47% of Jobs Not at Immediate Risk of Being Taken by Robots or Automation

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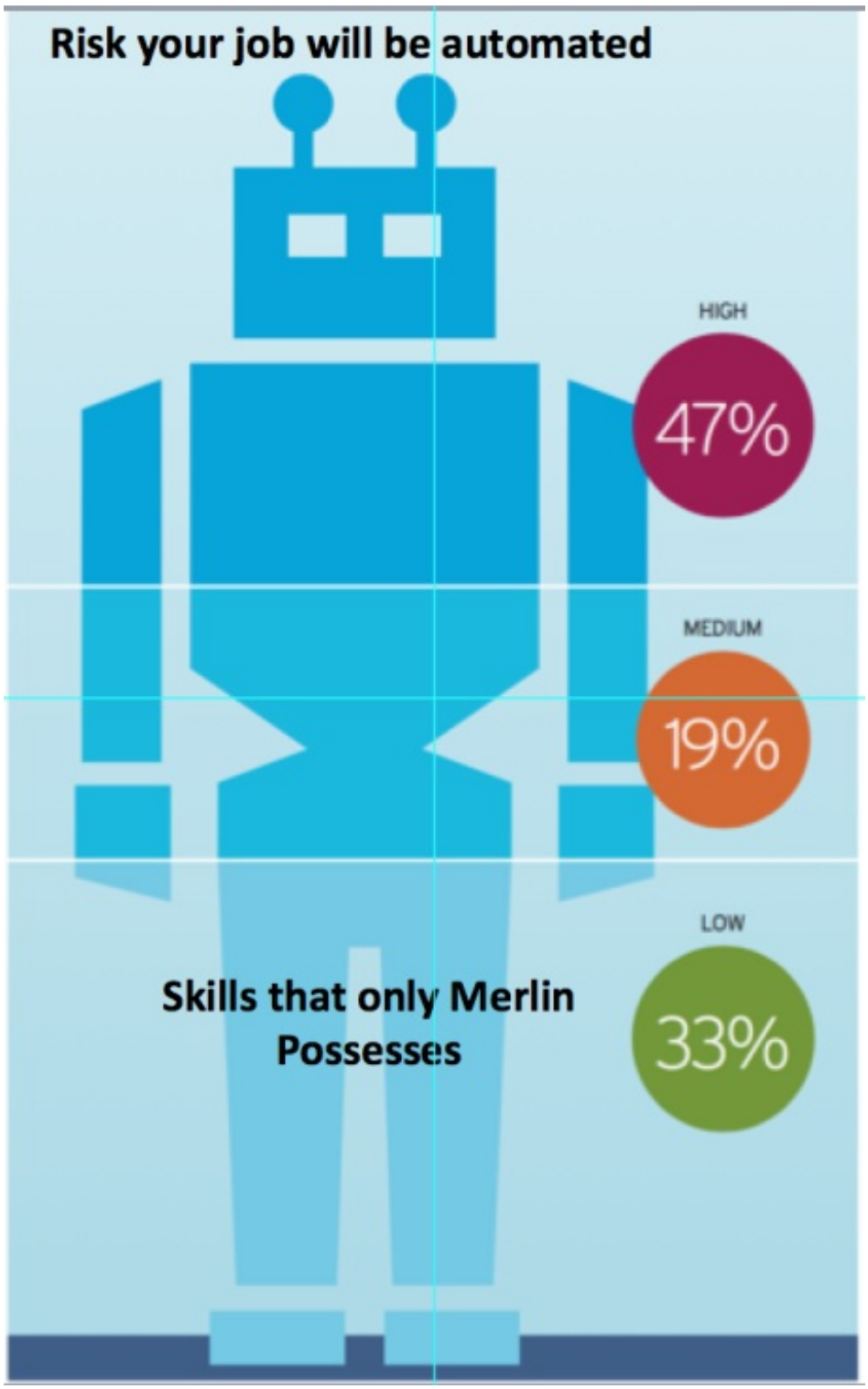

In 1812 the British government created an Act of Parliament which made the destruction of mechanized looms – or knitting machines – a capital felony and hence a crime punishable by death. The Act was implemented as a result of so called Luddite attacks on machines.[1]

It should be noted that in many cases the so called Luddites were not raging against the machines taking jobs, but against the employers who failed to provide them with a 'living wage.'

According to the esteemed historian Eric Hobsbawm, the Luddites had: "no special hostility to machines as such," their actions were in fact, "a normal means of putting pressure on employers." Hobsbawm wrote: "Such misconceptions are, I think, due to the persistence of views about the introduction of machinery elaborated in the early nineteenth century."[2] Adding:

> This sort of wrecking was a traditional and established part of industrial conflict in the period of the domestic and manufacturing system, and the early stages of factory and mine. It was directed not only against machines, but also against raw material, finished goods and even the private property of employers, depending on what sort of damage these were most sensitive to. Thus in three months of agitation in 1802 the Wiltshire shearmen burned hay-ricks, barns and kennels of unpopular clothiers, cut down their trees and destroyed loads of cloth, as well as attacking and destroying their mills.

Essentially Luddites were the early trade unions and not raging specifically against the machines but seeking a 'fair wage' for the employees by rioting and causing damage to business owners' property by any means to press their case.

The misconceptions of the actions of the Luddites led to poor legislation and policy in the United Kingdom.

Job security requires skills only Merlin possesses

In 2013, researchers Carl Frey and Michael Osborne of the Oxford Martin School announced that 47 percent of U S jobs were at risk of computerization:

> According to our estimates around 47 percent of total US employment is in the high risk category. We refer to these as jobs at risk – i.e. **jobs we expect could be automated relatively soon, perhaps over the next decade or two.**

In 2014 Deloitte asked them to carry out similar research in the UK, where it was stated Frey and Osborne: "estimate that on average, 35 per cent of current jobs in the UK are at high risk over the next ten to twenty years.[3]"

Frey and Osborne's papers have led to a deluge of bleak headlines, such asDeath of the Accountant and Auditor; Advances in artificial intelligence could lead to mass unemployment, warn experts; and whilst we are on this theme maybe the most embellished article and headline of all: Technology f*cked us all: The anxiety driving Donald Trump and Bernie Sanders is really about machines taking our jobs. The pessimistic view associated with Frey and Osborne's paper has even led to claims that we may be headed for another Engels' Pause: a period of stagnant living standards and higher unemployment in the face of rapid technological change.[4]

I am worried by the seemingly incurable pessimism caused by these headlines, which are also instigating governments to champion or consider policies that may not be in the long term best interests of the population they serve.

The headlines scream that if you want to make your job 'non-susceptible' to automation then you should make sure it has the type of skills that only Merlin possesses

It is important to realize that the methodology in the Frey and Osborne papers have never been validated with any actual evidence. Anyone with five minutes to spare, a Maths GCSE, and a modicum of common sense could pick flaws in the selection of types of jobs shown to be at high risk of being taken over by a computer algorithm.

Nevertheless, people, including policy makers, suspend their critical judgment and believe the headlines that robots are set to become a Hobbesian nightmare of breathtaking scope.

But if we look beyond the headlines and read the Frey and Osborne paper we find the authors are not stating 'robots' WILL take half of all jobs but computerization 'could' displace people from the types of jobs they have highlighted. In fact one of the authors, Carl Benedikt Frey, recently wrote in March 2016[5]:

> Although we cannot exclude the possibility that technology ***may*** reduce the overall demand for jobs in the future, ***this is seemingly not an immediate concern***.

Meanwhile his co-author Michael Osborne has gone as far as saying[6]:

> I think a lot of the risk to professions has been overhyped.

Frey and Osborne do a good job surveying a certain type of literature on the suggested improvements being made within robotic, machine learning, artificial intelligence, etc. Although this research tends to rely too much on sources such as the International Federation of Robotics, an industry association with, in my opinion little impartiality and other publicity afforded to various robots and A.I. providers. They provide very little actual citation of work happening within the labs of developers, nor do they analyze the capabilities of current robots in any great degree through discussions with users of these robots, rather referring to the reported capabilities (or expected capabilities) of Baxter the co-bot by Rethink Robotics with a nominal number in service. They also use research that estimates that "the market for personal and household service robots is already growing by about 20 percent annually." Which is more or less Roomba the automated vacuum cleaner, that to the best of my knowledge has not displaced any Ukrainian housecleaners in Poland!

Evidence of any actual job displacement by the current types of robotics and computerization illustrated by the authors is not shown. What the authors are doing is predicting a demise of jobs based on their research of the available literature! In fact the authors state in the paper:

> We speculate about technology that is in only the early stages of development.

Nevertheless, despite the 'speculation,' they do make the bold claim:

> In the first wave, we **find** that **most workers** in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labour in production occupations, **are likely to be substituted by computer automation**.

So unlikely, so unimaginable

Which jobs are not at risk of automation according to Frey & Osborne?

> Occupations that involve complex perception and manipulation tasks, creative intelligence tasks, and social intelligence tasks are unlikely to be substituted by computer capital over the next decade or two.

These are what the authors terms non-susceptible task characteristics.

A sub element of manipulation is manual dexterity. An indication of the level of “Manual Dexterity” computer-controlled equipment would require to perform a specific occupation. Low (level) manual dexterity corresponds to “Screw a light bulb into a light socket”; medium (level) is exemplified by “Pack oranges in crates as quickly as possible”; high (level) is described as “Perform open-heart surgery with surgical instruments”.

It is thus obvious in Frey and Osborne’s thesis that jobs at risk of automation can be summed up as follows:

> The probability of an occupation being automated can thus be described as a function of these task characteristics. As suggested by Figure I, the low degree of social intelligence required by a dishwasher makes this occupation more susceptible to computerisation than a public relation specialist, for example. We proceed to examining the susceptibility of jobs to computerisation as a function of the above described non-susceptible task characteristics.

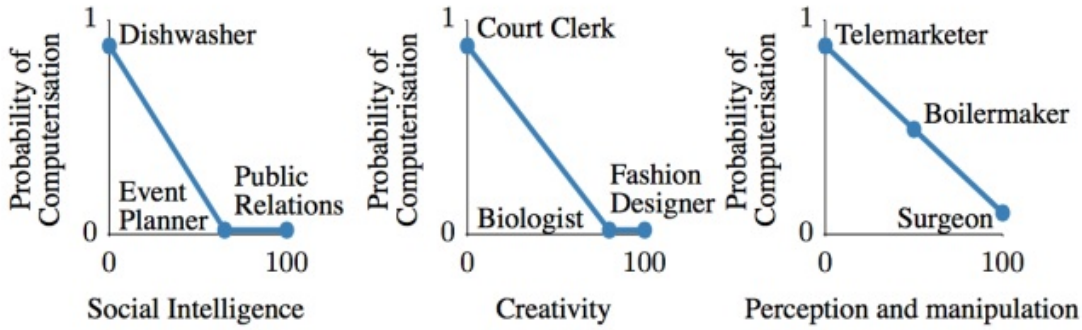

FIGURE I. A sketch of how the probability of computerisation might vary as a function of bottleneck variables.

Arriving at 47% of jobs being highly susceptible to automation

The authors relied on O*NET, an online service developed for the US Department of Labor. O*NET defines the key features of an occupation as a standardised and measurable set of variables. It also provides open-ended descriptions of specific tasks to each occupation.

They then asked a specific question:

> Can the tasks of this job be sufficiently specified, conditional on the availability of big data, to be performed by state of the art computer-controlled equipment?

The authors further identified nine variables that describe the attributes of perception and manipulation, creativity, and social intelligence and which are required to perform the attributes. These are shown in Table 1 from the authors’ paper. They then focused on

O*NET's description of Tasks.

It should be Work Activity and Skills not Tasks

Time and time again as I look at the types of jobs Frey and Osborne say are at high and medium risk of being done by automation I can't help but question – is it because they specifically looked at O*NET data with respect to Tasks and not the essential element that portrays Work Activity and Skills?

Table 1 from Frey and Osborne.

Computerisation bottleneck	O*NET Variable	O*NET Description
Perception and Manipulation	Finger Dexterity	The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.
	Manual Dexterity	The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.
	Cramped Work Space, Awkward Positions	How often does this job require working in cramped work spaces that requires getting into awkward positions?
Creative Intelligence	Originality	The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.
	Fine Arts	Knowledge of theory and techniques required to compose, produce, and perform works of music, dance, visual arts, drama, and sculpture.
Social Intelligence	Social Perceptiveness	Being aware of others' reactions and understanding why they react as they do.
	Negotiation	Bringing others together and trying to reconcile differences.
	Persuasion	Persuading others to change their minds or behavior.
	Assisting and Caring for Others	Providing personal assistance, medical attention, emotional support, or other personal care to others such as coworkers, customers, or patients.

Frey and Osborne indicate that their algorithm predicts that most workers in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labour in production occupations, are at risk of automation within ten to twenty years,

Much of their argument about transportation employees circulates around the advent of driverless cars. We are much closer to an understanding of when driverless cars will be available to the 'general public' and it certainly seems that they will not be the main mode of transport in the next 3 decades if current developments and legislation is anything to go by. I do believe that we will see more semi-autonomous trucks on the roads in the coming decade, but I do not see that they will be without a human in the cab for sometime in the future. There are just too many infrastructure problems to overcome, let alone the technical obstacles.

Sports referees, Watch Repairers, Models and Manicurists jobs to be automated

Drill into the report and look at the types of jobs that they say have the highest probability of being replaced by automation and we find all sorts of jobs even the most pessimistic luddite will find hard to accept.

One job at the highest risk of automation, using Frey and Osborne's methodology is that of Watch Repairer. According to O*NET statistics there are 3,000 watch repairers in the United States. Now I may accept jobs of watch repairers will dwindle as sales of watches falls due to the fact nearly everybody looks at their smart phone for the time, but not that watches will be repaired by robots! If sales of watches are dwindling why invest the time and money building a robot to repair watches? In fact I suspect that Watch Repairers will become even more of a specialized job as sales of watches focus on the high value watch. I do not expect Watch Repairers will be replaced because an automated machine can repair the watch.

Another job that the authors state is at high risk of automation is Manicurists and Pedicurists – surely that requires a high level of dexterity, precision and social skill?

They also predict the days of Animal Breeders are over (is that because we will all have pet robots?), Gaming Dealers – not social at all!, Real Estate Brokers – presumably robots will arrange to show us around prospective houses. Maybe many people's favorite choice but not likely any time soon – Umpires, Referees, and Other Sports Officials – will be automated.

Perhaps the one I most flinch at which Frey and Osborne's algorithm predicts is at high risk of automation is Models.

Look at the tasks O*NET provides as key for Models.

1. Pose for artists and photographers.
2. Gather information from agents concerning the pay, dates, times, provisions, and lengths of jobs.
3. Follow strict routines of diet, sleep, and exercise to maintain appearance.
4. Record rates of pay and durations of jobs on vouchers.
5. Report job completions to agencies and obtain information about future appointments.

Now look at the Work Activity O*NET provides.

1. Establishing and Maintaining Interpersonal Relationships — Developing constructive and cooperative working relationships with others, and maintaining them over time.
2. Performing General Physical Activities — Performing physical activities that require considerable use of your arms and legs and moving your whole body, such as climbing, lifting, balancing, walking, stooping, and handling of materials.
3. Thinking Creatively — Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.

And Skills

Social Perceptiveness — Being aware of others' reactions and understanding why they react as they do.

Surely these Work Activities and Skills are elements that fit into Frey and Osborne's criteria for jobs that will not be automated. I have repeated detailed analysis of over 90 of the occupations that Frey and Osborne indicate are at high and medium risk of automation and each time I question the judgment of the authors.

Policy makers are well advised to do their own analysis before using the Frey and Osborne paper to pursue policies that may not be in the best interest of their constituents.

One final word from the Frey and Osborne which is often overlooked in the hype associated with the paper:

> We acknowledge that it is by no means certain that a job is computerisable given our labelling.

[1] The Destruction of Stocking Frames, etc. Act 1812 (https://en.wikipedia.org/wiki/Destruction_of_Stocking_Frames,_etc._Act_1812)

[2] Eric Hobsbawm, Machine Breakers (http://libcom.org/history/machine-breakers-eric-hobsbawm)

[3] Deloitte London Futures: Agiletown: the relentless march of technology and London's response (http://www2.deloitte.com/uk/en/pages/growth/articles/agiletown-the-relentless-march-of-technology-and-londons-response.html Last accessed 11th April 2016)

[4] Engel`s Pause: A Pessimist`s Guide to the British Industrial Revolution. Robert C. Allen, April 2007 (http://www.economics.ox.ac.uk/materials/working_papers/paper315.pdf Last accessed 18th April 2016)

[5] Technology at work: How the digital revolution is reshaping the global workforce. Carl Benedikt Frey, Ebrahim Rahbari 25 March 2016 (http://www.voxeu.org/article/how-digital-revolution-reshaping-global-workforce Last accessed 11th April 2016)

[6] Robots are leaving the factory floor and heading for your desk – and your job, The Guardian Zoe Corbyn 9th February 2015 (https://www.theguardian.com/technology/2015/feb/09/robots-manual-jobs-now-people-skills-take-over-your-job Last accessed 11th April 2016)

Main paper cited – The Future of Employment: How susceptible are jobs to computerisation? Carl Benedikt Frey and Michael A. Osborne. September 17, 2013 (http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)