Genetics, Robotics and Nanotechnology: A Path to Development or Destruction

As society progresses, we are becoming more and more reliant on machines. With our advancement in technology comes an ever-increasing risk. Technology such as Artificial Intelligence has virtually unlimited applications in today's world, whether it be medical equipment, security, transport, or manufacturing goods (Essays, UK. November 2018). But in our pursuit of a technological Utopia, we must walk a thin line between the advancement of the human race or the destruction of it. In this essay, I will assess the threats of Bill Joy's GNR technologies and justify whether it is practical and safe to continue to pursue advancements in these areas. I will explain why I think some of Joy's Philosophy is based on false prepositions. Although I am sympathetic to some of Bill Joy's concerns, I will outline why I support much of the philosophy of James Hughes. Finally why I think it is impractical to abandon the advancement of GNR technologies entirely to avoid Bill Joy's proposed mass destruction.

Bill Joy's Concerns about the advancement of GNR technologies

Bill Joy, the co-founder of Sun Microsystems and co-author of the widely used programming language Java, posted the now-famous article "Why the Future Doesn't Need Us." The article opposed the advancement of GNR (Genetics, Nanotechnology, and Robotics) technologies in the "militantly pro-technology Wired magazine" (J Hughes, 2007). In the article, Joy's primary concern is about the self-replication capability of upcoming technology. Whether it be a genetically altered pathogen, an artificial Intelligence that can copy itself or Nanotechnology, they all are capable of reproducing in one form or another. Bill Joy proposed that all nations should relinquish research and development of weapons of mass destruction using GNR technology. Joy's second concern on the development of GNR technologies is the potential for abuse, the power of mass destruction is "no longer in the hands of nation-states, but in the hands of individuals" (Bill Joy, 2006).

Firstly, it is clear that as we pursue these technologies, they do pose genuine threats. Today many nations have the knowledge and infrastructure to build and research biochemical weapons (Wiley, 2007); many genomes are freely available on the internet, such as Influenza and SARS. Reconstructing and editing these genomes, could be an effective method of destroying countries strength and crippling economies, this sort of attack could have similar effects as the COVID-19 pandemic we are currently facing. Joy is not only concerned with a tailored infectious virus but is also worried about accidental releases of viruses and medicinal micro-organisms while researching them. In my opinion, this is a much more likely and real threat, Australian researchers created a virus with 100% lethality to mice while trying to create a viral contraceptive (J Hughes, 2007, sourced from Nowak, 2001). It does not seem a far stretch to speculate that if a similar thing happened with lethality to humans, it could result in a major pandemic.

The reproduction of Nanotechnology is more speculative. The fear of nanotechnology self-replicating stems from the hypothetical apocalypse known as the grey goo scenario. The scenario shows what happens when nanotechnology replicates outside the constraints of their programming and starts targeting everything on earth (J Hughes, 2007). I think that it is hard to form accurate opinions of nanotechnology as it refers to a science fiction trope of small self-replicating machines. For this reason, I do not think that it is a realistic scenario. I will not address this topic further.

Finally, Joy's concern on the reproduction of killer robots or superior artificial intelligence, despite being one of the oldest Sci-Fi tropes, Joy expresses concern by saying that "superior robots would surely affect humans as North American placentals affected South American marsupials (and as

humans have affected countless species)... biological humans would be squeezed out of existence" (Bill Joy, 2000). The basis of Joy's concern is built by two assumptions that are not necessarily true. Firstly, that computational power of computers will continue to double every two years (Moore's Law), and secondly that Artificial Intelligence will have the autonomy, meaning they are self-governing.

Gordan Moore predicted that the number of transistors on a given chip would double every 18 months. In April 2005, he predicted that Moore's Law would break down by 2025, and said that Moore's Law will not continue on forever. According to Michio Kaku and many other scientists, it is already slowing down. If Moore's Law is not maintained, it means that the first premise is false.

I am skeptical about the idea that machines can attain autonomy, as for a computer to demonstrate this, there must be some form of intuition, some event that we can't predict by running through the algorithm manually. Machines can appear to be intelligent by being complex. They can learn by themselves, but when it comes down to it if you were to take the code of an any Artificial Intelligence at any point in time if you were to halt its learning and feed it a question you could, in theory, follow it with Boolean logic, and arrive at the same conclusion. This seems to be anything but autonomous; this appears to demonstrate an exclusion of free will (Selmer Bringsjord, 2008). A counter-argument could be made that human thought could be similar to machine thought, that human logic can also be solved in an algorithmic manner if you had all the information in the brain such that you do a computer, that every decision you make is based on memory and boolean logic, fight or flight, good or bad etc. My response to this would be to reference the famous Turing Test, the test consists of a person trying to decide if a machine is a computer or a human. If the machine can convince the tester that it is human, then it has passed, if not it has failed. Nothing that we have

put to this test has come close to the standard of constantly passing this test without incorporating some sort of cheat, for example pretending to be a 13 year old boy, this is not really counted as it doesn't demonstrate human-like intelligence or thought, but is specifically designed to trick the tester. As nothing has passed this test convincingly, I think that if a computer can to some extent imitate human-like thought, that implies that human thought is algorithmic. As nothing has really got close to this, it implies a fundamental difference between human thought and machine thought.

Despite not being convinced that Artificial Intelligence can display autonomy or that Moore's Law is still a valid projection, I agree with Joy that the development of Artificial Intelligence and Robotics can cause real and plausible threats. I became increasingly more concerned as I was exposed to Joy's work, at his suggested possibility of abuse. There are many ways in which this technology could be misused. Artificial Intelligence could be used to streamline mass surveillance, used by rogue states to identify targets, carry out assassinations or cripple economies and for many other uses. Bioweapons could be used to weaken a country before an attack. These technologies are "dual-use," having both beneficial and destructive uses (J Hughes, 2007), in the wrong hands this could mean devastating power, and as we progress, there are more and more entities that have the resources to develop such technologies.

The Impracticalities of Relinquishing GNR Technologies

The first of my many problems with Joy's proposal is that it would be impossible to get our entire species, let alone the main superpowers to agree to stop developing GNR technologies, countries such as the United States and Russia have never even entertained the idea of having inspections on their nuclear facilities (J Hughes, 2008). It is an infeasible task to get all companies, governments, and rogue entities to agree on such terms. Even if you could, there is nothing stopping countries

from setting up their private research and development for these technologies. Regulating the development on a global scale is a seemingly impossible task; more effective use of time and resources would be to pursue safe methods of testing, creating ethical guidelines. With the $35 Billion we poured into the research and development of Artificial Intelligence in 2019, It would be reasonable to put time and research into protection against rogue AI's and safe methods of developing AI.

The second problem is Joy's sudden dismissal of the brilliant applications of GNR technologies; it seems to me that to dismiss the development of these technologies would be unethical, as you would deny millions of people affected by sickness the potential to get better. Through the development of Artificial intelligence, genetic engineering, and molecular nanotechnology, we could be close to solving some of humanity's most pressing issues. It seems that in Joy's article, there is a significant skew towards the negative effects and a distinct lack of emphasis on the enormous benefits these technologies bring.

Lastly, the main issue I have with Joy's philosophy is he seems to have this idea that if we do not relinquish GNR technologies, it will almost certainly result in catastrophe, this is not a valid conclusion to draw. If the premise is true, it does not guarantee that conclusion is valid; it is just as likely that it would not result in a catastrophe. I would argue that if we were to endorse the relinquishment of these technologies, the most likely outcome would be that not everyone would honor this agreement, this would result in nation-states accepting this agreement. Rouge entities will have more destructive capability than nation-states.

Conclusion

In conclusion, I disagree that the machines are capable of having autonomy, and therefore they are not capable of reaching goals of their own making. As a result of this, I believe that the possibility of Killer Robots remains Science Fiction. I think that the real danger of GNR technologies lies in which entities have access to them, It lies with the fact that these new technologies can be accessed by individuals and small groups, they could potentially become "super-empowered by access to these kinds of self-replicating technologies, whether it be biological or other" (Bill Joy, 2006), I fear that as this technology gets increasingly easier to produce, it will have the potential to be misused.

The benefits of creating GNR technologies are undeniable. I think it would be wrong to reject them based on the slim possibility of mass destruction; I believe that for an apocalyptic event to take place, we would have to have made some serious mistakes. As destructive capabilities grow with this technology, so will the medical and beneficial capabilities.

It is clear that as we pursue these technologies, we must continue with caution. Improving our philosophical and ethical understanding of GNR technologies. Actively seeking out ways to more safely deal with these technologies is in our best interest. Bill Joy's article, alongside his Ted talks, has shed light on the ethical and philosophical debate of the control problem. But if we are cautious in the future development of these technologies, it is not so much a thin line that we are walking between advancement and destruction, but rather a concrete path.

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