

## Man vs Machine

### The Struggle is Real – Or is It?

With the rapid acceleration of artificial intelligence many people fear that machines will replace us in the workplace. This has caused a flurry of outcries from some to pause AI development and has prompted governments from the U.S. to China to invoke executive and legislative powers to put measures in an attempt to safeguard us against the potential risks that AI may bring. While scientists and engineers work to find better and faster ways to launch us into the future there are ethical issues being discussed. Are machines capable of doing our jobs? Should they be allowed to take our jobs? Is it even possible to prevent them from taking our jobs? Who should decide if and when a human should be replaced by a machine?. What are the safety issues? Are there implications for society? What are the ethical implications? These are difficult questions and are more complicated than many realize. Answering these questions and balancing the interests and rights of employees with those of employers will be challenging. It is crucial that we make every effort to understand the implications and consequences as best we can, for both the short term and long term. Do we as humans have the right to hold our jobs and do employers have the right to choose at the expense of the human employees?

We all like to think that there is something superior about humans. We don't just think we are superior; we believe that we have some quintessential element that machines do not, that they can never possess. We write books about it, we make movies about it. We even write songs celebrating it. One such song features the American folk legend John Henry. John Henry was a steel-driver. His job was to

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hammer holes into rock that were used to place explosives to clear away the rock to build tunnels. When the new steam powered hammer threatened to replace men such as John Henry, he fought back. He was sure he could work faster and better than the new machine. This culminated in a face off in 1870. At the site of a new tunnel in West Virginia known as Big Bend, John Henry and the steam powered hammer spent almost two days demonstrating their ability. John Henry worked without rest and in the end he succeeded at besting the machine. This victory was at the expense of his life. He died, either immediately or shortly thereafter, by some accounts because his heart gave out after the prolonged effort to beat his nemesis. Regardless of the details or even of the accuracy of the accounts, the message is obvious: machines possess certain advantages over humans. They can work without breaks, they don't get tired, they don't sleep. They work "like a machine".

Technological advances have been a threat to labor ever since the industrial revolution. Over the past century we have seen great strides in automating tasks formerly carried out by humans. These advances and the increases in productivity that come with it have become even more pronounced with the standardization and formalization of processes used in many industries. What were formerly considered skilled artisans and laborers were decomposed into specific tasks which were easily teachable to an unskilled person. No doubt the most well-known instance of this was Henry Ford's creation of the assembly line for the efficient production of the motor car. By decomposing the building of an automobile into discrete tasks he was able to define specific skills required at each step of the process. No longer did the manufacture of the automobile require a team of people with many skills acquired over many years. He could hire anyone off the street and with a minimal amount of training make them a productive worker on the assembly line. This was the dawn of mass production.

In the second half of the twentieth century our ability to optimize our efficiency through the use of more advanced tools and machinery

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accelerated and towards the end of the century we began to see machines take over many jobs completely. By the turn of the century, automobile assembly lines became almost completely automated. Advanced robots became capable of moving quickly through warehouses and picking inventory for shipment. This was the first time we got a real glimpse of the future – of the future of the worker. Whereas John Henry was being replaced by a machine which still had to be in the hands of a human being, this new generation of machines could operate autonomously. While machines still rely on humans for supervision and maintenance, they are taking on more and more responsibility. They are requiring less supervision and taking on more difficult tasks.

In the next several decades we will see a rapid increase in the capability of machines but also in the responsibility and autonomy of machines. Every year that goes by we trust the capabilities of machines more and this gives rise to giving them more responsibility. We have seen cars which are capable of driving themselves even though we may be reluctant to trust them enough to give up our driver's seat. We have seen drones used first in military applications and now they are ready to enter the business world as agents of delivery for shipments. The advances in technology during the twentieth century which replaced the jobs of humans were characterized by electro-mechanical advances and the electronics which control them. In this century the machines seeing the most rapid advances are the *intelligent* machines. The physical capabilities of machines are still advancing but the real magic is the ability of these machines to do the things we have always thought only a human was smart enough to do. The next generation of computers, robots, and machines will be superior to humans not just physically but in their ability to process enormous amounts of information, solve complex problems, and react more quickly than their human predecessors.

None of this answers our original questions very well but only peels back the first layers so that we begin to appreciate just how serious and

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far-reaching these concerns truly are. There are still more questions to ask about where we draw the line between helping humanity and crippling it. Even once we understand and agree where that line lies, what should we do about it? What can we do about it? Even now we are seeing first attempts at introducing rules in the form of legislature and executive orders to control the unchecked growth of AI in the workplace. Past experience has shown that while these measures may be necessary, they fall short of being sufficient when attempting to control human behavior. Certainly, we will have no more success in controlling the behavior of machines by legislation alone. And in some cases, legislation may make matters worse if the wrong decisions are made about what we try to control and how.

Where does this leave us, the primitive human? Will we be relegated to cleaning up after our mechanical successors? Will the world degenerate into the final chapter of The Terminator? The list of sci-fi movies about this type of struggle is a long one. Is this life imitating art? Or perhaps the real fiction is that in the movies the humans always win.

## **The Ultimate Team**

It is easy to see the new breed of machines as the enemy. In many areas they are faster, stronger, and better than we are. Over the past century many jobs have been lost to a machine and it appears that the trend will continue.

In the face of increasing competition for jobs between machines and humans two things are apparent:

1. There are some jobs that a human will never be able to compete with machines for.
2. Some jobs cannot be done as efficiently without the aid of tools

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such as computers and other electromechanical machines.

Any task which is relatively simple or easily replicated can almost always be done faster, more efficiently, and at a lower cost by a machine. Since the 1940's we have used automation in what is known as CNC (computer numerical control) automation. Modern CNC systems allow us to take a design for a simple component and have the system use tools such as lathes, mills, cutters, hole-punches, and welders to produce the component. These types of jobs benefit greatly from the increased productivity of a machine. For this reason, fewer and fewer humans are employed to create machined components.

Many jobs are still done by humans but have benefited from the increased productivity afforded by using some sort of machine to assist them. Early examples include jack-hammers, electric drills, and nail guns. As computers have become more common and cheaper we have seen their use in the workplace become more and more commonplace. In the business environment, it is very rare to see anyone using a typewriter for letters, purchase orders or any other document. The word processor has become the norm and is present in one form or another on every laptop, tablet, and even mobile phone. Technical fields such as medicine, biology, and astronomy depend heavily on the power of the computer for processing immense amounts of data and performing complex calculations which would never have been possible before. The degree to which computers have become integrated with the careers of today is evident by looking at the curriculum of any modern educational institution. Learning to use a computer in one's trade has become as necessary as a carpenter learning to use a hammer. As the use of machines and computers increases so does their value. But in some cases this decreases the value of the human worker. As the skills and complexity required to do a job are shifted from human to machine, the value shifts with it. This is especially evident where the role of the human becomes so depleted of specialized skills as to move them into the category of unskilled worker.

The key to surviving the silicon takeover, at least for now, is to take

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sanctuary in jobs which fall into the second category. But you may ask yourself, “As computers become more intelligent won’t more and more jobs fall into the second category?” Yes, but it may not be as simple as dividing jobs into ones in which computers are better and jobs at which humans are better. Let’s switch gears for a moment and look at one of the most cited examples of human intelligence vs. machine intelligence: the game of chess.

For years, computers have been rather good at playing chess. They can assess the many possible moves with lightning speed, can remember countless tricks, traps, and gambits along with many historic games played by the very best chess champions in the world. Since the 1970’s almost any chess software program could defeat all but the best chess players in the world. By 1997 the IBM computer Deep Blue beat Gary Kasparov, the world chess champion. Since then computers have left human players in the dust.

It might seem that in the game of chesslike the job market, humans will never be able to compete with these super intelligent monsters which never sleep and make few demands. But the story took an interesting turn a few years ago when a new form of chess tournament emerged: *freestyle chess*. Freestyle chess is a tournament between humans who are allowed “to make use of any technical or human support for selecting their moves.” It turns out that while no single human player can defeat even a mediocre chess program, a person assisted by a computer program used to evaluate options and assist in making decisions can beat even the best of chess playing computers. An even more astounding result came out of a freestyle tournament in 2005. In “The Chess Master and the Computer” Gary Kasparov describes what happened:

*Human strategic guidance combined with the tactical acuity of a computer was overwhelming. The surprise came at the conclusion of the event. The winner was revealed to be not a grandmaster with a state-of-the-art PC but a pair of amateur American chess players using three computers at the same time. Their skill at manipulating and “coaching”*

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*their computers to look very deeply into positions effectively counteracted the superior chess understanding of their grandmaster opponents and the greater computational power of other participants. Weak human + machine + better process was superior to a strong computer alone and, more remarkably, superior to a strong human + machine + inferior process.*

GARRY KASPAROV, "THE CHESS MASTER AND THE COMPUTER," NEW YORK REVIEW OF BOOKS, FEBRUARY 11, 2010  
<http://www.nybooks.com/articles/archives/2010/feb/11/the-chess-master-and-the-computer/>

By complementing each other's strengths, the humans and computers formed the ultimate team, unbeatable even by the best of the best from either side alone. By taking this approach in the workplace, we may find that our most challenging tasks are best performed not by humans alone or by autonomous AI systems but by collaborating. The future is both inevitable and very clear. In at least some fields, the only way to survive the continuing migration of jobs from human worker to automated machine is to form an alliance. The machines will continue to improve in speed, efficiency, and intelligence. But the ultimate team will be the team that best utilizes the strengths of both machine and human. By leveraging the machine's capacity for processing immense amounts of data, analyzing and choosing the best options from millions of possibilities, yet guided by well-trained humans with experience in their domain of expertise, they will leave everyone else . . . in the dust.