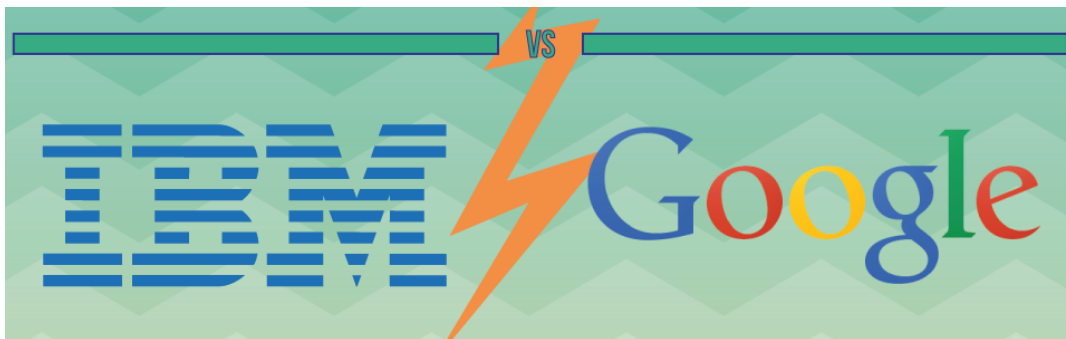


In our last newsletter we told you about the many amazing things that technology is doing to improve healthcare and what the future of healthcare holds. Mentioned prominently were IBM's Watson and Google's DeepMind, the two major players in the billion-dollar healthcare technology industry. If you care to look the last newsletter it is at <http://privatepracticedoctors.com/wp-content/uploads/2018/02/Technology-is-amazing-A-PPD-Newsletter-2.pdf>.



If you superficially follow the news, it appears that the outlook is rosy and the potential benefits limitless. It is human nature to see the wonders of the new and exciting without seeing the downsides and pitfalls of these ideas. But as with most new shiny untested toys, the initial sheen can hide some very substantial problems. This is not to say that the future is dismal in the AI healthcare world, but rather, that progress comes with a price tag attached. We need to go evaluate these new



systems with our eyes wide open, simultaneously realizing the potential benefits as well as the potential risks.

Let's first review Google's DeepMind. If you recall, we discussed this amazing program that has literally taught itself to walk and to beat a Grandmaster at the world's hardest game, Go. One would think that bringing the same technological ability to healthcare would yield amazing results. But to date, it has become one large headache to the National Health Service of England. A contract was made between the Royal Free National Health Service Foundation and Google that allowed Google to access the healthcare records of the National Health Service. Through this project, Google was allowed access to millions of very sensitive NHS patient records.



This arrangement should immediately set off alarm bells. Questions that immediately come to mind:

- How will the data-sharing arrangements be regulated and monitored when governmental or large hospital units interact with private technology firms?
- When for-profit firms interact with Google's DeepMind or IBM Watson, who controls the information?
- How are safeguards introduced?
- Who profits from the information?
- How are patients notified?
- How is individual consent obtained?
- And so many more.....

When an independent entity investigated these areas of concern, they discovered several amazing things. The purpose of the agreement between Google and the NHS was to improve clinicians' ability to manage Acute Kidney Injury. But, the agreement itself was far less specific and allowed open-ended use of NHS data. Further investigation appears to indicate that patient data was not deidentified. Deidentified data included information about patient HIV status, drug use,



abortions and routine hospital visits. Even if the investigators wanted to, it is impossible to track how patient records were being used. Finally, and most importantly, no patient whose data was shared with DeepMind was ever asked for their consent.

Although an updated agreement is now in place, the investigation into the old agreement was not made public. In addition, DeepMind continues to retain access to the data. It is very disconcerting that no patient whose records were accessed gave permission or was even asked for consent. Is it ethical that only one in six of the records DeepMind accessed would have involved Acute Kidney Injury patients? It is disturbing to say the least. The authors who found this deeply troubling information noted that the relationship with Google was like having a one-way mirror.

“Once our data makes its way onto Google-controlled servers, our ability to track it – to understand how and why decisions are made about us – is at an end.”

Now that we have found a problem, what is the solution? One could potentially set up an independently resourced body to protect the public. But who would fund this body? How would it maintain its independence? Regulatory bodies have been known to go off the rails with conflicting political and financial gain.

Once again, let me stress that changes are happening in healthcare and that large companies are trying to legitimately deal with trying to leverage these new technologies into their business models. This, after all, is the American way. What we need is awareness of the pitfalls and problems associated with these new technologies. Now, let's look at another giant technology company and see what potential and real traps have opened. IBM has proved that Watson has tremendous capabilities, including the amazing ability to win at Jeopardy. IBM has been investing heavily in Watson and touts its potential to help doctors identify and treat disease. If you recall, our previous newsletter discussed how Watson had the potential to aid doctors choose chemotherapeutic regimens in oncological patients.



But all is not rosy in Watsonville. To date, studies suggest that IBM may have rushed the computer and its programming to market. Watson is having problems distinguishing types of cancers and its acceptance has not been very widespread despite its amazing potential. As of the time of its analysis, Stat magazine reported that IBM had not published a single scientific paper about the impact of Watson on physicians and patients.

According to Stat, Watson uses cloud-based computers to review and digest massive amounts of medical data including physician notes, medical studies or clinical guidelines. Also, according to Stat, Watson's recommendations are not derived from insights obtained through data analysis, but rather are exclusively the result of training by the humans overseeing the project.

It truly appears that we are looking at technology in its infancy if not in its neonatology. Is it really massive technological computer-based progress when

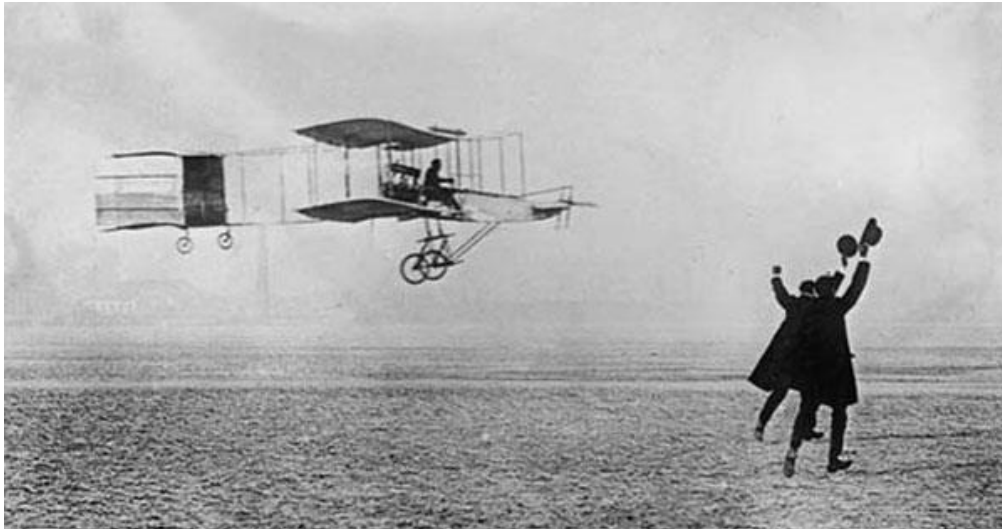


human physicians at a single US hospital (Memorial Sloan Kettering Cancer Center) input their own recommendations despite the evidence? Perhaps not surprisingly, MD Anderson put their collaboration with IBM Watson on hold.

So here we have an amazing new technology which was probably released prematurely. In all honesty, it is very possible that the shortcomings were not known pre-release but only noted during the testing process. We don't want to throw the baby out with the bathwater, so proof of concept and testing are important, but how do we learn when a technology is ready for prime time unless it



is pretested? Manned flight did not begin in 1903 with the Wright brothers' first successful powered controlled manned flight. Man had been experimenting, and dying, with balloons and gliders for years. Wartime brought amazing breakthroughs and more deaths. But, within 65 years of the Wright brothers, man had landed on the moon. AI technology in healthcare will come and will blossom but not without failure, false pathways and follies. How much will the public tolerate the foibles necessary for a successful result?



These two examples of the initial attempts by these huge technology companies raise fairly large but straightforward questions. New smaller companies are sure to make a name for themselves and set themselves as benchmarks in the years to come. What unrecognized problems will they bring and how will we solve them?

Are you ready for some extra credit? OK, let's get down and dirty with more potential problems with AI. If you don't mind digging in the weeds, go ahead and finish the article, if you're not the digging type it's OK to stop here.



Do you know what risk homeostasis is? If so, do you know how it works in healthcare? According to Dutch psychologist Gerald Wilde, when an activity is made safer, the rate of accidents remains the same. Drivers with anti-lock brakes drive closer to the car in front. Mandatory seat belts reduce the likelihood of an injury in accidents, but don't reduce the death rate per capita. And in medicine, the greater the number of prescriptions, the more people's sense of personal responsibility dwindles. A perfect example of this is when I find my patients liberalize their diet when they know that statins will drive down their cholesterol. If I have that cheeseburger by cholesterol medication will take care of it.

Would you like a statin drug with your cheeseburger?



When I read about risk homeostatis, I thought of the episode in World War I when the British were first using hard helmets. Prior to WWI, almost all the soldiers across the world wore soft caps. Given advances in warfare such as the use of automatic weapons, large caliber guns and high-grade artillery, the British army started supplying their soldiers with metal helmets to potentially reduce death from shrapnel and bullets, etc. However, an unintended consequence was the sudden



rise in head injuries seen in their field hospitals. The initial response was to return to soft helmets to decrease the number of head injuries. Luckily, calmer and rational heads prevailed. The reason there was an increase in the number of head injuries was that soldiers with wounds from projectiles to the head that were survivable with the helmets, were previously head fatalities and now made it to the hospital and many survived intact able to return to battle.

A study done with nurses in ICUs in the UK is another example of risk homeostasis. Safety measures implemented during drug dispensing involved multiple cross checks by different colleagues prior to drug administration. Although nurses are trained to double check, these safety measures reduced the perceived risk and nurses assumed a mistake was less likely and, as a result, their own double checking decreased.

Similarly, when automation and technology come into play, we may see no benefit because there are unintended consequences and human responsibility can decline.



There is also something called automation bias. This is “the tendency to disregard or not search for contradictory information in light of a computer-generated solution that is accepted as correct.”

Full automation works great for tasks that require no flexibility in decision making. Full automation without human interaction is hard to achieve in healthcare because

of the complexities of patient care. Humans must know when to trust a system or not. A potassium level of 7.9 in a normal individual might not lead you to immediately treat that individual; it's possible, for example, that there was hemolysis in the tube. A completely automated system would begin treatment of hyperkalemia immediately.

Risk homeostasis suggests that over-automating clinical practice will lead to complacency and an increase in the number of errors. Studies from other fields show that humans do suffer automation bias and reduction in personal accountability.



**ERRORS
OF
OMISSION**



**ERRORS
OF
COMMISSION**

Over trust in imperfect automated systems leads to two types of errors. “Errors of commission and errors of omission. Errors of commission occur when a person acts erroneously, and errors of omission occur when the person fails to act when they should have.”

Studies show when the automation is wrong, the participant's decision-making performance goes to zero. He/she assumes the machine or system is correct and makes an error of commission. When the system failed to give a recommendation, he/she would fail to act as an error of omission. Humans make more errors when the automation is wrong than when the automation was gone.

Therefore, you can see that as we become more and more dependent on automation, our automation bias will increase remarkably. The potential for disaster is huge unless there are corrections built into automated systems.

In summary, the potential for artificial intelligence in healthcare is quite amazing. But the potential for giant problems is also remarkable. Remember, electronic medical records were going to revolutionize healthcare and make everyone interact in a paperless nirvana. The bottom line is that the potential is there, but so are the risks. Let's not get blinded by the brightness of the shiny new object and let's remember to look deep into its inner workings.

We hope you have enjoyed a summary of the problems of AI in technology. The goal of PPD is to keep you up-to-date and to allow your practice to thrive in the 21st century.

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