Integrating the Histories of Race and Technology

Bruce Sinclair

This volume brings together two subjects strongly connected but long segregated from each other. The history of race in America has been written as if technologies scarcely existed, and the history of technology as if it were utterly innocent of racial significance. Neither of these assumptions bears scrutiny. Indeed, in both cases the very opposite is true; an ancient and pervasive set of bonds links their histories. But there is little by way of an established literature that directly explores this relationship, nor a body of teaching that unites the two subjects. So we must begin the project of constructing a joint history by re-thinking our own assumptions, by borrowing useful ideas from related fields of scholarship, and by selecting examples of method and subject matter that promise fruitful lines of investigation—and in that fashion lay a groundwork. That is why this book is subtitled "Needs and Opportunities for Study." Its goal is simply to open up the topic for further exploration.

There are reasons why the past we seek to reveal has been so long denied, and racial prejudice dominates all of them. But more particularly, perceptions about inventiveness, presentations in our history about the nation-building role of technological talent, and the disciplinary boundaries between the fields of study themselves—as well as the politics that drove their own development—have all served to mask reality, and they are among the issues I want to consider in this introductory essay. A good place to start is with our oldest, most obvious attitudes. White Americans, including those as committed to Enlightenment ideals as Thomas Jefferson—even as he corresponded with Benjamin Banneker, the African-American astronomer and almanac maker—believed the black people among them were mentally inferior, and by that they didn't just mean a capacity for advanced intellectual accomplishment.[1] What good would freedom be, one Southern planter put it, to a field hand whose highest faculties were taxed "to discriminate between cotton and crop-grass, and to strike one with a hoe without hitting the other"?[2] Crude preconceptions of mental inferiority went well beyond simple tool using to include almost any aptitude for technological competence,

and these notions flowered in the basic conditions of forced servitude. Owners linked the supposed endurance for hard, menial labor to brutish intelligence, and then justified enslavement on the grounds of such limited capacities. Besides that casual kind of rationalization, a substantial eighteenth-century literature invidiously compared African and other non-Western civilizations in terms of their relative backwardness in science and technology, making it easy for Europeans and Americans to take it as given that inventive talent was not to be found in any people of color.[3]

The idea that technical competence was related to race grew even more fixed with time. Even in the relatively tolerant city of Philadelphia, the Franklin Institute, established in 1824 explicitly to encourage the development of the mechanic arts, refused to allow blacks to attend lectures or classes. As Nina Lerman shows in her essay in this volume, the city's educational institutions increasingly planned occupations for its black students that required only minimal training. The great industrial expositions of the latter part of the nineteenth century made the same point graphically in the contrasts they drew between exhibits of the savagery of the dark-skinned peoples of the world and the brilliant flowering of civilized progress epitomized in Chicago's 1893 "White City."[4] But rather than simply the shell or emblem of racist thinking, defining African-Americans as technically incompetent and then—in a kind of double curse—denying them access to education, control over complex machinery, or the power of patent rights lay at the heart of the distinctions drawn between black and white people in this country. That formulation always served important political, economic, and social functions, and it is fundamentally why race and technology have for such a long time seemed different, even immiscible, categories of analysis. Racism may have colored all our history, but it whitened the national narrative.

Now, without looking very hard, we can see that this deeply ingrained and long perpetuated myth of black disingenuity has been a central element in attempts to justify slavery, as well as a whole array of racialized behaviors in the centuries after emancipation. But we are still left to wonder why scholars haven't stepped in with a more critically satisfying analysis of the relation between race and technology. The answer to that question lies at least partly in the evolution of the disciplines most concerned with those subjects.

In the United States, the history of technology emerged on a wave of post-World War II technological enthusiasm and economic ebullience. Perhaps naturally, it took on a celebratory character, emphasizing a triumphant technics, and Cold War politics reinforced that tendency. This kind of attention to great men and technological progress drove research into rather limited and exclusive channels that centered on big capital, complex technologies, and the small fragment of the population acting on that narrow

stage. Inevitably, it dismissed all those who, to use Carroll Pursell's apt language, "were effectively barred by law, habit, and social expectation from the design and development stages of technical praxis."[5] It was a tale, in other words, of advantage and the successes that flowed from it.

This essentially conservative approach had its own theory. Brooke Hindle, one of the field's early spokesmen, claimed that there was a deep, interior logic to technology, crucial to the understanding of its meaning, and accessible only through rigorous study of its internal complexities.[6] That position argued the need for technical as well as historical training, and more selectively defined who and what was worth study. It took a new generation of historians to realize that technology is as much about process as about product, and that its history legitimately comprises the field as well as the factory, the home as well as the engineering site.

George Washington Williams published his *History of the Negro Race in America from 1619 to 1880* in 1882, though most people would date the origins of African-American history as a discipline to Carter Woodson's founding of the Association for the Study of Negro Life and History in 1915.[7] Still, it was not until the 1960s that African-American Studies became established in the academy, largely as a consequence of the civil rights movement and the research of a group of historians who wrote out of strong ideological conviction. The field that emerged continued a tradition of writing about race relations, implicitly if not explicitly, as a basis for political action. As it matured, however, scholars produced increasingly complex and subtle conceptual frameworks for analyzing race, including new understandings of agency—the ways in which men and women shape their own lives, even under disadvantageous circumstances.

These theoretical advances in both fields now open the way for an enriched history of technology and for new insights into the role of technology in African-American life. We have learned for a certainty that race is not a fixed, immutable concept—that definitions of who is white and who is black have changed with time, place, and circumstance. That technology is also a product of interest—political and ideological as well as economic—is also now widely accepted as an analytical point of departure. And we can begin to see that these subjects are more tightly connected than we imagined. Technology has long been an important element in the formation of racial identity in America. Whiteness and technological capability, Susan Smulyan points out, were usually seen as "natural" parts of each other, and as fundamental elements of masculinity.[8] By the end of the nineteenth century, these ideas had found widespread acceptance in such best-selling novels as *Trail of the Lonesome Pine* and *The Winning of Barbara Worth*, each subsequently made into a movie that featured a rugged, intelligent,

problem-solving white engineer as the leading male character. An opposite calculus—the imputation of foolish incompetence in blacks, and thus the want of a key ingredient for independent manhood—found equally widespread acceptance. How and why these constructions were framed and how they interact thus becomes not just a good object of study, but a critical one.

There is a very reasonable argument to be made for the proposition that all discussions of race should go beyond the simple juxtaposition of black and white, and this is certainly true in the case of technology. But there is an equally persuasive logic for starting with African-Americans—because they are the classic American minority group, because they have been the focus of most American civil rights efforts, and because in their case American ideals of justice and equity are most specifically at issue.[9]

Yet, even with an enhanced appreciation of the complexities of these subjects and of their interrelatedness, we need also to be reminded that, although archival holdings and museum collections influence what historians study, people also make choices about what history gets written. Until feminist scholars created the analytical tools that revealed the women who had been there all along, historians could hardly imagine their existence.[10] Similarly, until very recently few historians have sought analytical tools that might link the study of African-Americans and technology. Just as it took new approaches to put women back into the story of America, so we now seek the means to write blacks back into the history of American technology.

To conceive such tools, we need to start not with African-Americans but with the ways in which white Americans have represented themselves. From the eighteenth century on, white Americans described themselves as an inventive people. They claimed to have a natural disposition for quick and novel solutions to the practical problems of life. That is what "Yankee ingenuity" meant—a self-attached label, applied early on.[11] And that distinct image, explicitly and repeatedly articulated over the next two centuries, was ideologically linked to the exploitation of the continent's natural resources as well as to the historic destiny white Americans imagined to be the just consequence of their political experiment. Democratic ideals would triumph by releasing the people's energies, and they would prosper by exploiting the resources that had been given them.

But that romantic vision was always framed in racial terms. European-Americans almost never considered the Africans among them, whether enslaved or enfranchised, to be capable of creative technical thought—and they translated that difference into an explicit point of contrast. Hundreds of examples illustrate that conviction, but they are all summed up in the sarcasm of a Massachusetts lawyer in a patent case when he said "I never knew a negro to invent anything but lies."[12] And even as colonial

newspaper advertisements by the hundreds described the considerable craft skills of runaways, plantation owners insisted that enslaved Africans broke or misused their tools because they could not understand how to use them, not as deliberate acts of resistance.[13]

More than that, Ron Takaki points out, technology was perceived as the means by which people of color throughout the United States—African, Native American, Hispanic, and Asian—were to be subordinated to the grander purposes of American civilization.[14] All down these long decades, white, Anglo-Saxon, Protestant Americans made technology and the capacity for its skillful management central both to the task of nation-building and to the way they represented themselves. Just as plainly, they contrasted themselves to people of color, whom they judged incapable of such things. That's what Toni Morrison means by "Africanism," an explicit kind of marginalization against which privileged status can be defined.[15]

Our history with technology, then, has always been entangled in ideas about race. But the curious consequence is that we have written that history blind to color—as if accepting all those earlier assumptions about who was inventive and who was not, as if the ways in which a people thought about and used technologies were essentially irrelevant. This limited kind of understanding is currently under attack. The work of Takaki, Robert Rydell, and Michael Adas reveals the extent to which our historic concepts of technology and of our own technological prowess have been infused by racial ideology.[16] Even *Technology and Culture*—the principal journal on the history of technology—has started publishing articles that explicitly engage the issue of race and technology. One example, reprinted here, shows how rice cultivation in South Carolina and Georgia depended on knowledge brought to those places by enslaved Africans. We already knew from Peter Wood's work that lowland South Carolina planters preferred slaves from the rice-growing regions of Africa, and we knew that those slave owners were themselves originally ignorant of the techniques and processes of rice cultivation.[17] Now we can appreciate in more explicit detail the specifics of field layout, of irrigation methods, and of the technics of rice processing (all African imports), and what we learn directly challenges the notion that blacks contributed only their labor.[18] Another recent article in *Technology and Culture* describes the relation between race, changing technology, and work assignments at Bell Telephone, and shows how the technological displacement of labor was biased by color.[19] We always thought that happened; now we have a compelling analysis of the process. So, even if slowly, we begin to see that in our country technology and race have always been tied closely together, just as we begin to sense that those connections are much more intertwined and ubiquitous than we ever realized.

How can we throw even more light on these complexities? We might start by searching out all the black inventors who have never received appropriate credit. That approach not only gives the lie to the myth of disingenuity, but also offers the comfort of familiar ground. In this country we have always celebrated our inventors. We love telling success stories, imagining them to say something important about both our past and our future. And in fact we are now beginning to see some interesting work about black inventiveness. A good place to start is Portia James's *The Real McCoy*, an extensive catalog written to accompany an exhibit she developed at the Anacostia Museum of the Smithsonian Institution. In a revised form, her essay from that book is included in this volume.[20] Another source that will prove valuable is Rayvon Fouche's *Black Inventors in the Age of Segregation*, soon to be released by the John Hopkins University Press

Invention is, however, a problematic category of analysis. The patent system has always worked worst for the poor, who have had least access to its law and processes, and that proved doubly so for black inventors. Before 1865, they were even denied the right to a patent, so that slave owners could lay claim to the intellectual as well as the physical labor of their property. After 1865 blacks more often than not lacked the economic resources to develop their ideas into patentable or marketable form, and for that reason were often forced to sell their interest in inventions prematurely. The romance of invention focuses on the flash of creative insight, to use A. P. Usher's dramatic phrase, but financial rewards more often depend on the legal manipulation of patent rights—something else not easily managed from the margins of society.[21] Finally, it is important to realize that patents describe only a fragment of human inventive activity and are only a small part of the story of people's experiences with technologies. On the other hand, if that familiar model doesn't work very well, what new paradigms do we need in order to discover the connections we seek?

In fact, all it takes to reveal a much more richly populated and therefore more authentic history is to turn the older approach on its head. If, instead of concentrating on the production of new technology, we look equally hard at the worlds of labor and of consumption, then whole new casts of characters emerge. Let's start with work. After all, it was the work of African-Americans that created the rice, tobacco, and cotton economies of the South, and thus so much of America's eighteenth- and nineteenth-century agricultural wealth. Some of that labor also took place in factories, both before and after the Civil War. Charles B. Dew originally pointed out the crucial role played by skilled slave ironworkers in Richmond's Tredegar Ironworks, one of the South's largest industrial enterprises. In a subsequent analysis of smaller furnaces and forges in the great valley of Virginia, Dew revealed both the extent to which slave artisans (who

couldn't go on strike) became the preferred work force and how their skills gave them some control over their own work assignments.[22] W. E. B. Du Bois, in *The Negro Artisan,* identified black workers with "considerable mechanical ingenuity" across a broad range of craft and manufacturing occupations.[23] World War I opened up new opportunities for black people in Northern factories, breaking the agricultural "job ceiling" (to use the words of Trotter and Lewis) and making blacks important contributors to the nation's industrial economy.[24]

Thinking about labor means establishing the historical worth of the work in which most people have always been engaged, and it means exploring more creatively the relations between work, technologies, and skill. I don't at all mean to suggest that we relegate the inventive imagination of Elijah McCoy or Granville Woods to a place of lesser historic importance. But if we intend a truly inclusive history, an argument Lonnie Bunch cogently advances in an essay reprinted here, then we have to take into account all those people whose most crucial encounter with machines and technological systems takes place on the job. And surely it is the case that, in the normal, daily working of the world, skill and experience count for as much as abstract knowledge and formal training. What makes this fact important to us is that by defining technical knowledge and creativity in broad terms we immediately reveal hosts of African-Americans who had previously been excluded from the story. We find them planning the layout of South Carolina rice fields, creating pottery, fashioning the furniture now highly prized by collectors, using sewing machines, running and fixing cotton gins, molding iron in Henry Ford's assembly-line factories, and fishing in the ocean for schools of menhaden.[25]

Frederick Douglass understood the critical importance of these kinds of skills in American society, and more particularly he recognized the precise connection in our society between skill and manly status. In an 1848 letter to Harriet Beecher Stowe, he wrote: "We must become mechanics—we must build, as well as live in houses—we must make, as well as use furniture—we must construct bridges, as well as pass over them—before we can properly live, or be respected by our fellow men."[26]

Work has been an important theme of recent studies in African-American history. But in addition to the relation between labor and the creation of wealth, we also need to think about the connections between work and craft and about the affinity between craft skill and knowledge. Since the nineteenth century, engineering in this country has depended on a published literature and on advanced formal instruction that has included physics and mathematics. Craft skill depends on a different kind of knowledge, most of it unwritten and learned on the job. Apprenticeship—whether institutionalized or not—rests on emulation and repetitive practice in the interest of acquiring

manual skills, and it is married to experience with the ways in which materials behave in different circumstances. Not only is this kind of knowledge complex and difficult to transfer; it gains importance when considered in the context of the history of American slavery, the formal acquisition of knowledge by slaves having been forbidden by law.

In the seventeenth century, there was little hesitancy at exploiting the technical talents of African labor. Edmund White, for instance, wrote in 1688 to Joseph Morton, twice governor of the Carolina colony: "let yr negroes be taught to be smiths, shoemakers & carpenters & bricklayers: they are capable of learning anything."[27] And learn they did. Robert Fogel estimates that by the eighteenth century 10 percent of all black women were engaged in cloth production, while upwards of half of all male slaves were employed in blacksmithing, leather-working, cooperage, and carpentry—all considered elite occupations, as were such subsequent pursuits as the management of steam engines, boilers, and other machinery.[28] Indeed, Fogel points out, plantations were industrial enterprises that employed advanced technologies and depended upon a wide variety of skills. A more complex division of labor yields more complex labor, and this fact is important as a corrective to the notion that enslaved blacks were ignorant of current technics and untouched by them.

Almost from the beginning, slavery in America was characterized by substantial technical talent and an elaborate occupational hierarchy. Moreover, planters encouraged the development of hierarchies, seeing it as a means of ensuring a tractable work force. As Fogel argues, "the critical decision made by the planters, the decision that allowed the eventual emergence of a many-sided and often quasi-autonomous slave society, was the switch from whites to slaves as the source of personnel for their various managerial and craft slots."[29] There were risks to this approach. Even as their owners encouraged legislation to prohibit the education of slaves, the teaching of craft skills often required some book learning. And knowledge combined with skill brought other contradictions. One planter ruefully observed that, analogous to the profit he made, these elite occupations rewarded their black practitioners with "an extra measure of pride."[30] So perhaps we shouldn't be surprised to learn that skilled craftsmen led most slave rebellions.

Identity through one's work has always been a fundamental part of our culture. Consider the maritime occupations, for example. Long before Frederick Douglass learned the ship caulker's trade, blacks—both free and unfree—worked at shipbuilding, as sailmakers, and as sailors.[31] On both sides of the Chesapeake, where waterways provided the dominant means of transportation, as well as the source of seafood and game, generations of African-American watermen and boat builders, down to the present, have practiced their crafts, as family histories are now beginning to reveal.[32]

Pursuing these kinds of investigations will amplify our understanding both of technology and of the diverse people engaged with it. And field is as relevant as factory; agriculture depends on a set of technologies, just as does fishing, mining, and forestry. Each also requires varied kinds of expertise in the management of its techniques, some of which, Barbara Garrity-Blake's essay provocatively suggests, can even be invisible in character.

Finally, examining the links between race and labor gives us more useful conceptual tools. Scholars have already noticed that while access to technology-related jobs has often been made a matter of color, that relationship has often changed as technologies have changed, and the assignments have also differed geographically. At one end of the range technologies displace labor, while at the other technologies create a demand for low-wage labor in high-risk conditions, some of which can include strikebreaking. Thus, new technologies constantly force the renegotiation of racialized work, and the whole history of that process remains to be written.[33]

An examination of the role of consumption similarly reveals a much more interesting picture of the relation between technology and race and promises an especially fruitful line of inquiry. Leaving aside the idea that consumers play a role in the design process, it can at least be said that outside of work, most of us encounter technologies as consumers—that is, through use. Patents, after all, have little historical importance if no one uses the thing invented, as happens more often than one might realize. Moreover, we know that people employ technologies differently. Black families in Atlanta used automobiles not only for work or personal convenience, but also to escape the humiliating experience of segregated systems of public transit—thus giving that technology a distinctly political purpose.[34] Indeed, Langdon Winner claims that technologies actually have politics embedded in their forms—an argument that might sound right to anyone familiar with the effects of technological unemployment on blacks.[35] And it works the other way, too. The furnaces and foundries at the Ford Motor Company, for example, replicated the social politics of the outside world when white workers decided that, regardless of pay scales, they would not work at such dirty jobs.[36]

Besides whatever practical ends or economic ambitions it serves, access to technology defines status and power. Electrical technicians of the late nineteenth century, in an attempt to establish their own primacy as experts in the fluid occupational demographics of that period, consistently belittled the technological competence of blacks and women.[37] People use technology that way—to maintain existing social arrangements, or to escape them. We can most clearly see how these behaviors and strategies play out in the case of novel technologies; Kathleen Franz's essay in this volume shows the rich research possibilities of this approach.

People also appropriate technologies for their own ends, which are often different than those originally intended. Women have been known to cook turkeys in dishwashers, using the drying cycle. A decade ago, young African-American musicians experimentally scratched a stylus across vinyl records to create an alternative sound that carried political and cultural meaning. Despite the subsequent commercialization of that sound, it is still a good example of people using their politics to rethink technologies.[38] And here we come back to that matter of representation. Bell hooks has focused our attention on "the politics of representation," and that issue bears with particular force for us here because it has been such a struggle for blacks to represent themselves as technically competent. Photography is an oblique but good example of the case. When black people used it, the camera became "a political instrument, a way to resist misrepresentation, as well as a means by which alternative images could be produced." The camera was crucial to the way they could picture themselves. It gave them a means to "participate fully in the production of images," regardless of class—an ability that was enormously important in a world where someone else usually controlled the ways in which African-Americans were represented. Photography became, as hooks puts it, "a powerful location for the construction of an oppositional black aesthetic."[39] This power to define reality provides a starting point from which to shape politics and culture differently. And it works two ways: cameras in black hands—just like the technology of music in black hands—allows for the creation of an alternative image, but that image also enables African-Americans to represent themselves as skillful in the management of those technologies.

Thus, the way we think about race is often shaped by the technology employed in the debate. That connection becomes clear if we look at communications media, and it tells us something important about the control of radio that "Amos 'n' Andy" was the first serial program broadcast nationally in the United States. Even though that particular show employed white actors who imitated Negro speech, in many other cases the networks depended on black artists for talent, an important reality for people of color. According to Stanley Crouch, African-Americans could "remember radio waves smacking down segregation and making the jazz and dance band broadcasts, for instance, national experiences in the most democratic sense possible."[40]

African-Americans have always been interested in new technologies. And, like most other Americans, they have believed in the regenerative powers of technology. Inevitably, they ascribed an array of possibilities to machines such as cars and airplanes—new economic opportunities, an escape from racism, the chance to claim a place for themselves in American society. But technologies that you cannot own are different. Blacks could and did buy phonograph records as a way of managing the

content of that technology within their own homes. The content of radio, however, was much more difficult to control, as those "Amos 'n' Andy" broadcasts so blatantly revealed. Yet even in this case, the politics of radio technology allowed African-Americans at least one chance to manipulate programming for their own ends.

Barbara Savage tells the story in her recent book *Broadcasting Freedom*. The central character in this episode is Ambrose Calliver, Senior Specialist in Education of Negroes in the U.S. Department of Education.[41] Long interested in radio as a medium, Calliver wanted to develop a series of programs that would showcase African-American contributions to the nation's history, culture, and intellectual life. To that end, he adroitly linked technology and politics. First, he knew that the Roosevelt administration was concerned about the extent to which blacks would support the war effort, particularly since A. Philip Randolph—using the very rhetoric employed against Hitlerism to address the problems of racism at home—was threatening a march on Washington to protest discriminatory hiring in defense jobs. Calliver also appreciated the fact that government control of frequency allocation gave him leverage with network broadcasters, and he understood that this public character of radio made it especially suitable for educational content. Calliver skillfully manipulated these factors to push NBC into broadcasting a series called "Freedom's People," starting in the fall of 1941. Using an experienced science writer, he artfully orchestrated a message that began with comfortable, non-threatening music such as "Go Down Moses" and featured celebrated artists such as Paul Robeson. Then, in a conscious and deliberate way, Calliver progressed to shows on literature, science, discovery, invention, military service, and the skills of black workers—building his argument for the intellectual abilities, the inventive talents, the courage, and the capabilities of African-Americans, past and present.

Besides serving as a nice example of the intersection of race, politics, and technology, Calliver's radio series raises interesting questions that call for further study. We might ask, for instance, how race gets represented in communications media. African-Americans were anxious to counteract the vulgarity of "Amos 'n' Andy" and the way blacks were portrayed on programs like "The Jack Benny Show," but in casting "Freedom's People" Calliver and his advisors were also concerned not to have an announcer whose voice didn't sound black enough. So, one might ask, how do race and technology reconstruct each other in radio and in other media?

We can give meaning and form to our technologies as consumers, and we can shape their applications through politics, but it is important to understand that they do not come to us as a given. They are not the result of a neutral process, and they are certainly not the consequence of some inevitable technical logic. They are the result of choices,

of social processes, and consequently they embody interests, positions, and attitudes. Steven Lubar puts it as follows: "Machines and technological systems, like other forms of material culture, render cultural and social relations visible, tangible, and artifactual, objectifying and externalizing them. Our machines reflect our culture and society."[42] More than that, even, one could argue that machines and technical processes—whether simple or complex—don't just mirror us, but rather they *are* our culture and society. In other words, all these objects, techniques, and systems, as well as the ways in which they are imagined, produced, employed, consumed, and experienced, are embodiments of the ways in which we think and act.

In their own work, historians of technology have demonstrated that technologies emerge from a rich mix of choices and constraints that are social, economic, political, and technical. But for all that effort, the notion of technology as a black box—something that comes to us in an inescapable form—is still widely popular. Consider, for example, a recent feature story in the *New York Times* about an array of small electronic devices, often installed and deployed without the knowledge of the car owner, that are increasingly being used to monitor people and their automobiles. In fact, these intrusive technologies are promoted by an array of interests that include insurance companies, fast food chains, and car rental agencies. Yet in speaking of their use, a faculty member at the University of Pennsylvania's law school concluded—as if the outcome were predetermined—that "technology goes forward and people are either forced to accept the loss of privacy or lose out on the benefits."[43] That casual observation, so reminiscent of the slogan of the 1933 Chicago World's Fair, "Science Finds, Industry Applies, Man Conforms," ignores both the contingent nature of technology and the unequal power relations in these transactions. And that is where including race in our analysis brings especially useful insights. Looking at technology from the vantage point of African-American history throws the issue of power into sharp relief. Technology may be socially constructed, but the players are not all on the same footing—a truth familiar to people of color, who have also long known that both its benefits and consequences are distributed unequally.

Once we understand technology in these broader terms, we can appreciate the fact that the history of technology in America must necessarily comprise a much larger segment of the population, black and white, than we have imagined. And this understanding of the material world we have created for ourselves, while more complex than our earlier ideas about these things, ultimately yields a truer, more empowering history. But this history will not write itself. The problem of sources is real; for want of written historical records, we know little of the enslaved African potter "Dave," of South Carolina, beyond the remarkable examples of his talent now housed in museums,

and not much more of Thomas Day, the celebrated African-American furniture maker.[44] But, of course—it is worth repeating—what gets remembered is not simply a matter of documents but also of choice, of deciding what we will write about. And that decision often rests on what we imagine it possible to write about. More and more, we are coming to see that there is an interesting and important history to be written about race and technology in America. Recent Ph.D. dissertations such as Linda Tucker's "Science at Hampton Normal and Agricultural Institute," Nina Lerman's on nineteenth-century industrial and vocational education in Philadelphia, Rayvon Fouche's on the African-American inventor Granville Woods, Jill Snider's "Flying to Freedom: African-American Visions of Aviation, 1910–1927," and Angela Lakwete's on the cotton gin are a few examples. But there is yet a great deal to be done. "Invisible Hands," an exhibit of black craftsmanship held at Macon, Georgia, suggested the possibilities of future work in material culture study. And anyone interested in pursuing the subject should begin with Theodore C. Landsmark's "Bibliography of African-American Material Culture," deposited at the Henry Francis du Pont Winterthur Library in Wilmington, Delaware.

Much is still to be discovered about the history of black scientific and technical educational institutions. Nina Lerman has written insightfully about race and education in nineteenth-century Philadelphia, and contributes an essay to this volume that suggests important larger themes on the subject, as well as an innovative conceptual framework. But while there were hundreds of technical colleges and institutes created to educate African-Americans, there is very little information about schools other than Tuskegee and Hampton. Amy Slaton's essay in this volume on more contemporary educational practice neatly outlines a research program that, besides providing an example of a successful grant proposal, might help us understand some of the roots of contrasting professional experiences between black and white engineers.

We also need a more complete exploration of African-American participation in the industrial exhibitions of the nineteenth and twentieth centuries—from regional fairs such as the Cotton States Expositions in Atlanta to national exhibitions such as the one held in Louisiana in 1904 and on to the great international expositions in Paris that Du Bois wrote about.[45] The Columbian Exposition in Chicago in 1893 presents especially rich materials for further examination. *The Reason Why the Colored American Is Not in the World's Columbian Exposition*, edited by Robert Rydell, is a good place to begin.[46]

At the local level, the study of African-American communities with technology in mind will reveal a wide range of technical knowledge and skills practiced by women and men, in their homes, stores, and shops. That was true of free black neighborhoods

before 1865, and was certainly so in the urban centers of the later nineteenth and the twentieth century.[47]

We can see, then, that there is a great deal more to the interrelatedness of race and technology than scholars once thought, and a variety of interesting ways to come at this history. Upsetting as her story is, now that we know the dangers of overexposure to radiation, Rebecca Herzig's exploration of x-ray hair removal and skin whitening provides a provocative example of the varieties in analysis this subject offers. Furthermore, there is quite a substantial amount of rewarding material for study available both to teachers and students. The broad scope of Amy Bix's bibliographic essay reveals a surprising array of source materials and of research possibilities, and—together with the footnote references from the essays assembled here, many of which she incorporated into her essay—interested students will find all they need to make a start. Indeed, as we continue to explore the richness of this subject, the only surprise will be that we have waited so long to discover what lies at hand.

Notes

1. For the details of that correspondence, see Silvio Bedini, *The Life of Benjamin Banneker* (Scribner, 1971).

2. Frederick Law Olmsted, *A Journey in the Back Country, 1853–1854* (Schocken, 1970), reprint, p. 382.

3. The best source for the ways in which racial characteristics were defined in terms of scientific and technological accomplishment is Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance* (Cornell University Press, 1989).

4. Robert Rydell, *All the World's a Fair: Visions of Empire at American International Expositions, 1876–1916* (University of Chicago Press, 1984).

5. Carroll W. Pursell, Listening for the Silences, position paper presented at a workshop on Technology and the African-American Experience, Atlanta, February 4, 1994.

6. Brooke Hindle, *Technology in Early America: Needs and Opportunities for Study* (University of North Carolina Press, 1966).

7. See Robert L. Harris, "The Flowering of Afro-American History," *American Historical Review* 92 (1987), December: 1150–1161.

8. Susan Smulyan, The Social Construction of Race in the United States, a position paper presented at workshop on Technology and the African-American Experience, Atlanta, February 4, 1994.

9. This case is well made by Ron Takaki on p. 7 of *A Different Mirror*: *A History of Multicultural America* (Little, Brown, 1993).

10. For examples of how feminist scholars have changed the history of technology, see Judy Wajcman, *Feminism Confronts Technology* (Pennsylvania State University Press, 1991); Angela

N. H. Creager et al., *Feminism in Twentieth-Century Science, Technology, and Medicine* (University of Chicago Press, 2001); *Technology and Culture* 38 (1997), special edition edited by Nina Lerman, Arwen Palmer Mohun, and Ruth Oldenziel.

11. A good example of this notion of a predisposition toward inventiveness, as well as a telling case of postwar technological enthusiasm, can be found in John A. Kouwenhoven, *Made in America: The Arts in Modern American Civilization* (Branford, 1948).

12. W. E. Burghardt Du Bois, "The American Negro at Paris," *American Monthly Review of Reviews* 22 (1900), p. 576.

13. Ira Berlin, *Many Thousands Gone: The First Two Centuries of Slavery in North America* (Harvard University Press, 1998), p. 120.

14. Ron Takaki, *Iron Cages: Race and Culture in 19th-Century America* (Oxford University Press, 1990).

15. Toni Morrison, *Playing in the Dark: Whiteness and the Literary Imagination* (Harvard University Press, 1992).

16. Adas, *Machines as the Measure of Men*; Robert Rydell, *All the World's a Fair* (University of Chicago Press, 1987).

17. "Literally hundreds of black immigrants were more familiar with the planting, hoeing, processing, and cooking of rice than were the European settlers who purchased them." (Peter H. Wood, *Black Majority: Negroes in Colonial South Carolina, From 1670 through the Stono Rebellion*, Norton, 1974, p. 61) See also Peter H. Wood, "'It Was a Negro Taught Them': A New Look at African Labor in Early South Carolina," *Journal of Asian and African Studies* 9 (1974): 160–179.

18. Judith Carney, "Landscapes of Technology Transfer: Rice Cultivation and African Continuities," *Technology and Culture* 37 (1996), January: 5–35.

19. Venus Green, "Goodbye Central: Automation and the Decline of 'Personal Service' in the Bell System," *Technology and Culture* 36 (1995), October: 912–949.

20. Pursell, Listening for the Silences.

21. Abbott Payson Usher, *A History of Mechanical Invention*s (McGraw-Hill, 1929). On the manipulation of patents, see also Carolyn C. Cooper, *Shaping Invention: Thomas Blanchard's Machinery and Patent Management in Nineteenth-Century America* (Columbia University Press, 1991).

22. Charles B. Dew, *Ironmaker to the Confederacy: Joseph Anderson and the Tredegar Iron Works* (Yale University Press, 1966), pp. 29–31; Dew, *Bond of Iron: Master and Slave at Buffalo Forge* (Norton, 1994), pp. 67–70.

23. W. E. Burghardt Du Bois, *The Negro Artisan* (Atlanta University Press, 1902), p. 188.

24. Joe W. Trotter and Earl Lewis, eds., *African Americans in the Industrial Age: A Documentary History, 1915–1945* (Northeastern University Press, 1996), p. 1.

25. John Michael Vlach has provided the best information on African-American craft workers. See, for example, his book *The Afro-American Tradition in Decorative Arts* (Cleveland Museum of Art Press, 1978). Barbara Garrity-Blake's *The Fish Factory: Work and Meaning for Black and White Fishermen of the American Menhaden Industry* (University of Tennessee Press, 1994) is a fascinating study of the intersection of work, mechanism, and social relations.

26. "Proceedings of the 1853 Colored National Convention at Rochester, New York" (Frederick Douglass to Harriet Beecher Stowe, March 8, 1848), in *Minutes of the Proceedings of the National Negro Conventions, 1830–1864*, ed. H. Bell (Arno, 1969). Another useful source of information on the subject of work and skill is *A Guide to the Microfilm Edition of Slavery in Ante-Bellum Southern Industries*, ed. M. Shipper (University Publications of America, 1997).

27. Peter H. Wood, *Black Majority: Negroes in Colonial South Carolina From 1670 through the Stono Rebellion* (Norton, 1974), pp. 43–44.

28. Robert William Fogel, *Without Consent or Contract*: *The Rise and Fall of American Slavery* (Norton, 1989), p. 50.

29. Ibid., p. 58.

30. Berlin, *Many Thousands Gone*, p. 137.

31. Jeffrey Bolster, *Black Jacks: African American Seamen in the Age of Sail* (Harvard University Press, 1997).

32. Harold Anderson, "Black Men, Blue Waters: African Americans on the Chesapeake," *Maryland Marine Notes* 16 (1998), March-April: 1–3, 6–7.

33. One example of this literature is Jaqueline Jones, *American Work: Four Centuries of Black and White Labor* (Norton, 1998). For an account of the ways in which technologies create demand for low wage, high-risk jobs see Armando Solorzano and Jorge Iber, "Digging the 'Richest Hole on Earth': The Hispanic Miners of Utah, 1912–1945," *Perspectives in Mexican American Studies* 7 (2000): 1–27.

34. Blaine A. Brownell, "A Symbol of Modernity: Attitudes toward the Automobile in Southern Cities in the 1920s," *American Quarterly* 24 (1972), March, p. 35.

35. Langdon Winner, *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (University of Chicago Press, 1986).

36. Joyce S. Peterson, "Black Automotive Workers in Detroit, 1910–1930," *Journal of Negro History* 64 (1978): 177–190. See also Warren Whatley, African Americans, Technology, Work and the Reproduction of Racial Differencing, unpublished research paper, 1994.

37. Carolyn Marvin, *When Old Technologies Were New: Thinking About Electrical Communication in the Late Nineteenth Century* (Oxford University Press, 1988).

38. Tricia Rose, *Black Noise: Rap Music and Black Culture in Contemporary America* (Wesleyan University Press, 1994).

39. Bell hooks, "In Our Glory," in *Picturing Us*, ed. D. Willis (New Press, 1994), p. 49.

40. Stanley Crouch, *The All American Skin Game*, *or The Decoy of Race* (Vintage, 1995), p. 110.

41. Barbara Dianne Savage, *Broadcasting Freedom: Radio, War, and the Politics of Race, 1938–1948* (University of North Carolina Press, 1999).

42. Steven Lubar, Technology and Race, position paper presented at workshop on Technology and the African-American Experience, Atlanta, February 5, 1994.

43. *New York Times*, October 25, 2001.

44. See Vlach, *The Afro-American Tradition in Decorative Arts*.

45. See Du Bois, "The American Negro at Paris," and Philip S. Foner, "Black Participation in the Centennial of 1876," *Phylon* 39 (1978): 283–295. Nicholas Murray Butler of Columbia

University also presented an exhibit of American higher education at the Paris exposition, irresistibly suggesting a comparison with Du Bois's experience there.

46. Robert Rydell, ed., *The Reason Why the Colored American Is Not in the World's Columbian Exposition* (University of Illinois Press, 1999).

47. For an example of a study of free black communities, see James O. Horton, *Free People of Color*: *Inside the African American Community* (Smithsonian Institution Press, 1993). See also his more recent studies *In Hope of Liberty* (Oxford University Press, 1997) and *Black Bostonians* (Holmes & Meier, 1999).