# Will Robots Displace Human Workers?

**By Walter Cummins**

*Third in a series*

A robot killed a young contractor in a German Volkswagen production plant recently. While the worker was installing the stationary robot in its protective cage, the device suddenly struck out with a fatal blow. Apparently, this robot killing was the first of its kind in German manufacturing, with the greatest use of robots in Europe. In the United Kingdom, however, in 2007, 77 robot accidents were reported, with people crushed, hit on the head, welded, and doused with molten aluminum. Like the German robot, these were not the malevolent creations of sci-fi films but only machines misbehaving because of technical malfunctions. Was a crime committed at the Volkswagen plant? The local prosecutor's office is deciding "whether to bring charges, and, if so, against whom."

Should we humans be worried? I don't think so. At least, not about murderous production robots, whose responsibility for injuries and deaths equals only a fraction of the shower slips. For example, in 2007, 3,318 residents of the UK suffered fatal falls (not just when showering). That number dwarfs the 77 robot injuries, few—if any—of which were fatal.

But does that mean we should focus on shower mats and minding our steps rather than being concerned about robots and other products of artificial intelligence (AI)? There, too, I don't think so.

While robots are not out to do us physical harm through acts of violent aggression, the consequences of AI algorithms are already affecting human life and are on the verge of even more consequential transformations. How deeply should this new reality concern us? The most extreme threat identified by a number of alarmed and famous scientists is human domination by a "race" of intelligent and self-replicating computerized devices, robotic and otherwise. A less existential possibility would have humans becoming superfluous for many occupations, and not just the production of Volkswagens and the like. On the list would be medicine, law, finance, and other fields that provide high salaries. What jobs would be left for creatures of flesh and blood?

*Walter Cummins published his seventh short story collection,* Telling Stories: Old & New, in 2015. *He teaches in the MFA in Creative Writing and MA in Creative Writing and Literature for Educators programs at Fairleigh Dickinson University. His previous* Zeteo *essays in this series were "Where Do Humans End" and "RealDolls and Other Humanoids."*

**Doomsday: The Singularity**

Let's consider the worst-case scenario first. The physicist Stephen Hawking is quoted as warning:

> The development of full artificial intelligence could spell the end of the human race. It would take off on its own and re-design itself at an ever-increasing rate. Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded.

Hawking's doomsday scenario is based on the AI concept of the "singularity"—the point at which the devices of artificial intelligence achieve the ability to surpass human mental processes; that is, to be smarter than we are. Ray Kurzweil, in *The Singularity Is Near*, predicts that non-biological intelligence will "soar" past that of humans. To prevent this possibility, Hawking has called for a cessation of extreme AI research and development.

If Hawking is right about the dangers, AI development—i.e. evolution—will move beyond the control of mankind and nature, possibly expanding at an exponential pace. Where it would all lead is beyond the imaginations of limited human brainpower, even the speculations of science-fiction masters who have dreamed up a host of dystopian futures.

**AI Devices All Around Us**

Yet, despite Hawking's plea, AI research and development is ongoing and progressing rapidly. We can see the results all around us, from voices on our smart phones that tell us how to get from one place to another or relieve us of the burden of dialing phone numbers—"Siri, call home"—to software that transmits automatic mortgage payments and manages our thermostats from miles away.

It's not only phone numbers we don't have to remember. Social media alerts us to family and friends' birthdays. Search engines offer facts and figures in mere seconds. Some consider these aids as paths to less rigorous minds, just as Plato's Socrates opposed writing because it obviated the need for memorization. He says in the *Phaedrus* that written text gives "the appearance of wisdom, not true wisdom." Similar criticisms have been made of the reliance on computers.

In the midst of writing this piece, I pause to search for references, verifications, and passages to quote. The resources of the Internet are at my fingertips, responding almost instantly. It's all too much for my limited brain. But one memory I do retain is driving to a library, flipping through a card catalogue, and running a finger over book spines to find the one that had the information I needed—a process of hours and days. Surely, computers have made life easier despite the pleasure of immersion in the stacks. Computers have become so ubiquitous—including the one I carry in a pocket—they may no longer seem examples of artificial intelligence. Note that the Word grammar tool has even restructured and improved several of my sentences, including one in this paragraph.

We live in a sea of devices that embody robotics and AI, as with computers, often taking them for granted. And many, if not most, of their devices are more effective and faster than humans at accomplishing tasks. Robots are better at manufacturing than people, and despite the poor victim at the VW plant, less dangerous to life and limb than human-operated machinery. Self-driven cars, now on the cusp of production, are also safer than person-driven cars. According to a McKinsey study reported in *Fast Company,* "autonomous vehicles could reduce traffic accidents by 90%. In the process, our new robot cars will save us $190 billion in wrecked cars, broken bones, and other costs incurred by plowing into things with our current fleet of brain-driven cars." An immediate problem is the coexistence of robotic operators and human drivers who do not adhere to safety standards on the road. For example, Google cars have been in sixteen fender benders since 2009, all caused by humans at the wheel of the other vehicles, the company claims. A dark side exists: hacking into cars and controlling them, but that can happen even with a helpless human in the driver's seat, with a myriad of computerized processes, in fact.

## Computerizing Occupational Functions

So, eventually people may interact with their cars just as they now rarely interact with a live person when calling a business organization. In fact, in the future people could even check into a hotel and have luggage delivered to their rooms without seeing another living soul. A Japanese hotel about to open uses an all-robot humanoid staff for check-in and machines to deliver baggage to rooms. Clearly, following the trend of manufacturing robots, automated answering, and driverless cars, robotics and AI can accomplish a range of tasks that once required human presence, especially including a very large number that provided gainful employment.

That's the possible variation of Stephen Hawking's doomsday scenario, not nearly as cataclysmic, but rather a chipping away at human work roles until many people will have fewer and fewer occupational functions.

## Optimists and Pessimists

Such a pessimistic projection is hardly a given. Most of the pundits on the future of work for humans seem to share two extremes of an all-or-nothing mindset. For one group, robotics and AI will make the great majority of human workers obsolete and irrelevant. For the other group, the creations of the new technologies, most of which are not yet imagined, will yield an abundance of new careers, new opportunities, and new occupational satisfactions.

The Pew Research Center, in its 2014 Future of the Internet Survey, polled nearly 2,000 authorities about this question: "The economic impact of robotic advances and AI— Self-driving cars, intelligent digital agents that can act for you, and robots are advancing rapidly. Will networked, automated, artificial intelligence (AI) applications and robotic

devices have displaced more jobs than they have created by 2025?" The responses split down the middle, with a slightly larger number—52 percent—on the optimistic side.

The pessimists saw widening income inequality, great numbers of unemployable, and social unrest. The optimists, while agreeing that robotic and AI technology will displace many workers, have "faith that human ingenuity will create new jobs, industries, and ways to make a living, just as it has been doing since the dawn of the Industrial Revolution." They argue that only humans can accomplish certain jobs.

### Who Is at Risk?

But what are those jobs, and how long will they be immune to technological replacement? Will the as yet unknown new jobs provide employment for the millions displaced? Is the faith justified?

We already know about the predominance of robots in manufacturing and similar work based on their physical strength, dexterity, and singular focus. But what about mental occupations that require years of education and superior cognitive skills?

Let's take physicians, members of a profession with high prestige and high financial rewards, requiring many years of training and real intelligence to qualify. Yet they are vulnerable, too. At the M.D. Anderson Center, IBM's Watson supercomputer is being trained, i.e. programmed, to be a cancer specialist. If the experiment succeeds, Watson will take just minutes to process a patient's medical history, genetic data, tests, scans, and the like to determine an individualized plan of treatment. Medical researchers would require weeks to accomplish the same result.

Will AI replace doctors in other ways? Probably unlikely, but the doctor relationship with patients is already changing. The growing use of robotic surgeries—with the smaller incisions, less pain and bleeding, fewer infections, and faster healing times—has turned surgeons into control panel operators instead of hands-on scalpel wielders. Such procedures have been used for kidney and gallbladder removal, artery bypass, and cancer excision. On an even smaller scale, NASA has developed a 0.4kg bot—microminiaturized robot—that can be inserted through the navel to perform abdominal surgery on astronauts in space if they suffer an unexpected malady like appendicitis or intestinal bleeding. The bots have a video camera and attachments to hold, cauterize, and suture tissue. An earthbound physician using joysticks would direct the procedure. So far such surgeries have only been conducted on pigs. But, if they succeed, the use of bots would not have to be confined to those circling the earth.

Of course, robotic surgeries of any sort still need highly trained physicians to manage the controls. Is it possible that after the singularity—or even before—an AI algorithm could take over?

Psychiatrists, with their hourly rates, may be more vulnerable in some areas. An experimental computer program can diagnose depression, a condition often unrecognized. The method analyzes speech patterns and uses tracking cameras to measure facial

expressions and eye movements during conversation. The algorithm has been 75 percent effective in the resulting diagnoses. Of course, a human would be necessary to follow up with therapy and medications. So far.

An even more impressive computerized psychiatric diagnostic result is found in the 100 percent accuracy of an automated speech-analysis program that differentiated between young at-risk people who became psychotic and those who did not over a two-and-a-half year period. The computer's predictive accuracy was far greater than methods such as neuroimaging and EEG measurement of brain activity.

Lawyers aren't exempt from AI replacement. A report in the *New York Times* uses the example of a 1978 Justice Department lawsuit where "discovery" involved examining 6 million documents by lawyers and paralegals at a cost of $2.2 million. In contrast, recently, "e-discovery" software analyzed 1.5 million documents for less than $100.000. Like Watson for cancer, this software did the job in a fraction of the time. Less than 60% of 2014 graduates had found jobs in the field after ten months of search. Yet law schools keep turning them out, perhaps to maintain a flow of tuition income, ignoring the consequences of AI.

Even the highly lucrative world of financial services is on the cusp of widespread computerization, according to an article in the *Harvard Business Review* by Brad Power, a consultant at FCB Partners. He reports that Watson Group Marketing Communications has clients working mostly on three applications: a virtual agent that banks and insurance companies can use for "personalized" customer relationship, a wealth planning advisor, and a tool for risk and compliance management. USAA, another financial services organization, uses the Enhanced Virtual Assistant, or Eva, which, according to Neff Hudson, vice president of emerging channels, "enables members to do 200 transactions by just talking, including transferring money and paying bills. It makes search easier and answers in a Siri-like voice. But this is a 1.0 version. Our next step is to create a virtual agent that is capable of learning."

What's happening at the Watson Group seems to be an illustration of one of the conclusions reached by Paul Rowady of the Tabb Group: that the financial market will shift expenditures from people to technology and replace financial specialists with those who develop and manage this technology. According to Rowady, "We see the true and blunt objective of digital transformation as the elimination of dependence on human responsibility for tasks and processes wherever possible." The result will be an industry-wide reduction in head count and shifts to new skillsets for the employees who remain.

Replaced workers in fields such as medicine, law, and finance will be just one aspect of the transformation ahead, according to Richard and Daniel Suskind in their soon to be published book, *The Future of the Professions: How Technology Will Transform the Work of Human Experts.* They predict a decline of today's professions in an Internet society: "… we will neither need nor want doctors, teachers, accountants, architects, the clergy, consultants, lawyers, and many others, to work as they did in the 20th century." Technology will bring an upheaval to what professionals do and how they do it.

**Winners and Losers**

In its report on the future of work at a time of AI and automation, *The Economist* includes a table that lists certain occupations and the likelihood of their replacement as a result of computerization. The source was C. Frey and M. Osborne's 2013 calculations, "The Future of Employment: How Susceptible are Jobs to Computerisation." Their news is bad for telemarketers, accountants and auditors, retail salespersons, technical writers, real estate agents, among others. It's middling for machinists, commercial pilots, health technologists, and economists. Editors and chemical engineers seem safe. But safest of all, and likely to increase, are recreational therapists, dentists, athletic trainers, and clergy. The latter suggests a growing need for prayer in the future.

      *The Economist* concludes: "However, society may find itself sorely tested if, as seems possible, growth and innovation deliver handsome gains to the skilled, while the rest cling to dwindling employment opportunities at stagnant wages." Such dislocation is not a hypothesis in light of the evidence from recent economic growth. The profits soar to those already at the top. Most people belong to "the rest."


**The Fate of Workers in a Robotic Age**

What will happen to the unemployed and the growing numbers of underemployed if that assessment, along with those of the Pew pessimists, plays out in the future?

      According to one scenario, "the rest" have nothing to worry about if AI devices come to dominate productive functions. A rosy view sees an accumulating abundance of wealth resulting from the economic productivity of a robotic workforce. These riches would allow governments to support "the rest" through grants and the comforting supports of social services. Assuming that food, sustenance, and shelter vanish as human concerns, then what?

      Two radically different alternative consequences of such prosperity have been suggested. In one, content people will indulge in the fruits of their leisure, happy to become clients of all those new recreational therapists. They'll travel, swim, read, listen to music, and cultivate all their real and psychological gardens.

      The unhappy opposite has them wallowing in functionless boredom, aimless and depressed, not unlike retired people who no longer have work to occupy their time and to sustain their psyches. Sue Halpern, in her *New York Review of Books* review of Nicholas Carr's *The Glass Cage: Automation and Us*, cites a finding by Dean Baker of the Center for Economic and Policy Research that the death rate for older males goes up significantly soon after they stop working. Carr cites a conclusion made in 1990 by Mihaly Csikszentmihalyi, the author of *Flow: The Psychology of Optimal Experience*, that "people were happier, felt more fulfilled by what they were doing, while they were at work than during their leisure hours."

      Marcus Wohlsen, a senior writer at *Wired*, wonders what would happen if people

didn't have to work:

> The idea that robots could make employment itself optional may sound fantastic. No more work! But the end result could be more, not less angst. We'd still have to find our place among the robots, except this time without work as a guidepost for defining a sense of purpose. By eliminating the need for people to work, robots would free us up to focus on what really makes us human. The scariest possibility of all is that only then do we figure out what really makes us human is work.

Existential anxiety may be the least of it for great numbers of unemployed, particularly millions of young people at the peak of hormonal urgings.

The extent of actual unemployment today, especially of the young, has been posited as a reason for radical violence in the Middle East, with religion just an excuse. Interviews of a number of people who have gravitated to ISIL reveal that the cause gives them a function and a purpose—conquest rather than aimlessness.

According to John Brian Shannon, an editor at *Arabian Gazette* of Dubai, "Unemployment among youths continues to hit 70 percent in some Middle East countries. It's not a temporary situation; it's the normal state of affairs there, and almost alone it's responsible for the rapid rise of terror and other crime throughout the region."

A far less warlike possibility is dramatized in Kurt Vonnegut's 1952 dystopian novel, *Player Piano*, in which the protagonist, Paul Proteus, claims, "Machines and organization and pursuit of efficiency have robbed the American people of liberty and the pursuit of happiness." At the climax, bands of angry unemployed destroy the machines that replaced them, but ultimately—with nothing else to do—turn to rebuilding them to give themselves a purpose.

I'm also reminded of Dostoevsky (a writer whose work influenced Vonnegut's) and his Underground Man, who—despite his many maladjustments—is often admirably perceptive. Two of his insights are relevant to the question of whether people need work. He asserts that they will commit to meaningless tasks just to be saved from "the deadly snares of idleness." And "The whole work of man really seems to consist in nothing but proving to himself every minute that he is a man and not a piano key." Vonnegut's unemployed reject roles as the pedal pumpers of player pianos that create the real music. Yet, in the end all they have is make work.

Another author who comes to mind is Henry David Thoreau, who wrote in his *Journal* of "the most poetical farmer": "He does nothing with haste and drudgery, but as if he loved it. He makes the most of his labor, and takes infinite satisfaction in every part of it. He is not looking forward to the sale of his crops or any pecuniary profit, but he is paid by the constant satisfaction which his labor yields him." Perhaps Thoreau would agree that there is only "quiet desperation" in being a piano key.

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