Chapter 29
The Artilect Debate

Why Build Superhuman Machines, and Why Not?

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Abstract Twenty-first-century technologies will allow the creation of massively intelligent machines, many trillions of times as smart, fast, and durable as humans. Issues concerning industrial, consumer, and military applications of mobile autonomous robots, cyborgs, and computer-based AI systems could divisively split humanity into ideological camps regarding whether “artilects” (artificial intellects) should be built or not. The artilect debate, unlike any before it, could dominate the 21st-century political landscape, and has the potential to cause conflict on a global scale. Research is needed to inform policy and individual decisions; and healthy debate should be initiated now to prepare institutions and individuals alike for the impact of AI.

29.1 Introduction

Physics was reinvented as a frontier of science in the 17th century. In the 18th century chemistry produced similarly spectacular and exciting results. In the latter half of the 20th century, computer science emerged with the same sense of adventure, inspiring some of the brightest minds to explore the potentials this new discipline promised. In the decades following, Alan Turing’s assertion that computers would one day mimic the human cognitive faculty, advances in computational power, and a plethora of design methodologies have yielded successful applications in robotics and computer-based systems.

The advent of digital computing is arguably the most significant phenomenon in the history of science and technology. But, surprisingly, results to date pale in comparison to those forecasted for the relatively near future. The first half of the 21st century seems likely to witness computers and robots that rival or even dramatically surpass human abilities; as well as technologies that allow humans to supplement their biological cognition with silicon implants. Meanwhile, as computer scientists

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produce systems with greater computational power, and make them ever more autonomous in the real world, many are becoming aware of enormous social implications that could follow the breakthroughs yet to come.

This chapter provides a broad and intuitive framework to help readers understand an issue that could well dominate global politics in the 21st century, coloring and defining the age, namely, the question of “species dominance”. The question of species dominance has the potential to divide humanity more bitterly in the 21st century than did the conflicts that defined the 20th century, such as communism versus capitalism, the entangled issue of nuclear supremacy, and equality of rights for women and minorities. Who or what should be the dominant species on earth? Should electrochemical, carbon-based biological life reign supreme, or should electromagnetic, silicon-based machines be allowed to rise and surpass humanity? And what about the middle ground, will cyborgs which meld man and machine emerge into a new race?

The potential for 21st-century technologies to generate massively intelligent machines and upgrades for human beings is clearly understood by theorists and practitioners in the sciences contributing to this goal. And, as observers witness progress in physics, robotics, and the cognitive sciences, many are becoming aware of and concerned about the impact these converging disciplines will have on modern society. The prospect of building “godlike” creatures fills many people with a sense of religious awe that motivates them to relish progress, while others experience trepidation concerning the consequences of such science fiction-like progress.

However, most people remain less familiar with AI, and are relatively unaware of its implications. Massive intelligence means artificial brains which may end up being more efficient and effective than human brains by not just a factor of two or even ten times, but by a factor of many trillions of times. The prospect of humanity building these godlike machines raises vast and hugely important questions that cut across all aspects of human life.

### 29.2 Technology

One of the great technological trends of our recent history has been Moore’s Law, one of the founders of the Intel microprocessor manufacturing company, which states that the computational capacities (e.g., electronic component densities and electronic signal processing speeds) of integrated circuits will double every year or two. Moore’s Law is a consequence of the shrinking size of electronic circuits so that the distance electrons have to travel between two electronic components, say two transistors, is reduced.

According to Einstein, the fastest speed at which anything can move is the speed of light (about 300,000 km/sec). And although modern results indicate nonlocal phenomena are real, the speed of light remains a constant of nature that electric currents in circuit boards must respect. If one shortens the distance