A Way Through the Global Techno-Scientific Culture

A Way Through the Global Techno-Scientific Culture

By

Sheldon Richmond

Cambridge
Scholars
Publishing

A Way Through the Global Techno-Scientific Culture

By Sheldon Richmond

This book first published 2020

Cambridge Scholars Publishing

Lady Stephenson Library, Newcastle upon Tyne, NE6 2PA, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

ISBN (10): 1-5275-4626-8
ISBN (13): 978-1-5275-4626-4

For my teachers and mentors:
Ian Charles Jarvie and Joseph Agassi

We are analog beings trapped in a digital world, and the worst part is, that we did it to ourselves.
(Donald Norman, 1998, p. 135)

...I regard the doctrine that men are machines not only as mistaken, but as prone to undermine a humanist ethics.
(Karl Popper, 1977, p. 5)

Computer science...is often largely about imaginary constructs and their exploration...In this respect computer science can be more like metaphysics than physics...
(Ted Nelson, 2004, p. 27)

We can only see a short distance ahead, but we can see plenty there that needs to be done.
(Alan Turing, 1950, p. 460)

ANNOTATED TABLE OF CONTENTS

The mystique of computer technology inhibits the widespread mastery of computers by ordinary computer users. How can we overcome the mystique of computer technology? In order to overcome the mystique we must recognize that the mystique is part of an ideology promoted and enforced by the technological elite or the techno-elite. Furthermore, the techno-elite uses the mystique of computer technology and other components of the ideology of the Global Techno-Scientific Culture to gain and maintain social control over computer technology. The techno-elite in their social control over computer technology turns users of computer technology into techno-subjects. How do we, as techno-subjects, break the social control by the techno-elite over computer technology? In order to overcome the social control by the techno-elite over computer technology, we techno-subjects must recognize that by having social control over computer technology, the techno-elite gain control over the Global Techno-Scientific Culture. How do we techno-subjects gain control over the Global Techno-Scientific Culture?

Democratic control of computer technology, the transfer of control over the computer from the technological elites to the individual users, to techno-subjects, allows non-experts to learn how to use and control computer technology. The boundary between the techno-elite and the techno-subject is dissolved; and the control of the techno-subject by the techno-elite is eliminated. Thus, we dispel the mystique of computer technology and, we gain democratic control over the Global Techno-Scientific Culture.

The monopolization of our Global Techno-Scientific Culture by digital information technology, the Technopoly, has resulted in the extinction of Knowledge, by reducing Knowledge to systems of symbols, formalized algorithmic hierarchies of symbol-systems without external reference: a totalistic virtuality, or real virtuality. The extinction of Knowledge has resulted in two mutually reinforcing situations. One situation is the rise of a new elite of technology experts. The other situation is the dummification of people. These two mutually reinforcing situations further result in an illegitimate role reversal between people and their machines. The machines become treated as smart; people become treated as dummies. The role reversal of machines and people reinforces the monopoly of digital technology over everything. The monopoly of the Global Techno-Scientific Culture, the Technopoly, becomes accepted without question and without criticism. However, there is a way to retrieve Knowledge, and that way is through restoring the (Ionian) tradition of critical discussion within all our institutions. Critical discussion can be restored by increasing democratic participation in our Global Techno-Scientific Culture, which amounts to implementing a socratic social architecture.

Many post World War II thinkers have been perplexed by the problem of how or even whether people from different cultures can understand each other. The problem arose when we started to think of culture as formative of language and thought. The common assumptions of most theorists of language are that language is fundamental to thinking and culture; and, language, thought, culture, humanity is a natural product of biological evolution. Though language and culture create hurdles for achieving cross-cultural understanding, the pursuit of technology and science transcends the limitations of culture, and indeed has created a monopolistic Global Techno-Scientific Culture or Technopoly. But within the monopolistic Global Techno-Scientific Culture of the Technopoly, there are two subcultures, the techno-elite who dominate the Global Techno-Scientific Culture, and the techno-subjects who comprehend little of digital technology. However, the traditional humanist oriented culture of techno-subjects has been overcome and virtually eliminated by the dominant Global Techno-Scientific Culture of the oligarchic Technopoly.

Dialogue is the key both to interpersonal dialogical relationships and critical enquiry. How do we alleviate the obstacles to dialogue as techno-subjects in the Global Techno-Scientific Culture or Technopoly? The

answer is: Use cross-cultural/social group dialogues as a model for dialogue as techno-subjects in the Technopoly. Cross-cultural/social group dialogue works through cultural borrowing, and then modifying those borrowed cultural elements. For cross-cultural/social group dialogue to occur, we have to treat cultures and social groups as having permeable borders that allow us to adopt and adapt elements from different cultures and social groups. Indeed, the daily reality of cultural and social life reveals that cultural/social group boundaries are not fixed. Though cultures/social groups seem (and can be made) parallel, their boundaries are fluid and porous. Individuals are able to cross cultures/social groups and simultaneously live and experience multiple cultures/social groups. Indeed, all cultures and social groups involve appropriations of other cultures/social groups and are in perpetual flux through cultural interactions and through individuals introducing cultural borrowings from other cultures. This feature of cultural permeability, living in multiple cultures and cultural borrowings, raises the question: what sort of social architecture or structure best allows for cross-cultural and cross social group dialogue? The answer is: the social architecture required both for cultural/social group development and cross-cultural and cross social group dialogue can be developed from the structure of Socratic dialogue.

The short of it is that by implementing socratic social architecture in all institutions, we create the space for dialogue within the Global Techno-Scientific Culture or Technopoly.

Philosophers can choose to leave everything as is or choose to improve the world through critical enquiry and discussion. Where we have no choice is that the world will change regardless of how we choose. I propose that philosophers, and for that matter, all of us, participate in the current radical transformation of society by acting as critical enquirers. Philosophers, and all of us, can participate in the changing world by implementing virtual dialogical interfaces in our various corporate organizations such as in

government, business, universities, in research institutes, in journals, and in conferences. Two structures I suggest are democratic relationships and interpersonal dialogical relationships. Democratic relationships occur when individuals share planning, decision-making, and intelligence. Interpersonal dialogical relationships occur when individuals speak with and listen to each other regardless of position in social hierarchies. Basically, these structures amount to the implementation of a socratic social architecture, for all our institutions.

The Global Techno-Scientific Culture makes life difficult or next to impossible for the archetypal Socrates, or the culture critic, or critical thinker, or critical enquirer, or independent thinker. Where can a modern day Socrates or current critical thinkers open their mouths?

In other words, that is the crucial question, the focal question of this chapter: can critics get a hearing in the Global Techno-Scientific Culture. But the question of whether critics have any place in modern day society, requires considering two other prior questions. First, how do Socratic teachers, thinkers, and critics function even in theory? Second, how has the Global Techno-Scientific Culture fashioned society? After discussing those two questions, I turn to the main question of this chapter: How critical enquiry or Socratic criticism can be heard in the Technopoly, the oligarchic Global Techno-Scientific Culture? The short answer is: concentrate on the serious four fault-lines of the Technopoly. To be explained.

Throughout this book I discuss how and why we have allowed ourselves to lose our sense of humanity, humanism (our humanity as creatures that seek to know, and seek to act morally), by the Global Techno-Scientific Culture. Why and how? Throughout this book I argue, in different ways, as follows: We live in a socio-technical system, the Global Techno-Scientific Culture, dominated by computer technology and other so-called "smart" devices; as well as the techno-elite who control the design, development, and implementation of those devices. We have allowed ourselves to become techno-subjects. In our modern socio-technical system we have various mistaken ideas about computers, i.e. computers are smart machines, and in many cases, are smarter than humans. Hence, we do something very strange with tools of our own making: we transfer human qualities (such as creative and critical thinking, judgment, decision-making, including moral decisions) to technology and take them from ourselves by transferring machine-like behaviour and as well transferring machine functions and attributes to ourselves. When we make such a transference between ourselves and our technology, we allow ourselves to lose both our mastery and control over our computer technology. We transfer our mastery of computer technology and our intelligence to the technology. Hence, we remove humanism, our humanity as creatures that seek to know, and seek to act morally, from and for humanity when we become techno-subjects. To regain humanism, we need to transfer back our mastery, and intelligence, from the computer to ourselves. How can we do this: regain our mastery and intelligence, our humanism? We need to open up computers to everyone so that we allow everyone to learn computer technology use and control both through trial and error and through consultation with our mentors, colleagues, and friends. Moreover, everyone needs to be given the opportunity to participate in the development and implementation of a new architecture for computer systems that conforms to humanity as analog-cybernetic creatures. Everyone needs to be given the opportunity to participate in the implementation of a new social architecture that permits universal interpersonal dialogue, universal critical discussion, and universal full participation in social decision-making.

PREFACE

> We can only see a short distance ahead, but we can see plenty there that needs to be done.
> (Alan Turing, 1950, p. 460)

Warning: this Preface has no plot-spoiler; indeed, I do not outline the book, nor summarize each chapter, nor tell you the main thesis and argument of the book. Good prefaces usually do those things.

Why do I write a Preface?

I do not need to summarize each chapter, or tell you the main argument of the book: all that information is in the Analytical Table of Contents, and in the Prologue as well as Epilogue, if you want to read any of that first rather than last.

Again, we are back to the question, why do I write a Preface? I thought I could tell the reader how this book came to me, and also, in that way introduce myself to the reader. I view this book as an attempt to get the reader to engage with the questions and proposals in it, and thereby to get the reader to engage in a virtual dialogue with me.

Some years ago after working for thirty one or so years as a systems analyst, a computer person, in a corporate institution, I retired and decided to return more fully to my first vocation: writing and reading philosophy. Though I did attend conferences, present papers, and write some articles and reviews, and have some of those published in academic journals, I did this in my spare-time as a hobby. My situation was similar to a friend at my place of work, Gorilla (his nickname that another friend at work, Pest, gave to him. “Pest” was the nickname Pest gave to himself, and his nickname for me was “Bananas and Nuts”, my main snack time and lunchtime diet at work). My friend Gorilla had a passion for wrestling, weight-lifting, and leading and singing in a semi-professional 1950s style Rock and Roll band. He did this after hours. During daylight hours, he worked as a drafts-person, first manual, and later on a computer-aided drafting system. (My doing in part, because I was assigned the task of evaluating and recommending the then leading edge technology for

computer assisted drafting.) I will talk more about Gorilla and other persons in my various corporate departments in Chapter Four, Dialogue. Gorilla loved music, but had to make a living. Bananas and Nuts, Sheldon, loved philosophy, but desired to make a living and not to work in the part-time, casual labour, philosophy workforce.

To shorten the story, I became a professional computer systems analyst on the job, taking a degree from a local university in the field, and various professional courses from private computer training companies, thanks to my managers. During this time I developed a love-hate relationship with computers. Computers made life easier, no more literal cutting and pasting that I used to do as a student and later as a philosophy professor writing essays with a typewriter. I had to use scissors and paste, or tape, when I wanted to change things around. No longer. The text processing application on the new personal computers had virtualized the functions of scissors and paste or tape. I had purchased a so-called "portable" computer for home and a desktop personal computer was provided to me by management at work, as part of my training in my development as a programmer and then systems analyst. At that time (1980s), what one could do with a word processing application, not to mention, spreadsheet, and database, as well as easy to programme Basic (MBASIC, CBASIC, and other varieties), amazed me.

I was part of the group locally or regionally, and in headquarters (or top-level management), that eventually proliferated computers and networks to every work-station (or desk, and cubicle) in the Corporation. I noticed that people became frustrated with their computers: why? computers helped us do our jobs more effectively and efficiently. I also noticed that technical people, all of we technical people, became frustrated with our own computers, computer networks, servers, and related technical equipment: strange things happened, files disappeared, computers crashed, even literally burned, everyday there was a surprise. One of the work-time French language teachers I had when I was periodically called out of class to work on the latest crisis, compared me to a firefighter. An appropriate analogy, but I had no life-threatening incidents, other than frustrated people getting angry with us due to another crazy failure in the system.

Computer machines drove us all crazy, why? They were touted as miracles that could do magic: provide automated inventories; have national conferences online where no one had to fly across country; allow us to solve computer problems of remote users, who were otherwise isolated in the far north office; and many other great things.

But why did computers frustrate us so much? Not only the novice computer user who had done everything by hand and gave written notes to a secretary to type up, or file, or compose a letter and post, but also we technical wizards had our own problems, where at times we had to call on the higher and sometimes highest level wizard to help us with a roll-out (installation) of new technology and applications. During this time I took the after-hours opportunities I had to write essays on the philosophy of computer technology to present at conferences, and to think things through for myself. Even some publications happened. But the only way I knew, given my first-life, was to write through my puzzles in order to help me understand what was going on. Also, I took courses, not just to keep up-to-date with the latest technology and applications, but other courses in cognitive science, and systems analysis and design, to help me understand philosophically what was going on with people versus technology. How come the technology that very smart people invented and developed ended up frustrating other people that were supposed to benefit from the technology? These other people were smart too: professionals in various fields, and long-time and highly skilled employees who were masters at their jobs, at least before computers landed on their desks. Where did this dissonance come from?

The question of the discrepancy between techno-experts thinking that computers will benefit everyone, and everyone who became frustrated, daily, by some computer misfire, puzzled me over the thirty-one years of work.

After retirement, one of my friends, not a philosopher, happened to mention a book that he liked by a well-known philosopher whom I actually heard lecture when I was a graduate student. I was no fan of this particular philosopher and the type or school of philosophy of which he was one of the leading exponents. However, I thought to myself, time to give a second look at various schools of philosophy and approaches that I dismissed. I decided to give those schools of philosophy and approaches that I dismissed as soon as I had become a Professional Philosopher, a second look. I could get books from a variety of schools of thoughts to review. Which I did and do.

Then one day, I ran into another retired acquaintance who knew that I had a background in philosophy, and he asked me, how's the book going? What book, I answered. You told me you were going to write a book. No, I said, I decided to write essays and book reviews, not a book. Too bad, he said, you should write a book.

His words nagged at me. I looked at what I had written over and over again from various angles, like a musical composer who repeats themes with counterpoint throughout a single composition. The essays I wrote, as a whole, were variations on themes with counterpoint, over my thirty-one years at work, and I realized here is a book. Moreover, unlike aesthetics, philosophy of art, and philosophy of science, which I wrote about in my dissertation. I actually had first-hand, real-time, real-life experience with computer technology, not just from reading books, listening to lectures, attending conferences, making up presentations and papers for conferences and journals, or attending concerts, looking at masterpieces. I had first-hand, real-time, real-life experience with computer-technology and the techno-social environment. I had first-hand, real-time, real-life experience with what I call the Corporation, basically a large corporate enterprise where budgets have to be met, and employees dismissed for economic reasons, and all that goes into running large national and international corporate enterprises, public and private, in the world of today.

I knew whereof I wanted to speak, and so I decided now is the time to break my silence. I think that I have a book here where I speak from my own life-experience in a form that is meant to open discussion with others, especially and including those who disagree with this or that, and even everything I say here. By the way, if there is anything new or original here (most of it you will have experienced yourselves, or at least read about), it is this: the choice to put up with computer frustrations or the choice to eliminate those frustrations by changing and improving the very basis of computers and the social-technical system surrounding computer technology, is ours to make and do.

I conclude the Preface with a short bit of advice for the reader: as I said, the book is contrapuntal in form repeating themes and variations on those themes, so you can start anywhere, and read in whatever order you like. The Table of Contents gives everything away, anyway. No mystery here, I spell it all out, and I hope you are willing to engage with me in discussion, at least virtually, when reading this book.

ACKNOWLEDGEMENTS

My family, Marilyn Loshin Richmond and Elken Richmond, and my friend since childhood, Garry Levman for providing moral support and alternative outlooks for everything. My friends, among whom are philosophers, intellectuals, business people, professionals, workers, artists, artisans, musicians, and all of whom are questioners, those with whom I talk with in personal face-to-face contact, and those with whom I talk with virtually in email, for discussing various thoughts with me over many years and some only very recently as new friends. My former colleagues in the *Corporation* (a fictional name to safeguard the privacy of former co-workers), managers who supported my intellectual curiosity, and colleagues who worked with me through various technical and human situations.

Some of the chapters contain and modify various themes from my previously published essays. I thank the various editors for providing me with permission to use modified versions of the essays below in this book.

Chapter One: Mystique: "The Mystique of Computer Technology and the Waning of Critical Enquiry"113-127, Encouraging Openness: Essays for Joseph Agassi on the Occasion of His 90th Birthday, eds. Bar-Am, Nimrod, and Stefano Gattei. Cham, Switzerland: Springer.

Chapter Two: Knowledge, "Post-Knowledge: The Extinction of Knowledge in our Techno-Scientific Culture". Dialogue and Universalism 29 (2): 123-145. editor-in-chief: Małgorzata Czarnocka

Chapter Four Dialogue: "How to Alleviate the Cultural Obstacles to Dialogue". Dialogue and Universalism 27 (4): 87-98, editor-in-chief: Małgorzata Czarnocka

PROLOGUE

> ...assume that we find a physical machine whose mechanism we do not understand and whose behaviour is very human. We may then wonder whether it does not, perhaps, act intentionally, rather than mechanically (causally, or probabilistically), i.e. whether it does not have a mind after all; whether we should not be very careful to avoid causing it pain, etc. But once we realize completely how it is constructed, how it can be copied, who is responsible for its design, etc., no degree of complexity will make it different in kind from an automatic pilot, or a watch, or a wall-thermometer... Objections to this view...are usually based on the positivist doctrine of the identity of empirically indistinguishable objects.
> Karl Popper (1963,1965 p. 296)

The main thesis of this book is: in our monolithic Global Techno-Scientific Culture that we have created, we have not overtly, but by default, unintentionally, unaware and even unexpectedly and surprisingly, found as part of the package deal of the Global Techno-Scientific Culture, that we are losing our sense of humanity, our humanism (our humanity as creatures that seek to know, and seek to act morally). The global loss of humanism is self-inflicted as intertwined with the whole package deal, the monolithic all-encompassing system of the Global Techno-Scientific Culture. Because our loss of humanism is self-inflicted and it is global, it cuts through all particular nationalities, cultures, religions, ethnic and gender identities. However, we can choose to change our self-inflicted loss of humanism and choose to change our Global Techno-Scientific Culture. As the title of the book says: there is a way through the Global Techno-Scientific Culture.

This book is an extended attempt to propose a very general direction through the Global Techno-Scientific Culture, so that we can gain control over monopolistic digital computer technology. I borrow the term Technopoly from Neil Postman (1992) as a convenient label that epitomizes the nature of the control that the scientific technological culture has over humanity. The Technopoly is a monopoly that has permeated and transformed all specific cultures into one monolithic culture, not to deny there are surface variations within the Technopoly that have been carried forward among particular nationalities, traditions, religions, and ethnic

groups. But the Technopoly is a tsunami wave that has flooded every culture, every nationality, every religion, every society, every institution, and almost every individual (even those who do not have smart devices).

Taking a step back: The question that has occupied me over many years was: why are so many people frustrated by digital computer technology? Moreover, whatever we have done to make computers more user-friendly, more efficient, more handy, more multi-purpose and versatile, has not lessened our frustrations, but has increased them and has made us increasingly dependent on digital computer technology. Why? Digital computers do not fit us. Digital computers are basically misfits. How? Humans are analogue-cybernetic creatures: we like to compare, contrast, and we like to use feedback to improve our comparisons and contrasts. Analogue: we seek out how we relate to each other and how everything relates to us and each other. Cybernetic: we use feedback from our attempts to seek relationships, to check those searches, our mistakes, bugs in our systems, to make corrections in our searches.

Let me take another step further back: I came up with those answers to my question as to how digital computers frustrate us by asking myself: why do so many people fascinated with computers, and who also spend their careers in computers, come to think that people, minds, knowledge, society, culture, work, and even the universe are nothing but and nothing more than a form of digital computation? (Vlatko Vedral, 2018) I thought that a computer is nothing more than a device, a machine, that uses algorithms, instructions, to transform data. However, many people fascinated by computers see the computer as something more than a dumb machine that just follows instructions, even when following instructions to make new instructions. Moreover, many people, not only fascinated but also overwhelmed by computers who are experts in the fields of computer support, development, science, treat the computer as a mythical hybrid device, that produces knowledge, that is intelligent, that may even be conscious and have a mind, and ultimately have feelings. Then, I struggled over many years, maybe too many years, to understand this: why do people think that if computers can do things that humans do, even faster, and better than humans do, then computers must be using processes that humans use, and have attributes that humans have? It took me a while to find an answer to why smart people think that computers, that they made, or other smart people made, are smarter than themselves. The answer involves the compounding of three errors. The first error is the mistaken idea that if something walks and quacks like a duck, it must be a duck. This mistaken idea is based on the principle of the identity of look-alikes,

behave-alikes, function-alikes, or work-alikes: the identity of entities that have no observable differences. The first error is due to overlooking the truism that things are more than they seem. For instance, identical machines produced on a robotic assembly line, such as the same model cars with all the same features and colours, are not identical, though they each could be impossible to tell apart coming off the assembly line if each were not stamped with a unique vehicle serial number or ("VIN"). Generally, some things appear alike or behave alike or function alike but their underlying hypothetical structures differ, or their historical, social, political context may differ, or their provenance may differ, or their genealogy or genesis may differ, even when we cannot directly observe those differences. The second error is a semantic one: we use language that is appropriate for humans and apply that language to machines. We apply such words, as "smart", "learn" and "intelligent", or in general, the language that is appropriate to cognitive attributes and functions, and the language that is appropriate to rational decision-making functions, to computers. This error is known as a category mistake, we apply words that apply to one category of entities to another category of entities. It is a great thing to do when writing poetry, or when using metaphor to reveal a new way of looking at things, but it can lead to gross intellectual errors. The third error is in treating imaginary constructs, virtual constructs and social constructs, fictions, as metaphysical entities. We do this with respect to computers when we treat artificial and fictional design elements, social decisions, and even technological elements as permanent, and inevitable features of computer technologies and of the Global Techno-Scientific Culture. For instance, we have treated the following virtual, imaginary or fictional and social constructs of both the technology of computers and the Global Techno-Scientific Culture as inevitable metaphysical realities: the digital architecture of computers; the social choice to use computers to make financial and other decisions for us; or the social choice to use computer technology to do certain highly demanding and cognitive functions for us. Once we turn these technological virtual features, technological designs, and technological social uses into fixed realities, into metaphysical entities beyond changing, we block all critical discussion of those features and we block all attempts to develop alternative non-digital technologies and alternative social uses for computers.

Computers do a lot of things that humans do, but they are not identical to humans. They simulate, they imitate, but they don't have what they simulate and imitate. Computers simulate knowledge but don't have knowledge: they are not smart, they are not intelligent. Computers simulate consciousness,

but they don't have consciousness and they do not have minds. In general, it is important to keep in mind that when something simulates another thing, it means that it is not that thing. A simulation is not the real thing. This truism is wonderfully brought home in the classic children's book, The Wonderful Wizard of Oz (1900). The Wizard turns out to be a huckster hiding in a box, pulling levers that simulate the powerful, magical operations of what turns out to be the fake Wizard.

The sum of it is: Computers are machines and nothing more. Computers do not deserve respect, nor reverence nor awe. Our Global Techno-Scientific Culture can be changed. We can choose to change our Global Techno-Scientific Culture now.

But I could be wrong about all this. In this book I make proposals, suggestions, and arguments. In other words, I am engaging with readers of this book in a virtual dialogue. Also, I am engaging with the various books I have read, and people I have encountered in places of discussion, study, research, learning, and work, in email and online, in a virtual dialogue through the book. My purpose in writing this book is to seek feedback from others. My purpose in writing this book is to engage with all and any others who choose to join with me in a discussion about the following questions: what are computers doing to us? how can we gain control over computers? how can we make a society with institutions that promote humanism for humanity?

I suggest that we can change both our social and technological architecture as follows: We implement a social architecture that is socratic where we learn through mutual critical discussion or through mutual democratic feedback. I also suggest that we fix our computer architecture, digital technology, by developing analogue-cybernetic technology. At least we could have a techno-plurality, where there are multiple alternative computer architectures, other than the exclusively digital architecture.

The short of it is: The way through our Global Techno-Scientific Culture is to open up the culture to democratic control, or implementing socratic social architecture in our social institutions where critical discussion and feedback occurs broadly, and democratically, throughout society. We can even implement technological architectures that are more suited to we analogue-cybernetic creatures. Rather than twist ourselves into becoming extensions of our machines or not just extensions, but servants to our machines and reversing roles between us and our machines, we can return ourselves to ourselves, and ensure that our machines serve us.

In general, technological developments throughout human history have had surprising results. We seem to have lost control over those technological developments. But still we hoped that the next technological developments would lead to improvement, but often they did not; or they did lead to improvements, but at a great unexpected cost that overran the benefits gained. However, I am hopeful that by developing social institutions that promote democratic controls, and by developing new forms of technology, such as analogue-cybernetic computer architectures, we will develop computers that will not frustrate us and will fit us. As Yuval Noah Harari says:

> As technology improved, two things happened. First, as flint knives gradually evolved into nuclear missiles, destabilizing the social order became more dangerous. Second, as cave paintings gradually evolved into television broadcasts, it became easier to delude people. In the near future, algorithms might bring this process to completion, making it well-nigh impossible for people to observe the reality about themselves. It will be the algorithms that will decide for us who we are and what we should know about ourselves.
>
> For a few more years or decades, we still have a choice. If we make the effort, we can still investigate who we really are. But if we want to make use of this opportunity, we had better do it now. (Harari, 2018, p. 323)

In this book, I propose that we now act in the world to change our social institutions and technology so that they promote rather than disenfranchise humanity, rather than diminish humanism, our humanity as creatures that seek to know, and seek to act morally.

CHAPTER ONE

MYSTIQUE

> It is desirable to guard against the possibility of exaggerated ideas that might arise as to the powers of the Analytical Engine. In considering any new subject, there is frequently a tendency, first, to overrate what we find to be already interesting or remarkable; and, secondly, by a sort of natural reaction, to undervalue the true state of the case, when we do discover that our notions have surpassed those that were really tenable.
> Ada Lovelace (1842, Note G)

0. overview

1. the development of the mystique of computer technology

2. the root of the mystique concerning computer technology

3. how the new elite of computer technology workers keep control over computer technology?

4. are computers a hybrid technology that is difficult to learn?

5. summing up and where to go from here: the false absolutes of computer technology

0. overview

The mystique of computer technology inhibits the widespread mastery of computers by ordinary computer users. How can we overcome the mystique of computer technology? In order to overcome the mystique we must recognize that the mystique is part of an ideology promoted and enforced by the technological elite or the techno-elite. Furthermore, the techno-elite uses the mystique of computer technology and other components of the ideology of the Global Techno-Scientific Culture to gain and maintain social control over computer technology. The techno-elite in their social control over computer technology turns users of computer technology into techno-subjects. How do we, as techno-subjects, break the social control by the techno-elite over computer technology? In order to overcome the social control by the techno-elite over computer technology, we techno-subjects must recognize that by having social control over computer technology, the techno-elite gain control over the Global Techno-Scientific Culture. How do we techno-subjects gain control over the Global Techno-Scientific Culture?

Democratic control of computer technology, the transfer of control over the computer from the technological elites to the individual users, to techno-subjects, allows non-experts to learn how to use and control computer technology. The boundary between the techno-elite and the techno-subject is dissolved; and the control of the techno-subject by the techno-elite is eliminated. Thus, we dispel the mystique of computer technology, and we gain democratic control over the Global Techno-Scientific Culture.

1. the development of the mystique of computer technology

Do we really need computer technical professionals for helping us to learn the use of computer technology and for helping us to solve our difficulties with the use of computer technology? No: non-technical experts can learn the use of computer technology through trial and error with the help of mentors (friends, co-workers, children, as opposed to computer professionals). The obstacles we have created for ourselves in mastering the use of computer technology are purely social and artificial.

It is almost commonplace to remark that we are in the early phases of a technological revolution created by the personal computer or PC. PCs and

other computing devices such as PDAs or Personal Digital Assistants, smart phones or cell phones with PC capabilities, tablets or flat and small PCs with touch screens and software keyboards, and microprocessor controlled devices in standard office equipment such as fax machines and photocopiers that can be accessed through the internet, and in homes such as thermostats, light switches and timers also with microprocessors that can be accessed through the internet or the internet of things. The internet of things are the ordinary appliances and devices, watches, activity trackers, diagnostic monitors, implants, prosthetic devices, and so on and so on, that have embedded digital processors controlled and accessed by applications or apps on PCs and smartphones. The internet of things are simply ordinary, everyday gadgets, tools, and appliances with embedded digital processors. These so-called smart devices as part of the internet of things are remotely controlled and accessed by digital agents, bots, and various applications. The internet of things are monitored and used by private corporations, and government agencies unknown to the owners and users of those devices. We are within a global matrix of anonymously monitored and controlled things, including bodily implanted devices.

What do we really know about computation, computers, digital processor and digital computer technology? What do we know about the complex system of computer technologies tied together through the internet and the cloud or banks of dedicated computer servers? What do we know about how the cloud that runs programs (apps) and stores data, whose physical location is not seen or known by the users of smart devices? What do even the technological experts, who control the access to the cloud (the physical server computers, hubs, fibre lines, Wi-Fi connections, the data and the apps), know about the complexities of the cloud, its computer servers and its users? Are these questions asked and discussed?

We have become distracted by what I think is a side issue. To my mind the side issue is the philosophical debate concerning Artificial Intelligence or AI, and the general philosophical approach called computational philosophy, and the various alternative groups called neurophilosophy and functionalism, which all take seriously the questions of whether human intelligence is a function of computation or whether the mind is a computer or whether the brain is a computer (for those who don't like talk of minds). To my knowledge, those questions about how much we really know and understand about computing, computers, and computer technology, are not generally discussed even in computer science and mathematics. For instance, the popular and apparently serious concerns of the philosopher Nick Bostrom (2014), who argues in his work on super-intelligence, also

called the singularity (Ray Kurzweil, 2005), that computer intelligence will inevitability surpass human intelligence. Ross Ashby's (1956b) argument that computers can amplify human intelligence by solving problems beyond human capability, is a precursor to Kurzweil's and Bostrom's argument for the inevitability of super-intelligence. However, whether computer intelligence can amplify or surpass human intelligence is a distracting side issue. (I discuss how much of the current philosophy of mind and computers is a distraction to the currently more fundamental problems about humans and computers, in Chapter Five, Philosophers.) The concern about the singularity and super-intelligence presumes a pretense to know not only everything there is to know about computing but also the inevitable future development of computers. It would be less pretentious and more open minded to take for our starting point the possibility that we are at the same level of understanding in our current knowledge of computers as the ancient Greeks were concerning mathematics before and even after the discovery of the irrational number.

What we know about computation is extremely little because computation is not reducible to algorithms or moreover, not even reducible to mathematics in general. We know that real physical systems are not reducible to abstract geometrical systems, that a physical edge is not identical to an abstract geometric line, or that a physical flat surface is not identical to an abstract geometrical plane. However, when it comes to physical computers, we adopt the pretense without any thought that physical computers are identical to Turing Machines named after Alan Turing who devised a mathematical model for computation, an abstract model of a universal computer, in order to demonstrate that not all mathematical theorems or computer algorithms (programs) are computable or decidable. (Turing 1937, Alonzo Church 1936, Martin Davis 1965) However, Turing Machines are merely mathematical abstractions. A Turing Machine assumes mathematical infinity, i.e. an infinite tape; whereas, physical computational devices have limited "tapes" or memories. That difference makes a world of difference between mathematical abstractions and physical systems. Furthermore, Turing Machines, including Universal Turing Machines, are isolated or closed systems. Whereas, physical computers, including stand-alone computers that are not on the Internet or other networks, are still open physical systems that interact with their physical environment. For the integrity of their computational functions, physical computers depend on the integrity of their hardware and software. For instance, the integrity of computational functions relies on hardware such as power supplies, keyboards, disk drives, monitors, cases, silicon chips, solid state devices; and software such as operating

systems that control physical devices as well as applications, but which ultimately depend on their binary coded instructions being properly stored and acted upon by physical devices. By throwing these quirky physical systems onto networks, with a new level of hardware such as wires, switches, routers, servers and also with a new level of software such as network operating systems and communication protocols, we add a new dynamical layer where the mythical butterfly flapping its wings can change the universe.

Mathematical theorists and computer scientists of finite machines (Turing Machines that have finite "tapes" or memory) have been unable to solve Stephen Cook's famous Millennium Prize problem of P vs. NP (Cook, 1971). We cannot prove for every problem whether the solution can be transformed into an algorithm that will complete before the machines stop running. More exactly put by Oded Goldreich (2010):

> *..it is believed that P is different from NP*, where P corresponds to the class of efficiently solvable problems and NP corresponds to the seemingly wider class of problems allowing for efficient verification of potential solutions...the P-vs-NP Question has been unresolved since the early 1970s, and it is the author's guess that the question will remain unresolved for centuries, waiting for the development of a deeper understanding of the nature of efficient computation." (p. xiv, italics in original)

Another take on this dilemma is by Lance Fortnow (2013) about the limits of finite computers. Lance Fortnow very concisely states both the problem for computer science and its impact on what we think are the limits of computers and automata, in general:

> P refers to the problems we can solve quickly using computers. NP refers to the problems which we would like to find the best solution...If $P \neq NP$...then there are some problems we cannot hope to solve quickly...$P \neq NP$ means there is no automated way to solve some of the problems we want to solve. (p. ix-x)

Computational devices and automation have limits that are still unknown even in theory to mathematicians and computer scientists. In other words, one main limit in computer science or the mathematical theory of computers or automata is this: given the P vs. NP dilemma, we do not know where and how computers will fail even in theory. But we do know that they can fail even in theory because we don't know and still have not mathematically demonstrated whether or not computers must under certain conditions fail.

Edsger W. Dijkstra, who in his day was a leading computer scientist and winner of the Turing Prize, had a realistic diagnosis of the state of our knowledge about computer technology. It is a diagnosis that is more general than the specific issue of the P vs. NP dilemma. It is also a diagnosis that deals with the actual complexity of our current computer systems rather than dealing merely with abstract theoretical models of computers confronting abstract mathematical-theoretical models of complexity:

> I would therefore like to posit that computing's central challenge, viz. "How not to make a mess of it", has not been met. On the contrary, most of our systems are much more complicated than can be considered healthy, and are too messy and chaotic to be used in comfort and confidence… …You see, while we all know that unmastered complexity is at the root of the misery, we do not know what degree of simplicity can be obtained, nor to what extent the intrinsic complexity of the whole design has to show up in the interfaces. We simply do not know yet the limits of disentanglement. We do not know yet whether intrinsic intricacy can be distinguished from accidental intricacy. We do not know yet whether trade-offs will be possible. We do not know yet whether we can invent for intricacy a meaningful concept about which we can prove theorems that help. To put it bluntly, we simply do not know yet what we should be talking about ... (Dijkstra, 2001)

To my mind, Dijkstra does not quite get to the bottom line reason for the limits of computer science. It is not merely a matter of losing sight of the goal of achieving simple models of complex systems. Rather the bottom line reason for the limits of computer science is that no real computer is reducible to Turing Machines nor even finite-state machines, and so real computers are not reducible to mathematical systems. (Jean Van Heijenoort, 1967) Hence, what mathematicians know is not the whole story about what computers can and can't do.

This lesson of our ignorance about computers leads me to ask the question, are we asking the questions that will help us to achieve some real world minimal understanding of computer technology?

I think that the fundamental issue is not whether technology will and by itself take over the world, in the form of super-intelligence according to the arguments of Nick Bostrom (2014) as implicitly assumed by technological determinists whether technophilic or –phobic. Rather, the fundamental issue as Joseph Agassi sees it and which I think is in the right direction, is how to design our social institutions so that democratic control is in place, for the institutions themselves as well as for technology. (Agassi, 1985)