

Analysis of Artificial Intelligence and its Impact on Society

A Research Paper Submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia - Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

By

Karanvir Jassal

Spring, 2021

On my honor as a University student, I have neither given nor received
unauthorized aid on this assignment as defined by the Honor Guidelines for

Thesis-Related Assignments

Introduction:

There have been many moments in human history where a technological revolution has changed everything about humans including the way we communicate, function, mortality rate, average lifespan, and even how we spend our free time. In many ways, I see the same happening very soon; we are at the cusp of a great technological revolution, perhaps even the biggest one. This revolution will be brought on by artificial intelligence. In the previous 50 years, we have made more technological progress than humans have ever made. For example, in 1984, only 8 percent of households had a computer in their house. Now, that number is most likely above 90 percent (Bauer). This is just one example of how fast technology is growing right in front of our eyes.

Artificial intelligence, the ability for a computer to think on its own and do tasks that are not explicitly programmed into its process, is very unique and will spark the next generation in technology and wellbeing in society. Artificial Intelligence will change virtually every industry (Brynjolfsson). However, there are many skeptics out there that believe that artificial intelligence will negatively affect society and will be used adversely. However, there may be a big disconnect on what people think artificial intelligence is and what it really is currently, which means that individuals and communities must be educated on artificial intelligence. Some of the main reasons that make people wary of AI include: general anxiety about machine intelligence, the fear of mass unemployment, concerns about super-intelligence, putting the power of AI into the wrong people's hands, and general concern and caution when it comes to new technology (Brynjolfsson). In this paper, I illustrate how the framework of attitudes toward technology can be used to understand and describe the difference between expert and non-expert attitudes with respect to AI.

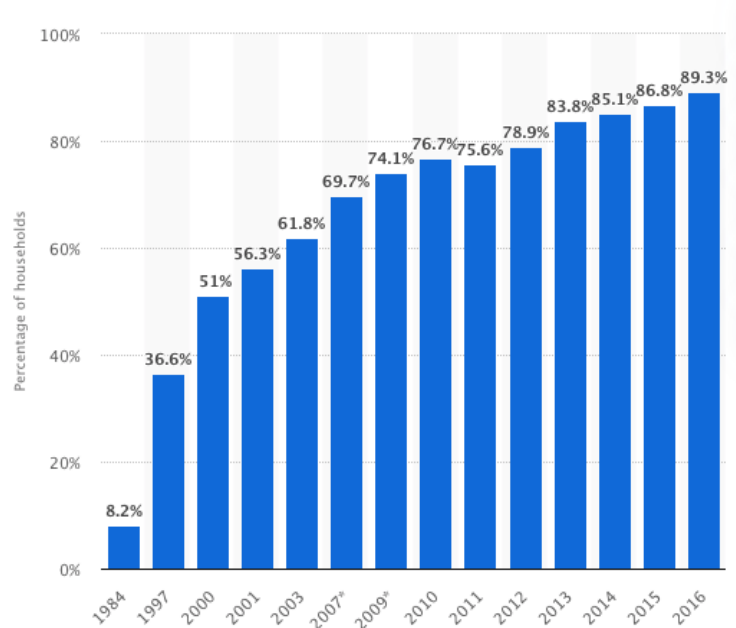


Figure 1 : Shows how the percentage of Americans with computers in their households has progressed from 1984 to 2016 (Bauer).

What is Artificial Intelligence and what will be its implications on Society:

The most important part of changing the notion and connotation behind artificial intelligence with the average American is to explain to them what artificial intelligence truly is because part of the fear can be due from simply not knowing what the technology truly is. As seen in a research paper about the perception of artificial intelligence, it seems that 50 percent of Americans are actually afraid of what artificial intelligence could become, due to many reasons but not limited to lack of education and general rejection of machines making life decisions for humans.

Artificial intelligence was first coined by John McCarthy in 1955 which he defined as “the science and engineering of making intelligent machines.” However, now this definition is vague and doesn’t tell the full story. Artificial intelligence refers to the ability of a computer or robot exhibiting human-like intelligence. It means that the machine has the ability to mimic the human

mind, recognize objects, understand and respond to language, make decisions, solve advanced problems; however, the most important ability is for the robot or computer to learn from its experiences and later apply that knowledge to other future scenarios. By combining all these abilities, robots currently can drive cars, talk to humans, greet guests at parties, and even play chess.

Before the only times one would see artificial intelligence would be in science fiction novels and movies; however, now AI is in almost every sector of our lives. The recent surge in AI technology has been possible because of the large data that is always being collected and machines that can quickly make the data available for consumption. However, currently AI is limited. It has only been able to exceed one certain task. For example, a chess AI can only play chess, a self-driving car can only drive cars, and a natural language processor AI can only understand language. This AI is called weak-AI - when the computer is specialized to do only one task at a time. However, to truly mimic human intelligence, a machine should be able to learn about everything around it, and replicate the autonomy of humans. This type of AI is called strong-AI and it is completely theoretical currently; however, researchers are cautiously exploring the possibility of it. This AI will be much smarter than humans and is commonly referred to as super artificial intelligence.

A massive survey done by Pew Research, shows that about 70 percent of Americans are wary and concerned about the AI revolution. These concerns are valid, as AI becomes more and more involved in our everyday lives, there is a possibility that it may have an adverse effect on people's lives rather than a positive one. The main three concerns that the American public has about AI is the chance of it becoming better than humans at tasks, which in return would make humans obsolete. Furthermore, many Americans place a lot of value in human decision making and do not completely trust robots making decisions that could have an impact on their lives. The last big concern that was illustrated in the study was that many Americans thought

that their job may be at risk to a robot as AI may be able to do a better job than they can at that particular task.

One drastic example is that of self-driving cars. To the tech-world and people in tech, self-driving cars are the solution to human-error such as drunk-driving, miscalculations, and distractions. However, 54 percent of Americans are rather concerned about self-driving vehicles than excited, with 30 percent of Americans saying that they believe that self-driving cars will make the roads more dangerous than safer. Furthermore, 56 percent of Americans have stated that they would not want to ride in an autonomous vehicle if given the chance as well. This evidently shows that Americans are not willing to cede control to machines in a potentially life or death scenario.

There also seems to be a big trend between acceptance of ai with higher educated people and non-acceptance with lower educated people. For example, college educated respondents had a general acceptance of ai stating it as a way that can improve their opportunities for career advancement, and allow them to pursue more interesting paths rather than monotone career paths. They believe that AI will take over dull and boring work and inevitably create new spaces for where humans will work. However, the average person does not. Almost three-quarters of americans expect that machines will take over many human jobs and it will lead to an even bigger increase in inequality between the rich and poor.

However, many debate the biggest negative impact that AI could have is an apocalyptic scenario where ai becomes more intelligent than humans and it decides to think that humans are a threat rather than an ally. 12 percent of Americans think that this is possible and could result in human extinction. So the main question is why is there such a negative connotation on ai and what can be done to improve this situation. The rest of this report will dive deeper into the attitudes towards technology, how these attitudes are developed, and lastly how the attitude toward AI has come to be.

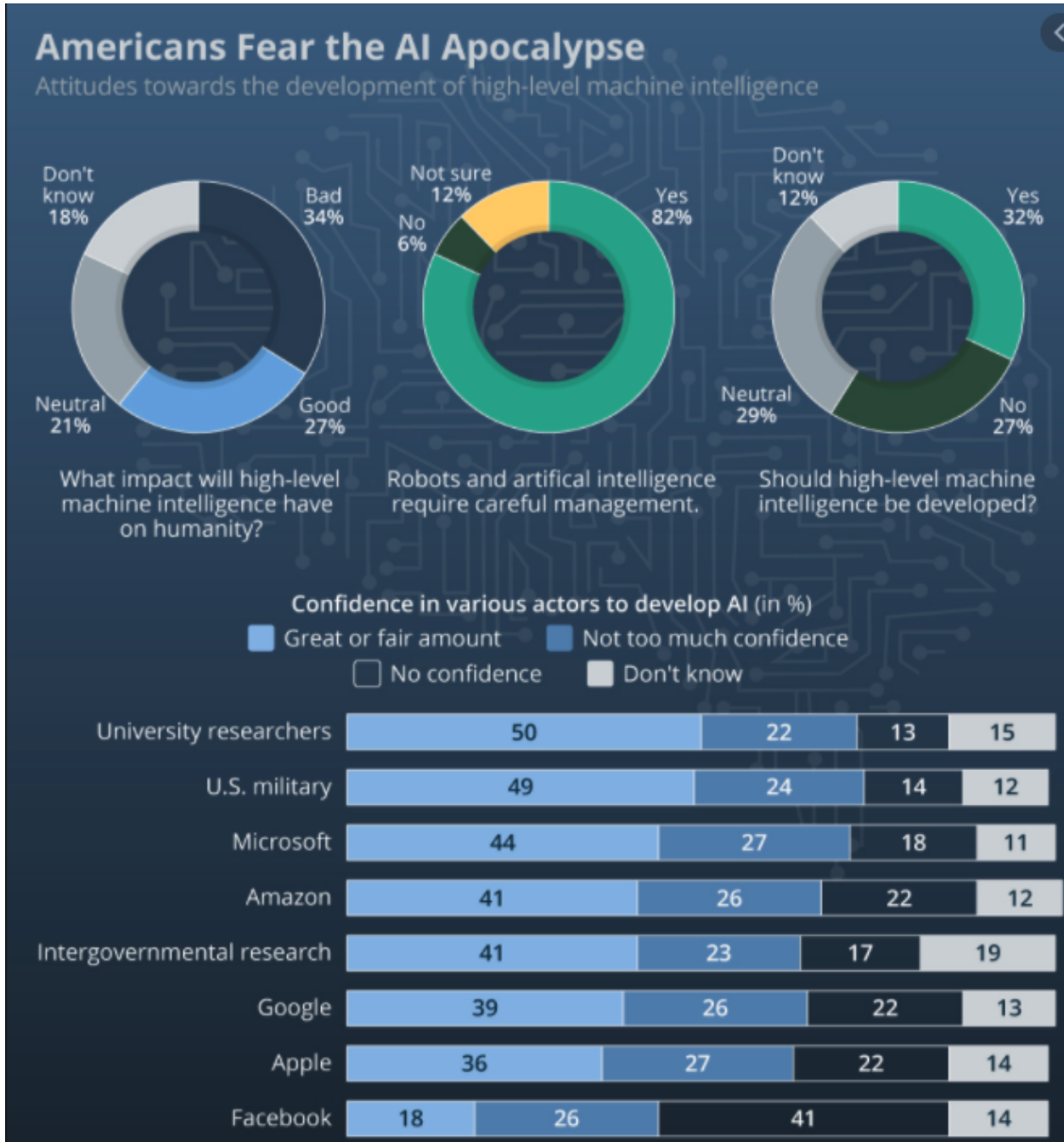


Figure 2: Shows the trust of people in ai when asked several questions

Application of framework of attitudes towards technology on artificial intelligence

Throughout history, there have been many advancements in technology. These advancements have changed how humans interact with each other, how humans interact with

the environment, and how humans interact with technology. Even though most of these advancements have helped lift societies' view and attitudes towards technology, there have been many times where military advancements leave people with more critical perspectives. However, sometimes this more critical perspective has been beneficial to society. For example, when the government is trying to seize more power over the people using surveillance technology, the overall perspective of society should be negative especially in a free country such as America (Smith). Comparatively, the problem that this paper is looking into is society's attitude towards artificial intelligence and trying to comprehend why that attitude exists. Thus, it only makes sense to use the method that describes a framework on attitudes towards technology.

The framework of attitudes towards technology in theory and practice goes over four main techno-attitudes - enthusiasm, determinism, romanticism, and scepticism. This spectrum of attitudes can be seen throughout history, literature, and lectures.

The first techno-attitude - enthusiasm - is a viewpoint that would be used if people are optimistic about a technology. Within the enthusiast perspective, human ingenuity, science, and technology are omnipotent. Many with this view believe that technology is inherently good and any bad that comes out of technology is a miscalculation or misuse on the humans part. There are three types of technological enthusiasts including the technophiles, technocrats, and entropy optimists. Technophiles are really intrigued towards technology and cannot picture anyone that is not. They think that technology will solve every problem, will improve live, and even solve social problems. They also believe that any technological advancement is for the benefit of society. Next there is the technocrat. The technocrat goes one step further than a technophile and believes that people that are in power should be selected based on their technological knowledge. They believe that this will reduce discourse in society and people opposed to technology should be seen as "enemies of reason." Lastly there is the entropy optimist. This viewpoint suggests that unlimited economic growth is necessary to combat the

world's hardest problems such as overpopulation, pollution, and even world hunger. They argue that in order for unlimited economic growth to exist, there must be technological progress.

The second techno-attitude is romanticism. This attitude describes uneasiness towards technology mainly due to the nuclear weapons that were developed and used that led to environmental damage. The people of this viewpoint will usually take into the account the benefit of a certain technology and consider the moral arguments of the technology and the potential consequences. One considers both the positives and negatives of a technological advancement and believes that it mainly depends on the object, context, and perspective. This attitude is the middle perspective between technological enthusiasts and skeptics. There are three types of technological romanticists including ambiguous aversion, ambiguous appropriation, and a post-normal-science view. The ambiguous aversion debates that technology has to be questioned in order to exist. A person of this viewpoint debates that technology may be beneficial, but speculation about the negative side is more profound. Next there is the ambiguous appropriation. This viewpoint is more hopeful but it brings up concern on how technology should be treated or governed. A person with this perspective would believe that there can be dangers surrounding technology but the positive potential outweighs the negative potential. Lastly, there is the post normal science. This viewpoint acknowledges technological ambiguity but focuses on the risk, uncertainty, and complexity of technology deployment. They firmly believe that technologies should be decided by many experts, citizens, and scientists which can also address the social construct of technology.

The third techno-attitude is technological determinism. This viewpoint believes that technology isn't correlated with social, economic, or even political ideologies but rather develops on its own. This viewpoint argues that humanity is in full control of the technology that is developed, and the technology that is developed is a neutral object yet the use of it can be deemed negative or positive. However, the only measurement of the technology should be its effectiveness and efficiency at doing what it was designed to do, but not whether the effects are

positive or negative. There are three types of technological deterministic including automatic, social, and evolutionary. The automatic viewpoint illustrates that technological change is automatic and impossible to control (Wyatt). The social viewpoint shows that technology is socially shaped and is mainly based on society's needs and wants. Lastly, there is the evolutionary perspective which focuses on the mechanisms that drive technological change rather than trying to answer whether technology is good or bad (Wyatt).

The last techno-attitude is scepticism. Technological sceptics argue that technology undermines social cohesion, eliminates jobs, and negatively impacts society. There are three types of sceptics: simple sceptics, technophobes, and entropy pessimists. Simple sceptics believe that technology is inherently bad and has to prove that it does not have any drawbacks before use as well. The next viewpoint is technophobes. This viewpoint blames technology for all the world's problems such as poverty, world hunger, and inequality. The last viewpoint is entropy pessimism. This viewpoint suggests that technology will cause doom to this world. They believe that technological achievements are not signs of progress rather the sign of increasing social complexity, scarcity, and population growth. They then believe that society will become overly complicated and implode on itself due to technological advances.

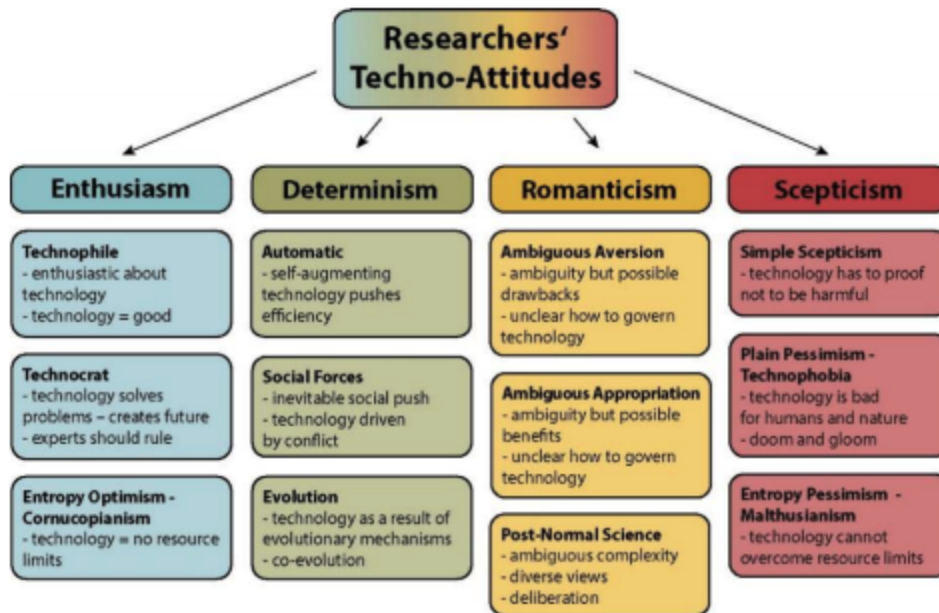


Figure 2. Attitudes Towards Technology These are the twelve techno-attitudes that researchers have identified. However, one may not always fit into one of these categories exactly and there may be grey area but the visualization is for the purpose of simplicity.

Analysis on the societies perspectives on artificial intelligence

After discussing all the different attitudes on technology, it becomes obvious which attitudes the general public deem artificial intelligence in. People that have a negative connotation on artificial intelligence have a similar viewpoint to that of a sceptic. Usually the people that are sceptical about artificial intelligence tend to have a lower education level and do jobs that are more monotone, which can justify why they have a fear for artificial intelligence. Soon artificial intelligence will be able to outperform humans in monotonous tasks that may end up costing those humans their jobs; for example, artificial intelligence is getting very good at driving recently, and may very well disrupt the transportation sector very soon. This will mean that drivers may become obsolete, including yellow cab drivers, uber drivers, bus drivers, and even possibly truck drivers. Other more skeptical people, however, fall into the entropy pessimist

category. They truly believe that AI will be the cause of doom, and justifying this is slightly more difficult than the traditional skeptic. The feeling of giving up control to an artificial machine is scary in many people's heads. For example, killer robots may not be able to tell the difference between a child and an adult and may fire objectively without any emotion, and because the robots do not have the tangibles of humans, people start fearing them (Bijker). Furthermore, pop culture may also play a big role in shaping society's viewpoint on artificial intelligence especially to those who have not studied it before. In Hollywood movies there has been a popular representation of artificial intelligence going "rogue", doing evil things, and sometimes even putting the world at the brink of extinction, so this gives AI a bad picture in many people's heads (Bijker).

Furthermore, according to this framework of attitudes toward technologies, people that have positive views on artificial intelligence fall under the enthusiast category. The people that belonged into the enthusiast category were people that worked in technology and have more awareness about AI than the general public (Heidegger). However, why do these people have the views that they do? One justification according to research is that the things that people work on they have a greater appreciation for the field. For example, a chess player has great appreciation for chess and respects the game itself. Similarly, a person working in technology, will have a greater appreciation for AI because he or she may have had an impact on the technology itself.

Another crucial finding that was made is that although there will always be pessimists and skeptics, over time society becomes more forgiving about technology and accepts it more. This can be seen over history with many technological revolutions. For example, one of the biggest technological revolutions was the industrial revolution. In this revolution, many jobs were initially lost. However, the steam power and industrial machinery eventually led to an economic boom. The growth that was seen due to this was never seen before and was on a different scale. After, there were much more jobs available than before due to the economic boom. There

were completely different sectors that were not there before for people to work in. A famous economist states that “people create jobs”. Then slowly, people, even the skeptics, started to appreciate the technological boom. Similarly, skeptics will slowly start accepting artificial intelligence as it will help humans go into different fields that had not even existed before.

Conclusion:

When fire was first discovered millions of years ago, people first feared it. They saw the destruction that it could cause, but eventually as they started to use it, it became their best friend. People tend to fear ideas and objects they do not understand, and artificial intelligence is no different. In this paper, we described artificial intelligence as a robot or computer simulating intelligence and in sort of a way mimicking human intelligence. A machine that can act and think like a human.

After researching the various attitudes towards technology, it was found that the main attitude towards artificial intelligence was skepticism. People that are unwilling to accept a robot as a replacement for another person and deem it as a threat to life itself. Furthermore, the paper then went into reasons as to why people may approach artificial intelligence as such. As explained before, many people that do not support artificial intelligence think that they do not have much to gain from AI, while experts in AI will lose out if AI is not commonly accepted into society. Because these experts have this commitment to AI, they start overlooking some of the real concerns that others bring up that have a negative attitude towards AI.

Citation:

Bauer, M.W., 2009. The evolution of public understanding of science — discourse and comparative evidence. *Science, Technology and Society* 14, 221–240. <http://dx.doi.org/10.1177/097172180901400202>.

Bijker, W.E., Law, J., 1992. *Shaping Technology/Building Society: Studies in Sociotechnical Change*. MIT Press, Cambridge, Massachusetts.

Brynjolfsson, E. and K. McElheran (2017) “The Rapid Adoption of Data Driven Decision Making,” *American Economic Review*, 106(5), 133-139

Cohen, M.J., 1997. Risk society and ecological modernisation alternative visions for postindustrial nations. *Futures* 29, 105–119. [http://dx.doi.org/10.1016/S0016-3287\(96\)00071-7](http://dx.doi.org/10.1016/S0016-3287(96)00071-7).

Evans, W.N., Graham, J.D., 1991. Risk reduction or risk compensation? the case of mandatory safety-belt use laws. *J. Risk Uncertain.* 4, 61–73. <http://dx.doi.org/10.1007/BF00057886>.

Funtowicz, S.O., Ravetz, J.R., 2008. Post-Normal Science. *International Society for Ecological Economics (Content Partner). Encyclopedia of Earth* URL <http://www.eoearth.org/view/article/155319> [WWW Document](accessed 4.16.14).

Heidegger, M., 1977. The question concerning technology. In: Heidegger, M. (Ed.), *The Question Concerning Technology and Other Essays*. Harper Perennial, New York, pp. 287–317.

Reichel, A., 2011. Technology as system: towards an autopoietic theory of technology. *International Journal of Innovation and Sustainable Development* 5, 105–118. <http://dx.doi.org/10.1504/IJISD.2011.043070>.

Smith, M.R., Marx, L., 1994a. Introduction, in: Smith, M.R., Marx, L. (Eds.), *Does technology drive history? The Dilemma of Technological Determinism*. MIT Press, pp. ix–iv.

Wyatt, S., 2008. Technological determinism is dead; long live technological determinism. In: Hackett, E., Amsterdamska, O., Lynch, M., Wajcman, J. (Eds.), *Handbook of Science and Technology Studies*. MIT Press, Cambridge, Massachusetts, pp. 165–180.

Yearley, S., 1999. Computer models and the public's understanding of science: A casestudy analysis. *Soc. Stud. Sci.* 29, 845–866. <http://dx.doi.org/10.1177/030631299029006002>.