Working Machines
In 2014, the New York Times reported a story about Jannette Navarro, a mother of a 4 year old who at the time was working at a Starbucks in Southern California.¹ Navarro not only had to battle a 3 hour commute, but she also “rarely learned her schedule more than three days before the start of a workweek.” The unpredictability of her schedule bordered on cruelty. She was asked to “work until 11 p.m. on Friday [and] report again at 4 a.m.,” a practice that workers like her knew as clopening. Navarro’s unpredictable work schedule made her life incredibly complicated. Finding someone to take care of a 4 year old is challenging, but it is especially hard when you are constantly required to do so with only a few days’ notice. But Navarro’s schedule was not being prepared by a sadistic manager. It was made by an algorithm created by a company called Kronos, a vendor that Starbucks hired to optimize its labor force.

Starbucks updated its practices immediately after the Times ran Navarro’s story.² Yet practices such as clopening still prevail in the low-wage sectors of the US economy.³ For the purpose of this chapter, however, Navarro’s story illustrates two important aspects of the effects of technology on labor. The first is the simple idea of labor displacement, which is embodied in the fact that Navarro’s schedule was not being managed by a human, but by an algorithm. The second is the idea that technology can decrease the quality of work, an effect known as precarization, which is defined as reducing the material and psychological welfare of a job.
In recent years, people have grown concerned about technological labor displacement and the precarization of work. But these concerns are not new. Concerns about the influence of technology on labor are as old as the introduction of printing in Europe. As printing spread, monastic scribes attempted to ban presses, declaring them demonic devices. Centuries later, English Luddites became famous for opposing steam-powered looms. But the rage of Luddites was not only about labor displacement. It was the abysmal labor conditions of the Industrial Revolution, a clear example of the precarization of work.

In the twentieth century, fears of automation took over the public dialogue in the US at least twice. In the 1960s, fears of technological displacement grew after *Time* magazine published a popular article in 1961 on “The Automation Jobless.” “Not Fired, Just Not Hired,” the subhead continued, building a case on the effects of technology on the future of labor.

Recently, displacement fears revived, together with reports claiming that almost half of all jobs could be automated and that this change could be happening “ten times faster [than] and at 300 times the scale” of the Industrial Revolution. Yet most of the academic literature on labor and automation has embraced a less alarmist approach.

Labor economists have been eager to emphasize that technology is not only a substitute for labor, but also a complement, so it creates jobs with one hand and takes them away with the other. Economists agree—in general—that technology is labor saving, but many also say that it increases the productivity of the workers that it does not replace. These increases in productivity, plus new complementarities, can increase aggregate demand and stimulate the need for more human work.

A classic example of the complex interaction between technology and labor is the introduction of automatic teller machines (ATMs). ATMs did not eliminate human tellers, as some feared. In fact, the number of human tellers in the US actually grew modestly after ATMs were introduced, from 500,000 in 1980 to about 550,000 in 2010.
ATMs did not eliminate the job of teller; they transformed it. This was in part due to the lower cost of opening new bank branches, which together with other factors, such as more bank-friendly regulations, contributed to new bank teller jobs with different responsibilities.\textsuperscript{16}

A more modern example of the complex interaction between technology and labor can be found in China. In cities like Nanjing, it is common for restaurants to have QR codes on every table. The QR code allows customers to order food and pay their bills using their phones. But this technology does not replace the need for human servers. It only automates a few of their tasks, allowing them to focus on things other than taking orders or collecting checks. Servers are still needed to carry food, clear tables, greet customers, deal with special requests, and maintain a civilized environment at the restaurant. This example also shows that automation often does not replace entire jobs because it involves tasks. That is why studies that focus on the automation of jobs tend to overestimate the impact of automation\textsuperscript{17} compared to studies focused on the automation of tasks.\textsuperscript{18}

Hence, the question that we should be asking is not “Will a robot will take my job?” but “How will the labor market change with technology?” In response to that question, economists have made a few predictions.

On the one hand, there is an apparent consensus that while changes in technology have important effects on labor on the short term, they do not appear to affect the need for labor in the long run.\textsuperscript{19} Using data from the International Federation of Robotics (IFR), Graetz and Michaels report that between 1993 and 2007, the introduction of robots did not reduce total employment, although they do find evidence that robots reduce the employment share of low-skilled workers.\textsuperscript{20} Other authors also find a negative correlation between the stock of robots in a country and unemployment.\textsuperscript{21}

On the other hand, there is no clear consensus on predictions about the redistributive effects of technology. Some scholars anticipate an increased polarization of the
labor force and increased inequality. Yet some scholars have arrived at the opposite conclusion when focusing on the replacement of tasks rather than occupations.

Another angle of this discussion has been to focus on the types of jobs being replaced by new technologies. In his book *Prediction Machines*, Ajay Agrawal focuses on the fact that artificial intelligence (AI) technologies are mostly good for prediction, so he forecasts the effect of AI on labor by assuming that its main effect is a reduction in the cost of predictions. For instance, lower prediction costs could flip the shopping-then-shipping model of online retailers to a shipping-then-shopping model. This is because, in a world where stores can predict the items that a person may buy, business models in which stores ship items and learn from the ones that are returned may become viable.

The fact that technology will affect the future of work is undeniable. But technology is not the only force affecting labor. The future of work also depends on global value chains, the increasing concentration of complex economic activities, the rising education levels of the Global South, and international migration. To better manage this impact, we need to understand how people react to the impact of technology on jobs compared to other forces.

The goal of this chapter is to compare people’s reactions to displacement attributed to technology with displacement attributed to humans. We contribute to that goal by using two sets of scenarios. The first set compares technology-based displacement with displacement attributed to foreign temporary workers. The second set compares technology-based displacement with displacement coming from four sources: foreign temporary workers, foreign contractors (outsourcing), foreign subsidiaries (offshoring), and younger workers. Let’s begin by looking at the first set of examples.
A trucking company is looking to lower costs by bringing in [temporary foreign drivers/autonomous trucks]. This change reduces the company’s costs by 30 percent, but several local drivers lose their jobs.

A large chain of luxury resorts decides to lower the cost of staffing their poolside bars by bringing in [temporary foreign workers/vending and cooking robots]. The [workers/robots] can take a guest’s room number for payment purposes and serve a large variety of cocktails and dishes. As a result of the change, several local workers lose their jobs.

A nuclear power plant is looking to lower their operational costs. They decide to [bring in foreign nuclear technicians/buy an AI operation system]. This change allows the company to reduce their operational costs by 30 percent, but several local technicians lose their jobs.
A school is looking to lower their costs by [bringing in foreign teachers/adding robot teachers to some of their classes]. As a result, the school reduces its costs by 30 percent but fires several local teachers.

For each scenario, we asked the following questions:

- Do you **approve** of this change? (from “Strongly disapprove” to “Strongly approve”)

- Would you **ban** this change? (from “Would surely not ban” to “Would surely ban”)

- How **morally** wrong or right was the action of the manager? (from “Extremely wrong” to “Extremely right”)

- Does your **opinion** of this organization worsen or improve because of this change? (from “Worsens extremely” to “Improves extremely”)

- Do you think **others will approve** of this change? (from “Strongly disapprove” to “Strongly approve”)

- If you were in a similar situation as the manager, would you have done the same? (from “Definitely not” to “Definitely yes”)
Figure 5.1 compares technological displacement with displacement attributed to foreign workers in these four scenarios. In general, we find a preference for displacement attributed to technology over displacement attributed to foreign workers. The strength of this preference, however, varies depending on the scenario. In the case of trucking, the preference to ban foreign workers is much stronger than the preference to ban autonomous trucks. People also approve of foreign workers less than autonomous vehicles and think that others will have similar opinions. The resort scenario shows a similar pattern, albeit with lesser differences.

These differences persist, although weakened, in the power plant scenario, and they vanish altogether in the school scenario. We should note, however, that in the school scenario, people have a strong preference against both machines and foreigners replacing teachers. Thus, the fact that we do not observe strong differences may be due to a floor effect among two unpopular options.
Next, we look at scenarios comparing labor displacement with displacement due to other sources, including foreign temporary workers, foreign contractors (outsourcing), foreign subsidiaries (offshoring), and younger workers.

Once again, we find results that are quite consistent across all scenarios (see figure 5.2). People tend to approve more and are less willing to ban displacement caused by technology than displacement involving other people.

People react particularly strongly against displacement attributed to foreign workers and replacing older workers with younger workers. Among the nontechnological forms of displacement, people react less negatively to opening a foreign subsidiary (offshoring), followed by hiring a foreign contractor (outsourcing).

**Figure 5.1**

Participant reactions to displacement by foreign workers, as opposed to technology, in four scenarios: (S52,S53,S54,S55)
A law firm is looking to lower their costs for routine clerical work. They decide to [open a branch in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy an AI legal system]. The result is a reduction in costs and the firing of several of their local staff.

A software firm is looking to lower the costs of their routine maintenance and updating tasks. They decide to [open a branch of the firm in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy an AI system]. The result is a reduction in costs and the firing of several of their local staff.
A hospital is looking to lower their diagnostic costs for X-rays and computerized axial tomography (CAT) scans. They decide to [open a branch in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy a computer vision system]. The result is a reduction in costs and the firing of several of their local staff.

A manufacturing company is looking to lower their production costs. They decide to [open a plant in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy a robotic manufacturing system]. The result is a reduction in costs and the firing of several of their local staff.
A film studio is looking to lower their animation costs. They decide to [open a studio in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy AI animation software]. The result is a reduction in costs and the firing of several of their local staff.

A finance company is looking to lower their fund management costs. They decide to [open a branch in a low-income country/hire a foreign contractor/bring in foreign workers with temporary visas/replace older workers with younger workers/buy AI investment software]. The result is a reduction in costs and the firing of several of their local staff.
Figure 5.2

Participant reactions to displacement by foreign temporary workers, foreign contractors, foreign subsidiaries, younger workers, and technology, in six scenarios.
Together, these scenarios show that people tend to react less negatively to technology-based displacement than to displacement based on other humans. This may be the case for a variety of reasons.

First, people may see technological displacement as more inevitable. People may see competing against a machine designed to excel at a specific task as futile, but competing against other humans, even when they are younger or foreign, as always possible. A second possibility is that the negative reactions against displacement by foreign workers are automatic responses to well-socialized “in-group versus out-group” biases. In the US, displacement by foreigners is a narrative with a well-established negative connotation. Also, people may perceive displacement by foreigners and younger people as more imminent to them, especially if they or someone they know has experienced a similar situation.

Third, it could be that people oppose cost reductions based on cheaper labor more strongly because they consider profiting from lower salaries to be more exploitative, and less acceptable, than profiting from technology. In fact, when we look at the moral dimensions associated with these scenarios, we find that they trigger the fairness dimension of moral psychology. As we saw in chapter 3, people tend to react more strongly to humans in situations that they perceive as unfair, so this could be yet another effect that contributes to explaining our observations. Finally, people could see replacement by cheaper labor as retrograde compared to replacement by technology, which could be seen as progress.

Regardless of the explanation, what is true is that within this sample, there are clear negative reactions to labor displacement, which are amplified when displacement is attributed to foreign or younger workers, but which are still there for displacements attributed to machines. Because of these reactions, it is not surprising to find work focused on mitigating the potential negative consequences of technological displacement. Some of these alternatives have a strong taste for regulation, while others focus more on additional market flexibility.
On the side with a stronger taste for regulation, we find people in favor of a robot tax (i.e., a tax on the profits of companies that use more robots). The argument is that because most tax revenue comes from labor income, tax policies tacitly incentivize automation.\(^2^9\) By adopting automation, companies reduce their labor costs, as well as the taxes they pay on their employees. In this view, automation erodes the overall tax base if robotic labor goes untaxed. Of course, there are some clear counterarguments to this line of reasoning. For instance, if automation does not cause unemployment but simply shifts workers to different jobs, we cannot use this argument to justify a robot tax. Also, robot workers do not consume government services in the same way that human workers do, so their tax bill would not need to cover for items like pensions, health care, and education, which taxes on labor usually cover.

On the side arguing for more flexibility, we find proposals focused on removing barriers limiting the ability of workers to move between occupations, and limiting new business models from entering established sectors. One barrier to labor mobility is the excessive need for state licensing. In the US, the need for a state license has grown from 5 percent to 30 percent of workers between 1950 and 2008. As McAfee and Brynjolfsson argue, “Some of the requirements are plainly absurd: in Tennessee, a hair shampooer must complete 70 days of training and two exams, whereas the average emergency medical technician needs just 33 days of training.”\(^3^0\) Labor mobility is known to be an important channel of knowledge diffusion,\(^3^1\) so barriers for workers to move between occupations and industries, like excessive licensing, can reduce the ability of the market to adapt to changes in technology.

On that front, Alan Krueger and Seth Harris\(^3^2\) advocate for a new worker classification that sits somewhere between full-time employees and contractors: “independent workers.” Independent workers “would not be eligible for overtime pay or unemployment insurance, but would enjoy the protection of federal antidiscrimination statutes and [would] have the right to organize, . . . withhold taxes and make payroll tax contributions.”
Finally, between both of these camps, we have the idea of universal basic income (UBI). UBI is not a new idea. It can be traced back to Thomas More and Condorcet. Still, UBI is an idea that has recently regained popularity. One of the modern versions of UBI is the idea of paying a guaranteed income to all citizens, which they can then use to procure services that are often the purview of government, like education, health care, or affordable housing. On the one hand, UBI is quite market oriented, as it entrusts basic social safety nets to cash transfers and the market. On the other hand, the source of these funds is public, making it more of a government intervention. Not surprisingly, UBI is a divisive topic, with some arguing that it is excessive and impractical, and others—like recent presidential candidate Andrew Yang—touting it with enthusiasm.

In this chapter, we compared people’s reactions to scenarios involving labor displacement attributed to either technology or humans. We found that, on average and across most scenarios, people reacted less negatively to technological displacement. They were less prone to ban it and accepted it more than other forms of displacement, especially when the displacement was attributed to foreign or younger workers.

In chapter 6, we will zoom out from individual scenarios and look across them instead. We will use data from all the cases studied so far, as well as data from additional ones (shown in the appendix), to discover trends and patterns that are hard to observe by looking at scenarios alone. By zooming out, we will lose granularity but gain the power of abstraction in our quest to understand how humans judge machines.