story that begins before World War II.

In 1922, Carl Seashore, dean of the UI Graduate College, set a national precedent by announcing that creative work would be acceptable as theses for advanced degrees. Today we take this for granted in universities across the country; but it turns out to be important to the charters’ story that

the first master of fine arts degrees in creative writing were awarded at the University of Iowa in the 1930s and that the Iowa Writers' Workshop was established as a program in 1936. In 1937, Lester Longman, head of the Art Department and professor of the history of art, with the support of visionary administrators, established the first MFA in studio art in the nation at UI. That tradition has continued with many other firsts, decade after decade.

In 1986, the University of Iowa established the Center for the Book. There were similar programs at other universities where the book arts were taught: papermaking, printing, and bookbinding. But UI set out to offer a deeper, more comprehensive curriculum by adding calligraphy to the book arts courses and by incorporating scholarly courses on the impact of the book and paper on society and culture.



Once transferred to a damp white woolen felt, each new sheet of specially prepared paper is covered with another damp felt and the process is repeated until a “post” is built up, consisting of about twelve sheets of paper, each of which is interleaved with a felt. The repeated sandwich is then pressed in an eighty-ton Center for the Book air bladder press engineered by Twinrocker, Inc. Following pressing, the damp sheets are strong enough to be taken to the final step, where they are dried between blotters. Photograph by Jon Van Allen, University of Iowa Center for the Book Paper Research and Production Facility.

A reasonable person might ask, “Why would the University of Iowa want to get into book arts and book studies to begin with? Isn’t this the digital age? Aren’t we supposed to be training students in what comes next rather than offering a program centered on old artisanal techniques and modes of communication?”

Good and fair questions. But consider this: the first time all of us wrote the most important word in our language, our name, we scrawled it out in rough letters on a piece of paper. Our first assertions of self—our first attempt at a picture, a drawing, a work of art—were all made on paper. For many of us our earliest recollections of intimacy and affection center on being read to by an older loved one. And then, later, many of us remember the enjoyment of being able to go to the library and pick out something to take home and read. Our birth certificate, Social Security card, and, later in life, photos of our own children; Grandpa’s letters home from the war; the poem that always makes us weep; and the prose passage that again and again leaves us proud to be human—all of them are likely on paper or in books. When we engage with paper, we touch the lives of many who have gone before us and have also been influenced, consciously or not, by the printed word or image. And yet, surprisingly, we take them for granted.

At the Center for the Book, we believe that the revolution in digital communications signals not the worst time to study and work creatively with books and paper but, in fact, the best time. This is our first opportunity to look back with a clear perspective on the contributions books and paper have made to our society. Artists find working with the book form compelling and exciting—because books require an intimate engagement with the viewer and because books embody a cultural weight as a result of our long historical engagement with them.

By creating the Center for the Book with its unique approach, UI once again claimed leadership in a new field. The year 1995 signaled the beginning of our graduate certificate program, and in 2010 the Iowa Board of Regents approved UI’s new MFA degree in book arts. Competing programs focus on the book arts or the scholarly study of the history and future of the book. Only the University of Iowa has brought the two together at one institution.

When the center was created, the university sought specialists in papermaking and bookbinding history and technique to add to book arts

and book studies specialists already on campus. I was lucky to be hired in 1986 to fill a new position created for a paper specialist. I brought with me a background in making paper for conservators of rare books and works of art and a record of publishing and external fundraising for research on the stability of historical papers. I was interested in how the best papers of the past can inform our design of the longest lasting papers for the future. When conservators at the National Archives were designing the new charters' encasements and decided they needed a layer of special paper to support the handwritten documents on parchment (animal skin), they called the UI Center for the Book. Because of our reputation in making conservation papers, they trusted us with this important task. Needless to say, we were honored to take part.

Why does it matter that the UI was first, in the 1920s or 1930s or 1980s or in between?

We can't be first at everything, but by choosing carefully we have brought recognition to our institution and our state in many unique and special areas of research and scholarship. Over the decades, that reputation has become incredibly valuable in drawing the best students and the best faculty to our campus. And building that sort of community, in turn, means the learning environment here is special for the sons and daughters of Iowa residents and other students and faculty who come to Iowa from around the world.

Some people may consider Iowa flyover country. But we know, and we won't forget, that our paper sits beneath the Charters of Freedom—something no other university in the world can claim.

## Art on the Edge

### Pushing the Boundaries of Imagination and Creativity

THE AVANT-GARDE, by definition, is on the cutting edge. By 1910, when the word first appeared in a major English-language newspaper, the old French term for soldiers leading armies into battle was widely used to describe groups of thinkers and artists who made works so challenging they seemed ahead of their time. Committed to cultural and sometimes to political change, these individuals and groups differed from one another. Since the nineteenth century, however, avant-garde artists have shared one key belief: art has the potential to transform our world, and that potential extends far beyond the rarified spaces of galleries, auction houses, and the homes of the wealthy few. For the avant-gardes, artworks are not merely priceless objects to be worshiped or events to be enjoyed and then forgotten. Art offers new perspectives that respond to needs of our time. In the Americas, in Europe, and beyond, avant-garde artworks were and are the product of experimentation that breaches the boundaries between disciplines and expands our vision of the possible.

The University of Iowa, too, has a long tradition of supporting avant-garde art. It was the university's collection of works created by one network of avant-garde artists that motivated us to collaborate, crossing the boundaries between our areas of expertise (Tsai in the visual arts and Buckley in drama and theater). We met in the Main Library through Timothy Shipe, curator of the International Dada Archive (IDA). He had gathered several colleagues to plan events celebrating the fortieth anniversary of the IDA, an internationally renowned resource for scholars of the vanguard that emerged between 1916 and 1923 in Zurich, Paris, Berlin, New York, and other cities. Although we each specialize in different fields,

even that first discussion suggested that UI's collections of avant-garde works could become the focus of a shared research and teaching project. As we began to investigate, we discovered that the university has long encouraged avant-garde ideas and practice, drawing strength and vitality from the support of the students, faculty, administration, and the state of Iowa itself.

While most people think of the avant-gardes as located in big cities and bohemian artists' colonies, the University of Iowa did and does play an important role in pushing the limits of art. Carl E. Seashore, UI graduate dean from 1908 to 1936, recognized the importance of integrating the arts into the research, teaching, and service mission. The reforms he initiated were, in one sense, practical. Trained as a psychologist, Seashore wrote, "The fine arts in themselves are creative. . . . Basic training in art from the very beginning of childhood is training in performance, the development of specific skills, the mastery of media."<sup>1</sup> Art's function, he concluded, "is to integrate and interpret the contributions that come from other sciences."<sup>2</sup> Seashore and Walter A. Jessup (previously dean of the UI College of Education and university president from 1916 to 1934) valued art for its capacity to foster broad creativity and to break down disciplinary boundaries.

At a time when most students attended UI to become teachers, Seashore and Jessup developed a comprehensive strategy to modernize, professionalize, and integrate teaching and research in the arts in order to improve the quality of education in the state across all levels. In 1922, UI became one of the first universities to allow creative works to fulfill the requirements of the master of arts degree. This innovation, soon adopted nationwide, led to the creation of the BFA and MFA in fine art, drama, music, and art history. Even in the midst of the Great Depression, UI administrators, the state government, and private foundations invested heavily in building the UI Arts Campus, which was linked with a footbridge to the Iowa Memorial Union and the rest of the campus.

The Arts Campus included the Theatre Building and the School of Fine Arts. Even before the new buildings were completed in 1936, these disciplines underwent profound transformations at the university. Departing from traditional training models—namely, conservatory- and apprenticeship-style models that emphasized emulation and technical

training—UI theater and fine arts programs sought to combine practice and theory. Artists in these programs gained exposure to the liberal arts and sciences as part of their training. For example, art history students made paintings, prints, and sculpture to grasp how materials and practice shape the forms that art takes.<sup>3</sup> Touted as the “Iowa Idea,” this teaching philosophy influenced institutions of higher learning across the country.

Although the practical goal of improving teaching statewide motivated the UI administration to invest in the arts, the project acquired a new sense of urgency as the Depression continued and the threat of fascism loomed large. Art, the university leaders recognized, stimulates imagination and creativity, qualities crucial not only in science and industry but also in any democratic society determined to stay free.<sup>4</sup> Even before the United States intervened directly in World War II, School of Fine Arts director Lester Longman argued that the study of art and its history as a creative, critical, and interpretive endeavor helps “to prevent the fascist ‘new order’ from encroaching upon us in the name of ‘Americanism’ and similar slogans.” It was imperative, he argued, that art professionals “turn their talents to contemporary criticism, to concern themselves with the present pressing issues of American art and education, to enlist in the armed forces of enlightenment.”<sup>5</sup>

The University of Iowa also began to collect modern art as a method of engaging with urgent questions of the time. Among the most spectacular works acquired in those years are Max Beckmann’s monumental painting *Karneval* and Jackson Pollock’s *Mural*, both created in 1943. Beckmann was a German artist labeled “degenerate” by the Nazis and driven to exile in Amsterdam, where he painted *Karneval*. Adopting one of the most traditional formats in European painting—the triptych, made up of three panels—Beckmann staged a modern expulsion from Eden in violently vivid detail. By contrast, Pollock’s *Mural*, painted the same year in the United States, evinces the promise and ambition of American culture withstanding war’s onslaught. The enormous painting proved pivotal for Pollock, preparing his move to large-scale Abstract Expressionist work, in which the choreography of his dripped paint features prominently. Made while Americans fought in Europe and Asia, *Mural* asserts a heroic human survival rendered as repeated upright figures traversing the canvas from right to left. Generated by the upward sweep of Pollock’s arm, the



Sculpture Court, University of Iowa Museum of Art, with Max Beckmann's *Karneval* (1943), *left*, and Jackson Pollock's *Mural* (1943), *right*. Courtesy of University of Iowa Museum of Art.

figures move as if westward, capturing what the artist's contemporaries saw as the myth, promise, and ambition of the American project. These and other significant modern artworks formed the initial core collection of the art museum, which found a home in 1968, built with contributions large and small, drawn from within the university community, Iowa City, and the state of Iowa.<sup>6</sup>

The Iowa Idea provided the impetus for theoretically informed and aesthetically advanced practice not only in the visual arts but also in theater and performance. Already in the 1920s E. C. Mabie, who was initially hired to lead the Department of Public Speaking, worked with existing student-led drama clubs to create the University Theatres producing group. Mabie and his colleagues built the Department of Speech and Dramatic Arts into one of the nation's first and foremost advanced degree-granting theater programs. While his course Experimental Theatre may have prepared students like Tennessee Williams for Broadway

success, Mabie emphasized the department's capacity to develop new work for and about local and regional communities. Students wrote and staged polished, conventionally structured plays, but they also collaborated to create overtly political Living Newspaper–style productions in response to the current events that impacted their lives, including farm families' struggle to survive the Dust Bowl and African Americans' resistance to Ku Klux Klan violence.<sup>7</sup> A genre closely identified with the Federal Theatre Project (FTP), the Living Newspaper was a domestic development of the avant-garde theater forms the initiative's director, Hallie Flanagan, had seen in the Soviet Union and Italy. Flanagan, who had earned her BA from Grinnell College, tapped fellow midwesterner Mabie to serve as FTP regional director in 1935.<sup>8</sup>

UI students wrote not only for the stage, but also for new media—first radio and then television. Mabie aimed to take full advantage of the pioneering electronic communications research conducted by his engineering colleagues, and he intended the Theatre Building he co-designed to house a television studio. Had the Great Depression not curtailed construction funds, UI drama students might have appeared on live television before President Franklin D. Roosevelt did.<sup>9</sup> The faculty and students currently engaged in and around the Theatre Building continue that legacy, creating work for stages that incorporate new technologies and writing for all forms of screen media.

Interdisciplinary arts and technology research and practice continued in the postwar years. The Intermedia MFA program, established in 1969 by Hans Breder, encouraged students to move beyond traditional art forms by activating the zones between media, as did the prominent artists Breder brought to campus to work with them. Although Vito Acconci recalled a frosty reception for his stories at the Writers' Workshop in the early 1960s, by the time Intermedia invited him back to campus in 1976, he was widely recognized as a seminal conceptual artist, whose work traversed the media of poetry, publishing, performance, film, and video.<sup>10</sup> Under the auspices of Intermedia and allied entities—including the Center for New Performing Arts (CNPA), the Corroboree Gallery, and the Center for New Music—UI presented and commissioned work by genre-defying artists who were or would become widely influential, among them Dick Higgins, Robert Wilson, Carolee Schneemann, Nam June Paik, Ana Mendieta

(an Intermedia graduate), and Karen Finley. Broadly in keeping with an avant-garde aesthetics that interrogated conventional art-life divides, resident and visiting artists made a number of works that incorporated local landscapes and communities. Allan Kaprow dug temporary tributaries to the Iowa River in *Course* (1969); Elaine Summers filmed *Two Girls, Downtown Iowa* (1973) on Iowa City's College Street; and Mary Beth Edelson burned a large spiral made of bound cornstalks during the ritual action of *Fire Flights in Deep Space* (1978).<sup>11</sup> Some experimental performances also constituted experiments in collective creation and communal living: members of the Iowa Theatre Lab, convened by the CNPA, mined their daily lives and dreams to create participatory theater pieces.<sup>12</sup>

The University of Iowa's history of artistic experimentation provides both inspiration and material resources for our own developing research and teaching collaboration. Thousands of artifacts attesting to this history reside in the University of Iowa Stanley Museum of Art (commonly called "the Stanley"); many others—more than seventy thousand in the Dada Archive alone, as well as a significant cache of works by "neo-Dada" Fluxus artists—are housed in Special Collections, as well as in the University Archives. Among those we seek to reanimate through our teaching and scholarship are the collections gathered under the auspices of the Alternative Traditions in the Contemporary Arts by a previous group of UI curators and scholars, notably including art historian Estera Milman. Like the rest of UI's holdings, most of these artifacts are accessible to anyone who studies, works, or visits here. Web-based initiatives such as the Digital Dada Library and Fluxus Digital Archive have made high-quality images of these books, periodicals, and objects broadly available to scholars and students of art around the world.

UI's commitment to cutting-edge transformative art continues to this day, despite the flood of 2008 that destroyed much of West Campus, home to the arts since the 1930s. Spectacular new buildings—the School of Art and Art History, Visual Arts, Hancher, and Voxman—have all been unveiled in recent years, and the Stanley's new building is in the works. These spaces will continue to foster new ideas, artistic practices, and performances. Our own long-term collaborative project highlights and continues the university's role as a crucial incubator of avant-garde practice in the twentieth and twenty-first centuries. Comprised of symposia, gallery

exhibitions, interdisciplinary courses, scholarly publications, and a digital portal, the project engages the UI community to reflect upon practices that have transformed how we think about art—and how art responds to the most pressing needs of our own time. By illuminating the legacy of the avant-garde in Iowa, we seek to ensure its sustained vitality at UI as resource and practice. Reflection coupled with action reveals the power of interdisciplinary art and research in the past, as well as pathways to its future.

## Notes

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## The Museum of Today and Tomorrow

### Opportunities and Innovation in Art and Education

NAPOLEON BONAPARTE may have regretted selling what would become Iowa as part of the Louisiana Purchase if he could see it today—one state tourism campaign portrayed his seller’s remorse—but the state continues to benefit from its connection to the diminutive French leader almost two hundred years after his death. Despite losing its building to the 2008 flooding of the Iowa River, the University of Iowa Stanley Museum of Art recently received a loan of artwork and papers of the French illustrator, painter, and great-nephew of Napoleon, Ferdinand Bac.

Helping Iowans understand these kinds of connections between art and the state’s history is just one of the goals of *The Museum of Today and Tomorrow: How Museums Enhance the K–12 Classroom*, a course created at the University of Iowa by the Stanley and the UI College of Education to build understanding across disciplines. The class, offered online and on campus, is open to undergraduate and graduate students, as well as to teachers who are taking courses for licensure recertification. It provides those enrolled with the opportunity to, first, learn about the art collections in the College of Education and the Stanley; to take that knowledge to develop interdisciplinary K–12 activities and lesson plans for a variety of subjects such as science, history, French, and math; and, finally, to work in groups to create interactive online modules for K–12 teachers so classes don’t have to come all the way to Iowa City to take advantage of these lessons. The class offers collaboration across disciplines and departments and unique hands-on experience. Furthermore, it advances the mission of the college, museum, and university, all of which emphasize fostering

student success through research and creative endeavors to better the people of Iowa, the nation, and the world.

The idea for The Museum of Today and Tomorrow came from several challenges facing the Stanley and the College of Education. In June 2008, the Iowa River flooded the UI campus—including the museum—forcing the Stanley’s collection into storage until the new building is completed. Like the museum, the College of Education has its own obstacles when it comes to art. UI professor of education E. F. Lindquist, who served as director of the Iowa Testing Programs and created the ACT college assessment, donated his art collection to the college. It consists of more than one hundred works, including those by renowned artists and numerous examples of Scandinavian ceramics and textiles. After languishing in storage, the collection is now installed throughout the Lindquist Center—home to the UI College of Education—and it continues to grow thanks to the generosity of donors. Yet the artwork can be easily overlooked as students rush to their next class, and few in the community know the collection is there. An important learning opportunity has gone untapped for too long.

The Museum of Today and Tomorrow offers a solution to the Stanley’s and the College of Education’s dilemmas while giving UI students the chance to shape our understanding of the works and increase the public’s interaction with them. Students research the multitude of artworks in the Lindquist Center and the Stanley to expand the entries to the Lindquist Art Collection website (<https://education.uiowa.edu/lindquist-art-collection>) and add information to museum object files. They then apply that information in innovative ways for K–12 teachers to use in their classrooms. The course encourages students of all majors to investigate their interests through the two art collections. It requires no prerequisites and does not assume students have any previous knowledge of art.

Often art and artists in the Stanley’s permanent collection have delightful and surprising connections that spark interest in local, state, and national history. In 2015, the Iowa Tourism Office highlighted Iowa’s connection to France in its “This Is Iowa” campaign. Television ads featured Napoleon bicycling through fields and towns of present-day Iowa and lamenting his decision to sell the state to the US government in 1803. The Stanley’s exhibition *Napoléon and the Art of Propaganda* (September 2012–January 2013) reinforced the importance of Napoleon to the found-



Karen Kurka Jensen,  
*Celestial 4* and  
*Celestial 3*, ink on  
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Linda R. Baker. Second  
floor Lindquist Center  
North. Photograph  
by Kimberly Musial  
Datchuk, University  
of Iowa College of  
Education.

ing of Iowa and Iowa City (incidentally, Iowa City emerged out a settlement named Napoleon). The spring 2018 exhibition of descendant Ferdinand Bac's work underlines Iowa's connection to France and Napoleon, and it marked the first major show of the artist's work outside of France. The Stanley's reputation for protecting, researching, and sharing its collection with the public made the institution attractive to the collector. Thanks to the generous loan of Bac's artwork for the exhibition and the museum's subsequent acquisition of twenty drawings and prints from the show, the Stanley can continue to explore Iowa's Napoleonic roots

Delving into the state's relationship to France involves researching history, art, and politics. An interdisciplinary approach is necessary to uncover the complex web of connections. Similarly, investigating artwork calls for an interdisciplinary strategy to reveal the many layers of meaning

from an object's production to its engagement in the social and political issues of its time. Undoubtedly, an interdisciplinary research methodology can take many forms. An interdisciplinary approach to art, however, doesn't need to be complicated. Indeed, it is most effective when it is simple. Therefore, the Museum of Today and Tomorrow class reaches out to students of all disciplines and artistic backgrounds to make their mark on the interpretation of art in the Stanley and College of Education collections to create content aimed at K–12 students. Those enrolled in the course bring their interests and knowledge to bear on the artwork in the collections not only to enhance their own understanding of art but also to foster art appreciation and skills in younger students. Students in the course build their knowledge of art terms, movements, and techniques. Then, they research artwork and form groups to apply their new knowledge to create activities and lesson plans for K–12 students in a variety of subjects (English, math, science, etc.) using the objects in the collections.

One group could focus on the work of Josef Albers, who explored the relationship among colors in his paintings and prints, by developing a science lesson on light and the anatomy of vision. It could include activities that draw on the work of other artists in the Stanley and College of Education collections. The activities, created using Adobe Captivate software, will give UI students real-world experience in producing interactive online educational content. Adobe Captivate is frequently used in schools and universities, and it has the added benefit of being easy to learn. The student-developed activity modules will be available to K–12 teachers in Iowa and the United States on the Stanley and College of Education websites. The experience of making interactive modules for current teachers to use in their classrooms immediately will give students who choose to go into education an advantage over their peers at other institutions.

As the number of K–12 modules increases each semester, students will be able to build on previous activities and lesson plans to design modules that can help teachers create cross-disciplinary lessons around the artwork in the collections. For example, a literature unit for high school students may start with Bac's drawings that quote the philosopher Montaigne. As the students study Montaigne's writings, they can connect his ideas to those portrayed in Bac's drawings. After analyzing Montaigne's work and that of his contemporaries, students can consider a selection of Bac's other

drawings from the 1930s to 1950s and explore where they see Montaigne's ideas represented in those works and why Bac may have been drawn to Montaigne's writings during this time. Through these exercises, students will consider literature, philosophy, history, and art.

A course like *The Museum of Today and Tomorrow* is possible only at an institution that values the arts and recognizes the critical role they play in education. The class is one small example of harnessing the great cultural and educational resources at the University of Iowa and making them available to teachers to pass down to our children—expanding their understanding and appreciation of art and its application to life, learning, and culture. Students' experiences in the class contribute to their success at UI, give them an edge in the job market, and provide a fulfilling personal experience that starts with a few prints, drawings, and paintings—and represents a significant return on the US investment in the Louisiana Purchase.

## The History of Grace

### How Dance Shapes, and Is Shaped by, the World

But when from a long-distant past nothing subsists, after the people are dead, after the things are broken and scattered, still, alone, more fragile, but with more vitality, more unsubstantial, more persistent, more faithful, the smell and taste of things remain poised a long time, like souls, ready to remind us, waiting and hoping for their moment, amid the ruins of all the rest; and bear unfaltering, in the tiny and almost impalpable drop of their essence, the vast structure of recollection.

—MARCEL PROUST, *Swann's Way*

### Remembering Dance

In his epic work, *Remembrance of Things Past*, the French novelist and essayist Marcel Proust ruminates on the human capacity for memory and the challenge of recalling past lived experience. For Proust, “things” such as cake and tea, and the sense memories they trigger upon consumption, become conduits “to discover the truth,” allowing the author to tap into the realm of images, emotions, and the imagination: the physical experience of the material world provides a sensual reservoir for reflection, understanding, and ultimately art making. For Proust, the act of writing is also a path to *remembering*, a means by which the artist makes sense of his experience of the past.

For dancers and dance scholars, the Proustian affiliation of physical experience with discovery is a linchpin of our *embodied* research. Dance artists, such as choreographers and performers, spend their life’s work honing the body’s capacity to recall visceral memories and express ideas in physical bodies. The dance artist’s experiences of sensation, emotion, action, relationship, position, direction, and duration come into play in the realization of a role in rehearsal and performance or in the creation of a new work of choreography.

In its profound rootedness in the body, dance is unique among other

“plastic” art forms such as painting, sculpture, ceramics, photography, and film, all of which exist as a result of an artist’s manipulation of inanimate substances or matter. And while dance might share more characteristics with other time-based media such as video and film, which also represent the progression of action over time, what sets dance apart from these is its evanescence—its paradoxical disappearance in the act of its becoming. Whereas records of dance—notation, visual scores, photographs, films, video, and digital documentation—provide indispensable versions of dance or performance events, there is an undeniable aspect of dance that can be captured only in the present and realized in or as live performance. Consider the excitement that comes with attending a live event, such as a musical, theatrical, or dance performance or a game of a favorite sports team, and the visceral thrill confirming that something special has just happened that will never happen in exactly the same way again.

Given dance’s inherent fleetingness, what can be said about the work of the dance historian, the scholar whose preoccupation is to make meaning of dance that occurred in the past? What of dance is durable or at least accessible over time, and what goes into the work of recovering dances and dance practices that have long expired? And what is the role of embodied research for the scholar of dance performances realized most concretely in the moments of their physical execution? These and related questions have driven my research in dance studies and have developed and changed over the course of my career as a scholar. This essay will enlist strategies of Proustian remembering both to illuminate the nature of research in dance studies and to shed light on the contribution of performance-based exploration toward an understanding of a shared embodied past.

When most people hear “she studies dance,” they can imagine only that I am and have always been a dancer, not considering that there are other avenues in dance besides those in performance and choreography. In fact I *have* been a dancer, the kind who lives in New York City and shuttles back and forth between classes, auditions, and rehearsals, and barely makes ends meet. In my case, after college I worked directing an upscale art gallery and spent my other waking hours taking dance classes, rehearsing, and performing. My professional day started with a 9:00 A.M. ballet class in Times Square and ended at 10:00 P.M. with a rehearsal in the East Village. I fit my job in between. After a while, however, the

compartmentalization of my time became unbearable. My single-minded pursuit of a life in professional dance, and the work I had to do to sustain it, left little time for study, contemplation, writing, or discussion about the significance of dance in the world.

Entering graduate school in American Studies seemed the best option for reconciling my artistic and intellectual sides, although at the time I felt uncertain about the path to dance scholarship. I knew it was possible to combine my passions, thanks to my mentor at Barnard College, Cynthia Jean Cohen Bull. A choreographer and an anthropologist, Cynthia, as we called her, gracefully traversed between the body and the mind, her example then, as it does now, inspiring my work as scholar and teacher. I owe the prompting to study dance in graduate school to another mentor, however. It was Jean-Christophe Agnew, visiting New York University from his home institution, Yale University, who encouraged me to write my master's thesis about the American dancer and choreographer Martha Graham, owing to the fact that, as he put it, I knew dance because I was a dancer.

At that time, knowing dance amounted to a sense of familiarity with the art form and a way of relating to what I was studying. Having been involved in creative processes as both a dancer and a choreographer, I understood how choreographers composed dances and the effort dancers put into rehearsing and performing a work. My master's thesis focused on Graham's masterwork, *Appalachian Spring* (1944), choreographed to music by Aaron Copland, which focused on the plight of a central female character, the Bride, and her relationship to her husband and to members of her rural community. I also established a reservoir of archival materials that informed me about the performance and reception of the dance. I studied performances of the dance live and on video, pored over Graham's artist notebooks and autobiography, examined critical reviews published across the journalistic spectrum from *Dance Magazine* to *Time* and *Newsweek*, and read other scholarly accounts analyzing the meaning of the dance.

In line with many of my sources, I interpreted the dance as a celebration of the return of servicemen to their families after World War II, heralding an attendant return to domestic normalcy for the war-weary nation. But I also found reason to read the dance against the received

grain. My experiences as a dancer, choreographer, and budding historian allowed me access to formal materials that might have been opaque to other interpreters. I perceived ways that Graham's dances "worked" choreographically, on aesthetic, expressive, and political levels. These insights allowed me to find significant relationships between her choreography and the artistic, social, and cultural contexts in which it existed, giving credence to my idea that the dance articulated subtle ways of challenging conventional feminine ideals at midcentury. I saw Graham's choreography as a way of giving voice to women's questions about the meanings of their roles as wives, mothers, and lovers, questions that resonated with me too as someone who found herself also on the threshold of marriage and motherhood.

This research led to my first book, *How to Do Things with Dance* (2010), in which I examined a group of modern dance choreographers, including Graham, working in the mid-twentieth century. Like Graham, the other choreographers I studied imagined roles for dancers outside of conventional prescriptions about how "men" and "women" were expected to act, roles that challenged social expectations about racial or sexual difference. In the context of the late 1940s and 1950s, during the height of McCarthyism and cultural pressures to conform to dominant expectations, the racially diverse dance artists at the heart of my study envisioned the stage as a space to experiment with being otherwise. In this case, however, remembering dance shed light on the power of choreographic practices and performances to function as a cultural force revealing changing sociopolitical ideas. The choreographers I studied were on the leading edges of cultural change in their nonconformity, contributing to broad-scale forces ushering in the 1960s social revolution and a radical upending of social convention writ large.

Research on this book got me thinking about what dance and dancing could "do" in the world; in other words, the power of dance to alter received ways of thinking, being, and knowing. I found myself also contemplating ways of remembering the past by studying the lived experiences of my subjects—dancers and choreographers—and how those experiences might be translated into knowledge about the past.

The next chapter of my story begins in Iowa City, Iowa. In June 1949, a performer who called herself "La Meri" presented a lecture-demonstration,



“In Siam It’s ‘The Dance of Sita.’” Photograph of La Meri published in the *Daily Iowan*, June 21, 1949. © 1948 by the *Daily Iowan*. Reprinted with permission of the *Daily Iowan*.

“Ethnological Dances,” at the University of Iowa’s Macbride Hall as part of a summer lecture series. Born Russell Meriwether Hughes in Louisville, Kentucky, La Meri and her husband (who served as her producer) traveled the world in the late 1920s through the 1930s, first presenting concerts of Spanish dance and, as time went on, “all-international” solo bills. It was at these that La Meri performed traditional dances she had learned from master teachers throughout Europe, South America, and Asia. By 1940, when the declaration of World War II forced the couple to move back to New York City from Italy, where they had settled, La Meri had established herself as the “most eclectic dancer of the world” and the foremost authority on what was then called “ethnological dance”—or what we might call today “global dance.”

When La Meri performed at the university on June 24, 1949, she received a warm welcome at UI, by students, faculty, and community members alike. In a letter to the performer, one audience member exclaimed, “I could scarcely believe my eyes when I saw you dancing—here in Iowa City!” She continued, “For over six years I have looked forward to this happy occasion and never dreamed that I would have this privilege except by going to New York.”<sup>1</sup> In a letter to the editor, published in the *Daily Iowan* the following week, another viewer surmised that La Meri’s performance had given “many an exciting glimpse into a feture [sic] of the Orient which they have never known” and went on to recommend that “La Meri be made a permanent member of the faculty.”<sup>2</sup>

Due to her renown as an American practitioner of international dance, La Meri is among the central figures in my second book project, *Dancing the World Smaller: Staging the Global in Mid-Century America*. Here I investigate performances like La Meri’s in Macbride Hall to discover what globalism meant in mid-twentieth-century America.

**TO THE EDITOR:**

I am sure a capacity crowd would attend each of the summer lectures of the university if they were even half as interesting, entertaining, and educational as that of La Meri. I would term her performance magnificent; her exotic dances and interpretations gave many an exciting glimpse into a feture of the Orient which they had never known. If I had a voice in the university, I would surely advise that La Meri be made a permanent member of the faculty. Such a move would be greeted with enthusiastic approval by all, I am sure.

George Pavlik Jr.  
121 Law Commons

“Letters to the Editor.”  
A letter by George Pavlik Jr., published in the *Daily Iowan* on June 30, 1949.  
© 1949 by the *Daily Iowan*. Reprinted with permission of the *Daily Iowan*.

As with research I have conducted in the past, remembering dance takes into consideration elements of the social and political environment at the time and the ways that performances can provide focus to investigate broader cultural issues. I wondered to what extent events such as La Meri's were reminiscent of the firsthand narratives returning GIs told their families and friends about their encounters with peoples from distant lands—groups many in the United States had seen represented only in photographs or films. Did performers such as La Meri pave the way toward broader public awareness of global affairs, interest in foreign cultures, or acceptance of refugees and immigrants? Public support for federal reforms to immigration laws increased beginning in the mid-1940s, ending with the passage of the 1965 Immigration Act, which abolished preference for immigrants based on quotas and national origin. Might the public's encounters with dancers have encouraged contemplation of the responsibilities of global citizenship not only in New York City, the "culture capital of the world," but also elsewhere? And what are the politics inherent in the decision by an Anglo performer to see her own body as capable of representing the distinct and unfamiliar cultures and cultural perspectives of the peoples whose dances she performed?

Whereas my earlier research treated mainstream figures within the field of American concert dance, work on *Dancing the World Smaller* has posed additional problems for discovery, prompting me to further expand my understanding and applications of embodied research. In many cases, the performances at the heart of my study were never recorded on film, and very few photographs exist. This is because at the time critics and dance aficionados deemed the pieces interesting but not worthy of the kinds of documentation that concert dance forms, such as ballet and modern dance, would warrant. In other words, dance world elites valued them as cultural artifacts but not as forms of art.

This has pushed my research more into text-based records, such as programs, brochures, press releases, marketing materials, correspondence, and newspaper and magazine articles, none of which renders the body in motion as would film or video. Remembering dance has required more imaginative leaps than before and inventive approaches to finding and interpreting sources.

In the case of La Meri, one approach has been working closely with

undergraduates to trace the impact of the dancer's performances in and around the university. Finding a local angle, we have closely studied the activities of La Meri's protégées, Edna Dieman, a native Iowan, and Julia Bennett, from England, both of whom studied at La Meri's school in New York City (the Ethnologic Dance Center) and established the Dieman-Bennett Dance Theatre of the Hemispheres in Cedar Rapids in 1951. Drawing on the credo "Diversity in Dance," Dieman and Bennett's dance company served the community until 1997 with studio classes in Spanish, classical Indian, and Western court dances, as well as lecture-demonstrations and concerts. Dieman and Bennett left their manuscript collection to the Iowa Women's Archives (IWA) at UI Special Collections.

In the 2016–2017 academic year, under my guidance, two honors students spent considerable time at the IWA, looking for connections between La Meri's teaching of ethnologic dance and that of her protégées and their students. In the process, we found Bennett's unfinished autobiography, "Chest of Jewels," which recalls the development of her friendship with Dieman and La Meri thus: "It was an exciting and enlightening time for me. Dancers are so full of life and self-confidence and the joy of living. They are the nearest thing to angels."<sup>3</sup> We also discovered videotaped performances of lecture-demonstrations offered by the school, in which students perform excerpts of the repertoire of La Meri's dance company, the Exotic Ballet. In one, Bennett introduces the performers as "cultural interlocutors," embodying material drawn from the classical Indian repertoire and interpreting it from their perspectives for audiences. Bennett's acknowledgment of the power dance had over her and recognition of its potential to bridge cultural differences illuminate questions about the significance of embodiment on personal and social levels, suggesting some reasons behind the broader trend toward public interest in peoples and cultures outside of America's borders.

The American Museum of Natural History's dance series titled "Around the World in Dance and Song," which ran for almost ten years in New York City between 1943 and 1952, offers another revealing example. Sponsored by the museum's education department and initially staged among the dioramas in the exhibition halls, the program presented dance and dancers from around the world to attract more people and increase the museum's accessibility to the general public. La Meri was perhaps the museum's

most frequent and reliable performer over the years; her versatility and the diversity of her repertoire could easily fill entire program bills. In this mutually beneficial relationship, La Meri made the museum more alluring to the general public, and the museum helped authenticate La Meri's representation of nonnative peoples through her performances of their traditional dance forms. This partnership was emblematic of something larger, though, and that has to do with the power of dance in the enterprise of cultural diplomacy. As author and humanitarian Pearl S. Buck said of La Meri's work as a dancer, it served the purpose of "interpreting peoples to one another."<sup>4</sup>

A common view of dance is that its primary purpose is to entertain, embellishing our experience of life on Earth with beauty and grace. In the context of the academy, dance artists and scholars seek to expand this view. Using their choreographic craft and their very bodies, artists generate new knowledge about the world and human existence in ways only dance can. Likewise, scholars of dance are in the business of making meaning, illuminating the significance of dance practices whether of the moment or occurring long ago. However it is accomplished, dance research aims to illuminate the ways we connect with the world and with one another through its meditation on the body, collective bodies, and our experiences of embodiment.

## Notes

1. Ruth G. Huber to La Meri, June 29, 1949, La Meri Papers, 1912–1992, New York Public Library.

2. George Pavlik, Jr., letter to the editor, *Daily Iowan*, June 30, 1949. <http://dailyiowan.lib.uiowa.edu/DI/1949/di1949-06-30.pdf>.

3. "Chest of Jewels" manuscript, Dieman-Bennett Dance Theatre of the Hemispheres records, Iowa Women's Archives, University of Iowa Libraries, Iowa City.

4. *Battle Creek (MI) Enquirer*, April 18, 1952, 12.

## The Life of Discovery

NOT LONG AGO, I drove to Laguna Beach to sort through the papers of my mentor, Brewster Ghiselin, poet, essayist, teacher, naturalist, and compiler of a best-selling symposium, *The Creative Process*, which has been in print continuously for sixty-five years and which helped to launch the academic discipline of studying creativity. A decade had passed since I had last walked with him under the flame trees by his house in a canyon above the Pacific Ocean, where he spent his final years. But the salt spray and the smell of bark shedding from the eucalyptus trees brought back our conversations about the importance of what Brewster liked to call “the life of discovery.” He died in 2002, two days short of his hundredth birthday.

“I wanted to live and grow,” he wrote in unpublished papers, “in such a way that for me the precincts of the mind would also be the precincts of the sun.”

And it was light I sought in the annotated books and papers stored in cardboard boxes and file cabinets in the stable, where traps were laid for rats. His papers were in good order—we had once spent a week culling from them aphorisms about his art—and as I sifted through drafts of his poems (a note on a love poem begun in 1939 and revised just before he died read, *Not quite ready yet*), I remembered some of what he had taught me, reading drafts of my first poems, encouraging me to be alert to the movements of my own mind.

An adventurous spirit is required for creative work, he insisted—which is why apprentice writers must not only master the technical aspects of their craft and cultivate good work habits but summon the courage to follow their hunches and guesses, to discover their true voices and subjects,

to persist in the face of failure. What Brewster gave me was permission to trust my own instincts: a way forward.

Here are ten aphorisms that he wished to save<sup>1</sup>:

- Poetry is a way of looking beyond, in order that we may be able to see justly what is *here*.
- We live in the *instant*, in the flow of our physical and psychic being. The vistas of memory and of the future are frozen time: time stilled in forms. In the degree that they dominate our vision, we are frozen.
- Possibly the structure makes its own light as it comes into being in the mind.
- The poet at work must be free of words, in order that the work may advance in perfect conformity with what is beyond words.
- A poem is breath shaped in its flowing: breath as motion articulated, felt and heard.
- All the best poetry breathes the concord of our being with the vastness of things. It restores us—writer and reader alike—not merely to ourselves but to the ground of life on which love itself moves.
- What is the artistic impulse? It is above all an impulse toward action: a shaped behavior.
- The medium is the crystal into which the artist gazes.
- Is a poem ever finished? Yes: when the last breath of it flows away in harmony with the infinite need of the living.
- Almost the whole discipline of the poet is to learn to say no more than is necessary.

These maxims continue to guide my creative work. Likewise Brewster's belief that a public university offers writers a chance to explore the full range of human ingenuity and research, which may be incorporated into their work. For curiosity is the watchword of academic enterprises, and in my experience writers are by nature curious about everything. What better place to exercise the imagination than in a university library, where the search for one book may lead the literary pilgrim down avenues of learning heretofore unimagined? The same holds for the feast of public lectures, readings, symposia, conferences, and conversations with col-



Scenic Bartolomé Island is among the volcanic islets of the Galápagos archipelago, which straddles the equator off the continental Ecuadorian coast. Photography by Kelly Bedeian, University of Iowa International Writing Program.

leagues from different disciplines that define university life. Such interactions can inspire, provoke, and challenge one's assumptions about the very meaning of life, leading the writer to new insights, ideas, and books.

It was perhaps no accident that Brewster and his wife, Olive, a talented short story writer who published her first book to rave reviews at the age of eighty-three, raised two world-class scientists. They taught their sons from an early age to value every form of intellectual endeavor, to seek the wisdom of thinkers from a range of disciplines, and to cross borders, real and imagined, in their search for the complicated truths at the heart of life. Lunch with the Ghiselins was thus an interesting affair, especially when their younger son, Michael, was visiting. A MacArthur Award-winning marine biologist, historian, and philosopher, Michael brought to the table an astonishing array of intellectual gifts, and my mind would be reeling long before coffee and dessert were served. For example, when Brewster momentarily forgot my wife's name (Lisa), saying that the color blue came into his mind, Michael explained the neural mechanism accounting for his confusion of color and word, which led to a discussion about evolution,

ethics, what he had discovered on a recent dive in Australia, a paper he would deliver in Naples. . . . The world opened before my eyes.

Michael delights in challenging conventional thinking, scientific and humanistic, as a partial list of his book titles may suggest: *Intellectual Compromise: The Bottom Line*, *The Economy of Nature and the Evolution of Sex*, and *The Triumph of the Darwinian Method*. And as we worked together in Laguna Beach, debating how and where to file certain of his father's papers, it occurred to me that our work was a practical response to the thesis he had advanced in his most recent book, *Metaphysics and the Origin of Species*, which begins with an excerpt from Darwin's notebooks: "Origin of man now proved.—Metaphysics must flourish.—he who understands baboon would do more toward Metaphysics than Locke."<sup>2</sup> Which is to say: What is more critical than the artistic or humanistic enterprise of fleshing out the various meanings of any scientific discovery? Such work creates a virtuous circle, in which each advance in understanding leads to a deeper engagement with what remains unknown in various scientific disciplines.

As Brewster wrote, "the creative process is the process of change, of development, of evolution, in the organization of subjective life. The inventive minds through whose activity that evolution has been initiated and in large part accomplished have usually been the only ones much concerned with it."<sup>3</sup> He lamented the wasted time, obstructions, and lack of recognition endured by countless creative figures throughout history; hence his determination to collect, catalogue, and analyze testaments about creative breakthroughs made by adventurous spirits in the fields of art, literature, mathematics, music, physics, psychology, and many more.

"Simply the self-interest of mankind calls for a more general effort to foster the invention of life," he argued.<sup>4</sup>

Advancing such understanding is central to the cultural diplomacy missions I undertake for the State Department, in my role as director of the International Writing Program. Traveling alone or as part of a literary delegation to places of strategic importance (Lebanon, Syria, Iraq, Russia, Myanmar, Brazil, Venezuela, Bolivia, and more), I teach creative writing workshops, explaining to a variety of audiences the pleasures and possibilities available in the so-called Iowa Model. Pioneered nearly a century ago, this model values the creative process over the product, instructing



Rather clumsy on land but extremely agile in the air, the blue-footed booby is an iconic marine bird of the Galápagos archipelago. Photograph by Kelly Bedeian, University of Iowa International Writing Program.

young artists not only in the technical aspects of their chosen medium but also in the aesthetic and spiritual dimensions of their calling. Creative writing workshops explore poems and plays, stories and novels, essays and nonfiction writings at every stage of composition, with the hope of helping everyone around the table realize the true shape and scope of their work.

And so it was that a recent mission to Ecuador ended with a visit to the Galápagos Islands, the subject of *The Voyage of the Beagle*, Darwin's account of his travels through the archipelago of volcanic islands, where he began to develop his theories of evolution—which would upend the modern world. My powers of observation are as nothing compared to those of the great Victorian explorer, but upon my return to Iowa City I managed to write the following prose poem:

### *In the Galapagos Islands*

The pair of frigate birds that followed the yacht flew so close to the railing around the upper deck that I could almost stroke their bellies. And as they swooped and dipped and climbed I read about

Darwin's journey to a salt lake, where the captain of a seal vessel was murdered by his sailors; in the bushes Darwin saw the skull—a fact he recorded with the same equanimity as the temperature, the twenty-six varieties of endemic land-birds that he observed, and the reaction of the lizard he pulled from a hole by its tail. We made landfall on the first day of Holy Week, on an uninhabited island, where a naturalist led us to the top of a volcanic peak, past lava fields and tubes, pausing here and there to explain the difference between parasitic and tuft cones, what happens when lava and gas come into contact with water, how different volcanic slides determined the shape of the island. He pointed out euphorbia, *Tiquilia darwinii* (of the Boraginaceae or forget-me-not family), and, when we had returned to the yacht, a blue-footed booby perched on a ledge and three penguins standing on rocks at the edge of the shore. As for the lizard Darwin studied? It stared him in the face, “as much as to say, ‘What made you pull my tail?’” A bell rang to call us to lunch.

This piece will form part of a book that I am writing with Marvin Bell, an acclaimed poet and former professor in the Iowa Writers' Workshop, which is titled *After the Fact, Volume 2: If & When*. The happiness I feel about being in a sustained conversation with my esteemed elder seems to me to be the logical, and poetic, conclusion to what I felt in the presence of Brewster Ghiselin all those years ago, when I hungered for what he described in one poem as the “clear / Sayings of the unsystematized.”<sup>5</sup> I still hunger for such wisdom.

## Notes

1. Brewster Ghiselin, unpublished papers, Brewster Ghiselin Papers, 1928–1996, Manuscripts Division, J. Willard Marriott Library, University of Utah.

2. Michael T. Ghiselin, *Metaphysics and the Origin of Species* (Albany: State University of New York Press, 1997), 1.

3. Brewster Ghiselin, ed., *The Creative Process: A Symposium* (Berkeley: University of California Press, 1952), 2.

4. B. Ghiselin, *Creative Process*, 2.

5. Brewster Ghiselin, “Credo,” in *Windrose: Poems, 1929–1979* (Salt Lake City: University of Utah Press, 1979), 197.

PART

3

READING, SPEECH, AND LANGUAGE



## Strong Girls Read Strong Books

### Developing Reading Self-Efficacy and Critical Social Awareness in an Afterschool Book Club

I know two women who have a book club at one of our schools. They drag bags and boxes full of materials into the school and actually sit on the floor and work with children. I didn't know people at the university did research that looks like this.

—Donor representative at a College of Education banquet

WE OPEN WITH this quote from one of our donors because we know that our work in the Strong Girls Read Strong Books Project is different from what is often thought of as “university research.” However, a fundamental goal of the College of Education at the University of Iowa is engaging in teaching, service, and scholarship that create a better future for Iowans.

As faculty members in the College of Education, we believe research that engages deeply with real people in real community contexts is central to achieving that goal. And, as former classroom teachers who are now scholars and teacher educators, we believe research that informs teaching and learning must come not only from quantitative measures such as test scores but also from observing and engaging with teachers and students in lived-world contexts where learning occurs. The Strong Girls Read Strong Books Project reflects our beliefs, illustrating the power of publicly engaged research to make a real difference in the lives of Iowans at the same time that it contributes to scholarship on a broader scale.

The school bell rings at 2:55 on Friday afternoons. Along with our team of eight to ten future teachers (undergraduate students in our teacher education program) and future teacher-educators (graduate students), we walk through the afterschool chaos of the elementary school where we have conducted the Strong Girls Read Strong Books Project since 2012. Teachers greet us and fourth- through sixth-grade girls run up to us with hugs, eager to help us carry the snacks, art supplies, notebooks, video



Amanda Haertling Thein at Strong Girls Read book club meeting in 2016. Photograph by Mei-ling Shaw Williams.

recorders, and books we bring to the school each week for our afterschool book club. We settle ourselves into a sixth-grade classroom, ready to lead approximately thirty-five girls per week in reading, writing, art, and discussion that helps them think about what it means to be a strong girl.

Young girls in Iowa live increasingly diverse and complex lives. The girls who participate in the Strong Girls Read Strong Books Project represent Iowa's rapidly changing demographics. They come from a range of social, cultural, and racial backgrounds. Some are recent immigrants from Africa, Southeast Asia, or Latin America; often they have lived in several different countries. Some have come from larger cities in the region, their families seeking better schools and employment opportunity. Some have their roots in Iowa farming communities. Our participants come from a range of family and religious backgrounds as well and have a diversity of experiences related to the role of girls and women in the home and beyond. In common, the girls in our project are curious, ambitious, and eager for experiences that will expand their perspectives and help them develop agency. In thinking about our diverse participants, we embrace "cosmopolitanism"—respecting each of our participants as an important human being. Our goal in studying girls' participation in an afterschool book club is to learn how reading books about a diversity of strong female

protagonists might provide opportunities for these girls to explore the experiences of other girls and to imagine what being a “strong girl” might mean in their own lives.

As literacy scholars, we know the importance of reading skills. And while teachers spend a great deal of time helping students develop skills in comprehension and fluency, our goal in this project is different. Our research is grounded in scholarship suggesting that deep engagement with literary texts can help students do the complex mental work of exploring multiple perspectives on issues that matter. This scholarship also suggests that deep engagement with literature is facilitated when students are encouraged to make connections between literature, their lived experiences, and the lives of others around them. With this scholarship in mind, reading success in our project happens when girls develop reading confidence, trusting in their ability to offer important insights and interpretations on critical issues that emerge through active engagement with literature.

The practices and routines we have established in the Strong Girls Read Strong Books Project foster deep literary engagement and critical conversations about what it means to be a strong girl. We build trust with participants by insisting that every member of our teaching and research team attend every book club session. We build a sense of community by beginning each session in a large group talking with girls about current issues related to being a strong girl in our global community. In the past, we have highlighted Malala Yousafzai’s efforts to promote education for girls in Pakistan and beyond, Misty Copeland’s journey toward becoming the first African American prima ballerina, and most recently Jazz Jennings’s experiences as a transgender youth.

One-on-one relationships are built between our university student volunteers and our participants when they talk together each week about quality children’s literature with strong female protagonists. Having studied ideas about what it means to be a strong girl in life and in literature, we choose texts steeped in what we have learned. We want our participants to know that strong girls are not always perfect; we all have many flaws. We also encourage our participants to think about strength as something that is unique and looks different for each girl given her unique life circumstances. Strength is about taking chances while learning from your mistakes; being true to your beliefs and being willing to change your mind;



Renita Schmidt at Strong Girls Read book club meeting in 2015. Photograph by Mei-ling Shaw Williams.

being afraid and doing what you know is right. We read short texts and long texts, graphic novels, novels, poetry, picture books, and nonfiction in the book club. Some of the texts we have read are *George* by Alex Gino, *Lumberjanes* (a graphic novel) by Stevenson and Ellis, *Night Flight* (a picture book about Amelia Earhart) by Robert Burleigh, and *The Skin I'm In* by Sharon Flake. We choose texts that are challenging, engaging, and accessible, texts that help our participants make sense of tough topics related to girlhood—and personhood—in their lives.

Thanhha Lai's novel written in verse, *Inside Out and Back Again*, is one such book. Lai tells the autobiographical story of her family's immigration to the United States after the fall of Saigon. Following a harrowing overseas journey, in which her family leaves behind any hope of reuniting with her father, protagonist Hà and her family arrive in Alabama. Hà finds that food tastes different, people are not always friendly, and school is not easy.

In responding to this book, we found that our participants made a wide range of connections to their lived experiences and told stories that are rarely heard during the school day. Namama found her own experiences of escape and immigration validated in reading Hà's story. She talked of her family's dangerous journey out of Sudan, which included hiding among the trees as they were chased through the jungle by armed militia.

Jenny, who emigrated from Vietnam, resonated with the idea of having two homes and two identities, writing a poem and drawing pictures illustrating her identities. For these and other young girls in our project, reading and exploring texts help them consider where they have come from, who they are, and what their futures as young women in Iowa might look like.

Participation in the Strong Girls Read Strong Books Project also provides an important learning opportunity for our preservice teacher volunteers. Because our aim is to create a safe space and ample time to read and explore challenging topics about girlhood, our preservice teachers find that our participants share much more of their lived experiences in response to books than they typically do in school. Girls share funny stories of their friends and siblings, joyous stories about experiences with family, and, often, hard stories about challenges they have faced. Our preservice teacher volunteers learn that all these stories have value and deserve to be voiced and witnessed. They learn to listen carefully for the knowledge that girls bring with them—knowledge that is often far different from their own lived experiences. They learn to recognize the strengths girls already bring to our project. And they learn to sit with their own discomfort, resist their own assumptions, and share their own vulnerabilities.

Finally, this programmatic research has allowed us to communicate with parents and teachers and build relationships involving the university, public school, and community members in a variety of ways. With the generous help of our donors, we are able to take the girls on field trips to the public library, the Teacher Leader Center at the College of Education, and cultural houses like the Afro House on campus. We want the girls to see themselves as future college students who belong at an institution of higher learning like the University of Iowa.

On one of our bus trips to the College of Education, we noticed a girl looking intently out the window, watching the road signs and where we were going. When we asked her what she was thinking, she told us, “I’m just trying to remember how to get to the university. I might want to come back here someday.”

## **Fostering Collaboration among Reading Researchers, Policymakers, and Educators**

### **The Iowa Reading Research Center**

THERE IS GENERAL agreement that reading is important for children's success not only in school, but also in life. Determining how best to go about teaching this essential skill is the mission of the Iowa Reading Research Center (IRRC).

Hosted by the University of Iowa College of Education, the IRRC is well suited to assist Iowa schools with both applying and conducting scientific research to ensure they are using the most beneficial materials and practices. Funded through state appropriations, the IRRC fosters proactive, collaborative relationships among researchers, educators, families, advocacy groups, and governmental agencies for the greater good of a strong educational system.

Because the IRRC is based in Iowa, it is able to provide timely, relevant, and impactful support to Iowa schools. Never is that more important than when a school is in crisis. Such was the case when an Iowa school district contacted us after it had reached an impasse with a parent group. The district had identified a weakness in students' phonics performance and was trying to select a new curricular program to address the challenge. The parent group preferred a program instituted with their support by a principal in one of the district's elementary schools, but the teachers from another elementary school wanted to keep a different program they had been using. To make an informed decision, district administrators decided at the start of the school year to pilot three different phonics programs and use the data from this pilot to select which curriculum to adopt by the end of the school year.

Given the contentious and complicated nature of the pilot, the district

administrators and parent group wanted the IRRC to serve the role of impartial expert evaluator. Specifically, the IRRC was needed to assist with designing the pilot, collecting the data on how teachers and students responded to the different programs, and conducting the analyses of that data. This type of study can take several months to put together and launch; but we had only three to four weeks to prepare for a project we had not previously discussed, planned within our workload, or explored possible funding sources for.

If the IRRC did not have public funding, we would not have been able to act swiftly and nimbly in responding to the pressing challenge the school district was facing. Our presence reassured the parents and teachers alike that the pilot would be carried out with sound scientific methods and without bias. Moreover, the district had confidence that it would have sufficient and trustworthy information for making its decision in a timely manner.

Working with a school district to conduct research that meets an immediate need, such as choosing a reading program, is one way in which the IRRC's efforts are essential to the educational issues and concerns of Iowa. Rather than determining our research agenda based on our personal interests or the priorities set by the organizations that sponsor grants, the IRRC operates under legislated priorities and addresses the interests of the stakeholders in the educational system (e.g., teachers, administrators, families, community organizations, and policymakers).

In response to requests, the IRRC has marshaled its expertise to investigate current literacy instructional trends in Iowa, examine state and local data on students' reading performance, and offer professional development for pre- and in-service teachers.

Recently, we worked with regional education agencies to identify the literacy strategies commonly used by teachers across Iowa. The IRRC team then located existing research to narrow the list to those strategies that had evidence of being effective at improving students' reading abilities. We also analyzed available student data to determine with which components of reading children were struggling so that we could prioritize the creation of training modules to address these specific issues.

We piloted those training modules during professional development sessions for teachers in seven locations around Iowa, and we tested the

teachers' knowledge and skills about reading instruction before and after they participated in the training. The results were used to refine the professional development and identify teachers who could be filmed implementing the strategies in their classrooms. The demonstration videos were made a part of the training, and one partner school district asked us to provide them with yearlong assistance in changing the way their teachers delivered reading instruction.

All these functions of the IRRC typically are performed for individual school districts, who pay for the external services from vendors and other experts. Because the IRRC is publicly funded, its work carries the responsibility of public good. Therefore, our services are provided to districts at no charge, and the results are made available to all other schools in Iowa. In addition to helping Iowa educators make the best instructional decisions for their students, the IRRC makes its research available and accessible to the general public.

One of our studies had a particular impact on educational policy in the state. The same legislation that created the IRRC included rules for offering intensive summer reading programs for children not reading proficiently at the end of third grade as one means of avoiding being retained in that grade level the following school year. The Governor's Office requested that the IRRC conduct a large-scale study of the summer program requirements in advance of their implementation. Throughout the study, print and television media from the locations of our forty-four school districts shared with their communities what was happening and why.

After we released the results of the research, the report was covered by multiple media outlets throughout the state and was presented to the Iowa Senate and House Education Committees, as well as to school district superintendents statewide. The findings influenced policymakers to suspend the provisions of the law associated with retaining students in third grade and mandating particular types of summer reading programs. In addition, school districts contacted us to help them apply the findings to redesign the summer programs they offered independently from any state requirement.

Through our collaborative relationships with governmental and community organizations, the IRRC maintains a wide reach for disseminating information on reading research and practices. In a single year, our

open access electronic resources were viewed nearly a million times by IRRC's stakeholders. This is in addition to the more academic and technical reports that we submitted to scholarly journals as is customary for university faculty.

There is a societal benefit to having literate citizens because success in reading is related to success in life and the global economy. However, learning to read is difficult—as evidenced by the large numbers of individuals who struggle to develop adequate skills, even while enrolled in formal education. Since the passage of the Reading Excellence Act of 1999 and continuing through the most recent Every Student Succeeds Act, federal and state policies have required schools to use scientific research to evaluate reading programs and instructional strategies. The motivation behind coupling research and education was to make it more likely that children would become successful readers, so it stands to reason that state resources be provided for this goal.

The work of the IRRC offers a model of how a university-based organization can provide the needed expertise to support schools in appropriately serving their students. Public funding ensures the research support will be timely and its focus relevant to the priorities and interests of those in the education system. Furthermore, there is an efficiency to creating a common source for this support. Schools would otherwise be spending a portion of their funds to secure expertise, but they would do so in a disjointed and potentially duplicative manner. Each district would seek its own support, with no mechanism for sharing what was learned for the benefit of others in the state. Instead, the IRRC's collaborative relationship with all Iowa stakeholder groups facilitates wider impact and reinforces that a quality education for all students is indeed a public good.

## Hearing Lost Voices

### Researching Women in Elocution

IN THE MUCH-LOVED *Anne of Green Gables*, the students of Miss Stacey “get up a concert.” The “concert” in the 1908 novel by L. M. Montgomery consists of more than just music: it also features spoken poetry. The poetry is especially exciting for the young heroine, Anne Shirley, who plans to “groan heartrendingly” in her recitation. “It’s really hard to get up a good artistic groan,” she confides. Later in the novel, a more accomplished Anne recites at a hotel concert. Hearing a professional elocutionist momentarily undermines her confidence, but she recovers, “her clear, sweet voice reaching to the farthest corner of the room without a tremor or a break.”<sup>1</sup>

Today the spoken word is not usually found in concerts; however, the setting for Anne’s poetic effusions was typical in Montgomery’s era. As a music historian, I initially found the appearance of recitations on concert programs to be an intriguing oddity. However, my research has explored the ways in which performed speech was ubiquitous in America—including in Iowa—in the late nineteenth and early twentieth centuries. The sheer number of public events at which spoken word performances were heard alongside music makes them virtually impossible to summarize: not only concerts, but graduations, patriotic celebrations, oratory contests, religious events, and club meetings. Why have we forgotten this previously essential part of American cultural life? The primary reason is that for decades, to stand in front of an audience and speak literature was most often done by women.

In the nineteenth century, elocution was considered a moral and intellectual good, particularly for men, as it prepared them to be preachers, lawyers, or politicians. Women, discouraged from engaging in political speeches,

studied elocution in order to read to their children or to entertain their families in the home. However, changing social roles during the Progressive Era allowed for the increased professionalization of female performers.

A late-nineteenth-century etiquette manual described the “march of progress” as manifested in women’s changed status; like men, they were now able to be “the exponent of truth” through “recitation, reading, tableau and conversation.”<sup>2</sup> When the National Association of Elocutionists had its first meeting in 1892, three-quarters of the attendees were women.<sup>3</sup> All major cities had elocution schools, some of which developed into colleges, for example, Emerson College in Boston and Chicago’s Columbia College. Women also taught elocution lessons in music conservatories or in their homes and sometimes authored the textbooks and recitation anthologies designed for their students. Female elocutionists or “readers” toured the Midwest on the Chautauqua circuit into the 1920s. Every summer, tents were erected in towns of fewer than ten thousand people, settings in which local residents could experience a week of education and entertainment. Chautauqua’s small touring musical ensembles, or “concert companies,” regularly featured at least one spoken-word performer.

To be an elocutionist was a respectable occupation for a woman, unlike the morally suspect profession of actress, associated with a sordid theatrical world and requiring inherently dishonest portrayals. In contrast, elocutionists identified themselves not with drama but with literature, which could express moral truths. In actuality, audiences heard the sounds of women’s voices presenting a wide range of texts, everything from the poems of Edgar Allan Poe, Alfred Lord Tennyson, Henry Wadsworth Longfellow, or Paul Laurence Dunbar, to comedic monologues such as “Aunt Doleful’s Visit” and spoken songs, like “I’ve Got a Pain in My Sawdust.” Regardless of how highbrow or lowbrow the chosen selections, poetry was incomplete until it was transmitted to audiences through the voices of women. Elocutionists became known for their interpretations of a particular poem, in the same way that a singer might shape an individual rendition of a song.

Who were these women? What led them to take up elocution? And why do we not know their stories? The evidence needed to reconstruct elocutionists’ careers is often fragmentary or ephemeral: the few surviving programs, press reports of performances, yearbook photographs, or lists of students’ names in elocution school catalogs. Only rarely have

descendants preserved scrapbooks that help document an individual woman's career. The University of Iowa Libraries' Special Collections holds remarkable publicity materials from the Redpath Bureau, a major Chautauqua booking agency located in Cedar Rapids that provided performers across the Midwest and beyond. Multiple fliers show women elegantly gowned, sometimes with a book in hand, along with lists of the repertoire with which they were ready to entertain rural residents. Yet day-to-day details of their activities are seemingly as lost as the sounds of their voices before the era of recorded sound.

It would be easy to assume that most of the women who attended elocution school to learn how to perform before audiences eventually ended up as homemakers. But many embarked on notable careers. Alvina Carolyn Winkler Paterson of Troy, New York, gave her first professional engagement at a church at only fourteen; she reported that she "cleared twenty-two dollars, and managed the whole affair alone, besides selling seventy-two tickets in two days."<sup>4</sup> The book *Lest We Forget*, an overview of the lives of almost four hundred graduates of the Detroit Training School from before 1904 (only twenty of whom were men), suggests a picture of numerous women with similar levels of ambition.<sup>5</sup> Slightly less than half of the women married, more than half of the alumnae taught, and slightly less than half gave platform appearances. Nonetheless, many were more modest than Paterson in describing their professional activities: Helen Estelle Mulvey of Seattle reported, "My career has been rather uneventful, and yet successful in a quiet way."<sup>6</sup>

Iowa, located in the heart of the Chautauqua circuit, had its share of female elocutionists. Aspiring young women from the state often studied at Northwestern University's School of Oratory or other Chicago schools. Anna Morris from Des Moines traveled around Iowa, reciting and teaching women to pose in tableaux like the "Grecian Urn" ladies, later made famous by Mason City resident Meredith Willson in his Broadway show *The Music Man*. That Morris had the aptitude to attract would-be pupils is suggested by her third place in the *Des Moines Leader's* contest for most popular lady teacher, with over six thousand votes.<sup>7</sup> When she visited Cedar Rapids in 1894, the female students she taught there were so taken with her that they requested she remain in their town.<sup>8</sup>

Icey Teel Harling's scrapbooks are preserved in the Iowa Women's

Archives, as are the letters that Margaret Paul wrote while in elocution school. After studies in Chicago and New York, Harling spent several years performing in Los Angeles and touring. When she returned to Iowa, she established a school in Davenport that lasted from 1918 to 1934. Paul traveled the Midwest while attending Cornell College in Mount Vernon in 1907–1908. After a year studying at the Leland Powers School in Boston (all she could afford), Paul toured the Chautauqua summer circuits in 1914 and 1915. She later taught high school speech for twenty-five years.<sup>9</sup> Although Paul’s performing career ended when she was young, she was apparently a memorable teacher. In a surprising turn, one of the early reviewers of my book, *The Elocutionists*, excitedly wrote to tell me that his mother had been her pupil in Gary, Indiana, and had spoken highly of her.

The evocative fiction of Iowa author Ruth Suckow best captures the motivations of women in elocution. Suckow first “delivered a nice recitation” at age seven in Algona.<sup>10</sup> As a young woman she attended the Curry School of Expression in Boston but found her true calling as a novelist. Her second book, *The Odyssey of a Nice Girl*, from 1925, was based on her elocution school experiences and poignantly depicts the ways in which literature and music bring meaning to the life of her frustrated heroine, Marjorie Schoessel. Elocution allows Marjorie to experience the “intoxication of power and ease and beauty” and her own poetic reading to express the “little high soprano note, that answered to something which she dimly sensed as her own.”<sup>11</sup> In an earlier era, the power to stand before an audience, to move them through the sound of one’s voice, must have been a particularly potent experience for women. Harling noted the personal satisfaction “in being able to entertain and give pleasure to others through your efforts,” adding, “but there is something deeper and better than all these to the successful artist. It is the development of your own self that counts.”<sup>12</sup>

Ultimately, the popularity of elocution faded when radio and movies brought music and speech to audiences in a new way. Perhaps the strongest factor in the decline of elocution was the increasing social acceptance of theatrical performance for women, evident through their new dramatic engagement in schools and civic groups. Elocution’s fall from our cultural memory also stems from the modern rejection of its recited texts, no longer popular due to their undeniable sentimental excesses. However, when the anti-Victorian reaction against elocution swung into full force

after World War I, it was also a reaction against its professionalization of women. The habitually derogatory remarks about elocutionists were complaints about the period's "elocution ladies." The word "elocution" now called up visions of antiquated, amateurish performances by women and children, undermining the lasting recognition of an art form that had made a widespread impact.

Yet while it flourished, elocution enabled women to enter the public sphere as artists. With the goal of interpreting great literature, they were able to emerge as individual performers and to forge careers both on the platform and in the classroom. Elocutionists used the sounds of their voices to make their recitations come alive, enriching the worlds of their listeners in Iowa and across America. Reconstructing the stories of the elocutionists, who had the power to hold audiences spellbound, opens a new window on women's contributions to our cultural life.



Illustration for "Results of Higher Civilization," in Thomas E. Hill, *Hill's Manual of Social and Business Forms* (Chicago: Hill Standard Book Company, 1888), 456.

## Notes

1. L. M. Montgomery, *Anne of Green Gables*, reprint ed. (Boston: L. C. Page, 1908; New York: G. P. Putnam's Sons, 2008), 186–187, 262.
2. “Results of Higher Civilization,” in Thomas E. Hill, *Hill's Manual of Social and Business Forms* (Chicago: Hill Standard Book Company, 1888), 456.
3. “Public Reader's Convention: Delegates Present from Every Part of the Country,” *New York Times*, June 28, 1892.
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6. Ashmore, *Lest We Forget*, 159.
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11. Ruth Suckow, *The Odyssey of a Nice Girl* (New York: Alfred A. Knopf, 1925), 122, 140.
12. Icey L. Teel, “The Making of a Reader” (*Sunset Magazine*, Los Angeles, 1915), in Scrapbook, box 2, Icey Lenora Teel Harling papers, Iowa Women's Archives, University of Iowa Libraries, Iowa City.

## Why We Prank

### Lessons Learned at Stuttering Camp

IT'S 5:30 IN THE afternoon of a very long day, and I am standing in the parking lot behind Kinnick Stadium trying to cut through the plastic wrap that encapsulates my car—with a key. I know that somewhere in this parking lot is a group of teenagers and their dorm counselors watching my struggles and feeling very satisfied. They also feel apprehensive because they know that payback is coming and because I work very hard to make my pranks spectacular (though often I fail).

And so, another year of UISPEAKS is under way. For the past twenty years I have directed the University of Iowa Summer Program for Educating Adolescents and Kids Who Stutter. UISPEAKS is a weeklong residential therapy program for teenagers who stutter. We typically host adolescents from Iowa and the Midwest but have frequently invited teens from around the country to join us as well.

Stuttering is a neurodevelopmental speech disorder that begins in early childhood and typically takes one of two paths after it emerges: recovery or persistence. The teenagers who come to UISPEAKS represent the 25 percent for whom stuttering has developed into a chronic disorder characterized by repetitions and prolongation of sounds and syllables, usually accompanied by closing or lateral movements of the eyes, limb movement, and visible muscle tension in the lips or jaw. As such, they have been stuttering for at least half of their lives or longer, depending on their current age and age of onset.

Since stuttering is so rare, most teens have had limited contact with—or, more likely, have never encountered—another person on this particular journey. The low incidence of stuttering also impacts the expertise



Students in the University of Iowa Summer Program for Educating Adolescents and Kids Who Stutter (UISPEAKS) take a group selfie during the weeklong residential therapy program. Photograph by Abigail Peterson.

and confidence that speech-language pathologists frequently report in providing therapy. As a result, many adolescents who stutter have had inconsistent therapy or none at all, or their therapy has been unsuccessful.

For the majority of teenagers who come to UISPEAKS, stuttering has impacted their lives in large and small ways. For most of them, talking and social interaction are not just difficult but are avoided. This is where pranks come in.

I have found that allowing my students to plan and execute pranks on me provides an important learning and bonding experience for them. I encourage the dormitory counselors to tell their charges on the first day that pranking me is a UISPEAKS tradition, but that I don't like it. To carry out a successful group prank, each teen needs to be a good observer of another person's behaviors, schedule, habits, likes and dislikes, mood, temperament, and the thickness of their skin. It requires an understanding of the difference between irritation and humiliation, between funny and mean. Planning pranks as a group depends on good listening, negotia-

tion, problem-solving, spontaneity, timing, and decisions about who will lead and who will follow. Every member of the team is important, and everyone has a role.

Pranks allow teenagers who stutter to be playful and not take themselves too seriously, both of which help them to cope with life's challenges—including stuttering. Observing, listening, problem-solving, judgment; all of these are skills that help us decide what we may want to change about ourselves and how to go about doing it. I always have a group “debrief” to point out to the group what talent their prank required.

This emphasis on “what is right” as opposed to “what is wrong” with the teen who stutters, both broadly and specific to managing stuttering, is at the heart of my work and honors the long and rich history of stuttering research and clinical intervention at the University of Iowa. The discipline of speech-language pathology has its origins at the university, beginning with the selection in the early 1920s of undergraduate student Lee Travis to be the first person in the world to receive doctoral training in the study and treatment of speech and language disorders. Interest in this field soon exploded; and if you've seen the film *The King's Speech*, you know about the struggles of Great Britain's King George VI with stuttering: the monarch began speech therapy in 1926.

Stuttering was front and center in the early development of Travis's research and clinical programs, attracting a number of graduate students—many of whom stuttered themselves—to Iowa City. The most well-known of Travis's students was Wendell Johnson, who carved a distinguished career by examining the onset of stuttering and experimenting with ways to help people who stutter to talk more easily. Johnson spent considerable time analyzing his own stuttering, both what he did when he stuttered and the thoughts and emotions he experienced when about to stutter or in the stuttering moment. Johnson became convinced that once stuttering emerged in the young child, the behavior became entrenched as a result of fear and subsequent attempts to keep from stuttering. His early clinical work focused on helping the person who stutters to pay more attention to what they do when they talk easily (which is most of the time)—to pay more attention, in other words, to what they do that “feels like normal speech” than what they do when they stutter.<sup>1</sup>

The attentional focus that Johnson advocated was not cognitive or

emotional as much as physical: What does smooth speech feel like? What are you doing with your speech mechanism when talking feels easy? Johnson's work was expanded by his student Dean Williams, who also stuttered and who completed his PhD at Iowa in 1952. After a short stint at Indiana University, Williams came back to the faculty at Iowa and became a leading scholar and clinician in stuttering intervention. He held that position until his retirement in 1987.

Building on Johnson's belief in the importance of developing cognitive and emotional awareness as well as physical awareness of one's spontaneous or natural fluency, Williams divided the more global phenomena of "fluency" and "stuttering" into five speech processes—timing, tension, movement, airflow, and voicing—that people can feel, manipulate, and self-monitor while they talk. He argued that practice developing physical awareness of *what* and *how* one talks forms the basis for changing behavior and developing confidence in one's ability to control the way he or she speaks. This approach was referred to as the "normal talking" model of therapy, and Williams went on to adapt it for use with young children who stutter. While therapy approaches and programs for stuttering have changed over the years, the emphasis on feeling what one does while talking easily as well as when one interferes with smooth talking—known as the "Iowa Way"—remains one of the foundational principles in therapy for stuttering.

Since I came to Iowa in 1988, my own clinical and research interests have been inspired by the work of Johnson, Williams, and other pioneers in stuttering who found their passions here. Most recently, I have been studying the cognitive factors that underlie readiness to manage stuttering among teenagers with the condition. Specifically, I want to understand what ways of thinking lead an adolescent to actively engage in learning and in using the tools for changing speech that Johnson, Williams, and others developed years ago. This work was motivated by the frequent reality that therapy techniques for stuttering "work," but only if one uses them. One of my goals is to reframe "motivation" as "readiness" to change; another is to understand what cognitive constructs predict adolescents' readiness to actively engage in stuttering therapy. My hope is that this work will lead to the development of intervention processes that will help teenagers who stutter prepare for change and move toward active engagement, rather

than expecting them to be ready when they seek our help and deeming them to be them unmotivated when they are not.

Along with my students and coinvestigators at the University of Rhode Island, I have recently applied the “Stages of Change” model in a large-scale study that showed that teenagers and young adults who stutter can be placed in one of five stages of change. Each stage (from precontemplation to maintenance) correlates to two key factors: the number and weight of the pros and cons of changing stuttering and the teen’s degree of confidence that he or she can remain engaged in therapy when it is difficult. As we continue to further explore the data from this study, I look forward to adding another piece to the “Iowa Way”: moving from the when and how of changing stuttering to the why and its importance.

It’s three in the afternoon, close to the end of the spring semester, and I am sitting in my office looking over applications for UISPEAKS 2017. In four short weeks, I will be surrounded by teenagers, graduate student clinicians, and dorm counselors, all plotting this year’s prank. Regardless of what they come up with—plastic-wrapped car, balloon-filled office, big bites of chocolate-iced kitchen sponges, a sea of plastic forks stuck in my front lawn, Silly String or water balloon attacks—I’ll be ready. And long after I’m gone, I hope that people think of UISPEAKS—all of it—as the “Iowa Way.”

## Note

1. Wendell Johnson, “Some Practical Suggestions for Adults Who Stutter,” *ETC: A Review of General Semantics* 21, no. 2 (1964): 192.

## Education in a Multilingual Society

### Supporting Bilingual Students

ALBERTO MOVED TO Seattle, Washington, from Guatemala in October. Shortly after arriving with his parents and his older sister, he enrolled at Stevens Elementary School and began attending first grade. His teacher, Ms. King, has more than twenty years of experience, but she is unsure what to do with new students who do not speak English as their first language. Alberto understands little of what is said in class. He misses his old school, his old neighborhood, his family, and his friends. In Guatemala, he was surrounded by aunts and uncles, cousins, grandparents, and friends, all of whom provided a community of support. He felt confident in his classroom and on the playground. In Seattle, everything has changed, and Alberto struggles to find his place. A few other students speak to him in Spanish on the playground, but they are older, and they already know English. The other nonnative English speakers in his own class seem to speak all sorts of languages besides Spanish.

Alberto has an English as a Second Language (ESL) instructor—Mr. Johnson—who pulls him out of his classroom so they can work on English lessons in the hall. Mr. Johnson isn't credentialed and has little background in teaching ESL, but he is what the school can afford.

One day, after a thirty-minute lesson in the hall, Alberto returns to his class, but his attempts to catch up with the lesson seem futile. His frustrations bubble up and spill over as tears begin to pool on his desk. He is startled by this sudden show of emotion and hides his face in embarrassment.

Alberto's experience is increasingly common in the United States. One in ten US students is an English learner (EL), which amounts to roughly 4.5 million students. And this number is growing. In some states, like

California and Florida, this linguistic diversity has been a consistent part of the educational landscape for decades. In Washington State, however, the influx of large numbers of ELs is relatively new and has almost doubled over the past ten years.

Midwestern states like Iowa traditionally have had even less linguistic diversity in their schools. But over the past twenty years, the number of ELs in Iowa schools has quadrupled. While some school districts still report little linguistic diversity, others have experienced rapid growth. For example, Denison, Iowa, went from having almost no nonnative English speakers to having more than 50 percent.

Iowa fits a demographic phenomenon known as the New Latino Diaspora, which describes recent Latino immigration to rural areas that have not traditionally been popular destinations for Spanish-speaking immigrants. The national focus in EL education research has been on US states with longstanding EL populations (e.g., California, New York, Texas, and Florida), while more rural settings, such as Iowa, are in need of educational programming and professional development for teachers.

ELs in US school settings are challenged to acquire a new language while concurrently using it to learn academic content and display that knowledge through assessments. It is important that educators, parents, and policymakers recognize this as a very difficult task. This is a big part of our work at the University of Iowa in the field of language education. As education researchers, we ask and answer questions like these:

- How do ELs transition into new educational contexts?
- How do they socialize into the norms of US schooling?
- Which teaching methods are they exposed to?
- Which teaching principles, methods, and assessments tend to work and which do not?
- How do educational language policies and assessments help ensure equal educational opportunity for these students?
- How do policies and assessments deny equal educational opportunity?

A rapidly growing portion of the student population—and the health

and well-being of our educational system—depends on answers to these questions.

While the research suggests that young children do have an *eventual* advantage in acquiring another language—particularly with regard to pronunciation—they are not “sponges,” who magically soak up the language that surrounds them. It is an arduous, and often lengthy, task to acquire the kind of academic language necessary to be successful in school. Often, teachers are deceived by the amount of language they hear a student speaking outside of class: “Alberto has been here only six months but he’s communicating with his friends on the playground!” That may be true, but the type of English needed to compete in a game of kickball is different from the type of English needed for a social studies assignment.

The myth that children are language sponges is exacerbated by another myth: simply immersing them in all-English instruction will ensure language acquisition. This idea brings up two big problems. First, it doesn’t work. In the field of language education, we refer to this type of “program” as *submersion*, not immersion. Research on the relative effectiveness of different educational programs shows that submersion is very ineffective. A handful of students will succeed—even excel—regardless of the type of instruction they receive. However, on average, most students who are submerged will never achieve parity with their native English-speaking peers.

Second, submersion is illegal. In the Supreme Court case *Lau v. Nichols* (1974), submersion was found to violate Title VI of the Civil Rights Act of 1964 and ruled unconstitutional. In the unanimous decision, the court ruled that the same instruction for ELs as native English speakers is, in fact, *unequal*: “There is no equality of treatment merely by providing students with the same facilities, textbooks, teachers, and curriculum; for students who do not understand English are effectively foreclosed from any meaningful education.”<sup>1</sup>

This shifting linguistic ecology is changing the educational landscape in Iowa. It is up to educators and policymakers to accommodate these students, as stipulated in US law. Although federal educational policies, such as Title III of the Every Student Succeeds Act, increasingly focus on ELs, these students are often still denied equal educational opportuni-

ties. Furthermore, while the Lau decision engendered a litigious threat that encouraged schools and school districts to accommodate ELs, many schools have received little guidance in how best to do this.

Faculty in the University of Iowa College of Education have been exploring answers to how to best give EL students an equal education and have been embedding this work in UI teacher education and with teachers in Iowa schools. Much of it has been funded by the US Department of Education's Office of English Language Acquisition, which sponsors five-year grants to support projects involving teacher professional development. The Foreign Language and ESL Education Program has been awarded three consecutive grants in this area, starting in 2007 and continuing to 2021. Professional development is a term used to describe specialized learning, which we have designed to draw on current research and to lead to engaged scholarship.

The vast majority of ELs are educated in mainstream classrooms alongside their native English-speaking peers. To be successful, all their teachers need to incorporate linguistic accommodations as well as opportunities to develop academic English into their lessons designed for all students. This challenging reality means that all teachers need to be proficient in teaching ESL along with their content area. This is an enormous dilemma for schools. We prepare teachers for this task in two ways: (1) offering coursework and tuition stipends for teacher education students to complete our K–12 English as a Second Language Endorsement, and (2) providing current teachers in Iowa a series of online and in-person workshops on supporting ELs. These professional development programs are based on current research on ESL instruction, and they draw on techniques and methods to help bridge the gap in social and cultural understanding among ELs, their teachers, and their classmates. Two examples help illustrate this work.

Ms. Clinton (pseudonyms used in this narrative), a high school chemistry teacher in one of our professional development programs, wrote about helping an EL student and his classmates communicate more easily in small group lab work. After Ms. Clinton delivered the instructions to her EL student, Ahmed, whose native language was Arabic, she asked him to give the instructions in his native language to a small group of his non-Arabic-speaking peers. As she observed from a distance, Ahmed

fluently and confidently explained the instructions in Arabic to his two classmates, Emily and Aiden, who sat listening, smiling, and shaking their heads. She watched as the students recognized that their classmate, whom they assumed was shy or had limited chemistry knowledge, was able to talk their ears off in a language they could not comprehend. This raised awareness about the arduous task of learning the content of Ms. Clinton's lessons, while interpreting it in a new language, which could lead to exhaustion and frustration. This simple turning of the tables changed the dynamic of the small group work in her class. Ms. Clinton reported, sheepishly, that she too was surprised to hear her EL student's voice and realized her mistaken assumptions about his previous silence.

Another example comes from an assignment in our professional development workshop, in which teachers visited the home of one of their EL students. Because a "home visit" involves going outside their comfort zone, teachers experience anxiety with this assignment, perhaps somewhat similar to what an EL parent feels going to a parent-teacher conference. However, the discussions that follow these home visits are insightful and affirm the importance of family and community engagement with ELs. The following is an excerpt from a teacher's reflection on a home visit:

I learned from my visit how important Joe's culture is to his life. We spend so much time trying to make these students English speakers and learners that we dismiss that they have background and prior experiences far different than our own. I learned that he has a great deal of respect for authority when he feels needed and appreciated. I did notice that Joe works better with a routine at home. He was very helpful to his mom and his aunt. There is definitely a cultural difference between his expectations at school and his behavior at home. I enjoyed seeing his sense of responsibility at home.

These brief examples illustrate the challenges ahead—for the students, their teachers, and administrators and policymakers in Iowa. Research on the relative effectiveness of language education programs shows that well-implemented bilingual education, such as the dual language programs in West Liberty and Marshalltown, Iowa, tends to be better at preparing ELs to score as well as their native English-speaking peers on

standardized assessments. We support these programs. However, not every school can hire a cadre of bilingual teachers; and, therefore, they must develop quality ESL programs. We support these efforts as well. Through our grant-funded initiatives and educational programs, the University of Iowa is becoming a leader in the field and a champion of justice for an increasingly diverse student population.

## Note

1. *Lau v. Nichols*, 414 U.S. 563 (1974).

PART

4

HEALTH AND ENVIRONMENT



## Filling the Knowledge Gap through Clinical Trials

THERE ARE MANY important scientific questions that private industry has little interest in pursuing, whether that be for scientific or business reasons. To fill this research gap, the National Institutes of Health (NIH) funds clinical trials at universities like the University of Iowa that have the appropriate staffing, experience, and resources. The Clinical Trials Statistical and Data Management Center (CTSDMC) at the University of Iowa is one of the few academic organizations in the country with full expertise to coordinate the activities required to conduct such complex trials.

The CTSDMC was founded in 1989 by R. Skip Woolson and William R. Clarke, two faculty members in the UI Department of Biostatistics, to provide data and statistical coordination for the NIH-funded trial of a treatment protocol for strokes, called TOAST. The results of that study were published in the *Journal of the American Medical Association* (JAMA), and the TOAST classification system is currently used in clinics and hospitals across the country. This set a precedent of success in high-impact research that continues to this day at the University of Iowa.

Today, the CTSDMC competes with other organizations and academic institutions across the country for grants to design, implement, analyze, and disseminate results of multisite clinical trials. This is all done with the goal of improving health for children and adults across the country. The health questions may be in rare diseases such as spinal muscular atrophy (a congenital neuromuscular disease) or more common diseases such as stroke and diabetes. To successfully complete these types of trials requires a diverse range of experience. The CTSDMC is composed of six teams that contribute to the success of our projects: Biostatistics;

Information Technology, to design electronic data capture systems; Data Management; Protocol Coordination, which includes on-site monitoring; Regulatory, to assist with FDA submissions; and Quality Management, to ensure overall quality.

Among the many similar academic centers across the country, most are much smaller and lack the ability to address the full range of activities required to coordinate multisite clinical trials. While an exact number is not known, there are roughly fewer than a dozen similar-sized academic-based centers in the United States. Because the CTSDMC is situated within an academic institution of the caliber of the University of Iowa, we are able to leverage the clinical trial methodology and medical expertise of faculty from the College of Public Health, the Carver College of Medicine, and elsewhere on campus. This greatly increases our ability to fit the needs of our extremely diverse set of collaborators.

Success of multisite clinical trials is determined by the ability to get an answer to an important clinical question. Yet success does not just imply a statistically significant finding. Trials that definitively show that a drug, intervention, or approach of interest does not work are extremely valuable as well and play an important role in improving the health of the general population.

One example of this is the Childhood Adolescent and Migraine Prevention (CHAMP) trial conducted jointly with collaborators from Cincinnati Children's Hospital. This study was designed to test common prevention strategies and treatments for children and adolescents with migraine. The existing evidence for the treatment of childhood and adolescent migraine was based on results from adult headache studies. Opinions among clinical experts differed considerably as to whether results from these adult studies would apply to children. Many argued that there was no reason to believe that this was not the case and that it would be improper to expose children to risk needlessly. Others argued that children are not "little adults" and that what might be effective and safe in adults may not have the same properties in children.

The study randomized the young patients to be given either amitriptyline or topiramate (both commonly used to treat migraines but unproven to be effective in children) or a placebo. The study was designed to enroll 675 children at approximately thirty sites across the United States. To

protect the safety of patients, one of the important components of trial design is implementing procedures—called interim reviews—to assess a drug’s risk-benefit profile before the study is finished. These predefined interim reviews are prepared and presented to an external Data Safety Monitoring Board, a group of experts not involved in the study tasked with oversight of study quality, participant safety, and site performance. The CHAMP study had two predefined interim reviews scheduled, one after 225 participants completed six months of treatment and another after 450 participants had completed six months of treatment. The interim review results were hidden to all but the statisticians and the Data Safety Monitoring Board to insure that no bias was introduced into the ongoing trial. At the first interim review, the Data Safety Monitoring Board elected to discontinue the study for futility. It turned out that the placebo did just as well as amitriptyline or topiramate in preventing migraines.

Because this study was designed appropriately and the data were properly obtained and analyzed, the CHAMP study was halted early, which saved taxpayer dollars but also stopped children from receiving powerful drugs that did nothing to prevent their migraines. This type of trial is one that a pharmaceutical company would never run; doctors were already prescribing these adult migraine drugs to children and, if the drugs were proven ineffective, the company would lose money.

The results of CHAMP were published in the *New England Journal of Medicine* and named as one of the top ten advances in pediatric medicine in 2016 by the journal editors. The story was significant enough to be picked up by the *New York Times* and the *Washington Post*.

The CTSDMC has also received funding to design and implement clinical trials in a diverse set of areas, including stroke, scoliosis, hypertension, and Parkinson’s disease. In 2005, the CTSDMC received funding from NIH to design and implement clinical trials in support of FDA licensure for islet cell transplantation as part of the Clinical Islet Transplantation consortium. The contributions of the CTSDMC team at Iowa have contributed to the health care options and the quality of life for patients living with type 1 diabetes in Iowa as well as around the world. Additionally, the CTSDMC is involved in an innovative program through the Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT), an NIH-funded initiative to efficiently design and implement phase 2 trials in rare

neurological disorders. (Phase 2 trials are small tests, made up of fifty to one hundred participants, designed preliminarily to assess the safety and effectiveness of a given treatment to provide sufficient justification to move on to a much larger phase 3, confirmatory trial.) The National Institute of Neurological Disorders and Stroke (NINDS) had a vision for the future of clinical trials, particularly in rare neurological disorders, where it requires a network to find enough participants for a clinical trial in order to answer a research question. The CTSDMC serves as the Data Coordinating Center, along with a Clinical Coordinating Center at Massachusetts General Hospital and twenty-five hospital sites around the United States.

Since 2011, NeuroNEXT has successfully designed and received grant funding for nine clinical trials in a diverse portfolio of neurological disorders. The success of the network is particularly dependent upon the CTSDMC's ability to begin phase 2 trials quickly, collect robust data, close trials down efficiently, and disseminate the results promptly. The randomized, blinded, multisite clinical trial has long been the gold standard for developing the highest level of evidence for proof of treatments in biomedical research. That being said, this type of trial is also the most expensive mechanism we have to provide evidence for proof of treatments. So, it is critical to have experts involved in the process to ensure the most efficient use of valuable resources.

New initiatives to design “comparative effectiveness” trials that look at existing data to try to prove treatments worthy are much less expensive but also are much less robust. And the robustness of a phase 2 trial is critically important. After a seemingly successful phase 2 trial, many phase 3 clinical trials have subsequently failed at a huge expense. Phase 3 trials are much larger (typically two to three hundred participants) and are designed to get a definitive answer as to the effectiveness of the treatment. Some of the reasons for these failures are that the trials are not designed properly to achieve an answer because they are based on faulty assumptions, or recruitment lags to the point that the trials cannot be completed, or so much data are missing that the hypothesis cannot be proven—all things that the CTSDMC, through expertise and experience, is able to avoid.

The CTSDMC also plays an important role in contributing to the educa-

tion of students at the University of Iowa. Coffey and other members of the CTSDMC leadership are active in mentoring and training. The CTSDMC typically employs several graduate research assistants (RAs) from the Department of Biostatistics. This arrangement allows the CTSDMC to provide RAs with valuable hands-on experience in clinical trial methodology and implementation. The resulting synergy with their classroom studies prepares students well for the types of problems they are likely to encounter in their future careers. A recent RA participated in numerous projects throughout the CTSDMC while working toward his PhD. Upon graduation, he obtained a position at a major pharmaceutical firm. The company was so impressed with the skills and experience he garnered at the CTSDMC that they provided him with a sign-on salary increase and credited him with two years of work experience.

As the CTSDMC has grown, it continues to strive toward the same goal: to improve health care through biomedical research for the state of Iowa as well as the rest of the United States. With that same vigor, the CTSDMC looks to the future eagerly anticipating the next big challenge.

## Becoming “Welllderly”

### Hopes and Risks of Superaged Societies

THE YEAR 2018 was the first time in human history there were more senior citizens over the age of 65 than children under the age of 5 and as many children and seniors as there were working adults.

The so-called “Silver Tsunami” of very mature baby boomers represents a sixteen-fold increase in centenarians (those aged 100 years or older)<sup>1</sup> and will redefine and transform society in profound ways. The challenges before us range from redefining “retirement” to growing our understanding of how best to support the elderly in remaining healthy, active, and independent longer. In other words, how do we help more people become “welllderly” (a word that combines “well” with “elderly”) and not just aged and infirm?

Few institutions are as well prepared to explore the challenges posed by an aging population and to identify potential answers as public research universities. They have deep expertise in the areas of public health and medicine, psychology, and related fields, and the ability to bring together researchers from across the disciplines to work on common challenges.

That’s certainly the case at the University of Iowa, which has highly ranked colleges of medicine, nursing, pharmacy, and public health and where a cluster of faculty is working to unlock the mysteries of “The Aging Mind and Brain Initiative” (AMBI). The cluster is a highly multidisciplinary, multidimensional group of investigators spanning the life sciences, behavioral sciences, social sciences, engineering, medical sciences, human factors, biostatistics, ethics, law, and other disciplines. The main task of the AMBI is to identify methods for precise diagnosis of early onset mental decline and develop activities that delay progression.

AMBI faculty also work to understand and improve care for individuals with cognitive disorders who can no longer live independently. Their work spans areas from molecular biology to health policy, and much of the generated data has recently been published as *The Wiley Handbook on the Aging Mind and Brain*, edited by the former and current directors of the AMBI.<sup>2</sup>

Understanding the spectrum of social, medical, and material implications of accelerated population growth among the aging is of enormous scholarly interest. It's also a necessary step toward developing real-world solutions.

To prepare for the future, though, it's helpful to understand where we've been and where we're headed in this realm.

Only one hundred years ago, the average life expectancy was forty-eight years for men and fifty-four years for women. When Social Security was enacted in 1935, life expectancy was sixty-one years and only about 5 percent of the population lived past the sixty-five-year threshold. This societal structure allowed ten workers to support each retiree. Since then, life expectancy has gained about two years with every generation born ten years later. The mean life expectancy of a sixty-five-year-old planning to retire in 2020 will be approximately twenty-four additional years, with only 2.9 workers to support the retiree.

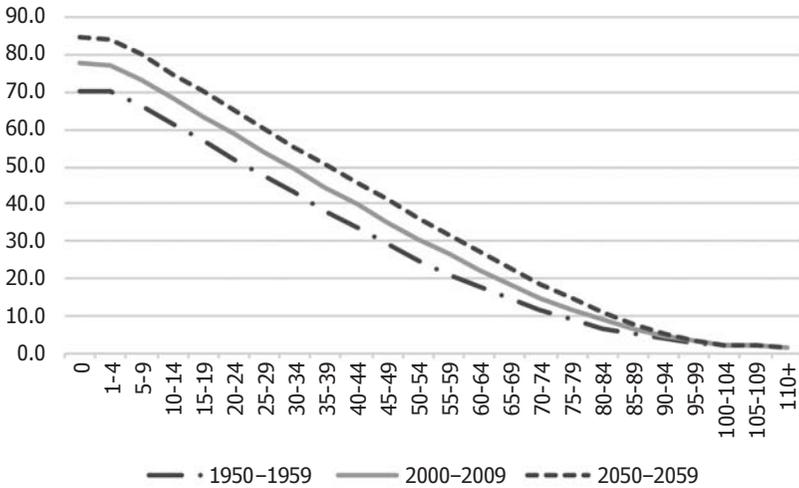
To follow is an overview of some of the opportunities and risks for society resulting from this historically unprecedented age distribution.

### **Longevity, Life Expectancy, and the Upper Limits of Life Span**

We are experiencing an unprecedented increase in life expectancy, but longevity has not yet pushed the absolute life span of humans much further. Reducing child mortality, combatting infectious diseases, reducing smoking, and reducing cardiovascular disease mortality<sup>3</sup> have added many years of expected life span to the population aged one to sixty-five. In contrast, once a person has reached 100 years, the average life expectancy remains unchanged. Indeed, the oldest recorded person, Jeanne Calment, lived for 122½ years. Since she died in 1997, nobody has beaten her record.

So is 122 years the absolute maximum our bodies and brains can reach?

### Change in Life Expectancy 1950–2050



Source: USA mortality index

Life expectancy (ordinate) as a function of age (abscissa) calculated using US mortality index ([www.mortality.org](http://www.mortality.org)). Between 1950 and 2000 the life expectancy of a newborn increased by 8.5 years, that of a 50-year-old by approximately 6 years, that of a 65-year-old by about 4.5 years, and it did not change for those 100 years old or older. Linear extrapolations suggest that life expectancy of the 2050–2059 cohort will be approximately 84 for a one-year-old, 37 for a 50-year-old, 22 for a 65-year-old, but still only 2 years for a 100-year-old. Note that gains above 90 years are limited. Chart by Bernd Fritsch, University of Iowa Department of Biology.

Some whales, warm-blooded mammals like us, can live up to 200 years. Why is that important? These data show that in principle humans could exceed 150 years or more. Can we use the whale’s genome to understand how this is accomplished and expand human longevity combined with perfect mental health?<sup>4</sup> Who would not want to live for 200 years in perfect mental and physical health? Minimally we may ask, what will it take to increase life expectancy of centenarians to match the gain newborns have been enjoying (8.5 years instead of 0 per 50-year cohort)?

## **Increasing Longevity of Seniors: Good Genes and Healthy Lifestyle**

Once childhood and infectious diseases are taken into account, limitations in life expectancy seem to depend on genetics and lifestyle choices. These factors set the limits for how body and brain are affected by wear and tear (biological aging). Obviously, not everybody ages at the same speed. As we progress, there is an increased separation between calendar age and biological age. In part this may relate to inheritance of specific genetic factors and mutations that affect individual aging processes. Multiple pathways at the level of gene defects and gene regulation changes, chromosome changes such as reduction in telomeres, protein misfoldings and their correction, and phagocytosis (ingestion) of dying cells through higher effectiveness of immunoresponses are among the most interesting candidates. Indeed, venture capital is financing research into aging using medications related to rapamycin to boost immune responses, which often decline with aging, and to gain insight into the genetic basis of welllderly octogenarians.

One goal is to tap into mechanisms activated by caloric restriction, which has a well-known antiaging effect. Dreams of immortality have led to investments in companies such as Calico and Human Longevity, Inc. to drive research into genetic mechanisms to counteract aging. The acknowledged role of certain forms of ApoE in Alzheimer's disease and also potentially in cardiovascular disease is a major focus. The insight that many diseases of the elderly are the consequences of earlier cellular effects has spawned novel hopes to increase longevity even in late stages, but this may be more effective through early prevention. Without a doubt, caloric restrictions and regular high-intensity interval training exercise to increase fitness<sup>5</sup> are beneficial at any age. Some of the medications and genetic manipulations discovered are effective in extending life expectancy in various animals. However, none of the interventions studied in animals, beyond the benefits of diet and exercise, has been demonstrated to benefit humans in twenty years of clinical trials. More research is needed to establish that effective approaches in animals can be used to combat human aging.

## Extending Healthy Life: What Are the Limits?

Beyond physical health issues related to osteoporosis, cancer, and diabetes, age-related mental and neurosensory decline (Alzheimer's disease and other dementia) is predicted to affect superaged societies the most. However, recent research has begun to unravel the molecular basis of youthful brains in "superagers," who have memory capacity and processing speed rivaling that of their juniors.<sup>6</sup> This seems to relate to profound retention of cortex, that is, the brains of these individuals do not show the decrease in size that often happens with aging. Genetic studies are under way not only to reveal mutations such as ApoE4 that increase risk of early Alzheimer's disease but to establish co-markers that either counteract or enhance the effect of ApoE4. Continued decline in the cost of whole genome sequencing combined with ever more effective correlation of genomes with health status will go beyond correlating single variations of protein-coding genes with specific diseases. It will allow us to understand how mutations in gene regulation affect levels of gene expression and thus health. Modern genetic manipulations using CRISPR/Cas9 technology, which can edit genes, may eventually be able to alter genetic predispositions to turn more seniors into welllderly persons with youthful brains. The prospects of this technology are exciting, but much research is needed before attempts to edit genes in humans without serious genetic diseases could be considered safe and ethical.

While in the future we may be able to predict longevity based on genetic predisposition and lifestyle, for the time being, neither correlation nor causality of genes and lifestyle with aging is firmly established. Since genetic analysis is already under way to define the common genes of up to one thousand octogenarians, AMBI focuses on precision early diagnosis of known mental functional decline associated with age and disease. For example, AMBI is developing simple computerized measurement to collect precision data to follow and ultimately predict future age-related mental decline in reaction speed and ability to correct mistakes. Such quantifiable biomarkers have also been identified for brain diseases such as Huntington's and Parkinson's. In addition, molecular countermeasures are being cultivated that will potentially result in interventions to prevent cognitive decline and whose effectiveness can be followed using the

sophisticated precision assessment of outcomes. Identifying promising interventions and evaluating them in long-term studies will require ongoing commitments of research at universities such as the University of Iowa's Aging Mind and Brain Initiative, with the Center on Aging playing the main role of disseminating the information and treatments developed by AMBI faculty.

Beyond living longer, healthier lives, we have to ask, what are the effects of healthy seniors living to ninety-five-plus years on our accepted sequence of steps in life: learning, working, and retiring? Simple linear extrapolation of current life cycles to adjust to longer life expectancy is missing the opportunity to redefine new phases in our lives for which we simply did not have the time before. Indeed, some data suggest that a ten-year-old has a 50 percent chance to reach 100 years.<sup>7</sup> Instead of retiring at age sixty-five, one could seize the opportunity to define a new phase in our lives between having fulfilled all of our societal obligations and deserved relaxed retirement: a phase of senior creativity and novel aspirations to reach new heights in whatever motivates us. Such a phase could last from ages sixty to eighty, redefining eighty as the new sixty and could account for twenty or more years of what is traditionally associated with a tranquil retirement. This should inspire the juniors to look forward to such a time as well as keep current seniors longer engaged in the society they are living in. As an aside, continued social interaction and engagement are strong indicators for mentally healthy longevity.

### **Extending Life: Future Hopes and Risks**

Of course, some diseases seem to relate invariably with cellular processes. For example, over 60 percent of human cancer correlates with—and may be caused by—the proliferation rate in a given tissue.<sup>8</sup> While cancer cell proliferation is accelerating, reduction of telomeres constrains the normal ability of cells to proliferate. As another example, the sensory cells of the ear apparently show a continuous numeric decline, setting elderly up for hearing loss and balance dysfunction. Molecular and cellular therapies aim to increase the self-correction within cells but also eliminate dysfunctional cells and stimulate those areas where no new cells naturally form.

No matter how successful these approaches may become, organ transplantation therapies to replace not only a failing heart but failing lungs, ears, and eyes will eventually be needed. Consider that in the future a few cells taken from a skin biopsy can be transformed into any cell type of your body and induced to form a beating heart or lung in a bioreactor. Since this artificial organ is made from your own cells, it can be transplanted back to you without facing tissue rejection. Combining such tissue culture approaches with proper organ scaffolding has already started in heart replacement<sup>9</sup> but will take some time for more complicated organs and thus needs to be initiated. Some AMBI-based research investigates transplanting: for example, developing ears to optimize such strategies and find out ways to connect such new organs (ears) with the brain, also a major problem in regeneration of vision.

One may also ask, who is willing to work for an additional five to ten years simply to be able to pay for an additional fifteen years or so of retirement, possibly in bad health—or save about 50 percent of income earned between ages thirty and sixty just to make ends meet during the prolonged retirement? For those working low-paying, repetitive jobs, such a perspective is not very enticing. This requires reflection on how altered longevity affects all levels of society, not just the few who can afford to have and look forward to a longer retirement. Expansion of skill sets and acquiring novel skills will be necessary to make this feasible and desirable for more members of society.

The good news is the very likely increase in longevity.<sup>10</sup> The bad news is that this does not automatically amount to an increased *healthy* life span. Indeed, the current obesity wave, with 30 percent of children being obese, combined with late onset diabetes, is slowing down and even eroding gain in life expectancy in the United States. Likewise, while we are gaining ground in survival from cancer and heart diseases, we are seeing an increase in dementia with no clear strategy to cure it or even delay its onset.

Some developed countries report a 20 percent decrease in new cases of dementia in a given cohort. While currently one in ten people over sixty-five has dementia, the total will increase as more people are living longer and thus may reach an age when they will become demented. In aggregate, this implies that dementia cases will likely increase in the foreseeable future. Costs for this aging-related problem alone will exceed

\$1 trillion by 2050, according to the Alzheimer's Society. This is roughly twice the annual defense budget of the United States. Enjoying longevity requires solving how to finance healthy life span increases. Without effectively changing the occurrence of dementia, adding years to our life span may add mostly years living in nursing homes.

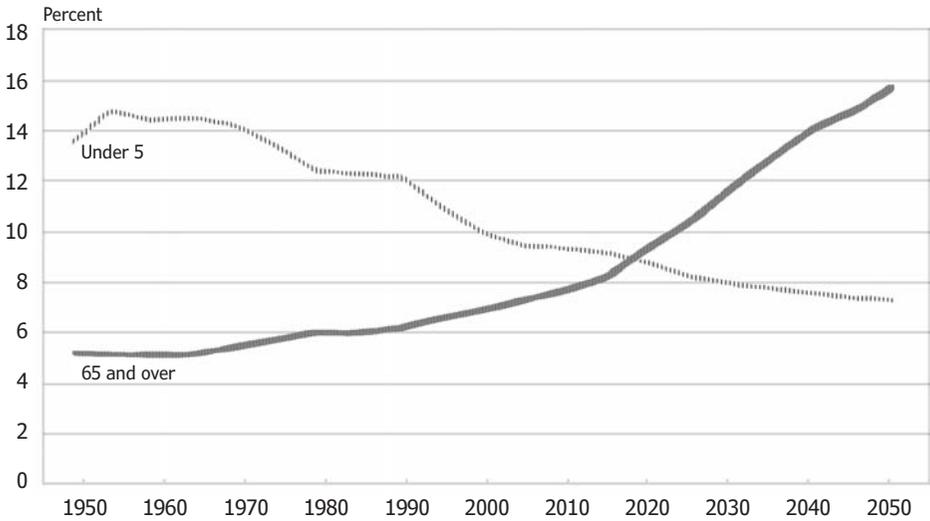
Beyond the emotional impact of experiencing a loved one “fade away” as the person you once knew is the financial burden when that person can no longer be cared for at home. At a cost of \$6,000 or more per month for long-term nursing home care, most people's reserves and Social Security income will not suffice. Fifty percent of Americans have retirement savings of less than \$25,000, and the mean savings is just around \$50,000, compromising the financial well-being of the elderly. Luckily enough, Iowa is faring much better, with the typical seventy-year-old making around \$70,000. Still, Social Security payouts are projected to decrease after 2035. In Iowa alone, projections predict an increase of nearly 30 percent of people with dementia, costing about \$600 million by 2025. In fact, the World Economic Forum (WEF) has described the shortfall in pension funding and a lack of personal retirement savings as a “time bomb.” The group estimated that just eight countries—the United States, United Kingdom, Japan, Canada, Australia, India, China, and the Netherlands—face a combined shortfall of \$400 trillion by 2050.

Given the fact that much of the estimated \$250,000 lifetime health care cost of the average American is accrued after age sixty-five, finding solutions to this problem is an urgent need. The situation is adding to the disproportionately high health care costs in general in the United States.<sup>11</sup> Even short delays of one to two years in the onset of dementia could dramatically benefit individuals and society by adding healthy, truly “golden years.” Some of the research aims to achieve this, but it is unclear at what time it will be cost-effective enough to minimize the foreseeable financial burden of increased longevity without added healthy life span.

## **Summary and Conclusion**

It's clear the aging boom is upon us. Demographics predict that an increase from historically less than 5 percent to more than 20 percent of citizens older than sixty-five years, with nearly 2 billion seniors worldwide, will

## Young Children and Older People as a Percentage of Global Population: 1950 to 2050



Source: United Nations, 2013

From 1950 to 2050 our society has switched the proportion of younger than 5 years and older than 65 years. Starting in 2018 the percentage of people age 65 and older will increase, while the percentage of children will fall to the percentage that seniors had around 2000. Chart by Bernd Fritsch, University of Iowa Department of Biology.

define the future. This will generate novel age distributions never experienced before in human history. Furthermore, in the United States, where over 80 percent of household wealth is held by those age fifty or older, who also consume more than fifty cents of every dollar, retirement savings is unequal and far from adequate for many Americans. This impacts many seniors today and will create major challenges for future generations if savings trends don't change.

The societal impact of this superaged population will include an increase in total capital, but *the benefit of this wealth will be determined by the proportion of sick to healthy people*. Some older adults will continue to be independent and contribute to society at multiple levels, whereas sick elderly people will depend on societal help and resources. The “longevity economy” could tap into the estimated \$6 trillion in private retirement savings in the United States alone, an amount exceeding most interna-

tional economies. But this requires implementing preventive health care much earlier in life and more effectively, a declared goal of the AMBI and Center on Aging at the University of Iowa.

The outcome of this unique human experiment will be determined by a number of factors, but adding healthy years will most certainly depend on a combination of several key actions: identifying genetic predispositions, appropriately adjusting diet, and taking other precautionary measures and individualized countermeasures. On the optimistic side are futurists like Ray Kurzweil, who look forward to a machine/human integration in a society with extremely long life expectancy<sup>12</sup> of 150 years or more. Balancing healthy longevity with economic wealth for all should be a primary goal for this possible future.

## Notes

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## Know It or Not

### Public Health Research Has Transformed Your Life

CLEAN WATER AND AIR. Food that does not make us sick. A toilet to flush away our waste. Surviving childbirth. Living a healthy and vital life into old age.

These are expectations we take for granted in the modern developed world, largely thanks to public health research and the translation of this research into practice. While health care providers treat people who are sick, public health practitioners aim to keep people healthy by *preventing* disease and injury. While medical researchers study how to improve treatment, public health researchers seek ways to alter root causes of disease and injury, thwarting those risks before they cause poor health.

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#### Iowa Connection

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The University of Iowa College of Public Health is a leading authority on research related to lung cancer, and its faculty were instrumental in sentinel studies that identified the causes of mesothelioma and that verified radon exposure as a cause of lung cancer. William Field, professor in the Department of Occupational and Environmental Health, is recognized as one of the foremost authorities on radon, both for his research that helped link it to cancer

and also for his advocacy and outreach activities to ensure the implementation of prevention practices. For example, a 2012 op-ed article in the *New York Times* written by Field educated the public about how radon accumulates in homes and what homeowners can do to reduce it. Field now serves on the EPA Science Advisory Board Radiation Advisory Committee and the CDC Advisory Board on Radiation and Worker Health.

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The path toward discovering radon's hidden dangers illustrates well how public health research benefits communities. Radon is an invisible, odorless, and tasteless gas that is the second leading cause of lung cancer in the United States. It is produced by the natural radioactive decay of radium, and humans are exposed through the air that we breathe. While radon occurs naturally outdoors, it is enhanced indoors because of construction practices that do not include radon resistant features. Some geographic areas, such as Iowa and the Midwest, have very high levels of radon. Public health research was responsible for understanding how humans are exposed to radon, for identifying the link between protracted radon exposure and lung cancer, and for developing and implementing evidence-based prevention programs. Public health prevention is by nature multifaceted, and prevention activities to reduce radon exposure include testing homes, schools, and workplaces; installing mitigation systems; instituting radon-resistant new construction policies; and sustaining and enhancing programs to promote consumer awareness about radon.

Prevention of lung cancer from radon begins with the scientific study of the risk factors that contribute to poor health and ends with widespread dissemination and communication of effective prevention strategies. Public health focuses on the health of individuals, nested within their families, nested within their communities. This population-level focus is somewhat unique in health research, and it follows the premise that our health is strongly tied to the communities in which we live, work, and play. Efforts to treat ill or injured individuals can have an impact on that individual, but efforts at the population level can improve the health of the entire community.

Given that public health focuses on communities, it makes sense that academic public health is the most community-engaged of all sciences. It was in academic public health that the field of community-based participatory research (CBPR) had its origins. CBPR is a partnership approach to research that equitably involves, for example, community organizational representatives and researchers in all aspects of the research process—an approach in which all partners contribute expertise and share decision making and ownership. CBPR is unique in research approaches in that it gives the community the lead voice. In Iowa, the College of Public Health has established a CBPR project with the community of Ottumwa, where

the Prevention Research Center, funded by the US Centers for Disease Control and Prevention, is working with community organizations and members to increase physical activity among community residents. Central to this project has been the guidance provided by the Community Advisory Board, which consists of community organizational representatives and which has been actively involved in decision making for every aspect of the project. With community leadership, health-related improvements such as walking trails and fitness classes have been established. CBPR has been demonstrated as an effective path toward sustainable long-term change, in part because the interventions are identified by the community and the community is engaged in their implementation.

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### Iowa Connection

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The State Health Registry of Iowa, housed at the University of Iowa and funded as one of seventeen Cancer Registries by the National Cancer Institute, has been collecting vital data about cancer frequency and trends in Iowa since 1973. In addition to providing population-level surveillance of cancer, the registry is the most comprehensive resource on cancer for health care providers, policymakers, industry, and the gen-

eral public. Each year, the registry releases the Cancer in Iowa Report,<sup>1</sup> which provides statistics and trends and which features one area of cancer prevention. Iowa is one of the only primarily rural and midwestern states represented among registries, and data from Iowa are instrumental in driving cancer prevention and treatment activities in the region and nationwide.

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While public health research is notable for community engagement, it is also notable as a highly interdisciplinary field. Public health problems stem from complex social, political, economic, environmental, and biological causes; and solutions require integration from each of these lenses. The integration of multiple fields of study has contributed to the high impact of public health research, and public health creates a playground in which multiple viewpoints contribute to solve health challenges. By bringing wide-ranging fields together, we have been able to define new paradigms for prevention.

Public health–driven paradigm shifts have been common in the study of cancer. While a great deal of research focus has been dedicated to the

diagnosis and treatment of cancer, public health research prioritizes prevention of cancer, removal of barriers to access to care, and population-level impact. These advances started with the establishment of cancer registries that facilitated the study of cancer trends and outcomes, and these registries have been instrumental in identifying causes of cancer ranging from smoking to obesity to genetics. Once causal factors are identified, partners can be brought together to take steps to reduce the incidence of cancers, such as guidelines for nutrition and physical activity for cancer prevention, policies that reduce tobacco use, and strategies to reduce environmental exposures. To achieve these advances, cancer researchers in public health have partnered with experts in basic science, informatics, engineering, communications, marketing, and policy.

The University of Iowa provides a stellar example of interdisciplinary research that has led to reductions in deaths and injuries from road traffic crashes. Large-scale efforts to reduce road traffic crashes in the United States began after increasing recognition of motor vehicle–related deaths in the 1960s; and since that time, the United States has experienced drastic reductions in motor vehicle deaths despite steeply increasing vehicle miles traveled. To prevent road traffic injuries in Iowa and the nation, Iowa houses a unique interdisciplinary blend of simulation, naturalistic, psychological, and interventional research. This team of researchers includes faculty from public health, public policy, engineering, psychology, computer science, neurology, emergency medicine, and education.

Together, this team produces state-of-the-art research to identify root causes of road traffic crashes and has implemented interventions focused on teen drivers, drugged drivers, elderly drivers, bicyclists, and pedestrians. Facilities, technologies, and initiatives include the Injury Prevention Research Center, the National Advanced Driving Simulator, the HANK Virtual Environments Lab for pedestrian and bicycle safety, the Pedal PORTAL instrumented bicycle, and the University of Iowa Children’s Hospital bicycle safety program.

Public health research is high impact and action oriented, and thus its contributions have measurable results in reducing premature death and prolonging healthy living. For example, the field of translational medical science has four steps, the last two of which are largely the domain of public health. The first phases in translational research involve

basic science and preclinical-to-clinical research. However, we know that individual patient treatment has limited impact on overall population health. Furthermore, most of us would rather have our potential diseases prevented than have to go through treatment for them. Thus, focus on the next steps of translational research are vital to the public's health. These steps involve the implementation of prevention and intervention programs into routine practice and advancing programs into large-scale sustainable community models that impact population health.

The complexity of public health challenges necessitates that these approaches be multifaceted. While we wait, for example, for science to develop a vaccine against obesity, we must in the meantime address obesity's contributors, which start with food production and extend through food availability and resources.

One success story of population-level translational research involves improved community-level access to healthy food. Through a partnership with the Iowa Department of Education's Team Nutrition, College of Public Health faculty and students have worked to improve school meals and to encourage students to make healthy choices in school districts across the state. Over the course of this partnership, they have developed social marketing campaigns to encourage parents to support changes to school meals, promoted school breakfast in high schools, and encouraged communication between food service staff and their students to improve the lunchroom experience. These projects have resulted in increases in school lunch and breakfast participation, greater understanding and communication between food service staff and students, and higher levels of satisfaction among students related to school meals.

Public health research is a good investment for individuals and for our communities. Despite the fact that in 2016 the US spent 17 percent of its gross domestic product and nearly \$10,348 per capita on health care, multiple studies worldwide have shown that health care expenditure and treatment of disease are not the leading drivers for better health status. Public health innovations do lead to better health. They have drastically prolonged life as well as the number of healthy years that we can expect to have. Because public health issues have such strong impact on individuals, families, and communities, we will always seek to solve them.

However, essential components of our public health successes include the research that helps us understand the multiple, complex root causes of poor health; the effective approaches to address these causes; and the best methods of translating and disseminating these approaches into communities using participatory methods.

## Note

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## Iowa's Role in the Genetics Revolution

SINCE THE IDENTIFICATION in the 1950s of DNA as the molecule containing genetic information and forty-six as the number of human chromosomes, the University of Iowa has provided insights into a range of human inherited disorders that result in both pediatric and adult-onset conditions. Iowa has a history of gene discovery leading to better diagnosis, treatment, and prevention of genetic disease. Through its institutional leadership, UI has partnered with state agencies to deliver what has become the model of public health genetic screenings and has also had the foresight and wisdom to include applied ethics in its development of genetics-based programs.

Iowa's involvement in the genetics revolution as applied to medicine began in 1959 when Johannes (Hans) Zellweger became professor of pediatrics at the University of Iowa College of Medicine. A Swiss native, his storied career included two years working with famed physician, philosopher, theologian, and Nobel Peace Prize recipient Albert Schweitzer in Africa; a return to Switzerland to recover from tuberculosis; assistance to immigrants fleeing Nazi Germany as a member of the Swiss ski patrol; and a stint as professor and head of the Department of Pediatrics at the American University in Beirut.

Zellweger was among the prescient few who anticipated the looming, foundational importance of genetics for basic medical research and provision of clinical care. After his arrival at the University of Iowa, he began to assemble the resources, people, and infrastructure to build up the university's capabilities in these areas. He also diagnosed children with a collection of congenital abnormalities now known as Zellweger

syndrome. Building on the expertise and early efforts of Zellweger, the university has developed a widely respected presence in birth defects surveillance, newborn screening, and human genomic studies.

In 1976, James Hanson joined Zellweger on the faculty of pediatrics. Hanson complemented the aspirations of Zellweger with his expansive vision for genetic services in Iowa, which ultimately became a model for other states. His public health approach—which has involved partnerships among the state health department, the College of Medicine’s departments of pediatrics and of obstetrics and gynecology, and a designated central screening laboratory—has proven to be optimal for providing statewide genetic screening, coupled with local access to clinical genetic services in a cost-effective and timely manner. This philosophy has also proven to attract dedicated clinician scientists with strong research backgrounds. Over the decades their studies have benefited from this established structure, and their research, in turn, has contributed to an enhanced learning environment for those providing care on the front lines and those whose lives are impacted.

Iowa has distinguished itself as a leader in one of the most important public health initiatives in the nation: newborn screening. In 1965, the Iowa Legislature enacted a law recommending voluntary testing for phenylketonuria (PKU), the prototypical disorder of metabolism in which an unchecked buildup of phenylalanine leads to mental retardation and delayed development. Early detection allows for dietary modifications that can enable the newborn to have a fully normal life and sets the standard for screening based on early and cost-effective detection tied to beneficial interventions. Congenital hypothyroidism and several other tests were added in 1981. In 1983, legislation was passed giving the Center for Congenital and Inherited Disorders (CCID) oversight of newborn screening in Iowa. At the same time the State Hygienic Laboratory (SHL) was designated the central screening laboratory. Screening is now mandatory unless a parent specifically “opts out.”

Currently, newborns in Iowa are screened for approximately fifty disorders by testing a dried blood spot specimen obtained from a heel stick. The majority of the tests are conducted by means of tandem mass spectrometry. Roughly sixty newborns each year are found to have one of these disorders. Many of these infants, like those with PKU, hypo-

thyroidism, and other disorders, will lead normal lives when treated. Because of the comprehensive nature of Iowa's genetics network, infants born with conditions lacking fully effective therapies may be enrolled in collaborative studies, such as enzyme replacement therapy, to search for new treatment modalities. In the past, other important research was allowed on these blood spots after newborn screening was completed. These leftover specimens were deidentified, meaning they could not be traced back to the infant.

The first director of the SHL, William Hausler, established Iowa as one of the premier and innovative newborn screening programs in the country, a tradition continued by Stanton Berberich, the long-term program director. Not a “bottles and jars” laboratorian, Berberich has been more concerned with how proposed changes to the program would impact the patient. A courier system was instituted that operates daily and on holidays, with the laboratory staffed seven days a week, including a night shift. For a few of these disorders, timeliness is critical; even a delay of a few days before institution of treatment can result in harm. Berberich recently received the George Cunningham Visionary Award in Newborn Screening given by the Association of Public Health Laboratories. Because of its reputation as a premier facility, it was to the Iowa Newborn Screening laboratory that authorities in Louisiana turned to perform their newborn screens after Hurricane Katrina destroyed their own capacity.

Beginning in 1984, in an effort to move public health screening to the very earliest stages possible, early pregnancy, the Department of Obstetrics and Gynecology, under the direction of Roger Williamson, initiated a maternal serum screening program based on a blood sample to detect fetal and other high-risk pregnancy conditions. Importantly, if alphafetoprotein, a protein the fetus makes in its liver, is elevated in maternal serum, the pregnancy is at higher risk for a poor outcome; this screening result thus signals that the pregnancy should be followed more carefully and the parents informed concerning specific risks.

Maternal serum screening was preceded by educational sessions throughout the state, emphasizing counseling and the voluntary nature of the program. As this program evolved, newer, more effective combinations of testing with serum markers, sometimes combined with ultrasound measurements, were introduced. Because this Iowa program was

centralized, with rigorous follow-up and data collection, we participated in large, collaborative studies to determine the most efficacious testing to offer. As with leftover newborn specimens, researchers at Iowa have been able to use deidentified maternal serum specimens to publish, for instance, a method to predict preterm birth by assaying a combination of these serum tests.

Both the newborn and maternal serum screening programs have benefited from allowing initial testing and evaluation to occur locally, along with long-term follow-up care when needed. In parallel, the University of Iowa Hospitals and Clinics has provided a platform for the specialized medical and surgical care that is sometimes required for these disorders. The Maternal-Fetal Medicine division in the Department of Obstetrics and Gynecology, the Neonatal Intensive Care Unit in the Department of Pediatrics, and various subspecialty units in neurology, cardiology, orthopedics, and other departments are consulted when needed, thus providing Iowans with the most comprehensive care possible.

Another high-functioning entity providing a valuable service to Iowans is the Iowa Registry for Congenital and Inherited Disorders (IRCID, previously the Birth Defects Registry). This registry, housed in the College of Public Health at the University of Iowa, has been operational since 1983, and like the other programs discussed, is overseen by the CCID. Information on over 45,000 infants born with a variety of birth defects has been collected since the inception of the registry. The depth of these reports and the reach of the registry activities have been made possible by a change in the Iowa Code mandating the reporting of birth defects. Since 1996, under the directorship of Paul Romitti, the IRCID has been funded by the Centers for Disease Control as one of eight national Centers of Excellence in the Research and Prevention of Birth Defects. This funding was expanded in 2002 to include children with various forms of muscular dystrophy, and, in 2011, Romitti received a grant to include stillbirth surveillance. In 2010, the IRCID was singled out for the State Leadership Award from the National Birth Defects Prevention Network.

These public health measures have been complemented by changes in the clinical relevance of genetics. DNA is the physical substrate of genes and chromosomes, disorders of which, often in combination with environmental factors, underlie so much of our disease burden. Zellweger

performed the first chromosome tests in 1960, only four years after the accurate number of human chromosomes was first determined. With the hiring of Shivanand Patil in 1977, the chromosome clinical diagnostics laboratory, which focused heavily on cancer and birth defects diagnostics, advanced to the forefront of rapid technological innovations, which have characterized the field as it applies to clinical care.

Iowa has gained an international reputation in this genomics era. George Winokur in psychiatry and Hanson in pediatrics—recognizing that understanding the biological underpinnings of psychiatric and pediatric diseases could provide keys to improving diagnosis, treatment, and prevention—built programs that included clinicians and scientists dedicated to gene discovery. These investigators, working hand in hand with experts in the College of Public Health to investigate the environmental contributions to human disease, have enabled Iowa to make major contributions to gene discovery and our understanding of gene-environment interactions. The acceleration of basic genetic knowledge leading to the sequencing of the human genome was fostered by the establishment of human genome centers. The Carver College of Medicine hosted one of these centers in the 1990s. The work of this center, in part, established genetic markers along the length of the chromosomes, facilitating the discovery of disease genes and the larger sequencing projects.

The history of innovation continues today through the application of DNA sequencing technologies by the Iowa Institute of Human Genetics. Major contributions have been made to both basic and applied research for a wide range of individual genetic disorders with a single gene cause, with particular acclaim for muscular dystrophies, cystic fibrosis, inherited disorders of hearing, Huntington's disease, and inherited eye diseases. Complex disorders that include multiple genetic and environmental components have also benefited from investigation by Iowa clinicians and scientists. Of particular note are the areas of psychiatric genetics, autism, cleft lip and palate, obesity, and cardiovascular/hypertensive disorders. Of course, there are many other examples and investigators too numerous to include on this partial list.

Credit must also be given to the many nurses, genetics counselors, patients, families, postdoctoral fellows, graduate students, administrators, and others who make this work possible. In addition, the basic genetic

sciences involving viruses, bacteria, yeast, fruit flies, zebrafish, mice, and other organisms have benefited from the vision of biologists like John Menninger and Gary Gussin, who established a premier graduate PhD program in genetics that interfaces directly with the human genetics researchers. This program educates the next generation of genetic scientists and enables the current generation to do more effective research by using animal models for human diseases.

Finally, it is important to acknowledge the many ethical challenges raised by genetics research and Iowa's response to those. The human genome center in the 1990s was the first to include a formal ethics component under the direction of Robert Weir, and this tradition of investigating the role of ethics in applying science to genetics has continued. The College of Nursing has served as an important platform both for the delivery of genetic counseling and for understanding the broad reach of social and legal concerns arising in genetics.

What may we anticipate in the future? Newer technologies and refinements in current capabilities are developing at an accelerating pace. As one example, the genome of an individual can now be sequenced at a fraction of the original cost in only two to three days. The implications are profound. In the coming decades it may become routine to sequence the genome of every newborn, eliminating much of the need for diagnoses based on biochemical testing. All of us carry variations in our DNA that may predispose us to disease, which may not manifest for years or decades, some of which may have no treatment. Further, a specific DNA change or variation may produce disease in one individual but not in another. These realizations only hint at the complexities of sequencing a genome and then providing accurate, understandable counseling based on that sequence. The ethical, legal, and social issues arising from the possibility of sequencing newborns are immense.

The excellence of all these programs that positively impact Iowans has required the concerted and collaborative efforts of many individuals and groups. Zellweger and Hanson set in motion a large, public-minded vision, which has extended beyond Iowa's borders. In the realm of gene discovery and its impacts on health, Iowa's influence is global. The dynamism that has characterized the genetic revolution will continue. A

nimble, well-supported medical research program is critical to assuring the delivery of quality clinical care. Having established a rapport with the public and earned its confidence, the programs described herein are in a favorable position to respond to the coming challenges.

◀ MARIN SCHWEIZER, CHRISTINE PETERSEN,  
KURAYI MAHACHI, AND KELLY BAKER

## **Ticking Time Bomb**

### **People, Animals, and the Effect of Antibiotics on Health and the Environment**

THERE'S A SAYING that too much of a good thing can be harmful. Nowhere is that truer than in the world of antibiotics, a miracle cure that researchers are learning also has unintended—and even deadly—side effects because of its widespread misuse.

The discovery of antibiotic compounds, specifically penicillin, prior to World War II, led to amazing decreases in soldier casualties; fewer troops died in that war because of infections than in any previous armed conflict. The ability to use these drugs led to declarations from the Surgeon General and others during the 1960s that the scourge of infectious diseases had been defeated. On the animal health side, use of antibiotics has allowed for great advances in the health of all animals, including dairy cows, which are often infected with bacteria. There was so much confidence in the endless ability of antibiotics to prevent infection that certain classes of antibiotics were used as feed additives to provide consistent growth improvements in all areas of poultry, beef, and pork production. In 2016 the markets for antibiotics centered on three primary applications: to treat human bacterial infection as prescribed by medical doctors; to treat animals used as food and companion animal infections as prescribed by veterinarians; and to use as growth enhancers in animal feed.

### **The Specter of Antibiotic Resistance**

Ever since the Food and Drug Administration (FDA) approval of the antibiotic penicillin in 1943, there has been concern that overuse of antibiotics will lead to antibiotic resistance. Currently, people all over the

world are becoming infected with untreatable or difficult-to-treat bacterial infections that are resistant to all—or nearly all—the antibiotics that we have available. Not only does the loss of effective antibiotics lead to more infection-related deaths, but it has undermined the ability to manage infectious complications of chemotherapy for cancer or of dialysis for renal failure, as well as infections that occur following surgery and organ transplantation. Without effective antibiotics, these life-saving medical advances may pose great postoperative health risks to less-than-healthy individuals requiring organ transplantation or chemotherapy.

### **Antibiotic Resistance and the University of Iowa**

The University of Iowa has been at the forefront of antibiotic resistance research and dialogue for more than half a decade. In 2014, researchers at the University of Iowa and Iowa City Veterans Administration (VA) hospital evaluated whether veterans from rural Iowa who were admitted to the VA hospital and lived close to large pig farms were more likely to carry antibiotic-resistant bacteria than rural VA patients who lived farther from these farms. They linked information from 1,036 veteran patients to data from the Iowa Department of Natural Resources to determine who lived near larger swine-production farms (defined as an operation with more than 2,500 pigs on site). This study found that, of the veterans admitted to the Iowa City VA hospital, those who lived within one mile of the large swine farms had double the risk of carrying a drug-resistant staph infection known as MRSA (Methicillin-resistant *Staphylococcus aureus*) in their nostrils compared to rural veterans who lived farther from such farms.

It's unclear where these veterans picked up the antibiotic-resistant bacteria—on those farms or through contamination of water, air, food, or other sources. This study had similar results to studies performed in Pennsylvania and the Netherlands. This important research was part of the reasoning that led to the 2017 Veterinary Food Directive from the FDA banning the use of medically important antibiotics in animal feed.

Because of the rising concern about antimicrobial resistance, in 2016 the University of Iowa's College of Public Health hosted the Great Plains Emerging Infectious Diseases Conference, with the theme of antibiotic

resistance. This conference brought health professionals from around the country to Iowa City to discuss novel approaches to stemming the rise of resistant bacterial “superbugs.” Key opinion leaders including Karen Bush, a leading figure in antibiotic resistance research, spoke about the significant threat of antibiotic resistance, the rapid decline of effective antibiotics, and the limited pipeline of novel compounds emerging from the pharmaceutical industry. Because of this conference and many other research and collaborative activities, the University of Iowa has become a focal point for antimicrobial research and collaboration connecting multiple fields of health care, biomedical research, and health policy in order to stem the decline of effective antibiotics and ensure their use long into the future.

### **The Impact of Health Care–Associated Infections and Antibiotic-Resistant Infections**

Approximately 75 percent of antibiotic-resistant infections spread from patient to patient in hospitals or nursing homes. These infections are called health care–associated infections. The remainder of infections are acquired from community sources, although these community-associated infections can then be spread into and through a hospital or other health care settings, such as the example of veterans living close to large hog farms. Antibiotic-resistant infections are most often seen among hospitalized patients because these patients often have weakened immune systems from medications such as chemotherapy.

Moreover, breaches to the body’s natural barriers, such as surgical incisions or wounds, allow opportunistic bacteria to invade and spread from infected to uninfected patients in hospitals via the hands of health care workers or hospital surfaces (such as bed rails or computer keyboards). Consider the fictional but representative case of someone we’ll call Julie, a spry sixty-eight-year-old woman who lives alone and works part-time in a Quad Cities gift shop. On an icy winter day, Julie slips, breaks her hip, and has to have routine hip-replacement surgery. Ten months later, as she is nearing full recovery from her surgery, her hip begins feeling hot, swollen, and painful.

Julie is readmitted to the hospital, where doctors determine that she

has a drug-resistant staph infection, MRSA, in the replaced hip. Over the next year, Julie has multiple courses of intravenous antibiotics and undergoes two more operations to eliminate the infection and replace the artificial hip. Because of her inability to care for herself, she has to move from her own home to a nursing home and has to undergo months of physical therapy to walk again. Stories like this are far too common and can be told by people of all ages and all walks of life.

Surgical-site or other health care–associated infections can often be prevented by restricting unnecessary use of antibiotics and keeping hospital surfaces, health care workers' hands, and patients' skin free from harmful bacteria. The Centers for Disease Control and Prevention (CDC) found that as much as 50 percent of all antibiotics prescribed in the United States are unnecessary or not optimally prescribed. This often occurs when people get antibiotics for viruses, such as colds or influenza, even though antibiotics are active only against bacteria. When this happens, small amounts of healthy bacteria that colonize the human gut, skin, and lungs can develop coping mechanisms to resist the killing effect of antibiotics. These bacteria can multiply without competition because antibiotic-susceptible bacteria in the body were wiped out. Antibiotic stewardship is the process of limiting unnecessary use of antibiotics in any setting. In the hospital setting, antibiotic stewardship involves educating patients and doctors on the best use of antibiotics and limiting use of antibiotics most commonly associated with resistance.

The CDC estimates that each year in the United States alone, at least two million people develop antibiotic-resistant infections; and another 250,000 patients develop *Clostridium difficile* infections, which are also associated with overuse of antibiotics and a disruption of healthy gastrointestinal tract bacteria. At least 37,000 of those infected Americans die from their infections each year, and even more die from other conditions that were complicated by antibiotic-resistant infections. Those who survive these antibiotic-resistant infections still may end up having longer hospital stays, delayed recovery, and long-term disability. The total cost of antibiotic resistance to the US economy has been estimated to be as high as \$20 billion per year in excess direct health care costs, and another \$35 billion per year in loss of societal productivity such as time away from work.<sup>1</sup>

The World Health Organization states that frequent hand washing using alcohol-based hand rub or soap and water is the best way to stop infections. However, thorough hospital cleaning is also an important method to prevent spread of these pathogens. Many studies have shown that antibiotic-resistant pathogens can be found on hospital bed rails, call buttons, and door handles and that they remain there after the infected patient has been discharged and a new patient admitted to that room. Infection prevention can be as simple as making hand rub dispensers more convenient for doctors and nurses, ensuring patient rooms are thoroughly cleaned by housekeeping staff, and improving training of health care providers on optimal use of antibiotics. Recent high-tech developments include UV robots that can kill specific types of antibiotic-resistant bacteria, like MRSA, in rooms after patient discharge. Usually a combination of these interventions works best.

### **Challenges of Balancing Antibiotic Use and Animal Health in Food Animals**

As an example of the important balance between proper animal care and husbandry and antibiotic use for treatment of animals, two studies were performed in 2009 and 2014 by veterinarians working with dairy herds in Wisconsin, New York, and Ontario. These combined studies found that, as a result of common husbandry practices (antibiotic teat dips, stringent milking parlor disinfection regimens), the improved antibiotic resistance profile of the cows correlated to a much lower incidence of mastitis or udder infections. This is good news for all milk drinkers, as it means that overall the likelihood of finding an antibiotic-resistant organism in the raw milk of a sick cow, let alone in pasteurized (heated, normal grocery store) milk, was low. Nonetheless, the increasing trend toward drinking raw milk, which is not processed at all, is concerning. Raw milk has been the cause of multiple food-borne outbreaks leading to hospitalizations and, in a few rare instances, deaths.

The growing popularity of organic milk has altered the normal interactions among veterinarian, dairy owner, and animals. Per Oregon Tilth certification (OTCO) standards, antibiotic use in and on dairy cows

is greatly limited and, as a result, allows higher somatic cell counts, or white blood cell levels, in bulk tank milk samples. In one organic dairy in New York, this meant that cows sometimes were not treated for low-level mastitis. In some instances, cows were more likely to die from infection as the initial signs of disease were ignored to allow organic milk production. This is not good news for savvy shoppers who buy organic milk with the perception that it is somehow healthier overall. Drinking a lesser amount of potential antibiotic residues but an increased quantity of white blood cells from infected cows is not often a welcomed trade-off. Finding the right balance between appropriate treatment and overuse of antibiotics should be the goal for all livestock managers.

As already mentioned, to prevent medically important antibiotic use in animal food, the FDA has taken important steps toward elimination of these drugs for growth promotion and feed efficiency. Through this very recent change, known as the Veterinary Feed Directive, the FDA has mandated that antibiotics used to treat people cannot be used in animal feed. Any remaining therapeutic use of antibiotics in animals used for food may happen only under the guidance of a licensed veterinarian. The balance between using antibiotics properly to treat animals that have signs of disease and, at the same time, avoiding antibiotic exposure in animals that are not sick and must stay healthy for maximum production will be a continuing challenge in the coming years. This concern was particularly heightened in 2017, the first year the FDA Veterinary Feed Directive limiting the use of antibiotics in livestock animals was rolled out to multiple production animal marketplaces.

### **Antibiotics in the Environment: A Moving Target**

Bacteria and other microbes produced molecules with antibiotic properties long before humankind recognized their usefulness. This means that bacteria have been exposed to antibiotic selection in the greater environment, albeit on a micro scale, for eons. In recent decades, however, human beings have increased environmental contamination of antibiotics by synthetically mass-producing antibiotics for human, veterinary, and agricultural use. As a result, there is much higher selective pressure for

antibiotic resistance in bacteria living in the environment. For instance, wastewater treatment plants in many large cities are among the leading sources of antibiotic release into our lakes, rivers, and oceans. This is mainly because most sewage treatment facilities were not designed to remove antibiotic compounds from wastewater. The indestructible nature of antibiotic compounds, such as fluoroquinolones like the commonly used antibiotic Cipro, makes their removal from wastewater incredibly difficult and costly, promoting their accumulation in the environment.

Hospitals and pharmaceutical manufacturing plants also produce significant quantities of wastewater contaminated with antibiotics, again because of lack of consideration about the importance of preventing antibiotic accumulation over time in the environment. In cities with large hospitals or pharmaceutical companies, particularly high concentrations of antibiotics are being introduced into recreational water areas like lakes, rivers, and streams through wastewater. This high level of antibiotic residues in urban water sources provides constant selective pressure for environmental development of antibiotic-resistant bacteria.

Similar trends, with perhaps lower concentrations, can be seen in rural agricultural settings across much of Iowa. Past use of antibiotics in livestock for therapeutic treatment, growth promotion, and feed efficiency resulted in increased levels of antibiotics present in livestock manure used both commercially and noncommercially for fertilization of the soil. Antibiotics in livestock urine and feces are directly released into soil and water systems via pasture runoff, increasing antibiotic concentrations in our rural environments. Varied concentrations of antibiotics, a hundred- to a thousandfold higher than water source levels first measured in the 1970s, are being introduced into the environment by both urban and rural industries, which has led to an increased presence of antibiotic-resistant bacteria in the environment.

### **What Is the Future for Antibiotics?**

Antibiotics are still a very important tool to treat bacterial infections in both medical and veterinary realms. Scientists, clinicians, and public health practitioners at the University of Iowa will continue leading the

way, promoting the importance of proper antibiotic stewardship both at the bedside and on the farm. With these continued research and practice efforts, antibiotics can remain part of our repertoire against bacterial infection far into the future.

## Note

1. R. D. Scott, “The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention,” Centers for Disease Control and Prevention, 2009, accessed October 4, 2017, [https://www.cdc.gov/hai/pdfs/hai/scott\\_costpaper.pdf](https://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf).

## Wrapping Our Hands, Hearts, and Heads around a Forest Half a World Away

WHEN WE GO HOME today and fire up our gas stoves and microwaves, let's pause a moment to think of a billion women in the developing world in front of their stoves, cooking meals for their families. Their stoves are three rocks placed at the apices of a triangle, a horseshoe-shaped brick-and-mud hearth or a small metal hearth, and they burn wood or other biomass. It is most often women who spend hours a day gathering fuel, likely trekking in extreme heat over difficult terrain. Finding energy for cooking is a big part of daily life in many rural areas of the globe.

The wood burnt in the stoves in remote areas of the developing world is extracted from the edges of forests, contributing to their gradual degradation. Loss of vegetation and thinning of forests allows greater solar penetration and thus affects the microclimate, leading to accelerated drying, changes in local rainfall patterns, soil erosion, and lack of groundwater retention. Why should we care about these women half a world away? Why do forests in Africa or Asia matter to us? A research team on the University of Iowa campus seeks answers to precisely these questions. The team consists of a feminist anthropologist (Meena Khandelwal), an engineer (H. S. Udaykumar), an archaeologist specializing in environmental change (Matt Hill), an archaeologist specializing in cooking practices across cultures (Margaret Beck), a geographer (Marc Linderman), an urban planning scholar (Jerry Anthony), and a historian (Paul Greenough).

Interdisciplinary research teams exert a gravitational pull on researchers, drawing them into complex, interesting, real-world problems. But they also attract students into their orbits, enabling them to connect with and wrap their hands, heads, and hearts around global issues that enlarge



Women in Rajasthan carry wood from the forest to use as firewood for cooking.  
Photograph by Donna Cleveland.

their creative energies and sense of purpose. Recently, our research group joined forces to offer a Big Ideas course to welcome students into this area of study. We offer them the opportunity to discover for themselves, via active classroom learning, the multiple pathways that connect their own lives to people and places that seem remote. Few things make for an enlightening educational experience like the conjoining of research and teaching.

Why do we need all these experts from different fields working together to study the issue of cooking among the three billion poorest of the poor in the world? Because poverty, energy insecurity, lack of access to education and opportunity for women, water scarcity, pollution, and global climate change are all linked together. Much of the developing world is trapped in this web of cause and effect from which extrication seems nearly impossible. But, given that the problem of cooking with firewood is an issue in the developing world, why do our students need to learn about it? For starters, the issue of cooking with wood-burning fires is not just *their* problem; it's our problem. Use of fuelwood for cooking not only affects local and regional ecosystems, it also has a global impact. Forests



Woman cooking rotis, a type of flat bread, on a three-stone hearth in Karech, Rajasthan. Photograph by Donna Cleveland.

store carbon and play a major role in sequestering all the carbon that we throw into the air by extracting fossil fuels like petroleum to power our cars and by running coal mines to provide cheap electricity for our microwaves. And all that excess atmospheric carbon is what is causing global temperatures to rise, leading to climate change. So, smaller, fewer forests mean more carbon in the air, globally. And that affects all of us.

When the women (yes, it's mostly women who cook in the developing world, much as in rich countries) burn low-quality firewood to cook over poorly conditioned fires, soot is produced. The soot is carried into the atmosphere and transported everywhere. Soot or black carbon in the atmosphere comes from wood burning and other sources such as diesel and coal burning as well as forest fires. Eventually particles of black carbon can return to the Earth's surface, landing on ice masses, including snowcaps, glaciers, and polar ice, leading to darkening of the ice. Dark ice reflects less sunlight and absorbs more of it, decreasing the albedo of the Earth, leading again to warming.<sup>1</sup> Again, we see how activities in one corner of the world impact our entire blue-green planet.

Hand-wringing about the carbon in the atmosphere from wood burning

and forest loss seems a little rich coming from those of us who devour energy without having to produce it ourselves. Our energy consumption and resulting emissions are about a hundred times greater than that of a poor woman toiling in the tropical sun to cook food—and not very much of it—for her family. But, despite the relatively small footprint of the global poor, it behooves us to understand the issue of their firewood use. Wood burning may impact climate in a small way compared to our own fossil fuel use, but in addition it may lead to biodiversity loss, desertification, depressed water tables, and other environmental problems.

Furthermore, the connection between those of us who access energy through large infrastructure projects and poor rural people worldwide who, marginalized from such projects, fend for themselves to find energy for cooking is quite intimate. While scientists trace the movement of carbon from rural homes to glaciers and the atmosphere, the quest for solutions requires us to trace with equal precision the economic and political systems that link people separated by vast geographic and social distance. This is where we must turn to social science in order to connect us—living half a world away in technologically advanced countries—to the global poor who harvest wood from forests to meet their daily energy needs. Climate science meets geopolitics.

The so-called forest commons in the developing world are neither public nor privately owned. They are used by various groups of people who have well-defined customary rights to benefits from the forest (including fuelwood) but don't own the land and can't sell it. Such users of commons have a stake in good governance that protects both the resource itself (by limiting use) and their right of access; limits on use are enforced through social pressure and are often deeply embedded in culture and ritual. Sustainable governance of common property systems enhances food security, institutional stability, resilience, adaptive capacity, and sustainability; therefore, our concern about forests in other parts of the world must lead us to curiosity about how these systems are undermined.<sup>2</sup>

Forest commons comprise nearly 18 percent of global forest area and provide livelihoods (fodder, firewood, timber, etc.), carbon sequestration, biodiversity, and other local and global benefits.<sup>3</sup> Even where surrounding communities rely heavily on firewood for their energy needs, local enforcement and collective action can allow for wood harvesting while

maintaining the health of forests; larger commons, however, are harder to govern and likely to be more degraded through mismanagement.<sup>4</sup> And this is where globalization and international trade regimes can have a major impact.

We usually think of “common-pool” resources, such as forests, on a scale that is local or regional rather than planetary. But this view is no longer valid in our contemporary world. We are now increasingly and directly connected to people in the remotest parts of the globe because today’s large land deals are facilitated by international laws and treaties that protect foreign investors, regardless of a particular country’s domestic law. When a company acquires land, the use of that land tends to shift from multiple local uses (farming, herding, foraging) to monoculture and plantation agriculture, and that land is treated as an abstract commodity rather than a basis of social identity and spiritual value as occurs with a family farm passed down through generations. This transformation of land into a commodity is facilitated by investment brokers and governments.<sup>5</sup>

Once native people or peasants are displaced by large plantations, they are likely to migrate to cities or other countries in search of jobs. The inability to make a living from the land due to degraded environments, climate change, land grabs, and enclosures is a primary reason that Indian villagers in Rajasthan find themselves hauling bricks on a construction site in the nearby city of Udaipur or Mexican farmers are working in meatpacking plants in Iowa. We *are* all connected—through trade deals, international treaties, commodity chains, and global markets. However, and this is crucial, we do not all share the same ability to shape these systems. Nor are we all impacted in the same way. The negotiation table is not a round one at which the world’s rich and poor all have a seat. This is why deals made in New York or Paris by powerful stakeholders are contested in streets and forests around the world. Our consumption of high-value products (minerals, organic materials such as palm oil) and high-calorie foods (milk, meat, processed packaged foods) puts pressure on forests everywhere in the world.

The worldwide commodification of land and its environmental consequences offer a cautionary tale when we search for new ways to mitigate climate change and other environmental problems. What does it mean to commodify carbon? Forest carbon schemes are founded on new

twenty-first-century forms of valuing nature and natural resources, particularly carbon, as a tradable commodity with a price tag. This means carbon sequestration in one place can be paid for by emitters in another place in order to provide a global good; thus, it is not only carbon but also carbon *markets* that connect people and places on opposite sides of the planet.<sup>6</sup> Even as carbon is rendered an abstract entity, its sequestration is territorialized in particular forests in poor countries; and environmental responsibility is handed from the world's wealthy—whose lifestyles are the main drivers of climate change—to villagers who are expected to protect the new global commons simply because of their dependency and proximity to such common lands.<sup>7</sup> While carbon markets bring needed cash into rural communities, they may also conflict with established practices of governing the commons. Will they end up destroying the very communities charged with protecting forests?

Attributing responsibility for global carbon emissions is not a clear-cut exercise, as the choices we make often have hidden costs. For example, we ask our students: between microwave ovens and wood-fired stoves, which is the cleaner cooking technology? Of course, they (and we) think of microwaves as cleaner. But are they? If we take a household perspective, then yes. But if we think about global commons, then no. This is because the wood used in a cook stove can—theoretically at least—be entirely recovered because biomass can participate in a closed carbon cycle. If the biomass is replenished naturally or by afforestation, biomass stocks can potentially be exploited sustainably. In contrast, the electricity used by a microwave oven typically comes from power plants that burn nonrenewable coal, and the resulting emissions stay in the atmosphere for about a hundred years. The burden of removing this extra carbon from the air then falls on the oceans or on terrestrial biota, neither of which may be able to adequately combat carbon accumulation in the atmosphere over short to intermediate time scales. Viewed this way, a good wood-burning stove could in fact be considered better for the environment than a microwave oven. It all hinges, of course, on how the biomass stocks are managed, locally as well as globally. Stable and empowered rural communities are invested in managing forests sustainably; they are invested in protecting the integrity of land that is both their livelihood and home. If not subject to external pressures, rural communities are often (though not always)

attuned to local resource constraints and compelled to utilize resources like biomass in a sustainable manner.

As the foregoing discussion indicates, there is more to wood burning and smoke than meets the eye. Building on these complex ideas connected with cooking in the developing world, the faculty members involved have drawn students from all over campus to the multi-disciplinary Big Ideas course called People and the Environment, which takes the cook stove problem in the developing world as its starting point and peels back its many layers. Student and faculty participants begin to discover that the most vexing problems in our world have complex causes and complex solutions. We encourage them to see problems in their multidimensionality and to understand connections between seemingly isolated fields of study and regions of the world. We present students with an authentic real-world problem, let them know that we ourselves do not have “the” answer, and invite them to join us in our efforts to find solutions. In doing so, we stress the need for those with diverse perspectives to learn to talk *with* each other rather than *past* each other, and we also model this kind of dialogue in the classroom.

In the winter of 2016–2017 our team, under Khandelwal’s leadership, headed to India for a month-long seminar, funded by a prestigious Fulbright-Hays Group Projects Abroad award from the US Department of Education. Five Iowa faculty and eight students had the opportunity to meet scholars, activists, development practitioners, and field workers. On our return home, this same team, led by Jerry Anthony, hosted a three-day international event on campus, a University of Iowa Provost’s Global Forum, to draw attention to the cook stove problem. The forum included several panels and brought together world-renowned experts to discuss the cook stove conundrum; they do not all agree on the best solutions, which is not surprising as this is ongoing research in a rapidly shifting domain at the intersection of environmental policy and practical solutions. As part of this forum, we organized a demonstration of “improved” biofuel stoves on the Cleary walkway and an evening WorldCanvass event so that experts could share their views with broader audiences in Iowa.

Interdisciplinary research teams forged at the University of Iowa have allowed us to see the shades of gray in a world that prefers black and white. Real solutions aren’t possible without first fully appreciating the complex-

ity of an issue with global implications. Our most vexing problems in the world are never merely technical. Teaching students to bring their minds, their emotions, and their very bodies to understanding and engaging the study of these and other issues is a critical first step in answering not only this question but many others they will encounter throughout their lives.

## Notes

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3. Ashwini Chhatre and Arun Agrawal, “Forest Commons and Local Enforcement,” *Proceedings of the National Academy of Sciences* 105, no. 36 (2008): 13286–13291.

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## A Hard Rain

### How the Flood of 2008 Transformed IIHR

MOST OF ALL, I remember the darkness.

It was one of the worst nights of the flood of 2008, when it seemed as if anything could happen. I stood on the Burlington Street bridge in downtown Iowa City. On my right, the University of Iowa's Stanley Hydraulics Lab loomed in the shadows. Below me, the Iowa River roiled.

The entire river corridor was dark, lit only by the glow of the moon. The university had ordered the evacuation of all the buildings near the river, chained and padlocked the doors, and shut off the power. A curfew was in effect, and the area immediately around the river was off-limits to everyone except emergency response teams and university facilities staff. Although the Stanley Hydraulics Lab has been home to IIHR—Hydro-science & Engineering for nearly a century, I had been only recently hired as the research institute's director. Officials were concerned about potential bridge failures upstream as debris swept along by the swollen waters hammered the structures. My colleague Witold Krajewski had predicted that if the bridges start failing, trees, boulders, and who knows what else would come hurtling toward the Burlington Street bridge on which I stood. If the bridge failed, it could take Stanley Hydraulics Lab with it.

When the power was shut off, the sump pumps in the Stanley Hydraulics Lab stuttered to a halt. At my direction, IIHR had rented gas-powered pumps and dropped a suction hose into the lab's subbasement, home to IIHR's state-of-the-art towing tank. To prevent this multimillion-dollar research equipment from being submerged, my colleagues and I kept the gas-powered pumps running night and day. I took the first shift, watching over the pumps from 8 P.M. to 2 A.M. Meanwhile, I knew that several

IIHR staff members were battling floodwaters in their own homes or in the homes of family and friends.

The flood of 2008 would eventually wreak about \$1 billion in damage to the University of Iowa campus. Stanley Hydraulics Lab wasn't immune; the building sustained damage. But the structure remained intact. The early twentieth-century builders of the facility knew what they were doing; the building was designed to withstand the full hydrostatic load of the river. It did exactly that, even as the raging river rose to more than twenty-three feet, pounding the building for days on end. The builders' foresight not only garnered my respect but helped inspire the University of Iowa and IIHR as we took on the challenge of repairing and rebuilding after the floodwaters receded, turning the disaster into a benefit for the university and the people of Iowa.

Several months after the flood, a small group of Iowa legislators asked us for a meeting. State senator Rob Hogg from Cedar Rapids led the legislative delegation. In his opening statement, Hogg said, in essence, that Iowa wanted to stop what had happened from ever occurring again. Krajewski and I joked that even we couldn't control the weather, and we explained to legislators how the flood had evolved and why it was so much more devastating than past floods. That was in October 2008. In mid-December, I received a letter from the Iowa General Assembly asking the University of Iowa for a proposal to create a state-funded flood center. I wasn't sure how to move forward. But after consulting with Krajewski, we wrote a two-page proposal to establish the Iowa Flood Center (IFC). Because the IFC concentrates its research efforts on direct service to the people of Iowa, IIHR was required to adopt a new research focus and outward-facing philosophy. I give Krajewski full credit for setting the IFC's technical vision. Hydrology and flooding fall squarely in Krajewski's area of expertise: his whole career to date had given him a running start.

Today, the people of Iowa can easily access online information—about rainfall, river and stream levels, flood predictions, and even flood inundation maps for twenty-two communities—to find out what a predicted flood stage will mean for their homes, businesses, and schools. This information is all part of the IFC's innovative Iowa Flood Information System (IFIS), which puts data directly into the hands of the people who need it: emergency managers, public safety personnel, and anyone else who has

access to the Internet. With this information, Iowans can make better decisions to protect their property, their families, and their livelihoods.

IFC researchers have demonstrated amazing ingenuity, vision, and energy, while engaging with and educating students every step of the way. The IFC is now setting the standard for tangible service to Iowans. As Krajewski says, people come to the IFC because they know they will get results. For example, the original flood center proposal included the monitoring of streams and rivers, and today the IFC maintains a network of about 250 stream-stage sensors across the state. The IFC assembles the sensors from relatively inexpensive components. The solar-powered sensors use cell phone technology to relay data back to the center every few minutes, where it appears on IFIS. This near real-time information helps emergency managers make thoughtful decisions about bridge closures and other community responses when floods threaten. It can also save time and—most important—lives.

IIHR has always been adaptable. Throughout the institute's nearly hundred-year history, IIHR has adapted to changing societal needs and funding sources. IIHR researchers have always conducted practical, useful research (often called applied research) that provides a direct public service to the people who fund the work through their tax dollars. It's no surprise that IIHR was able to swiftly and effectively pivot to address Iowa's need for flood information and research after the deluge of 2008. The difference today with the Iowa Flood Center is that the contributions now come from so many more IIHR researchers, and their work serves people closer to home—right here in Iowa.

The IFC aspires to be a national resource; the work at the flood center can translate to a bigger stage, serving more people. Flooding doesn't stop at any border. And, as Krajewski says, Iowa can serve as an excellent test ground for ideas that can be adapted to a national or global scale. Perhaps the best example of this adaptability is the Iowa Watershed Approach (IWA). This effort, funded with \$97 million from the US Department of Housing and Urban Development, is a statewide watershed improvement program designed to slow the movement of water through the landscape by strategically building farm ponds, wetlands, and other conservation projects in the watershed. IWA researchers hope to restore some of Iowa's natural resiliency to heavy rainfall, while also improving water quality,

adding natural beauty to the landscape, creating wildlife habitat, and restoring ecosystem services.

The IWA is a collaboration of many organizations and agencies state-wide, including the Iowa Flood Center. Without the IFC, there would be no Iowa Watershed Approach. As the IFC's pilot project, the Iowa Watersheds Project successfully tested our concepts in three Iowa watersheds. And IFC staff, particularly IFC director of development and communications Carmen Langel, played an important role in developing the IWA project proposal. For us, it was like a game of high-stakes poker. We were all in. We put every chip on the table.

Our gamble paid off. The state received five years of funding with which to improve nine watersheds and support flood-related infrastructure improvements in three Iowa cities. A new resilience component will focus on the human and societal aspects of resilience to flooding. The emphasis on resilience acknowledges that flooding doesn't just damage buildings and infrastructure, it also destroys lives.

The IWA's systems-based methodology includes a hydrologic assessment of the watershed, planning, monitoring, modeling, implementing conservation projects, and more. One of the unique aspects of the IWA is its collaborative structure, bringing together groups and constituents from across the state. The Iowa Watershed Approach is about everybody lifting a little bit for the greater benefit of all.

The project is an interesting mix of advanced technological tools and old-fashioned human interactions. My team and I travel the state for meetings with partners and stakeholders in all the watersheds. In the beginning, I had to sell the IWA to local groups and landowners, some of whom were skeptical. It didn't take long, though, before people began to share in the excitement. We had a vision. People got it, and they bought into the vision. Iowans seem engaged and eager to be part of the new project. And since participation is voluntary, landowners can make their own decisions about the IWA's benefits. Each landowner has to speak up and say, yes, I'm in. The IFC isn't there to tell them what to do. That is not the Iowa Watershed Approach.

When I think back to the dark moments during the worst of the flood, I feel proud of what IIHR has achieved through the Iowa Flood Center and the Iowa Watershed Approach. We have clearly made Iowa more

flood resilient. The IFC's data helped ensure that Cedar Rapids was better prepared when flooding of the Cedar River in 2016 again threatened the city. And I am also humbled because I understand the immense scope of the work still left to do. As an Iowan, I am honored that the University of Iowa is having such a positive impact on the state and—by extension—the world.

PART

5

COMMUNITY



## As Far as the Ear Can Hear

### Choral Singing in Prisons Grows a Community of Caring

SINGING IN A GROUP can be a powerful experience. Whether it's singing the national anthem at a ballpark or a familiar hymn in a place of worship, your whole self is engaged: voice, ears, breath, mind, and emotions. Song reverberates through every fiber of your being. It connects you to the people with whom you are singing in a manner that recognizes our commonality and the ways in which we complement one another.

This connection matters to me personally and as a scholar. In 2003, I started studying and participating in choral singing in prisons. My work has advanced research and the development of new music education methods. But perhaps my most profound discovery was how choral singing can build a caring community and serve as an important first step toward helping the public remember that incarcerated individuals are still people.

One of the great challenges of our criminal justice system is providing opportunities for returning citizens to live productively after finishing their sentences. Successful reentry begins when an individual is first arrested. So these are among the questions I have asked as part of my scholarship:

- What are the meanings of choral singing in prisons for people who are incarcerated, prison staff, prisoners' family members, community volunteers, and audience members?
- How does songwriting influence these experiences?
- To what extent does choral singing in prison humanize the prison system?

I believe this research and practice have the potential to build caring and healing for a troubled criminal injustice system.

## **Embodiment**

I began the Oakdale Prison Community Choir in Coralville, Iowa, because my experiences in prison choirs while in graduate school in Kansas had been so rich. This choir is composed of men and women from the community (“outside singers,” who include University of Iowa students, faculty, and staff) and a group of men (“inside singers”) incarcerated at the Oakdale Prison, officially called the Iowa Medical and Classification Center. Through a reflective writing exchange and songwriting workshops, we have created more than one hundred original songs, many sung by our choir.

### **“May the Stars Remember Your Name”**

In April 2010, Meade Palidofsky, the artistic director of Chicago-based Storycatchers Theatre, came to the Oakdale Choir’s dress rehearsal. She noticed an original song by inside singer Kenneth Bailey and me titled “May the Stars Remember Your Name” and asked if she could bring it back to the Fabulous Females program at the Illinois Youth Center–Warrenville, a maximum-security youth center for girls. In this program, incarcerated girls write their trauma stories, and, together with outside artists, they turn them into original musical theater. At the performances, the girls play one another’s roles and watch their stories acted out. In fall 2010, Kenneth’s song, with a slight alteration of the lyrics, became the theme of their show, “Mom in the Moon.”

Once captive, now I’m freed, once blind, now I see  
The beauty of the night that’s calling to me  
Here I go, on my own, the color of darkness, carries me home  
And the stars, the stars, remember, remember my name.

Kenneth wrote this song in anticipation of being released from prison and singing the song to the stars, which he had not seen since his incarceration because the blinding security lights outside obscured the night skies.

Storycatchers has a partnership with the Chicago Symphony Orchestra

(CSO). Riccardo Muti, musical director of the CSO, has visited Warrenville multiple times, as has internationally acclaimed cellist Yo-Yo Ma. In October 2010, Yo-Yo Ma and a group of musicians from the CSO and the Fabulous Females performed Kenneth's song inside the Warrenville youth center. When Yo-Yo Ma heard the story behind this song, he said this artistic creation could not occur without partnership and collaboration.

In May 2015, Kenneth was the first former inside singer to come to Oakdale Prison as a guest in the audience for the choir's "Evolving Lives" concert, which was videotaped for the filming of a documentary, "The Inside Singers." To his great surprise, we performed Kenneth's song at the concert. He said the experience touched his heart, and he was grateful for his participation in the choir. "My three years with the choir were amazing," said Kenneth. "[The choir] has the power to change and create, to bridge the gaps in society and bridge the gaps in synapses."

This story illustrates the building up of caring relationships at both the individual level and more broadly. Choral singing provides a direct physiological experience where the person singing and the instrument are the same being. The breath, vocal folds, bodily alignment, and shape of the mouth and tongue are all part of the mechanisms of singing. In a choral setting, individual human instruments come together to create a larger communal body. In Kenneth's story, his original song provided a means for several groups—the Fabulous Females in Warrenville, along with the musicians from the Chicago Symphony Orchestra, Yo-Yo Ma, and audience members, as well as the women and men in the Oakdale choir and people in the prison choir audiences—to connect with a social embodiment beyond the prison context, enlightening listeners with a deeper sense of humanity in conjunction with their perceptions of "prisoner." Prisoners are people too.

### *That Childhood of Ours*

Never had money, mom and dad drank it all  
All in our bed our empty stomachs would growl  
Monday to Sunday they were never sober  
We were afraid to bring anyone over  
Was beat black and blue by my own father's hands  
Next day, "What happened to you he would demand . . ."

The lyricist of “That Childhood of Ours” was in his seventies when he wrote these words. He was one of eight siblings, the only one still alive. He was not certain he should share stories of his difficult childhood through a song, but another inside singer encouraged him. I set his lyrics to lots of harsh-sounding chords, melodies, and rhythms. The theme of the December 2015 concert where we performed it was “Community of Caring,” a theme that has become the choir’s core function and goal: building a community of caring within ourselves, within the choir, inside the prison, and within broader society.

Why would a song about domestic abuse and substance abuse be appropriate for that concert’s theme? The ending of the song explains.

But all we kids ever had, all we kids ever had  
all we kids ever had . . .  
was an undying love for our Mom and our Dad

In this brief illustration, the embodied experience of creating and sharing an original song provided a sense of healing through self-expression. After that concert the Oakdale Choir had our first receiving line, where audience members could shake hands with choir members and speak to them briefly. The lyricist described multiple people congratulating him for his song, expressing their appreciation for his courage to share such deep and personal stories.

### *Dear Younger Me*

Dear Younger Me, I finally made it through as you can see  
So now I’ll pass on back to you, the things I think will get us through  
’Cause we only have one chance at life’s dance  
Yes we only have one chance at life’s dance.

I discovered the idea for the prompt that led to the song “Dear Younger Me” through Meade Palidofsky from the Storycatchers Theatre. The prompt asks the writer to write to himself as a younger person. Perry Miller, an inside singer in the choir, wrote four verses of advice. One of them is as follows:

Admit to your mistakes  
You're sometimes wrong  
It's just the breaks  
Find the place where you belong  
What doesn't kill you only makes you strong.

One of our music education PhD alumni, Catherine Wilson, who researched songwriting in prison during her doctoral program, set Perry's lyrics to music. In addition to the Oakdale Choir performing it, Storycatchers Theatre used a slight variation of the song for one of their productions. A few years after Perry was released from prison, he died of cancer. A choir he had joined upon his release from prison sang Perry's song at his funeral.

These stories illustrate how choral singing provides a means for choir members to feel embodied and empowered, increasing society's awareness of the humanity of prisoners. "May the Stars Remember Your Name" highlights the desire for someone behind bars to reconnect to the natural environment. "That Childhood of Ours" demonstrates how providing a communal voice to past trauma can allow healing and growth. "Dear Younger Me"—performed multiple times outside of the prison—indicates how the creation of original songs in prisons and their performance beyond prison walls might allow broader society to notice the humanity and positive intentions of people behind bars.

## **Engagement**

Many University of Iowa students have been involved in the choir through songwriting, singing in the choir, attending a concert, or observing a rehearsal. For three semesters, I cotaught a Topics in Human Rights class, where my section of classroom instruction was about mass incarceration and music-making in US prisons. The students were required to come into the prison for a rehearsal or for the concert and to write about their experiences.

Reading their reflections, I was surprised that nearly all the students described how they did not previously realize prisoners were people. It became evident that one core reason that might be related to sustaining

mass incarceration in the United States is that many individuals are not aware of human needs of people behind bars: an “us and them” mentality is at play. How can our society support returning citizens after they leave prison if they are unaware of them as people?

In the fall 2016 semester, outside singer and professor in the German department Kirsten Kumpf Baele taught a first-year seminar titled *Penned In*, where students explored various media portrayals of US prisons and reflected on the prison system. As part of the class, the students attended the Oakdale Choir’s seventeenth themed concert, “Look on the Bright Side,” with an incarcerated audience.

Prior to the performance, the students met with a group of inside singers, their professor, and the warden for a brief discussion. One student noted how the inmates they met were not the type of inmates commonly portrayed by media and literature. Another recognized how these men have families they care about. This example illustrates what lawyer and executive director of the Equal Justice Initiative Bryan Stevenson described in his book *Just Mercy: A Story of Justice and Redemption*: the value of proximity in order to understand more deeply who people in prison are and what their needs may be.<sup>1</sup>

After the start of the Oakdale Choir in 2009, people contacted me regularly to ask about the project out of curiosity, for research papers, or for guidance to start their own choir or other music program in a prison context. For those wishing to start a program, I ask them to reflect on their objectives. We stress that, beyond providing musical experiences, a new program must include a deeper goal of enhancing society’s awareness of the complexities related to criminal behavior, laws, jail and prison systems, and myriad other related issues. A strong need exists to increase support for returning citizens, such as restoration of voting rights; healing practices as alternatives to trial and incarceration; more mental health care services; and arts-based initiatives to release past trauma and move forward in life productively.

At the Oakdale Prison, many new volunteer programs have begun, inspired by the choir’s success, including a Writers’ Workshop, Pen and Paper Club, Job Club, Book Club, Parenting Class, and a faculty lecture series.

### — Select Programs with Similar Goals as the Oakdale Choir —

- Mount Pleasant Prison Choir in Iowa\*
- Art and Music Programs in Detention Centers in the Cook County Jail in Illinois
- Champaign County Juvenile Detention Center Arts Project in Illinois
- Voices of Hope at the Minnesota Correctional Facility in Shakopee
- Empowering Song in the Massachusetts Correctional Facilities in Norfolk (male) and Framingham (female)
- Oberlin Music at Grafton in Ohio
- MTC Glee Club at the Gadsden Correctional Facility for Women in Florida\*
- Ubuntu and Hope thru Harmony

*\*No longer active*

## Outcomes

Since the Oakdale Choir's fifteenth season, themed "Community of Caring," the group has more purposefully explored how we can build such a community. We have partnered with the Inside Out Reentry Community in Iowa City, providing information about this nonprofit to choir members and outside audience members. During our seventeenth season, we practiced a community of caring meditation, based on the loving-kindness meditation of many Buddhist traditions, at the beginning of rehearsal and at the concert. During our eighteenth season, the choir members chose to participate in various small groups, each with a particular purpose: one supports returning citizens; another is involved in the making of the documentary film about our choir, *The Inside Singers*; another is a gratitude group; and there are others.

Also, during the eighteenth season, in spring 2017, I cotaught a class for the University of Iowa Senior College (a program of short-term, low-cost classes for retirees, taught by UI faculty and community experts) with assistance from the inside singers of the Oakdale Choir. The topic was "Supporting Returning Citizens and an Introduction to Choral Singing in Prisons." We facilitated conversations among the students about reentry, asking the inside singers what concerns they have about release from prison and the senior students how they feel about a formerly incarcerated

person moving into their neighborhood or working with them. One man in the choir who has been incarcerated for more than thirty years told me that this course was the best course he has had since being incarcerated. This course was a pilot for a series of classes facilitated by UI faculty members as a first step toward offering credit-bearing courses taught at the Oakdale Prison.

Criminal behavior, inequities in our society, greed, power, and abusive behaviors are not eradicated through music-making in prisons. However, these programs and this line of research have the potential to provide healing, deepen awareness, offer support for families, and give space for self-expression for a large portion of our society. Research indicates that formal education programs in prisons reduce recidivism, the likelihood of a convicted criminal to reoffend. Through partnerships between higher education institutions and prisons, positive personal and social growth—for inmates, students, community members, faculty, and others—may be an outcome as this innovative, creative scholarship continues to develop and build community.

## Note

1. Bryan Stevenson, *Just Mercy* (New York: Penguin Random House, 2014).

## Faith and Friction

### Why Studying Religion, Migration, and Work in the Heartland Matters

ANYONE WHO DRIVES through the midwestern region of the United States today will be sure to notice one thing: rows upon rows of corn. Whether it is green and stalky in the summer or the color of brown sugar in the fall, corn dominates the Iowa landscape. The plant and its treasured yellow grain are featured in Iowa folklore, art, and in midwestern cookouts as well as at local and state fairs, where butter-drenched ears are a popular item. Corn has been the dominant midwestern crop since the mid-nineteenth century; and these six states—Indiana, Illinois, Iowa, Nebraska, Minnesota, and South Dakota—are collectively known as the Corn Belt. With the rise of commercial agriculture and livestock, especially hogs and cattle, demand for corn has risen since the mid-twentieth century.

When I came to the University of Iowa to join the Religious Studies Department in fall 2012, I didn't plan to study corn or rural Iowa. I was born and raised in northwest Indiana—part Hoosier country, more urban than rural, but, yes, we did have our cornfields, though not as many as Iowa. All my research and writing before coming to the University of Iowa centered on urban religious movements. But the beauty of conducting research in new places is that, at its best, the process can take us on altogether new pathways. As an ethnographer of religion, my career has taken me on the journey of interviewing women and men about their faith. I have always been driven to understand what matters most to people and how their faith works for them in their everyday lives. I have always practiced what my ethnobotanist cousin, Gary Paul Nabhan, has referred to as “ethnography in our backyards.” I believe that *place matters* and



Hispanic residents of Columbus Junction, Iowa, participate in a procession during the Feast Day of Our Lady of Guadalupe, which commemorates the appearance of Mary, mother of Jesus, to the Mexican peasant Juan Diego in 1531. Members of St. Joseph Catholic Church in Columbus Junction have been celebrating the feast for many years. Photograph by Lois Mincks.

that it is important for university professors to be good stewards of our local communities and our state.

As a university professor, I believe it is important that we work to understand what matters to Iowans—for I, too, have become an Iowan. As a first-generation college graduate on my mother's side, the proud product of kindergarten-to-PhD public school degrees, I take my role as a teacher and scholar at a state institution seriously. And as the inaugural chair and professor of Catholic Studies here at the University of Iowa (a position funded, in part, by Iowa Catholics), I have worked hard over the past five years to understand what matters to everyday Catholic Iowans. I have been deeply humbled by the women and men I have met during the course of my scholarship, and my life has been impacted forever by my interlocutors. For me, ethnography is a form of human relationships; as an ethnographer of religion, I enter into a relationship with the women and men I interview and spend time with at their churches, picnics, and other community gatherings. Throughout my career as a religious studies

scholar who has interviewed Catholics across the country for my research, I have discovered that family, faith, and community rank in the top three of ultimate concerns for most families. And this trifecta of ultimate concerns holds true for many Iowans.

So back to the relevance of corn—and cows and hogs, too—for my current work. My interviews, combined with what the anthropologist of religion Renato Rosaldo has called “deep hanging out” with Iowans, has led me to understand and appreciate the importance of corn and animals in our state and, moreover, how crops and animals factor into how people experience their work and faith. Corn, cattle, and hogs also have an impact on how Catholic priests in our state minister to their congregations. Religion and work matter to Iowans, and they overlap in significant ways, I have discovered. My current book-related research focuses on Iowa Latinas and Latinos and white non-Latino and non-Latina Catholics and how their religion, community, and jobs inform and impact each other. What I research as a scholar of religion is important and worthy of state support because it can help us better understand Iowans and the important role our state plays in broader economies of religion and work.

As a professor at a research-focused state university, I do not mean for my work to promote any specific religion or ideology but to inform and to lead to a deeper understanding of pressing issues for our state. My ultimate goal is for my work to encourage empathy. Moreover, I hope that my findings can tell us more about midwesterners and why the midwestern United States matters to global concerns—in general, why it’s a worthy topic for scholarship and state support. Religion has played a significant role in shaping the cultural landscape the way corn has shaped the agricultural landscape. What I am trying to do in my current research—understanding religion and its practitioners and leaders—helps Iowa, the nation, and the world understand how we relate to one another. I also believe that my research can help us see how we can move forward and make improvements to our churches, social services, local economies, and state. I hope to offer some suggestions for how employers and religious leaders in Iowa can help ensure that Iowa is a place for all people and for all families who want to work, live, and give back to their communities.

As the great-granddaughter of brown-skinned Lebanese immigrants, who is particularly interested in issues of social justice, I want to under-



Two members of a West Liberty, Iowa, dance group called *Danza San José* help celebrate the Feast Day of Our Lady of Guadalupe in Columbus Junction, Iowa. Processions are intended to remind participants and onlookers that they are on a journey from this world to the next and that God plays a central role in their lives. Photograph by Lois Mincks.

stand how we welcome and care for today's Latinos/as and other newer darker-hued immigrant groups. In my efforts to understand the connections between work and faith in Iowa, I am focusing on the current state of animal husbandry, migration, and food production in our state. If we want to make Iowa a welcoming place for all people, then we must understand what some anthropologists call “lifeworlds”—that is, the many layers of experience that they inhabit. For many Latinos/as in Iowa, their daily experience is informed by their migration experiences, as well as their work in meatpacking and on farms.

Latina and Latino workers in particular make up a large percentage of the concentrated animal feeding operation (CAFO) workforce—hogs, cattle, and chickens; they also dominate the workforce at the next phase in food production, the combined slaughterhouses and packing plants that dot the Iowa landscape. Latinos/as are now the majority nonwhite

ethnic group in a growing number of midwestern towns. From the years 2000 to 2014, the Latino/a population in Iowa increased 110.5 percent. By all accounts, Latinos/as are the major force behind the changing demographics of Iowa and the larger Midwest.<sup>1</sup> Social services, schools, businesses, and churches are among those institutions and services that have had to address the needs of Latinos/as. My adopted state of Iowa is indeed an excellent case study of migration politics, rural and small-town Latino/a ministries, and the increasing interfaith alliances.

It is mostly nonwhite workers who tend, kill, and package the animals that feed the world. And it is these men, women, and their children who are in many ways among the most vulnerable inhabitants of the state and the entire Corn Belt region. The Catholic Church in Iowa has taken notice and has reached out to help these newcomers. Increasingly, priests from around the state have become vocal leaders in what I am calling in my research a “politics of inclusivity,” and in doing so they draw on a long and deep tradition of activist and social justice–oriented Roman Catholic priests. Eastern Iowa priests like Rudy Juarez, Greg Steckel, and Joseph Sia want to make their state and their parishes more inclusive spaces. They want to transform the minds and hearts of Iowans. Father Juarez has led pro-immigration rallies; Father Steckel works closely with the West Liberty school superintendent and city leaders; and Father Sia has educated himself on Immigration and Customs Enforcement (ICE) raid awareness and preparation to reach out to families impacted by raids. All three of these eastern Iowa priests put themselves out in the public sphere and see themselves as advocates for their Latino/a and migrant Catholic parishioners. Moreover, these priests are reaching beyond their theological comfort zones to meet with pastors from Protestant denominations—including Baptist, Methodist, and Presbyterian church leaders—to work toward solutions. There is a popular slogan in Iowa today found on car stickers everywhere: ANF, short for “America Needs Farmers.” If the priests I am working with had their way—and they might, given their stalwart constitutions—they would create a new car window sticker that reads: “America Needs Latinos/as.” They want to raise awareness about the need in our state of the labor of many kinds of people and about Iowa’s diversifying population as it becomes home to many hues of individuals.

What I have discovered through my ethnographic research in Iowa

so far has led me to declare that if we want to understand the politics of migration and race relations in the church and broader American society, we must turn to rural America and to the Iowa communities where I am currently conducting research. When we turn our gaze on the midwestern part of the United States and to the Corn Belt region more particularly, we can gain a deeper appreciation of how Catholics—priests and laypeople alike—are taking concrete measures to address the intertwined religious, social, and economic issues facing members of their parishes and communities. Challenges do remain, and I am working to understand how religion can provide the motivation to help overcome certain challenges facing Iowans.

The rise of rural Catholic ministries and activist priests in midwestern states like Iowa should not surprise us, as it is in keeping with US Catholics' historic predilections to aid migrants and their communities. My research focuses on how Catholic churches are among those places on the forefront of working to include white Catholics and Catholics of color in the life of the Church and broader community. As the largest ethnic minority in the state, and the fastest growing, Latinos/as are positioning themselves as the future of the state of Iowa as well as the Catholic Church. While their numbers are still relatively small when compared to the white non-Latino/a majority of Iowa and larger Corn Belt Midwest, the rate of growth among Latinos/as has been by all accounts impressive. And when we consider the geographic range of the Corn Belt, Latinos/as are clearly on their way to becoming the future of those states and of religious institutions like the Catholic Church. My research seeks to understand how workplaces, churches, and communities can be home for all people in our state and region.

## Note

1. According to a 2013 study, the top five US states for crop yield are California, Iowa, Texas, Nebraska, and Illinois. "What US States Produce the Most Food? (Ranking 1–50)," *Western FarmPress*, April 30, 2013, <https://www.westernfarmpress.com/management/what-us-states-produce-most-food-ranking-1-50>.

## **“How Are You Going to Keep Them Down on the Farm after They’ve Seen Iowa City?”**

### **Making Public Research Universities Relevant to the Rural Midwest**

SMALL TOWNS FORM the backbone and breadbasket of the Midwest. Nowhere is this more true than in Iowa. But small towns also are struggling to stay alive and vibrant, as younger generations move to cities to pursue education or careers outside of agriculture. In Iowa, only twenty-six of the state’s ninety-nine counties experienced population growth between 2010 and 2016. Ironically, both the success of small towns—and their current struggles—can be traced in part to the work of public research universities.

On the one hand, research at midwestern land-grant universities enabled farmers to work more land with less labor. Iowa State University’s research on mechanizing hog production, for example, led to confined animal feeding operations (CAFOs) with more hogs and fewer farmers. On the other hand, midwest research universities have contributed to the “hollowing out” of the middle class in small towns. According to Maria J. Kefalas and Patrick J. Carr’s 2009 book *Hollowing Out the Middle*, small-town public schools reward the best and the brightest in their communities by encouraging them to leave for a place where there is more opportunity.<sup>1</sup> Aiding this process are research universities, such as the University of Iowa, where small-town students encounter a cosmopolitan and enriching atmosphere and become educated for careers that are most likely found in larger cities.

What, if any, role should midwest universities play in addressing the challenges faced by small towns? Is it really their responsibility to see that more of their students remain in their respective states or even return to their hometowns? Research universities are judged by the quality, quantity, and monetary value of their research as well as their ability to

attract and graduate significant numbers of highly qualified students at all levels. At universities, “student success” is typically not thought of with regard to whether students stay or leave their home states.

The fact is that the cost of ignoring state or local interests can be high. Over the past decade or so, public universities throughout the nation have experienced declining public support—both financial and moral. The latter, as Mary Sue Coleman, former president of the University of Iowa and University of Michigan, has said, reflects declining public belief in the value of higher education.<sup>2</sup> This point is made clear in Katherine Cramer’s 2016 book *The Politics of Resentment*, in which she documents widespread rural resentment in Wisconsin toward the University of Wisconsin—Madison—bitterness that has helped enable the state’s governor to challenge academic tenure and university budgeting.<sup>3</sup> Rural resentment clearly has important implications for other midwestern public research universities.

Within this context, several universities and university faculty at public midwestern universities have begun asking what can be done to convince the public that universities provide a useful public service that benefits small towns as well as big cities. In response, three midwestern public research universities—Iowa, Minnesota, and Wisconsin—have pioneered a new model of teaching and learning that attempts to relate to issues faced by communities, including rural communities in those three states, and work with them to find solutions. This work builds on the high level of expert research at these institutions.

Each of these programs is inspired by the Sustainable City Year model developed by the University of Oregon in 2009. In the model, communities in a state compete to participate in a one-year partnership with a university. The university organizes multiple units on campus—engaging hundreds of students and running across various disciplines—to address issues of sustainability faced by small to medium-sized cities and town. As a guiding principle and focus, sustainability not only addresses economic issues but also gives serious attention to the environment and social equity.

Sustainability’s breadth and richness correspond with a research university’s ability to address problems in multi- and interdisciplinary ways, bringing to bear the talents and skills of students, faculty, and staff mem-

bers. By focusing on a single city in a single year, the sheer concentration of projects and expertise increases both impact and visibility.

Employing this model at the University of Wisconsin–Madison, the UniverCity Alliance, begun in 2016, selects a single community each year and gathers the talents of students and faculty from a variety of disciplines including landscape architecture, civil engineering, soil science, geography, marketing, agriculture, and real estate. Thus far, the UniverCity Alliance has focused its work in the Madison area. At Minnesota, in the Resilient Communities Program, established in 2012, fifteen to thirty projects are completed each year by students and faculty in a variety of courses and departments, typically in the Minneapolis–St. Paul metropolitan area. Like Wisconsin, the focus is on one community per year.

At Iowa, the Iowa Initiative for Sustainable Communities (IISC), begun in 2009, has quite consciously attempted to bring the university's resources to the state's small towns and cities. Owing to its focus on smaller communities, ranging from Dubuque (population 58,253) to Mason City (27,704) to Delmar (512) and Salix (375), the university realizes its student and faculty resources could overwhelm a single small or even a modest-sized town. In 2014–2016, for example, IISC organized 69 projects engaging 72 community partners, 393 students, and 41 University of Iowa faculty and staff. These projects were spread over three cities or counties—Iowa City, Sioux City (including Salix), and Winneshiek County (including Decorah)—over two years. Moreover, IISC focuses on towns and cities whose populations are either flat (Dubuque) or declining (Mason City, Decorah, Sioux City). And while IISC concentrates its activities in eastern Iowa, it has demonstrated both a capacity and an interest in serving the western part of the state.

The activities undertaken by IISC vary widely but in all circumstances reflect a fully reciprocal partnership between the University of Iowa and the communities within which students, faculty, and staff do their project work. In a statewide competition, the IISC invites communities to propose the projects they believe they need. The IISC Advisory Committee then selects proposals that best fit faculty, student, and staff capacities. From there, IISC staff, along with UI faculty, respond to community ideas by developing project scopes that best serve both communities and

the university. IISC staff members facilitate community engagement by supporting faculty and students with the logistics associated with community projects as well as assuring their overall quality. Because most communities lack the resources to pay for these services, IISC asks for a nominal fee, basically to cover student travel to and from the community.

In 2014–2016, projects included developing bike and pedestrian plans for Sioux City and Winneshiek County; developing a comprehensive land use plan for Salix; preparing an analysis of safe routes to school; designing rooftop gardens for downtown Sioux City; preparing marketing plans for tourism, for economic development, and for food waste prevention; and creating public art for Winneshiek County parks. Other IISC projects have focused on public health.

IISC projects are especially rewarding to both universities and communities when they integrate various disciplines into a project. Building sustainable communities requires assistance that knows no academic boundaries. Economic growth, which communities crave, along with pursuit of the common good and responsible environmental protection, are best achieved when teams of diverse students, community members, and faculty work together. One example of this is the 2014–2015 work done by students in urban and regional planning, law, and earth and environmental sciences to assist Winneshiek County in developing an evidence-based ordinance for regulating the mining of high silica sand for hydraulic fracturing.

Another example is a 2017 project in the small town of Delmar, in which students have employed planning, digital storytelling, and the book arts to enable residents of that town, including its elementary school students, to tell the story of Delmar and to therefore lay the basis for planning the community's future. The perspectives captured in the digital stories told by longtime Delmar residents and the books created by Delmar's youth are used to inform today's community leaders about the community assets they should value and the directions they should take. By using both the humanities and the arts to enable Delmar's residents to express themselves, Delmar's leaders will have a better understanding of their community.

The value of such projects to the University of Iowa and to Iowa communities is captured in urban and regional planning professor Lucie Laurian's

comments on her participation in IISC: “From a faculty standpoint, being part of this process provides me with an ongoing opportunity to learn about, and actively engage in, a region and issues I care deeply about. IISC projects also serve Iowa communities well, expanding the local capacity to imagine, explore, adopt, fund and implement sustainability practices.”<sup>4</sup>

Clearly, Iowa’s IISC, as well as similar programs at Minnesota and Wisconsin, is not the only means for midwest public universities to assist the rural communities they serve. Nor is it clear how successful they will be in turning around the fortunes of the Midwest’s small communities. But by fostering a partnership whereby communities and universities can think creatively and collaboratively about the future, these programs expand the opportunity for a future enriched by intelligence and imagination—a future based on using the breadth and depth of university expertise as well as the experience, knowledge, and judgment of midwest communities. By making these communities more attractive places to live, moreover, the hope is that more people will find them healthy and enjoyable places. And by working together to address the problems of midwest rural communities, not only will faculty, staff, and students at public research universities meet their obligation to advance knowledge on a world-class stage, they will use that knowledge to enhance the quality of communities in the states that support them.

## Notes

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3. Katherine J. Cramer, *The Politics of Resentment: Rural Consciousness in Wisconsin and the Rise of Scott Walker* (Chicago: University of Chicago Press, 2016).

4. “Laurian Receives Faculty Service Award from Iowa Initiative for Sustainable Communities,” accessed April 15, 2017, <https://iisc.uiowa.edu/laurian-receives-faculty-service-award-iowa-initiative-sustainable-communities>.

## Building Partnerships for Sustainable and Healthy Rural Communities

WHEN MY CHILDREN were young, my family lived in northern Illinois. Every fall, we would cross the border into Wisconsin to visit an apple orchard and pick-your-own pumpkin farm. We would park along the road or in one of the designated fields and walk up the driveway, past the large white farmhouse, to the on-site retail store or into a play area filled with old farm equipment that my kids would climb on. We'd go home with freshly fried apple doughnuts, a pumpkin or two, and a pint of cider. The kids were happy, tired, and usually a little sticky.

Every visit made me recall the farm I grew up on in Missouri, where our equipment was maintained for use rather than as a climbing structure and our pastures were devoted to beef cattle, not parking spaces. The visits made me wonder about small farms and how they stayed profitable in an agricultural economy that rewarded size and quantity. As someone who grew up in the 1980s during the farm crisis, I well remember the foreclosure sales where our family picked over the remains of others' livelihoods. Thus, to me, agricultural "sustainability" meant staying in business, and I was curious about farmers who tried new things to do so, like inviting the public to the farm to walk around in the yard and pick their own pumpkins. The visits also made me wonder about what makes rural communities tick. As farms have gotten bigger and farmers fewer and as young people continue to leave farming communities, what do rural relationships look like?

Those questions ultimately sparked my later research interests when I enrolled in a graduate program in anthropology at the University of Iowa. During those years, I investigated the new-to-me phenomenon of

local food. My training was almost entirely focused on qualitative and ethnographic methods. That meant that I spent my research time doing fieldwork: interviewing farmers, attending farm-related conferences to figure out what topics were important to the local food community, and working on farms doing participant-observation, the research method that defines cultural anthropology. When I graduated, I was fortunate to land a job in a public health role, working to prevent injuries and illnesses in agricultural populations. This is yet another way to think about agricultural sustainability—keeping the people who produce our food and fiber safe and healthy so they stay in the agricultural workforce.

In 2007 the local food movement was really picking up steam. I spent a summer talking with community-supported agriculture (CSA) farmers about how they had gotten started with the model and how they stayed successful. CSAs are arrangements where consumers, or shareholders, pay the farmer a lump sum before planting starts and receive weekly boxes of the farm's bounty through the growing season. What I learned from that research was that there was more to this process than just farmers making deliveries directly to customers. Farmers repeatedly told me in interviews that a number of nonprofit agencies and local journalists had helped educate their customers about what to expect with local food and CSA. This was a lesson that has repeated itself throughout my career: there is almost always more than meets the eye, and the process of getting food from the farm to a table, no matter how direct, still relies on a system rather than a one-on-one relationship.

As I continued my research, I talked with farmers who used other local food strategies. They sold at farmers markets, butchered poultry on their farms, raised grass-fed beef, and delivered to nearby restaurants, schools, and grocery stores. Often, they did a number of these things to keep their farm operational. During this time, I learned a lot about complex agricultural systems and the relationships that support them.

I spent time with volunteers and employees on farms and in greenhouses. Sometimes, the employees were impatient with volunteers, who saw the farm work as a fun excursion and new experience. The employees took some offense at having their work and livelihood reduced to someone else's leisure pursuit. The farmers were also in an awkward position; they had to stop working sometimes to show the volunteer what to do and



Kale grows at a central Iowa CSA farm. Photograph by Brandi Janssen, University of Iowa College of Public Health.

maybe give a quick tour of the farm. In almost all cases, the volunteer was also a customer of the farm, so he or she couldn't just be treated like another employee. The farmer may have found that the day spent with the volunteer was a money-losing proposition, but that volunteer would continue to buy the farm's products, so it was a relationship that had to be cultivated.

I also spent time with local schools that were starting farm-to-school programs. I helped build school gardens and talked with the farmers who hoped to sell their products for school lunches. Here I learned a lot about food safety regulations, complicated school lunch cooking and delivery systems, and the quantities required to feed twelve thousand hungry kids every day. Sometimes tension arose between farmers and food service directors at schools. A small farmer may not be able to deliver twice each week, but that is what the school kitchen requires. The farmer may not have easy access to high-quality packaging to deliver food, which can make the food service director uneasy about the freshness of the food. And whole produce, like heads of lettuce, require significant labor to wash, chop, and pack to be ready for a school salad. I learned this lesson with a



Students plant seeds in a newly built school garden. Photograph by Brandi Janssen, University of Iowa College of Public Health.

team of exhausted volunteers who spent a full day washing and chopping three hundred pounds of lettuce that would be served during one lunch period. Again, I was reminded that agriculture is a complicated system.

The small-scale produce growers I worked with looked a little different from those with row crop or concentrated livestock operations. I wondered whether these local food producers got along with their neighbors. In fact, they usually did. Despite some challenges with pesticide spray drift, I was surprised to learn that these small farmers often called on their neighbors with larger equipment to do tillage or harvest work. These interactions recalled to me the days of shared threshers and seed cleaners, when farm work was a neighborhood event. Other farmers blended their row crop or large-scale livestock production on a farm. One used bedding from his poultry barn to fertilize his organic crops, while another added a CSA to his corn and soybean farm to gain some additional income. More relationships—sometimes unexpected ones—make the system work.

After that research project ended, I wrote a dissertation, and later a book, and wondered about my next step. I was lucky to find it in the College of Public Health at the University of Iowa, right across the river from

Macbride Hall, my home base as a graduate student. I was hired as the director of Iowa's Center for Agricultural Safety and Health (I-CASH), a state-funded, collaborative center that develops education and outreach programs that aim to reduce agricultural illness and injury. I'm also a faculty member in the Department of Occupational and Environmental Health, the only anthropologist in among industrial hygienists, toxicologists, injury prevention specialists, and other scientists.

Given the advances in agricultural technology, it may seem that farming, like other labor-intensive industries such as mining, is becoming safer. But unfortunately, farming consistently ranks among the most dangerous jobs in the United States. The overall rates for occupational fatalities are about three deaths per 100,000 workers each year. In agriculture, those rates are closer to twenty-two fatalities per 100,000 workers. Between 2013 and 2014, fatalities among agricultural workers increased a whopping 22 percent, more than almost any other industry. Iowa's rates are similar, and most years more occupational fatalities are related to agriculture than to any other industry in the state. Nonfatal injury rates are also higher than other industries, and a number of chronic health disorders, including respiratory disease, noise-induced hearing loss, and some kinds of cancer, are associated with farm work.

The segue to my job is not as awkward as it might sound. I'm actually in familiar territory, thinking about rural systems, relationships, and sustainability. I inherited an advisory board of about twenty-five people from across the state who are passionate about rural health, agricultural safety, and community vitality in Iowa. The work we do moves beyond farm safety; it also seeks to improve access to health care in rural areas, looks for economic development opportunities, and aims to enhance rural quality of life. We can do this work only by building partnerships throughout the state, by spending time in rural communities, and by learning from farmers and other rural residents. I like to think that our work is as surprisingly diverse as rural Iowa itself, blending old and new with a deep commitment to the people and the places they live.

Most farms remain outside of direct oversight by the federal Occupational Safety and Health Administration (OSHA) because they employ fewer than eleven nonrelated workers each year. That means that the work of university, private, or nonprofit funded research and outreach is even

more critical in agriculture than in other industries. I-CASH attempts to move the needle on these issues by working with rural communities as much as possible. One aspirational goal of the center is to “improve safety culture” on Iowa’s farms. If I know anything as an anthropologist, it’s that culture change happens slowly and only with the investment of an entire community.

We try to spend more time in rural communities, and less time on campus, by hosting interactive workshops and conferences that engage local residents. We also work closely with the agricultural media, a well-trusted source of information for farm families, by writing columns and contributing content. We organize events for journalists where we discuss best practices for reporting the complex—and sometimes controversial—issues surrounding agricultural injuries and fatalities. And we partner with Farm Service Agency, Iowa State University Extension, Future Farmers of America, 4-H chapters, and other agricultural associations to distribute information about best safety practices.

I started my research journey wondering how small farms remain profitable in an agricultural economy that views bigger as better. I quickly realized that there is no simple answer to that question and that even the smallest farms are an important part of the complicated systems that get food from the farm to the dinner table. I’ve also realized that sustainability means more than just improving soil quality or farm diversity. Sustaining agriculture means that we attend to rural communities more broadly to make sure that they remain vibrant for farmers and nonfarmers; it also requires that we keep our agricultural workforce safe and healthy. None of these issues can be solved in isolation or from my campus office. They require an engaged approach that identifies points of collaboration, rather than division, and emphasizes the connections that will keep rural communities healthy and sustainable.



## ◀ Contributors

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**CASSIE L. BARNHARDT, PHD**, is an assistant professor of Higher Education and Student Affairs at the University of Iowa. Her research focuses on various aspects of civic and public engagement, including the multiple ways in which college students learn about and enact social responsibility, as well as the ways that universities, as organizations, contribute to democracy and civic life.

**TIMOTHY BARRETT** is a professor in the University of Iowa Center for the Book and the School of Library and Information Science. His many years of research on early European handmade papers have been funded by the NEA, the Kress Foundation, the Institute for Museum and Library Services, and, as of 2009, a MacArthur Fellowship. Barrett is author of two books, one website, seven videotapes, and thirty-six articles or book chapters on the history, technique, science, and aesthetics of hand papermaking. He was director of the Iowa Center for the Book between 1996 and 2002 and again became director in the fall of 2012.

**NICHOLAS A. BOWMAN, PHD**, is the director of the Center for Research on Undergraduate Education and a professor of higher education and student affairs at the University of Iowa. His research covers several

different topics, including college diversity experiences, student persistence and graduation, college rankings, and decision making in college admissions. This work has been supported by approximately \$1 million in grants and contracts from a variety of sources, such as the National Science Foundation and the Roy J. Carver Charitable Trust.

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**RYAN CARNAHAN, PHARMD, MS**, is an associate professor of epidemiology at the University of Iowa College of Public Health and a board-certified psychiatric pharmacist. His research focuses on drug use and safety, especially use of psychoactive medications in older adults and people with cognitive disorders. He serves in leadership roles for the Center on Aging, Iowa Geriatric Education Center, and Health Effectiveness Research Center at the University of Iowa and for the Food and Drug Administration's Sentinel Initiative.

**CHRISTOPHER S. COFFEY, PHD**, joined the faculty at the University of Iowa in fall 2009 as a professor in the Department of Biostatistics and became the director of the Clinical Trials Statistical and Data Management Center in August 2010. He has more than fifteen years of experience providing data management and statistical support to clinical trials and serves as the primary investigator for several large clinical studies, including the Network for Excellence in Neuroscience Clinical Trials (NeuroNEXT), funded by the National Institute of Neurological Disorders and Stroke.

**MARY L. COHEN, PHD**, is an associate professor and area head of music education at the University of Iowa. She researches music making and wellness with respect to prison contexts, writing and songwriting, and collaborative communities. Since 2009, she has led the Oakdale Prison Community Choir, comprised of male inmates and women and men from the community, and, with them, has helped create more than one hundred original songs and reflective writings, some of which are available at <http://oakdalechoir.lib.uiowa.edu/>. She is a commissioner for

the Community Music Activity (CMA) Commission of the International Society for Music Education and cochaired the 2018 CMA Seminar.

**CHARLES (CHUCK) CONNERLY, PHD**, joined the University of Iowa School of Urban and Regional Planning in 2008 as professor and director. His best-known work is *“The Most Segregated City in America”*: *City Planning and Civil Rights in Birmingham, 1920–1980* (University of Virginia Press, 2005); more recently he coedited *Growth Management in Florida: Planning for Paradise* (Ashgate Publishing, 2007). His current research is an assessment (part history, part contemporary analysis) of Iowa’s sustainability challenges, titled *Prairie State Sustainability*, which builds on his work with the community engagement initiative of which he is the principal founder, UI’s Iowa Initiative for Sustainable Communities.

**KIMBERLY MUSIAL DATCHUK, PHD**, is a visiting assistant professor in art education at the University of Iowa and assistant curator of special projects in the University of Iowa Stanley Museum of Art. She specializes in nineteenth-century French art and Post-War American and European art. Her research and curatorial interests include gender, sexuality, and technology. She curated an exhibition about Napoleon Bonaparte’s great-nephew Ferdinand Bac in spring 2018.

**DIXIE J. ECKLUND, RN, MSN, MBA**, is director of operations for the University of Iowa Clinical Trials Statistical and Data Management Center (CTSDMC). She has more than thirty years of experience conducting clinical trials through the CTSDMC and in her previous role as nurse manager of the General Clinic Research Center (GCRC). She has also served as an adjunct assistant professor in the College of Nursing for more than twelve years.

**ANDREW FORBES, PHD**, is an associate professor of biology and academic coordinator for the Environmental Sciences Program in the University of Iowa College of Liberal Arts and Sciences. He is interested in the origin of species, and his research focuses on the evolution of natural insect populations in the very early stages of speciation. He helps to organize the annual Iowa City Darwin Day celebration and teaches in two of the UI’s Big Ideas courses.

**BERND FRITZSCH, PHD**, is director of the University of Iowa Aging Mind and Brain Initiative and its Center on Aging. A professor in the

Department of Biology in the University of Iowa College of Liberal Arts and Sciences, he has been a leader in the field of inner ear neuroembryology and evolution for thirty years. Through his research he seeks to understand basic aspects of specification, development, and maintenance of the neurosensory system of the ear. The genes he is focusing on are those relevant to specify the prosensory domains, to initiate differentiation of sensory neurons and hair cells, and to both guide the normal development of the ear and maintain its innervation.

**BRANDI JANSSEN, PHD**, is a clinical assistant professor in occupational and environmental health in the University of Iowa College of Public Health and is the director of Iowa's Center for Agricultural Safety and Health (I-CASH). Trained as an anthropologist, her research examines the production and marketing strategies of local food producers and their relationships with conventional agricultural production. She has collaborated with area school districts, nonprofits, and community agencies to promote and enhance sustainable food systems locally. She is the author of the book *Making Local Food Work: The Challenges and Opportunities of Today's Small Farmers* (University of Iowa Press, 2017).

**GERALD JOGERST, MD**, has for more than twenty-four years taught geriatrics to medical students and to family practice and internal medicine residents and has directed a geriatrics fellowship. He has also established family practice residency curricula for geriatrics, teaching in nursing homes, and home visit programs. He has taught geriatric topics to practicing physicians at local, national, and international conferences and has evaluated the geriatric learning experiences of medical students at the University of Iowa. Clinically, he has provided patient care to elders in a private office, hospitals, nursing homes, clinics, and home settings. His research has included investigation of the components of function impacting elders' daily living in both the United States and Russia. He has determined community risk factors associated with elder abuse and has completed a study investigating the impact of state laws on the reporting and substantiation of elder abuse.

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**MEENA KHANDELWAL, PHD**, is an associate professor of anthropology and holds a joint position in gender, women's, and sexuality studies. She has published extensively on the topic of Hindu religious renunciation (*sannyasa*) in India. *Sannyasa* entails the renunciation of marriage, family ties, wealth, caste, and professional status for a life of celibacy and spiritual discipline. Khandelwal published her findings in a monograph *Women in Ochre Robes* (SUNY Press, 2004) and coedited *Women's Renunciation in South Asia* (Palgrave Macmillan, 2006; Zubaan, 2007) with Sondra L. Hausner and Ann Grodzins Gold. Her inquiries into globalization have also led her to research arranged marriage and cultural politics of Indian diaspora in the United States. Recently, she turned her attention to biofuel cooking in rural India and, more broadly, to issues of development and environment. She is part of a multidisciplinary group of University of Iowa faculty exploring the linkages between local (rural Rajasthan) and global processes, as well as connections among forests, energy, gender relations, health, consumption and culture.

**REBEKAH J. KOWAL, PHD**, teaches dance history and theory at the University of Iowa and is chair of the Department of Dance in the College of Liberal Arts and Sciences. Her research investigates how moving bodies are compelling agents of social, cultural, and political change. A dancer and scholar, Kowal seeks to forge interdisciplinary connections between dance theory and practice. She has published widely in the fields of dance and performance studies. Her current book-length project, *Dancing the World Smaller: Staging the Global in Mid-Century America* (forthcoming, Oxford University Press), analyzes performances and the critical reception of international dance in New York City after World War II to illuminate cultural complexities and contradictions associated with the rise of American globalism.

**CORNELIA CHESLEY LANG, PHD**, is an associate professor in the Department of Physics and Astronomy in the College of Liberal Arts

and Sciences. Her research interests focus on understanding the astrophysics at the very center of the Milky Way Galaxy and of other nearby galaxies using radio telescopes at the National Radio Astronomy Observatory in New Mexico and satellites such as the Hubble Space Telescope. She recently served as the chair of a major international science symposium on the galactic center and has also served on the National Academy of Sciences committee for the Decadal Survey of Astronomy and Astrophysics (2009–2010) and on the National Science Foundation’s committee for the Portfolio Review of Astronomical Sciences (2010–2012). With colleagues in geoscience, biology, and anthropology, Lang has developed a set of general education courses titled *Big Ideas: Origins of the Universe, Earth, and Life*, and *Big Ideas: Evolution and Life in the Universe*.

KURAYI MAHACHI is a Master of Public Health candidate of the University of Iowa College of Public Health. He studies infectious diseases and antimicrobial resistant bacteria and in 2012 began conducting research on *Vibrio parahaemolyticus* pathogenesis. He has also done work exploring microbial fuel cells as an alternative energy source. In 2015, he worked in a hygienic lab in Togo, where he participated in multiple projects, including susceptibility tests for bacterial infections and infectious disease surveillance of diseases such as toxoplasmosis and HIV. He also volunteered in orphanages across Togo, raising awareness about prevention methods for infectious diseases, and helped provide basic medicine to orphanage caretakers. He is currently working on developing a project to measure the amount of antibiotic residue being emitted into the environment by individuals, animals, hospitals, and pharmacies in Kenya and the United States.

CHRISTOPHER MERRILL, MA, has published six collections of poetry, including *Watch Fire* (White Pine Press, 1994), for which he received the Lavan Younger Poets Award from the Academy of American Poets; many edited volumes and translations; and six books of nonfiction, among them, *Only the Nails Remain: Scenes from the Balkan Wars* (Rowman and Littlefield, 1999), *Things of the Hidden God: Journey to the Holy Mountain* (Random House, 2005), *The Tree of the Doves: Ceremony, Expedition, War* (Milkweed Editions, 2011), and *Self-Portrait with Dogwood* (Trinity University Press, 2017). His writings

have been translated into nearly forty languages, and his journalism appears widely. His honors include Chevalier de l'Ordre des Arts et des Letters (Knight of the Order of Arts and Letters) from the French government. As director of the International Writing Program at the University of Iowa, Merrill has conducted cultural diplomacy missions to more than fifty countries. He serves on the US National Commission for UNESCO, and in April 2012 President Obama appointed him to the National Council on the Humanities.

**JEFF MURRAY, MD**, board certified in pediatrics and clinical genetics, is a human molecular-developmental geneticist with a thirty-year academic career at the University of Iowa studying gene-environment interactions involved in human complex traits. He is currently on leave of absence from the University of Iowa Carver College of Medicine's Department of Pediatrics while serving as deputy director for Family Health in Discovery and Translational Sciences at the Bill and Melinda Gates Foundation, where his portfolio focuses on preterm birth and early childhood growth and development. He played a substantial role in the development of human genetic linkage maps as part of the Human Genome Project and is a coauthor on 490 peer-reviewed articles, was a member of the Scientific Council for the National Human Genome Research Institute, and served on the advisory committee to the director of NIH.

**KRISTY NABHAN-WARREN, PHD**, is professor and V. O. and Elizabeth Kahl Figge Chair of Catholic Studies at the University of Iowa. Her research and teaching focus on the relationships among religion, migration, ethnicity, and work. She is trained as a social historian of religion in the United States and as an anthropologist of religion. She is the author of two books, *The Virgin of El Barrio: Marian Apparitions, Catholic Evangelizing, and Mexican American Activism* (New York University Press, 2005) and *The Cursillo Movement in America: Catholics, Protestants, and Fourth-Day Spirituality* (University of North Carolina Press, 2013). She is currently editing *The Handbook of Latino/a Christianities* for Oxford University Press (forthcoming in spring 2020) and is working on her third manuscript, *Cornbelt U.S.A.: Family, Faith, and Work in the Heartland*.

**MAURINE NEIMAN, PHD**, is an associate professor in the Department of Biology at the University of Iowa. Her main research interest is a central unanswered question in evolution: why most organisms reproduce sexually even though asexual reproduction is much simpler and less costly. She draws from across biology to address the sex question in her snail system, applying data and insights from the lab and field to identify the costs and benefits of sexual reproduction. A main component of her group's research program is the direction of the genome project for their snail study system, involving the sequencing, assembly, and comparison of genomes from sexual and asexual snails. This research allows powerful direct assessment of how genomes evolve in the absence of sex.

**EDITH A. PARKER, PHD**, is professor and head of the Department of Community and Behavioral Health in the University of Iowa College of Public Health. She is also the director of the Prevention Research Center for Rural Health, funded by the Centers for Disease Control and Prevention, and is known internationally for her expertise in Community-Based Participatory Research.

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**CHRISTINE PETERSEN, PHD**, is an associate professor in the University of Iowa College of Public Health, Department of Epidemiology. She teaches joint medical, veterinary, and global public health coursework related to the diagnosis, treatment, and prevention of zoonotic diseases within all populations. Her research focuses on the recognition and prevention of zoonotic diseases, primarily the epidemiology and immunobiology of parasitic diseases. She is an editor for *PLOS Neglected Tropical Diseases*, *Infection and Immunity*, and *PLOS Pathogens* and was recently elected president of the American Committee of Cellular,

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- LIA PLAKANS, PHD, is an associate professor in the Department of Teaching and Learning in the University of Iowa College of Education. She teaches courses in teaching English as a Second Language (ESL), including second language literacy, language structure, and language assessment. She serves as the coordinator of the K–12 ESL Endorsement in the UI Teacher Education Program and is the co-PI on two federal grants from the Office of English Language Acquisition. She has coauthored two books with the University of Michigan Press, *Assessment Myths* (2015) and *Reading and Writing for Academic Success* (2003).
- DEBORAH K. REED, PHD, spent the first ten years of her career as an English language arts and reading teacher and reading specialist, primarily in inner city schools in California and Texas. Since 2003, she has been active in the field as a researcher and technical assistance provider in numerous states. She is now director of the Iowa Reading Research Center and an associate professor in the University of Iowa College of Education. Her current research interests include appropriate uses of reading data in instructional decision making and identification of evidence-based reading practices for teaching vulnerable youth.
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RENITA (NITA) R. SCHMIDT, PHD, began her career in education as an elementary teacher in Iowa rural schools. She taught at Furman University in Greenville, South Carolina, before returning to the University of Iowa in 2011 as an associate professor in the College of Education's Department of Teaching and Learning. She currently serves as program coordinator for the Language, Literacy, and Culture Program. Her main research interests are children's literature and the methods and materials elementary teachers use for literacy instruction.

EMILY SCHOERNING, PHD, began work in the field of science education in 2008. Her body of research focuses on spoken language, vocabulary, and science learning. Her publications address the relationships between language, access, and power in the science classroom. Her research goals are finding quantifiably significant, cost-effective methods to increase retention, literacy, and participation in the sciences, particularly among underserved populations. Currently, as director of research for the National Center for Science Education (NCSE), she leads NCSE's Science Booster Club program. This research project, conducted in collaboration with the University of Iowa, is developing scalable methods to organize communities around science education.

MARIN SCHWEIZER, PHD, is an assistant professor of general internal medicine at the University of Iowa Carver College of Medicine and an investigator at the Center for Comprehensive Access and Delivery Research and Evaluation at the Iowa City Veteran's Affairs (VA) Health Care System. She joined the University of Iowa faculty in 2010, and her research focuses on the prevention and treatment of *Staphylococcus aureus* infections, specifically bloodstream infections and surgical site infections. Her current research focuses on determining the best interventions to prevent these infections among hospitalized patients. She has research funding from the Veterans Administration, the Centers for Disease Control and Prevention, and the National Institutes of Health.

AMANDA HAERTLING THEIN, PHD, is associate dean for academic affairs and graduate programs and professor of language, literacy, and culture in the University of Iowa College of Education. Before coming to Iowa in 2011, she was a faculty member in English education at the University of Pittsburgh and a high school English and journalism

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**JOYCE TSAI, PHD**, is curator of the University of Iowa Museum of Art and clinical associate professor of Art Education at the College of Education at the University of Iowa. As a teacher, she has developed cross-disciplinary digital humanities courses that integrate the study of art with museum practice, community outreach, and digital project development. Her current research and curatorial projects center on artistic engagements with technology, which is the focus of her prize-winning book, *Painting after Photography* (University of California Press, 2017), and *Shape of Things to Come* (Yale University Press, 2015), a catalog that accompanied an exhibition she curated for the Santa Barbara Museum of Art.

**H. S. UDAYKUMAR, PHD**, is professor of mechanical and industrial engineering at the University of Iowa. His research areas include the flow of materials at high speeds, the thermomechanics and multiscale modeling of energetic materials, and the sustainable use of energy in rural households. For the past five years he has been involved in projects related to efficient cooking in rural households in India, Ghana, and Kenya. He has given a TEDx talk on the topic; led several "Winterim" courses, taking students to Rajasthan, India, to investigate the issue of firewood use for cooking; been a participant in a Fulbright Group visit to India; and coorganized a Provost Global Forum on the topic at UI.

**LARRY WEBER, PHD**, is a native Iowan, who grew up on a farm near Dyersville, Iowa. At the University of Iowa, Weber served as director of IIHR-Hydroscience & Engineering from 2004 to 2017, is a professor of civil and environmental engineering, and holds the Edwin B. Green Chair in Hydraulics. His research interests include combining hydrodynamic data and biological data of fish response, applying computational fluid dynamics codes to natural river reaches and hydraulic structures, studying fundamental principles of plunging

jets, and combining open channel flows, water quality, and watershed processes. He was instrumental in helping the state of Iowa secure a nearly \$100 million award from the US Department of Housing and Urban Development for the Iowa Watershed Approach, a five-year project reshaping how communities approach flooding and water-quality issues. And in 2009 he cofounded the Iowa Flood Center, along with colleague Witold Krajewski.

**ROGER A. WILLIAMSON, MD**, spent thirty years as a faculty member in the University of Iowa Carver College of Medicine. His clinical care duties were primarily focused on ultrasound, altered fetal development, and prenatal testing (including amniocentesis). His unit, Maternal-Fetal-Medicine, also established an active program of prenatal treatment, the most common indication being severe Rh disease requiring intrauterine fetal transfusion. From 1984 until retirement Williamson also directed a statewide Maternal Serum Screening program, which provided counseling for patients whose blood specimens indicated an increased risk for a fetal abnormality. In 1990, Williamson was granted a sabbatical year in the laboratory of British geneticist Oliver Smithies and subsequently developed a Gene Targeting Core Facility at the University of Iowa. He retired in 2010.

**MARIAN WILSON KIMBER, PHD**, is professor of musicology at the University of Iowa, where she teaches courses in music history. Her research explores biography, gender, musical reception, and relationships between music and the spoken word. Wilson Kimber's book, *The Elocutionists: Women, Music, and the Spoken Word* (University of Illinois Press, 2017), was the recipient of the Society for American Music's H. Earle Johnson Publication Subvention, as well as a subvention from the American Musicological Society, funded in part by the National Endowment for the Humanities and the Mellon Foundation. It explores the intersection of speech and music in performances by women in America between 1850 and 1950. Wilson Kimber can be seen on YouTube performing spoken word compositions by women composers.

**PATRICIA ZEBROWSKI, PHD**, is a professor in communication sciences and disorders at the University of Iowa. She is a fellow of the American Speech-Language-Hearing Association and is a specialist in fluency,

certified by the American Board of Fluency and Fluency Disorders. Her current research focuses on stuttering development and the cognitive factors underlying change readiness for teenagers who stutter. In addition to teaching and research, she has maintained active clinical practice in the department's clinic for close to thirty years. She directs a summer residential therapy program (UISPEAKS for Teens) for adolescents who stutter.

