[Hi! This is an very early summary of an argument I make in my book-in-progress, *Data Driven: Truckers and the New Workplace Surveillance.* I am super grateful for feedback. Thank you for reading it! - Karen]

Chapter 7

RoboTruckers: The Double Threat of AI for Low-Wage Work

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This book has focused on the trucking workplace as a site of intensifying surveillance, within which workers are much more closely monitored and managed. We have described how monitoring technology challenges' truckers professional culture, autonomy, and manhood, as well as their capacity to make the money they need to get by. Over the last fifteen years, as monitoring technologies have become ubiquitous, the specter of putting the manager (and the government) in the cab is gradually becoming an unwelcome reality for many truckers.

Lately, another narrative has emerged alongside this one. Economists and policymakers are becoming increasingly concerned about the effects of automation and artificial intelligence on employment—including whether some kinds of jobs will cease to exist at all. Trucking is one of the first industries at substantial risk from the prospect of increasing automation, leading to newfound concern about what will become of truckers when they are no longer needed behind the wheel.

This *displacement narrative*—in which workers are wholly replaced by robots—describes a real threat to truckers, and one that will require wholesale rethinking of how the industry works. But it is incomplete, and at odds with the real experiences truckers have had with AI to date. Truckers' encounters with automation and artificial intelligence have not (yet) supplanted them or made their skills redundant. Rather, truckers are experiencing these technologies as *intrusions* into their bodies and behaviors, often in incredibly intimate ways. Though truckers are, so far, still in the cab, intelligent systems are beginning to occupy these spaces as well—in the process, hybridizing worker and machine into an integrated and uneasy whole.

Who needs truckers if trucks drive themselves?

What does the advent of artificial intelligence mean for employment? The question has invited a great deal of concern from policymakers, as the prospect of millions of low-skilled workers finding themselves suddenly without employment brings with it the potential for tremendous social and economic disruption.

In projecting which industries are at the greatest risk from the threat of automation, many economists have identified trucking as a prime target. [TK: discussion of Frey and Osborne, White House report, other projections that focus on the *nature of the labor* (routine, physicality, etc.).]

Trucking is a prime target for automation not just because of the nature of trucking labor, but also because of the capabilities of autonomous vehicles. Autonomous vehicles have been a site of tremendous technical innovation in the past few years—and the capabilities of these systems lend themselves particularly to trucking. Autonomous vehicles do their best driving on highways, where the great majority of trucking miles are driven, rather than on city streets—where speeds are more variable, pedestrians more frequent, and obstacles less predictable.

Social and organizational factors also make trucking a good candidate for automation. The industry has a strong regulatory infrastructure (through the Department of Transportation) that would be necessary for widespread implementation and standard-setting. Major cost drivers and human inefficiencies in the industry—including driver turnover and fuel overuse—could be ameliorated in the absence of human drivers, constituting a strong "push factor" in favor of an automated solution; the cost savings to be gained from autonomous truck platooning—in which trucks drive close together to reduce wind drag)—could be particularly significant. And of course, the same concerns about driver fatigue and overwork that motivated electronic monitoring in the industry also serve as justificatory grounds for making trucks drive themselves: machines can work long hours, they don't get sleepy, and they don't need to take breaks. The tension between the legal restrictions on drivers' work hours and the speed of business demanded by the industry could be significantly eased if machines could do more of the work.

All of these factors have led to significant technical progress on autonomous trucks, and projections that the industry is ripe for widespread automation. A number of companies are testing new driverless truck systems. These systems contemplate removing the trucker from the cab altogether, at least for the majority of the time the truck is operating.

Systems like these contemplate the trucker as a *displaced* body. He is displaced both physically and economically: removed from the cab of the truck, and from his means of economic provision. The robot has replaced his imperfect, disobedient, tired, inefficient body, rendering him redundant, irrelevant, and jobless. And the result of this displacement, it is feared, could be sector-wide unemployment—the rapid dissolution of two million workers' livelihoods— resulting in massive demands for social services and economic disaster. The map below shows the most commonly held job in each state in 2014 (according to the Bureau of Labor Statistics). The source of concern is clear.
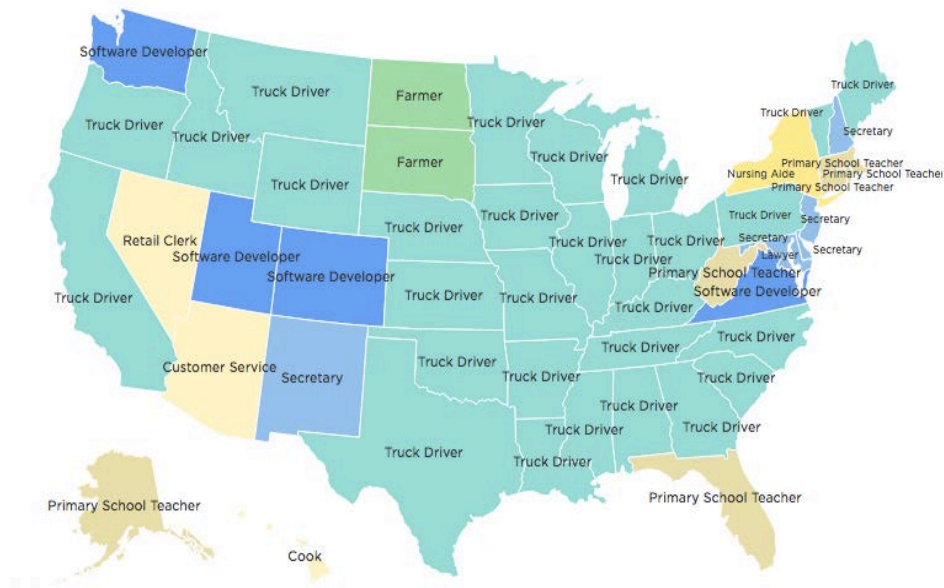
A slope, not a cliff

But the reality is more complicated. To be sure, unemployment is a real threat—but robotic trucks are unlikely to decimate the trucking profession in one sudden phase transition. The path to fully autonomous trucking is likely to be a gradual slope, not a steep cliff. In part, this is because truck drivers' daily work consists of much more than driving trucks. Truckers monitor their freight, keeping food at the right temperature and loads firmly secured. They conduct required safety inspections twice a day. They maintain the truck and make repairs to it—some of which are routine, and some less so. When truckers arrive at a terminal or delivery point, they don't just drop things off and leave: some load and unload their freight, they talk to customers, they deal with paperwork, they may spend hours making "yard moves" (waiting for an available delivery bay and moving to it, much as planes do at busy airports). Could some of these tasks be eliminated by intelligent systems? Surely some can, and will—but these components of the job are much harder to automate, and will come later, than highway driving.

Social factors matter too. The public are particularly wary of autonomous vehicles. [TK: fairly safe but not perfect, safety and security issues, high-profile mistakes. 80% of the public says they are fearful of autonomous cars. And if we think people are nervous about cars...] The prospect of an imperfectly controlled 100,000-pound truck barreling unmanned down the highway is, for many, the stuff of nightmares or horror films. (Not for nothing, Stephen King's 1986 film *Maximum Overdrive* and Steven Spielberg's *Duel*, from 1971, each feature autonomous trucks with a life of their own and a taste for blood.) Certainly, public opinion will adjust as autonomous vehicles become safer and more commonplace. This process, too, is likely to take time.

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[TK a bit on regulatory structure required for AVs – some roadblocks at NHTSA, some disagreement over whether feds or states get to regulate – all of which also slows things down.]

All of this suggests that there will still be human truckers for a long time to come—but this doesn't mean that what it is to be a human trucker won't change substantially. Rather than whole-cloth replacement of human truckers, autonomous technologies might require *coordination* between humans and machines over a long period of time. What might this look like?

Passing the baton

[TK. This section will talk about the idea of the "handoff" in which humans do what humans are good at and robots do what robots are good at, and the problems with that model in practice. Much of this already happens in driving via technological assistance (adaptive cruise control, anti-lock brakes, etc.). Maybe a short discussion of levels of vehicle autonomy.]

There are several ways the baton-passing model might work in trucking. Starsky Robotics is developing a drone-operator-like system in which trucks drive themselves to a certain point or in certain conditions, and human drivers sub in *remotely* for situations the truck can't handle—as if they are playing a video game. In theory, such a system could allow a single driver to pilot dozens of vehicles a day, for short periods of time, all over the country—and still return home each night. [But, still a long way to go technically.]

Another potential model is Uber's vision of an autonomous truck network, connected by local (and presumably Uber-owned) "hubs" throughout the country. In this vision, customers would contract with Uber for the delivery of goods; autonomous trucks would run the long hauls between hubs, and human truckers would pick up and pilot the trucks the "last mile" from the hubs to delivery. This model capitalizes on Uber's existing expertise with respect to distributing rides (or hauls) among drivers in a network. And like Starsky Robotics' idea, it could make human truck driving more local and less fatiguing by cutting out the long stretches of highway driving. But this model faces some roadblocks too. Creating a human/robot truck network is an incredibly ambitious project (even for Uber!) that would require substantial infrastructure to operate effectively. And it would necessitate a complete industry overhaul: currently, truckers (who are paid by the mile driven) make nearly all their money on the highway on long hauls, and almost nothing for slow local driving, sitting in traffic, and making deliveries. Uber would need to restructure pay in trucking fundamentally to make such a prospect attractive to human truckers.

The rise of the RoboTrucker

The future of trucking might someday look like the baton-passing coordination models that Uber and Starsky Robotics propose. But right now, human/robot interaction in trucking looks very

different: rather than coordination, truckers and intelligent systems are *integrating* into one another.

This cartoon appeared in a 2017 article published by *Land Line*, a truckers' trade magazine:
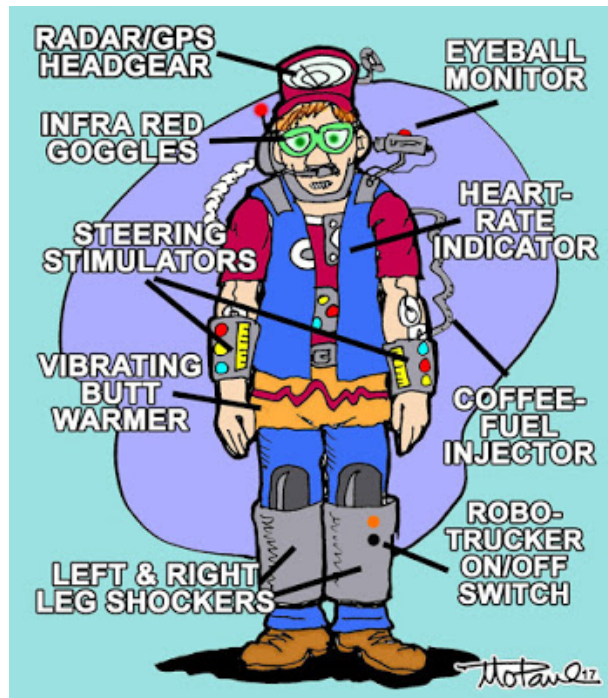
The article laments the rise of the "RoboTrucker": the proliferation of technological gadgets that aim to keep truckers awake, alert, and driving safely. Among the devices described in that piece and in other contexts:

⇒ Mercedes is working on a vest that monitors a trucker's heart rate, and can stop the truck if it senses the trucker is having a heart attack.

⇒ The SmartCap is a baseball cap that detects fatigue by monitoring a driver's brainwaves (essentially doing a constant EEG). If the wearer gets tired, it sounds an alarm (and some models flash lights in the wearer's eyes) [TK: confirm this is SmartCap and not another company]. It can be configured to send an alert to a fleet manager or a family member.

⇒ Seeing Machines is one of several companies that market driver-facing cameras that use computer vision to monitor a driver's eyelids for signs of fatigue or inattention. If the driver's eyes close or look away from the road for too long, it alters his boss, is logged on his record—and can also causes the driver's seat to vibrate in order to "goose" him back into attention. Another driver-facing camera vendor, Netradyne, uses deep learning and

data from driver- and road-facing cameras to generate scores for drivers based on their safe and unsafe driving behaviors.

$\Rightarrow$ [TK: other wearable and camera systems. And many other companies use predictive analytics to determine a driver's likelihood of being involved in a crash, using not only driving data but other indicators that act as proxies for other aspects of a driver's life—including things like recent pay shifts, a markedly different start time in the morning, etc.]

Note that there's an enormous distance between the narrative of displacement that characterizes most public discussion of AI's effects on truckers and how these effects are actually being felt through these technologies. The threat of displacement is a real one, particularly to truckers' economic livelihood—but driverless trucks are not yet borne out by common experience. And drivers are also not yet handing off a baton to a robot co-worker. Instead, technologies like the ones describe above represent a different and simultaneous threat: a threat of *compelled hybridization*, an intimate incursion into their work and bodies. AI in trucking today doesn't kick you out of the cab; it texts your boss and your wife, flashes lights in your eyes, and gooses your backside.

[TK: as you can imagine truckers aren't big fans of this. At this point in the book I'll have talked extensively about trucker culture, the truck cab as a home more than a workplace, these technologies as an affront to truckers' masculinity, expertise, autonomy; it's seen as infantilizing and emasculating.]

[TK: to understand the true range of potential effects of AI on low-wage work we should focus not just on job replacement, but on the quality of the work that remains.]