Chapter 82
Understanding the Human–Machine Interface in a Time of Change

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ABSTRACT

The author presents an overview of how the ubiquitous nature of technology has led to a monumental shift in human evolution, a change involving language, thought, and feeling. The interrelationship between humans and technology will undoubtedly alter the way in which we define what it truly means to be human in a world of complexities. As systems, networks, and programs become more complex, our ability to interface with these machines that play such a prominent and vital role in our day-to-day lives is becoming increasingly difficult. It used to be the human was in charge; able to manipulate the machine to perform a desired outcome. But it is no longer simply about input and output measures. Now the roles are reversing, and it is becoming harder to determine where power and control ultimately resides. Consequently, our ability to manage machines and robots will become more vulnerable. The intimate connection and interoperability of human intelligence with machine intelligence, has undoubtedly impacted the human experience and our process of self-identification.

INTRODUCTION

The world of technology has experienced evolutionary, if not revolutionary change, in the past several decades. This has manifested itself in myriad ways. Perhaps one of the most profound is the way in which humans interact with non-carbon life forms, networks, robots, structures, electronic devices and virtual entities. This shifting relationship represents a period of profound transformation; one which will unquestionably redefine our ways of living, our societal norms, our social groups and numerous other facets of society including the way in which humans construct their notion of self. Technology is challenging many of our assumptions of how the world worked, and how to be successful in it. In

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this period of exponential change, I would argue that we are undoubtedly going to move from the world as we have always known it to a radically new one, a world with new dimensions, boundaries and delineations.

A major part of this transformation relates to future of the human/machine interface. We are entering a future in which decisions in the home, in the market, in the workplace, in the health care arena, in the military and perhaps even in the voting booth, will increasingly be made by non-carbon life forms. They will increasingly instruct us about healthy choices, aspects of behavior, security, risk, education and work, to name just a few. Innumerable products and services over the next decade will be increasingly chosen based on the dictates of non-human factors in our lives. But while humans once controlled the behavior of their electronic devices, the tables are now turning, machines and electronic devices will instead be increasingly used to control and regulate our behavior. Not only will learning how to manage this relationship be essential in the future, but understanding the effect on the human when the biological and the artificial/mechanical merge will be equally, if not more, critical.

The underlying intent of this chapter is to inform the readers' understanding of how humans have become increasingly intertwined with machines, and the effect this will ultimately have on both human identity and the construction of the self within an ever-evolving technological society.

BACKGROUND

Technology is not only getting more demanding, but it is also creating a greater day-to-day human reliance on its functions. In fact, more people are forming attachments to and dependence on non-carbon life forms than perhaps with each other. Technological advances are rapidly engulfing the everyday lives and environments of people all over the globe. There is no doubt that the proliferation of these non-carbon life forms will dramatically affect and alter the ways in which we communicate both with each other and with machines in the future. Knowing how to successfully sustain both kinds of relationships will be essential.

Clearly, machines are becoming increasingly self-sufficient and self-reliant. Robots are not only becoming smarter and more able, but they are also becoming more self-aware and adaptive. In recent years, machines have been developed that learn from observation, similarly to humans who learn from the external environment, and computer programs will increasingly be able to employ its knowledge about emotions to make logical decisions based upon memory. Machines are also able to make inferences about human behavior. In fact, it is predicted that AI-based search engines will become almost humanlike by 2050, and will eventually be able to comprehend users' questions and queries just like a human assistant. Users will be able to enter questions and get relevant machine-generated answers (*The Futurist*, 2008.) The development of both mental and emotional robotic intelligence will have profound implications in terms of the way in which humans view their own intelligence. Traits typically assigned to human intelligence, such as abstract thought, self-awareness, reasoning, learning, having emotional knowledge, communication and problem solving will increasingly come under question as artificial intelligences become more advanced.

Not only are machines getting smarter but, in addition, we have gone from fairly simple computing architectures to massively interconnected and interdependent ones. Imperfect systems and increasingly complex networks are causing computer systems and machines to be less reliable and efficient. In other words, flaws in the system have become harder to predict or identify. Our reliance on computers is also increasing the threat of cyber attacks, especially as stock markets, power grids and banks depend on computers. But as computers and computer systems become more inconsistent and unpredictable, people are becoming more

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