MECHANIZATION AND ‘MEXICANIZATION’: Racializing California’s Agricultural Technology

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INTRODUCTION: ‘THEY’RE TODAY’S BRACEROS’

In recent years the United States federal government, immigration opponents, and large computer firms have debated an increase in temporary immigrant worker visas, known as H-1Bs. Under proposed policies, technical workers purportedly needed from abroad—particularly South and Southeast Asia—would receive 6-year working visas in exchange for employment with large, usually computer-technology firms.

This legislation was opposed by an odd coalition—including the Federation for American Immigration Reform (or FAIR, a conservative political group), organized labor leaders, and the Institute for Electric and Electronics Engineers (IEEE). They argued that such policies would break a social contract with US-born workers, would result in increased permanent immigration levels, and would establish ‘sweatshop’-like conditions in high-technology firms. Republican Senator Spencer Abraham and the industry group Information Technology Association of America—spurred by a Virginia Polytechnic University study that estimated an increase in unfilled technology jobs—proposed an annual increase in H-1B recipients from 65,000 to 90,000 workers in February 1998 in the US Senate, known as the American Competitiveness Bill.

Despite General Accounting Office reports that there was no evidence of a labor shortage, technology firms convinced political leaders that skilled employees were a critical and increasingly rare component of production. The firms, many based in California’s infamous Silicon Valley, argued that adequate technically competent
personnel were not only unavailable, but that temporary foreign workers were particularly suited for the work given their technical production capacity, their respective nations’ excellent educational systems, their easy availability, and their desire to improve their lot.\(^3\)

In early May, the Senate passed the Bill with additional requirements for increased spending for improved domestic technical education, job retraining, and the establishment of an on-line job bank. When introduced to the House of Representatives in June, anti-immigrant sentiments added the requirements that employers would first have to prove that no US resident was available for each job or had been laid off to create it.\(^4\) The revised Bill returned to the Senate to face more delays from senators arguing that high-tech firms were merely looking for ‘cheaper labor’ before final passage. Yet, fearful of breaking ties to high-technology industries, President Clinton signed the Bill in October.\(^5\)

Throughout the Bill’s history, its opponents, supporters, and the popular press regularly presented arguments and images that centered around the potential workforce’s racial, class, foreign-born, and technologically proficient character.\(^6\) Anti-immigration advocates claimed that the workers further diminished a job supply that had already witnessed a loss of assembly-line jobs in the globalizing, post-NAFTA economy—jobs that were, interestingly, taken primarily by Asian and Latina women in the sweatshop-like maquiladoras. John Templeton, the head of the minority technology training program Coalition for Fair Employment in Silicon Valley, feared that foreign workers would hamper the acquisition of technical skills among US minorities. Indeed, the vast number of Silicon Valley workers—especially Latino and Southeast Asian janitors and food preparers of both sexes—were and continue to be hidden by the political emphasis on these technical workers.

Newscasts were dominated by videotape of single South Asian men living four per apartment and working side by side in front of computer terminals.\(^7\) Though clearly better paid and more educated than service-sector immigrant workers, these technical workers still received fractions of the salaries earned by their native-born counterparts and fewer labor rights. Upon seeing all of this on the local news broadcast, my father was startled. The news reminded him of the days when he was recruited in Mexico by the US government to work as a farmhand, or *bracero*. He remarked, ‘That’s just like we
were out in the fields! They brought us here just like that. They’re today’s braceros’.

**RACE AND TECHNOLOGY**

Indeed, technological tools, practices, policies, and production have an extensive history in the United States. This history, of course, has not only determined economic or political strength. It has aided in the construction and reproduction of social categories that extend far beyond that of technological proficiency. Government-supported attempts to link foreign-born workers with technological production such as the American Competitiveness Bill demonstrate how technological requirements have shaped notions, ideologies, and the misuse of categories like class, gender, and, in particular, race.

Race—in its various physiological, cultural, and political dimensions—has been neglected by students of technology and science. Many scholars have articulated the ways in which cultural categories of all sorts and race in particular are socially constructed. Some have described how these notions are mutually constructed through scientific developments and technological artifacts. Few, however, have provided material and historical accounts of how these constructions transpire: how did these racial categories inform subsequent technological practices? How have both the category of race and the strategy of technology informed each other? This paper tells of one such historical episode.

As current US immigration policies suggest, technology shapes various social categories—like race, class, nationality, and gender—and is simultaneously informed by those categories in ways that shift within changing social and technological contexts. These dynamic transformations have a rich history, particularly in the United States. Californian agricultural practices demonstrate how social categories were constructed through political, economic, and technological means, and in ways that constructed and transformed those same politics, economics, and technologies. The appearance of different cultural groups and nationalities in the same historical setting problematized traditional assumptions of both racial phenotypes, class formation, and gendered work, while technological practices ensured that racial ideologies would persist.

The paper first reviews the political and economic ways that
California’s farms generated and perpetuated racial ideas and practices. The establishment of clear technical requirements for farm production, the development of race, class, and gender criteria for farm workers, and the specification for tools and practices that would assure these criteria are also sketched out. The second portion of the paper recounts the history of two specific tools—the mechanical tomato harvester and the short-handled hoe. As a response to union organizing, the harvester would fulfill assumptions about worker capacity—that is, that the technology was made to fit the race and the class. The hoe, on the other hand, was said to require specific workers. As such, the race and class would fit the technology. These techniques, then, materially demonstrate the links between technology and culture.

POLITICS AND ECONOMICS IN RACE
The rise of California’s agricultural production from the late nineteenth century to the present has been assigned to numerous factors, the most cited being its labor-intensive nature. Behind this reliance on labor, however, was the belief that specific racial groups would not only fulfill labor requirements, but embodied the ‘characteristics’ of farm labor. Simultaneously, the farm worker’s physical attributes were increasingly defined in ways that only certain racial groups—and certain technologies—could satisfy.

Imagining farm work
New England and Midwestern farmers and city-dwellers sought to free themselves from the toil of rural, family-farm work and increasing urban decay in the final decades of the nineteenth century. To do so, they established large farms and ‘pastoral dreams’ from the vineyards of Napa down to the fruit orchards of the Imperial Valley (Guerin-Gonzales, 1994). These dreams involved as little physical work and as much transplanting of East Coast social customs as possible.

To work their fields, the new immigrants of primarily English and German descent sought out recent European immigrants—usually Italian and Portuguese. Agricultural wage work became the most undesirable occupation at the same time that it came to characterize the majority of farm work. This order extended well beyond a
material separation between farm owner and farm worker. As one farm owner would later say, ‘... there was a tacit gentleman’s agree-
ment ... that growers would not compete for labor. They would tear
your heart out on any other thing ... but they would not compete on
labor’ (California State Employment Development Department,

Labor associations and farm owner groups also relied on the
support of other businesses and local, state, and federal US political
circles thanks to both their substantial congressional representation
and intensive lobbying efforts. An ‘axis of power’ subsequently ran
from individual growers, through growers’ organizations, into various
financial and political agencies, and later, into land-grant agricultural
colleges and finally immigration policy (Hawley, 1966, pp. 157–
176). Farm owners constructed this axis of power on both class and
racial notions which were maintained in turn by the structural and
material tools of that power.

Farm labor would not only be the least desirable work, but only
the ‘least desirable’ people would do it. Single, Chinese men—the
first sizable non-white group in farm labor—were recruited from
California’s expanding urban centers as early as the 1860s. Up to
75,000 Chinese supplied nearly 80% of California’s farm labor
needs, fueling public misgivings over ‘the importation of hordes of
undesirable people and the creation of troublesome social problems’
(Lange and Taylor, 1939, p. 147). Urban anti-Chinese movements,
however, led to the 1888 Chinese Exclusion Act—barring any fur-
ther Chinese immigration, effectively ghettoizing Chinese in the
largest Californian cities, and dramatically reducing the proportion
of Chinese working in the ever-expanding farms.

Thirty thousand Japanese immigrants were soon recruited into
farm work over the next decade, accounting for nearly half of all
agricultural-wage workers. Because many came to California’s fields
already with a high level of skill and experience in intensive farming,
white farm owners allowed some degree of autonomy both in the
tools and methods of cultivation (Murray, 1982, p. 27). Of course,
such autonomy quickly became a source of extreme fear among farm
owners as the Japanese began collectively buying their own parcels of
land and competing with farm owners while also reducing the labor
source. Less than two decades after the Chinese were cut off from
further immigration and rural employment, the Japanese government
agreed to reduce the number of emigrants at the request of the US in the 1907 Gentleman’s Agreement. Later, the 1924 Immigration Act barred all non-family East Asian immigration and explicitly prohibited Japanese citizens, regardless of residency status, from owning US land.

The 1920s witnessed the first large immigration from Mexico—largely of citizens fleeing civil war—and from the Philippines, which had remained a US colony since the Spanish–American War. Fearing another ‘labor shortage’ with the elimination of East Asian immigration, farm owners employed Filipinos and Mexicans, and pressured the US government into polices that opened US borders to these groups. Travel restrictions between the Philippine colony and the mainland US diminished though full residency was never granted, and segregation and intense anti-miscegenation laws were enacted against Filipinos (San Juan, 1994).

Similarly, the US and Mexican governments agreed to a limited worker exchange program that circumvented the 1924 Immigration Act, opening up the borders to both sanctioned and unsanctioned workers and reconstituting the labor force with Mexicans and Filipinos of varying citizenship status and background. Farm labor organizing in California was also racialized. Mexicans, like Filipinos and earlier East Asians, would face California’s version of ‘Jim Crow’, or the post-Civil War segregationist laws common to the US South, along with the more insipid cultural discrimination that had persisted since the Mexican–American War. As the deputy sheriff of California’s agriculturally rich Kern County testified in the 1930s, to the LaFollette Civil Liberties Committee hearings concerned with the anti-labor activities of the Associated Farmers in California: ‘We protect our farmers here in Kern County ... they are our best people ... they keep the county going ... but the Mexicans are trash. They have no standard of living. We herd them like pigs’ (Bustamante, 1975, p. 126).

By the 1930s, immigration policy drastically changed its operational tactics in ways that attacked these same nationalities. Fueled by Depression-era anti-immigrant hysteria, US immigration officials began actively deporting Mexican braceros in the 1930s (Calavita, 1992). Contrary to previous farm worker recruitment, the new ‘labor shortage’ in the 1930s was filled by white US citizens. Left destitute by drought, Depression economics, and the advanced mechanization
of grain crops throughout the Midwest, small farm owners from Oklahoma, Texas, and Arkansas migrated to California’s fields in search of employment (Fearis, 1971). New Dealers—including Carey McWilliams, John Steinbeck, Dorethea Lange, and Roosevelt program administrators—attempted to bring national attention to the plight of the ‘Okies, Arkies, and Texies’, and particularly to their color.¹² As McWilliams stated in *Factories in the Field*, ‘These despised “Okies”… were not another minority alien racial group … but American citizens’ (1939, p. 306).

Despite emphasizing the seemingly acceptable race and nationality of the Dust-Bowlers, New Dealers were unable to disentangle the already racialized context of farm work. Farm owners not only subjected the white Dust-Bowlers to a segregation comparable to that of non-white farm workers, but believed that ‘poor white trash’ belonged to a different culture than theirs, even a different phenotype (Stein, 1973; Jamieson, 1942). In explaining the conditions to which Dust-Bowlers were subjected, the controversial Lee Stone (Madera County health director and farm owner lackey) stated, ‘The conditions are not to be blamed on the growers, but on the people themselves’ (Stein, 1973, p. 48). He contended that the Okies had lived in squalor for generations, and were a ‘degraded American stock’.

The advent of World War II and US economic improvement, however, witnessed the migration of white workers to industrial and military jobs, and more stable positions in rural communities. Mexican, Chicano, and Filipino laborers remained in the fields throughout this period despite Mexican repatriation and the increased placement of Filipinos in US military service. Urged on by farm owners’ contentions of ‘labor shortages’, the US government enacted the first of a series of programs in 1942 which collectively would be known as Public Law 78, or the Bracero Program. Under the terms of this joint US–Mexican agreement, the US would enter central Mexico and recruit farm laborers who would be transported to the Southwest into industries that could ‘prove’ a temporary ‘labor shortage’.

These industries originally included railroads, mining, and agriculture—with agriculture eventually accounting for the vast majority of bracero employment. Bracero employers, also, were required to provide prevailing wages, adequate housing and working conditions,
and refrain from exposing Mexicans to discriminatory environments. Few of these conditions were met, and the immigration of several thousands of undocumented farm workers added to the reliance on Mexican labor.

Defining farm work

Farm owners and US political powers increasingly objectified various racial groups throughout contemporary Californian agricultural history, particularly Mexicans during the Bracero and post-Bracero years. Simultaneous to this, the ideological process of racializing the practices and practitioners of farm work became more deeply entrenched. I have presented numerous racial and cultural stereotypes that farm owners constructed for other ethnic groups that worked the fields; Mexican stereotypes were not only similar but more widely expressed. Farm owners described Mexicans as rural, hardworking, hypersexual/superabundant, contented, and most commonly, docile. Farm owners used these attributes not only as political tools for socially differentiating and excluding Mexicans, but also as a means of economically including them—that is, depicting the Mexican as the most desirable of farm workers (Heller Committee, 1933, p. 1).  

Two labor analysts provide one description of this desirable docility among farm owners out of dozens of accounts: ‘It is common among those familiar with working conditions in the Valley that it is the wetback’s docility, even more than the low wages he works for, that makes him so attractive as a worker’ (Saunders and Leonard, 1951, pp. 54–55).  

Docility—among almost all of the purported characteristics—was attributed to cultural difference. Mexicans, it was said, were the products of generations of servitude and complacency since the Spanish conquest and colonization. Farm owners connected this acculturation with their previous notions of race; I cannot resist providing one analyst’s observations at the end of the Bracero Program:

The history of semi-voluntary servitude in Mexico is primarily important today because of the influence of the accumulated weight of this tradition on the way the Mexican of the poorer classes—i.e., the bracero—regards himself, his employer, and the world. [Mexicans] are habituated to timorousness and deference. In common with the ‘good nigger’ of the U.S.
South, they do not ‘talk back.’ They accept their superiors’ word ... The significance of this quality in the operation of the bracero program can scarcely be exaggerated (Anderson, 1964, pp. 86–87).

Descriptions like these were verbally expressed and written up until the 1970s. Purported Mexican qualities even bordered on biological essentialism. When asked whether ending the Bracero Program would increase domestic farm wages in a 1949 congressional subcommittee hearing, one Californian farm owner testified: ‘... you cannot create workers by raising the wage rate. A farm worker is a farm worker ... He is physically able to do the work and he is mentally conditioned to work on a farm’ (US House of Representatives, 1949, p. 553).

Further, farm work became an occupation not only that Mexicans were suited for, but that US whites were unsuited for despite the reality of Dust-Bowl migration. A Department of Labor spokesman testified in a 1920 Congressional hearing that farm work ‘... is common labor. It is not labor that our white boys have ever taken to ... white men are adverse to accepting and refuse to accept ... employment as unskilled or common laborers’ (Cardenas, 1977, pp. 86–87; also Kirstein, 1973, p. 188).

In arguing that there were persistent labor shortages, farm owners ensured the racial constitution of farm work and affirmed the class and racial notions they had constructed (de la Torre, 1982, p. 20; Galarza, 1964, p. 55). By complying with farm owner pleas, political powers validated these ideologies, and affirmed them to the point where farm owners believed that they were ‘entitled to Mexican workers’, whether it be conveniently legal, or illegal (President’s Commission on Migratory Labor, 1951, pp. 69–88).16

With the end of the war, farm owners insisted that the program be continued. Not only did they argue that there was no American labor available for farms, but that temporary Mexican labor was perfectly compatible with US farming due to both laborers’ temporary political status and, as was increasingly put forth, their ‘natural’ inclination towards temporariness and transience (Bach, 1978, p. 87). The Bracero Program continued through the Korean War and was finally terminated in 1964 due in part to pressure from labor unions.
More significantly, the liberal Kennedy and Johnson administrations, in conjunction with urban Eastern and Southern Black advocates, viewed foreign labor as a practice inconsistent with the advancement of American society. This society was increasingly defined as urban (not rural), White and Black (not Brown), and domestic (not immigrant, whether contracted or undocumented) (Palerm, 1991, p. 3). Indeed, the Civil Rights Act was passed the same year as the Bracero Program was discontinued (US Secretary of Labor, 1965, p. 2).

Despite this, immigration from Mexico to the US persisted and grew well past that year to the present; approximately 4 million braceros had been recruited throughout the years of the Bracero Program, constituting from 80 to 90% of the laborers during peak harvests in the last years (Runsten and Leveen, 1981, p. 103). In 1965, the year after the program ended, Mexican and Chicanos constituted 46% of all farm personnel and whites were 44% (including farm owners)—the remaining 10% including Filipinos, Asians, Native Americans, and Blacks (California State Advisory Committee on Farm Labor Research, 1969).\(^{17}\) Two 1990 Department of Labor studies estimate the percentage of Mexican-born farm workers at 92–93% (Runsten, 1991, p. 33).

By the end of the Bracero Program, then, the fusing of race and class on California’s fields reached a new level of intensity and application. And both political processes—including immigration and segregation policies—and economic strategies—such as wage deflation, production-maximizing labor schemes, and anti-union collusion—played significant roles in forming and perpetuating these social categories. Yet, political and economic designs were not solely capable of cementing social definitions in and of themselves: material, technological means, in conjunction with political and economic ones, made race and class notions durable. Clear assumptions about both the skills of farm work and the composition of the farm labor group predicated the development of technological artifacts. In turn, these technologies cemented racial and class categories.

### TECHNOLOGIES IN RACE

There are two technological cases in Californian agriculture that have received a fair amount of attention from scholars, labor
activists, and the press. Not coincidentally, both transpired towards the end of the Bracero Program in 1964 and through the following decade: the same time that farm owners had thoroughly constructed a racialized farm worker in political and economic circles, but were exhausting the political and economic means for securing their racial and class notions. The US government, in line with general US sentiment, refused to support open immigration policies.

With the advent of the Chicana/Chicano liberation movement and numerous nationwide calls for ethnic and feminist action, miserable and discriminatory working conditions would also no longer be sanctioned. Increasing labor organization—primarily among workers of color—further reduced farm owners’ control over production. In this context, technologies became a fundamental tool and target for farm owner power. Farm owner notions of race and class shaped the technologies used on the fields just as they informed farm owner political and economic strategies. Further, technology (like politics and economics) cemented and transformed race and class ideologies.

**The mechanical tomato harvester**

A working knowledge of the categories of race and class is necessary for understanding the development of the mechanical tomato harvester, just as the harvester is necessary for understanding Californian farmers’ notions of race and class. In the late 1940s, the University of California at Davis’ Department of Agriculture Engineering reevaluated the direction of its mechanization research. Deciding that the numbers of seasonal harvest laborers in the tomato industry were extraordinarily high, the department placed tomatoes on a list of mechanization priorities (Runsten and Leveen, 1981, p. 101).

The problem with a mechanized tomato harvest, however, lay with the fruit itself: tomatoes were not strong enough to withstand mechanical prodding. As designed, the harvester would straddle a row of tomato plants and cut them off at root level with a front blade. Spikes would grab the vines, a conveyor belt would raise them to a series of moving claws, and these claws would strip the fruit from the stems. The vines would fall back to the soil and the tomatoes would be shaken down to manual sorters on both sides of the machine (Shotwell, 1961, pp. 189–190).
J. Hanna, a University of California plant breeder, began working on a stronger tomato strain which he presented to agriculture engineers in 1949. Subsequently, engineers began experimenting with various mechanical designs and Hanna received several small grants from the California Tomato Growers Association through the 1950s (Shotwell, 1961, p. 102). It was not until 1959 that farm owners were sufficiently interested and vested in mechanization efforts. Fearing increasing public and federal opposition to the Bracero Program, tomato growers granted money to researchers for a crash program to develop the machine and work with Hanna on the new
tomato. Several farm worker strikes in 1960 and 1961 further convinced farm owners that the Bracero Program would not only end, but would be supplanted with an increasingly unionized labor force (Shotwell, 1961, p. 106).

The 1964 Bracero Program termination led to a dramatic adoption of the harvester; by 1969, 99.5% of all Californian tomato fields had been mechanized (Brandt et al., 1978, p. 45). Of interest, however, is the fact that the tomato breeding was not completed until 1970. The tomato was still too soft and would not ripen evenly. When pulled mechanically, up to one fifth of the crop would be destroyed (Shotwell, 1961, p. 190). Subsequently, farm owners reported losses in the early adoption years (Runsten and Leveen, 1981, p. 103).

By the time the new tomato had been sufficiently developed and bred on most Californian tomato farms, the mechanical harvester had displaced a huge portion of harvest labor. More than 24,000 harvest labor jobs were lost between 1964 and 1969, accounting for 49.7% of harvest laborers (Barnett et al., 1978, p. 67). In classical economic terms, then, capital was substituted for labor.

For California’s tomato industry, however, the story is not as simple. Despite the displacement of half of all tomato farm workers, the demand for low-wage labor did not decrease substantially. Indeed, machine-harvest laborers were now required, not to mention the labor that was necessary during other parts of the planting season. While fewer numbers of people would be hired throughout the year, the employment of those staying on the fields would be increasingly shortened and sporadic (Bach, 1978, pp. 108–109).

With new industrial jobs, further, farm workers would no longer be paid piece-meal. Rather, they would be paid by the hour, but would have little control over their own production pace. The change from field pickers to machine sorters resulted in a pay decrease of 15–25 cents per hour (Runsten and Leveen, 1981, p. 109). With the expectation that farm work would no longer require physical strength and endurance (or commensurate pay), farm owners increasingly employed Mexican women as sorters (Padfield and Martin, 1965, p. 8).19 Indeed, Mexican women constituted 80% of the new sorting crews (Thompson and Sheuring, 1978; Runsten and Leveen, 1981, p. 113).

A glance at the overall composition of farm work in the wake of
tomato mechanization and post-Bracero labor is revealing. Between 1973 and 1987, the number of farm owners and permanent farm employees decreased, while the number of seasonal workers actually increased slightly. Seasonal work, dominated by Mexican laborers, became ‘relatively more important as a share of total employment’ (Mamer and Wilkie, 1990, p. 1). Runsten and Leveen, two farm analysts, described the tomato harvester as a representative example of the ‘uneven development of technology’, in which the mechanizing of only one agricultural task produces an increased work specialization, the increased seasonality of farm labor, and the further division of labor between permanent and migratory farm workers—thereby accentuating the dependence on temporary, low-wage workers (1981, pp. 103–104).

While tomato harvest mechanization secured a static and oppressed class position for farm workers through disastrous labor displacement, it also cemented a racialized work environment by defining the farm worker class with structural characteristics that would be met with a virtually total Mexican, and specifically Mexican female, work force. In sum, mechanization of the tomato harvest succeeded in eliminating the possibilities of labor organization and an ethnically reconstituted work force. Moreover, it secured farm owners’ ideologies of race, class, and gender.

Mechanization of the tomato industry, however, was an anomaly in Californian agriculture; the vast majority of California’s specialized crops would not undergo any major mechanization efforts despite post-Bracero claims by agricultural analysts and warnings by farm labor advocates. As one agricultural analyst noted: ‘The surprise is how little mechanization there has been in California … not how much’ (Padfield and Martin, 1965, pp. 8–9). The decision not to mechanize tells as much about rural Californian racial and class notions as an analysis of those crops which did mechanize.

Tomato farm owners, pressed by both researchers’ ongoing investigations and the increasing labor organization immediately preceding the end of the Bracero Program, cemented their ideologies mechanically. Given the reality of a continuous Mexican farm labor source, however, most farm owners in other crops chose to continue the use of existing tools and intensive farm labor. One analyst describes this seemingly anachronistic industrial strategy:
In sharp contrast with dominant practices that have characterized the development of US agriculture throughout the 20th century, California’s agricultural industry is being transformed because manual labor ... is needed instead of being replaced by mechanization. We call this transformation ‘Mexicanization’ (Palerm, 1991, p. 42).

**The short-handled hoe**

These existing technologies are very revealing. Looking at one specific instance of non-mechanization which persisted until 1975 will further help us understand how the accounts of labor racialization described earlier—that is farm owners’ class and race ideologies—were mapped onto production practices and tools. The second
technological case, then, is the case of *el cortito*, or the short-handled hoe.\textsuperscript{22} In contrast to the mechanically complex wiring of the tomato harvester, the short-handled hoe was a technically simple tool. Its use, however, posed serious physical damage—in the form of spine deterioration—to the farm worker’s body as well as excruciating production conditions (Murray, 1982, p. 29).\textsuperscript{23}

Japanese farm workers first introduced the hoe to Californian soil when they composed the largest labor group during the first decades of the twentieth century. As noted earlier, farm owners gave the Japanese much autonomy over the control of crop production. This control included tools. The Japanese had used the short-handled hoe for thinning and weeding on Japanese farms that required intense cultivation of row crops. Further, Japanese agriculture relied largely on massive labor use up to the time of early emigration to the US. Used in conjunction with the long-handled hoe in order to alleviate physical stress, the short-handled hoe came to be used in most low-level and root crops, especially lettuce.

When Japanese farm workers began forming their own farm collectives, white farm owners increasingly became suspicious not only of their own acquiescence in farm production but also of the tool and production practices which they believed had led to farm worker economic and social self-reliance. As Filipino and Mexican workers were increasingly employed in the 1920s, farm owners ensured that no future organizing would occur by increasing their control over the farming process. This control gradually involved the elimination of the long-handled hoe and the near total use of *el cortito* for non-harvest work. Owners claimed that it was more accurate and efficient in comparison to its long-handled counterpart, although later studies showed these claims to be largely false.

The testimony of farm workers demonstrates that farm owners had motives going well beyond simple desires to increase production efficiency. When Sebastián Carmona (the farm worker whose name would lead the later class action suit against the State) objected to using the hoe, his supervisor told him, ‘With the long handled hoe I can’t tell whether they [farm workers] are working or just leaning on their hoes. With the short-handled hoe I know when they are not working by how often they stand up’ (Murray, 1982, p. 28).

Indeed, *el cortito* was the center of numerous organized farm worker protests during the 1920s—protests which were subsequently
met with deportation or other violent retribution. *El cortito* became one of the technological means by which farm owners maintained control over both crop production and the farm laborers’ bodies. Dust-Bowler migration and their failed organizing attempts ensured *el cortito*’s continued presence well into and past Bracero immigration.

It was not until 1969—4 years after the Bracero Program’s termination and the same year that witnessed a total adoption of the mechanical tomato harvester—that *el cortito*’s use would again be questioned. As part of Lyndon B. Johnson’s War on Poverty, the Economic Opportunities Bill of 1964 was passed with provisions for providing legal service agencies to the nation’s disadvantaged communities. One of these agencies was the California Rural Legal Assistance (CRLA). In 1969, CRLA attorney Maurice Jourdane took on the case of *el cortito* after hearing repeated comments from farm workers about the hoe and its physically debilitating effects.

Attempting to circumvent the staunchly pro-farm owner sentiment of the Reagan governorship, Jourdane filed a petition with the California Industrial Safety Board (ISB). The petition was based on Title 8 of the California Administrative Code (Section 3316), which prohibited the use of unsafe hand tools. Since Title 8 had been applied almost only to the prohibition of broken manual tools, the CRLA sought a broader definition for both ‘unsafe’ and ‘broken’ technical tools—one that would include safety of workers with prolonged manual use of a tool beyond equipment malfunction.

The legal debate regarding *el cortito*’s abolition is particularly revealing of the ways in which government and industry formed collusive agreements, and of the ways in which both groups jointly viewed farm work. More to the point, *el cortito*’s trial depicted the ways in which farm owners and governmental agencies evoked farm workers’ physical and mental health in explicitly classed and racialized ways. Putting aside potentially easy connections between *el cortito*’s blunt technological nature and farm owners’ assumptions about the farm worker’s rural and ignorant background, farm owners also testified with rhetoric that mirrored the more complex classist and racist notions described in this paper; one Salinas Valley grower claimed:

The people that work for me, and have worked for me, take
a great deal of pride in their work ... and they want to do it with the short-handled hoe. These people are all happy to be there. They want the work done correctly and they do it with the short-handled hoe (Murray, 1982, p. 35).

Farm owners claimed not only that farm workers wanted to use el cortito, but were physically equipped for the tool as well; another farm owner provided testimony during the Industrial Safety Board hearings:

My father ran a crew of Hindus ... Then Japanese. Then we followed with Filipinos. And then the Mexicans. The stoop [laborers], most of them are small or more agile than the ordinary Anglo due to their build and the fact that they seem to have a stronger body for the job (Sebastián Carmona et al. v. Division of Industrial Safety, 1975; Murray, 1982, p. 30).

ISB hearings, however, reveal that farm owners were not only aware of the physical hardship of using el cortito, but actually wanted the high farm worker turnover rate that el cortito provided. In order to keep up a set production while using el cortito, farm workers would have to alternate turns repeatedly, and take frequent breaks. The tool, then, required an abundance of workers who were not protected under employment laws. In this way, they would be denied not only medical care, but paid breaks. Another farm grower testified that the daily turnover rate of crews using el cortito was ‘hopefully’ between 75 and 80% (Murray, 1982, p. 29).

By ignoring el cortito’s health consequences, farm owners further required a transient labor force with few legal rights. With el cortito, then, farm owners connected and conflated their notions of the farm workers’ class, the Mexicans’ biology, and undocumented residents’ nationality. Farm owners’ obscuring of all social categories had reached the point where they could not distinguish between the various farm worker groups: a spokesman for a large Californian agribusiness repeatedly delegitimized the petition for el cortito’s abolition as ‘the UFW case’, although the United Farm Workers’ Union played a very minor role in the legal battle (Murray, 1982, p. 34).

Farm owners’ claims that it was in the farm worker’s physical, psychological, and legally-enforced nature to use el cortito and be happy to use it did not fall on deaf ears. The Industrial Safety Board
dismissed the farm workers’ petition on 13 July 1973 (only 2 months after the initial hearings) based on arguments that were strikingly similar in approach to farm owner testimonies, although different in content. First, the ISB claimed that a ‘hazardous tool was one that was damaged or improperly maintained, not a tool that was a hazard due to its normal use’ (Murray, 1982, p. 35).

Further, and more interestingly, the ISB placed the blame on farm workers themselves—particularly on farm workers’ bodies. In contending with the argument regarding the spine deterioration caused by the use of el cortito, the ISB stated: ‘There are, in fact, many work operations that hasten aging of various body parts at varying rates according to individual resistance … Very few of these conditions are logically controllable by safety orders because such orders have few ways of adjusting to the fact that some people are quire resistant to the related aging process’ (Sebastian Carmona et al. v. Division of Industrial Safety, 1973; Murray, 1982, p. 35). In effect, the ISB depicted farm workers as a biological group whose own weakness was the source of their physical ailments.

The CRLA subsequently filed a suit against the ISB for their narrow interpretation of tool safety. With a newly configured California Supreme Court and the new mediation of Jerry Brown’s liberal governorship, the courts ruled in favor of the farm workers’ petition in January of 1975. The Division of Industrial Safety abolished the use of el cortito on Californian farms 3 months later. Additionally, state safety officials proposed an amendment to the 1975 abolition in 1985 that would allow farm owners to require the use of the short-handled hoe for some minutes each hour (Ferris and Sandoval, 1997). The proposal was quickly killed thanks to continued legal pressures from the trade unions and workers’ safety advocates.

CONCLUSION: SHAPING TECHNOLOGY, SHAPING RACE
The tomato harvester and the short-handled hoe originated from very different sources, were brought to California through different channels, and were used on different crops. Both, however, were used in ways that were predicated on racial notions and would, in turn, perpetuate racial ideologies. The harvester developed under conditions loaded with explicit class, race, and gender assumptions. The machine was wired to fulfill certain social expectations. By the
time of the harvester’s introduction, farm owners had clear visions of their work force, its color, its nationality, and even its gender.

In a different manner, the hoe’s continued use generated new social requirements. Racial notions were created to perpetuate the tool’s use. By the time of the hoe’s legal demise, farm owners could not distinguish between the tool and the raced, classed, and nationalized hand that was holding it. As such, technologies were as socially strategic as political decrees and economic imperatives in forming the racialized terrain of California’s farmlands.

In conjunction with political and economic strategies, then, specific technological choices cemented social notions in California’s fields. The shifting ways in which technology is put to racialized goals, and racial notions are formed around technological practices, exemplify material strategies of race and racialising. These material histories provide critical insight into the social motives and political process of ‘shaping race’, of forming and cementing racial notions.

This paper provides one historical account of how social categories—particularly race—are constructed by technological means, and how they shape technological knowledge, practices, and artifacts. The racialized construction of labor classes and the classed construction of races in California—and the gendering of both—are stories about the evolving relations between racial categories and the machine environment. The US immigration discussions introduced at the beginning of this paper suggest, further, that these means are an ongoing social phenomenon. Tools have repeatedly shaped relationships that subjugate political–economic groups and have continued to construct braceros of different colors, sexes, and nations. By playing such a role, they warrant further inquiry.

□ NOTES
1. Early work for this paper was funded by the Stanford University Center for Chicana/o Research under the guidance of Dr. Luis Fraga and the Escobedo Fellowship. Earlier versions of the paper were presented to the Bay Area Technology Studies Discussion Group and the 1997 Meeting of the Society for the History of Technology. The editors and readers of Technology and Culture as well as Science as Culture provided additional input. The author especially wishes to credit early scholars of Californian farm work for their original insight, and to the farm workers themselves—particularly the author’s father, Everardo Martín—for telling their stories.
2. US Senate Bill S.1723 was introduced in February 1998 and approved by the
Senate Judiciary Committee in April. The Bill sought to set this increased visa level for 3 years, after which ‘market forces’ would take effect. The 90,000, 3-year maximum cap was raised in the Judiciary Committee to 115,000 for 5 years, and brought back down to 95,000 for 5 years in the final Senate vote in May. See also San Francisco Chronicle (27 March 1998) and The Associate Press (2 April 1998).


4. A compromise between Senate and House leaders accepted these requirements but increased the numbers of visas to 85,000 in the first year, 95,000 in the second, 105,000 in the third, and 115,000 by the fourth, or 2001. See also New York Times (25 July 1998).

5. A review of this Bill’s debates and history can be found in Patrick (1998, p. 3).

6. Here, a breakdown of H-1B visa recipients’ national origins highlights the foreign nature of high-tech immigrant workers. The study measured 44% of visa recipients coming from India, 9% from China, 5% from Britain, and the remaining eight largest recipient nations being the Philippines, Canada, Taiwan, Japan, Germany, Pakistan, and France.


8. Feminist and post-colonial scholars have made large inroads into this field. Though the list is too large to cite here, notable contributors include: Said (1979), Anzaldúa (1987), Spivak (1987), hooks (1989), Butler (1990), and Bhabha (1994).


10. The term ‘labor shortage’ should be read with intense suspicion; throughout California’s agricultural history, clear evidence of low labor supplies has never been provided. The number of California laborers who would work for the wages and under the conditions preferred by farm owners, though, could be considered low. It is in this context that economic arguments for labor substitutes—i.e., mechanization—are extremely problematic and suspect.

11. One of the most extensive accounts of this period comes from Galarza (1964). See also de la Torre (1982).

12. Lange’s photographic exposés, the publication of Steinbeck’s The Grapes of Wrath and The Harvest Gypsies and McWilliams’ Factories in the Fields, and the LaFollette Committee Hearings on farm labor problems played a crucial role in fomenting this racialized attention.

13. The Committee highlights the odd contradiction in US farm owners’ and
policy-makers’ desires to praise the economic significance of Mexican and foreign farm workers, while perpetuating their social oppression.

14. The number of similar depictions of Mexicans is frighteningly large and can be found in sources ranging from farm owner interviews, to academic studies, to governmental reports. Some other examples can be found in Padfield and Martin (1965, p. 259), US Senate Immigration Commission (1911), Shotwell (1961, pp. 74–75), and Metzler (1950).

15. Again, these references are bountiful. See Padfield and Martin (1965, p. 186), Moquin (1971, p. 190), Kirstein (1973, p. 6), and Kiser and Silverman (1973, pp. 139–164).

16. For testimonies depicting the over-reliance and stabilization of Mexican labor, see also California State Joint Legislative Committee on Agriculture and Livestock Problems (1951, p. 19) and Bach (1978, p. 124).

17. These numbers do not include undocumented farm workers who, it is suggested, significantly increase the number of Mexicans in farm work.

18. Many scholars have already criticized the harvester as an unfair political tool. These include Winner (1980, pp. 121–136), Hightower (1972), and Kitron (1994).


20. Numerous studies claimed that total mechanization would categorically transform California’s agricultural industry. Reports of this are found in Mamer and Wilkie (1990), Padfield and Martin (1965), and Villarejo (1991).

21. It is necessary to note that early mechanization in grain crops (primarily wheat and cotton) did occur early on in California history, primarily because of mechanization efforts in the Midwest and South during the 1910s and 1920s (Padfield and Martin, 1965). These crops, however, played a decreasing role in California agricultural production as fruit, vegetables, and other labor-intensive crops became more lucrative.

22. As of the time of this writing, the California Rural Legal Assistance documentation over this legal battle is unavailable.

23. These conditions were noted during a physician’s testimony on 3 May 1973 to the Industrial Safety Board Hearings.

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□ NEWSPAPER ARTICLES
‘Senate panel OKs Bill raising visa number for skilled foreigners’, The Associated Press, 2 April 1998.
‘Senate OKs Bill to increase high-tech worker visas’, Los Angeles Times, 19 May 1998.
‘Oddball coalition was loser in high-tech H-1B struggle’, San Francisco Chronicle, 26 September 1998.