Technology and the Laws of Thought

by Gopi Krishna Vijaya, PhD

> There are a thousand hacking at the branches of evil to one who is striking at the root.
>
> *Henry David Thoreau*

There has been such a massive emphasis on technology around us that in its glare the condition of man is like a deer caught in the headlights. In this condition, understanding the very nature of technology, particularly computing technology, appears quite tricky—especially when there is a natural antipathy generated in almost everybody who has a wholesome human sense for things. Yet, in one way or another, it is absolutely essential to get to the bottom of it. My booklet *Technology and the Laws of Thought* is an attempt at doing precisely that.

The work arose due to graduate research where the author had to tackle several problems in theoretical physics utilizing computer programs and hardware-software interfaces. The question "What *is* a computer, really?" began to stand right at the forefront as the research progressed. Conventional technical approaches simply take the logic of computing for granted, and delve right into the details of the working computer. Any reader would quickly get lost in the forest of algorithms, logical circuits, language syntax, and calculation times, even with very basic level computing. On the other hand, while reading the history of development of the subject, it appeared clear that almost no one looked at the history of computing thought *symptomatically*. Nowadays, most analyses of the subject restrict themselves to simply outlining the development of concepts which took place in the past, such as the invention of binary number system, calculators, and computers, without paying adequate attention to how those concepts came to be developed—and more impor-

tantly, *whether those concepts fit reality or not.* Therefore it was inevitable that, even with such detailed historical books like *Turing's Cathedral* and Walter Isaacson's *The Innovators*, which give an almost blow-by-blow account of the development of computing ideas, there existed no real motif that answers the essential question: "Why did it take this particular route?" It was the old story of having a name for every bend of the river but having no name for the river. Moreover, historical books take the existing development for granted, as if that was the only possible way things could have evolved, and more importantly, they do not challenge the concepts used by the pioneers and inventors, nor take human development into account. So this line of investigation reached a dead end: there was way too much detail, and way too little in terms of coherent overarching *human* concepts.

Following this dead end, anthroposophical literature was analyzed. Several works address this subject head on. *Gondishapur to Silicon Valley* by Paul Emberson indicated not only the overall development of ideas, but also several references from Rudolf Steiner's work mentioning the nature of computing technology in terms of spiritual science. Steve Talbott's excellent work, such as *Devices of the Soul: Battling for Our Selves in the Age of Machines*, indicated the social effect of computing technology very well, drawing on his own computing background. In addition, several ways of

> *Conventional approaches take the logic of computing for granted, and delve right into the details of the working computer. Any reader would quickly get lost in the forest of algorithms, logical circuits, language syntax, and calculation times...*

offsetting the effects of computers were also described. In these works, the essential concepts were tackled by themselves, especially as they relate to the human being. Yet a clear bridge was not present to connect the already well-developed theories of computing to the kind of thinking activity developed in, for example, the *Philosophy of Spiritual Activity*, even though Carl Unger's work had pushed that thinking forward tremendously. What was necessary was to balance general concepts derived from anthroposophical spiritual science against the excessive detail given in traditional books on computing, so that the path to the human can be derived from the study of the logic itself.

It was with David Black's work *Computer and the Incarnation of Ahriman* that this bridge first became visible. It was an indispensible masterpiece, where the relation of the logic of thought to the logic of computers (Boolean algebra) was discussed, freely using concepts from anthroposophy. This pushed open the door, and the next step was to assemble a picture of the very core development of the computing process. Building that bridge was the key purpose of *Technology and the Laws of Thought*.

> *Identifying qualities that the thinking process has in itself, such as the feeling-element and the willing-element, it became clear that the development of mechanical aids to thought was mainly related to the will-power, or strength, of the thinking process.*

My approach has been to observe the thinking process closely. This was done to identify different qualities that the process necessarily has in itself, such as the feeling-element and the willing-element, as directly indicated by life experience. It became clear that the development of mechanical aids to thought was mainly related to the will-power, or strength, of the thinking process. Using the analogy between physical strength and mental strength, a place is created for the concept of will to be considered in thought as well, on par with well known factors like the structure of the brain and chemistry. This will factor has been largely ignored in conventional understanding, as it is not readily suited to cast in a logical form. Examining will-power in thought also led the way into the past, where it was shown that the nature of experience guided logic, and hence it is important to come to terms with experience based on which the logic was derived. It is one thing to talk about algorithms and logical connections, and quite another to examine how those arise from basic life experience.

With the door to the past being opened with these ideas, a systematic development is followed, starting from early Renaissance and Enlightenment ideas of mechanics and computing (by the likes of Leibniz, Bacon, and Descartes) to the results of the modern day (Boole, Frege, and von Neumann). Boolean algebra is treated in some detail, showing how the algebra works and how it matches up to normal experience. This point was necessary since it lies at the heart of all computing technology. On the way, the crisis that occurred at the middle of the 19th century is described, and the form of logic and mathematics created at this pinnacle of the Industrial Era is analyzed. A lot of ideas that came to the fore in this time period were basically a re-invention of the logic of Ancient Greece, but cast into a modern mechanical mold. Seeing this enabled direct parallels between Aristotelian logic and Boolean algebra, and the precise changes introduced in order to suit the logic to mechanization. In other words, the fork in the road was found, where one path led to increasing mechanization, the other to an increase of human capacities.

Now it was evident that the origin of computing does not lie in a natural development moving forward from earlier results in logic, but is actually *a restriction of the domain of logic to that which can be mechanized*. It was also found that mathematics and logic took this route mainly because many concepts held as true for two thousand years (such as Euclidean Geometry) were coming into question at that time, bringing uncertainty into the very foundations of mathematics and logic. Putting it plainly, the mathematicians freaked out. Yet, instead of starting afresh with a new path for tackling logic, the very opposite route was taken, marking the birth of computing technology. These were the findings of Kurt Gödel, Alan Turing and other such pioneers. Instead of facing the paradoxes generated by using traditional logic and moving ahead, as was done for example by Hegel, the paradoxes were shunned by seeking refuge in a restricted form of logic—but the same problems inevitably recurred once more in a different form! **This confirmed the insights from spiritual science that there is more to life than just thinking, and that thinking, feeling, and willing all have to be included to tackle the questions properly.**

As a direct consequence of the choices made, human thinking also faced several obstacles by being tied to mechanical ideas alone. I highlight the repercussions of continuing to adhere to the mechanized form of logic. The refusal to understand these principles as well as a lack of exercise of will-power of thought are seen to lie at the root

of all problems facing thinking and concentration today. The alternative that has been missed, which can restore the creative and constructive capacity to human thought, is described: *it is possible to reconnect thinking capacity to human potential directly, instead of taking the bypass through the machine, and this makes it possible to offset the effects of technology on the mind.* The correct identification of the will-element in thought also shows the ways it can be developed independently by anyone interested in doing so, and I show the paths pursued by a couple of people in this direction during the past century.

Finally, some effects of a misdirected application of the mechanized logic are touched upon (its effect on human relationships, for example), indicating the boundaries within which mechanized logic is useful. This enables the reader to appreciate the development of modern technology from the inside, so that education and self-development can restore creativity to its rightful place alongside the arts and crafts. It is only when the head and the limbs work in sync, that the heart can find a place in life as well.

It is hoped that this work will be beneficial to anyone who is willing to tackle the question of computing at its very root. Just as the bridge to the supersensible was built by spiritual science through the study of philosophy, a bridge to right use of technology has been attempted by the study of the "laws of thought."

Gopi Krishna Vijaya *has a background in Physics. He has obtained his Master's degree from the Indian Institute of Technology and his PhD (on the topic of improving efficiencies in solar cells) from the University of Houston. He is a member of the Anthroposophical Society. The paper described here is available as a PDF file on request to* editor@anthroposophy.org.