
David M. Walsh

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CURRENT DEVELOPMENTS

BOOK REVIEW


TURING'S MAN presents a masterful integration of the functional aspect of computers, their social and historical roots, and modern day ramifications in twentieth century society. Bolter successfully relates the seemingly disparate worlds of computer programming and design to the study of classical, medieval, romantic, and modern thought and philosophy. Undoubtedly, a large portion of Bolter's success arises from his familiarity with both worlds; the author is a professor of the classics and holds a master's degree in computer science. Perhaps the greatest achievement of this work is that it presents and explains, in bold outline, the inner workings and mechanism of a computer in terms and language that a nontechnical layperson, or even a classics major can comprehend. For that accomplishment alone, Bolter's work deserves careful reading.

Bolter chooses Turing's Man as the central motif and constant standard of his analysis of the role of the computer in western culture. As the author explains, Turing's Man is one who accepts the premise, enunciated by logician A.M. Turing in a 1950 essay, that by the year 2000 computers will be capable of imitating human intelligence perfectly. The author further defines Turing's Man as the

"most complete integration of humanity and technology, or artificer and artifact, in the history of the Western Cultures. With him, the tendency, implicit in all eras, to think 'through' one's contemporary technology is carried to an extreme; for him, the computer reflects, indeed imitates, the crucial human capacity of rational thinking."

In essence, Turing's Man sees man as a machine, and believes that by making a machine think as a man, "man recreates himself." The author tries to investigate and develop this frightening prospect of man as machine by carefully inspecting the workings of the computer, tracing

* Assistant Professor of Classics, University of North Carolina at Chapel Hill, (degrees needed).
modern day technical components and concepts back through the evolutionary cycle of time.

The author also relies upon another creation of A. M. Turing: the computer "machine", upon which technical analysis is performed. First advanced in a paper entitled "On Computable Numbers", published in 1936, Turing's machine was built on paper, using only symbolic description. Turing's machine has since come to prescribe the specifications of the most powerful computer built up to the present day. Some years after Turing first proposed his machine, John von Neumann created the physical embodiment of the Turing logic machine, and it is upon the von Neumann's computer that all modern computing machines are structured. It is this machine, and its finite perimeters first established by Turing in 1936, that Bolter utilizes in explaining the technical aspects of computers and then relating them to the evolution of Western culture.

Bolter's work is well organized, utilizing clear headings and logical development, as well an epistle on the structured world of computers should. A fair portion of the book is devoted to explaining the most basic functions and components of the computer. After succinctly covering the basics, the author turns to the central theme of the work: analyzing the cultural evolution of the computer. Bolter reviews the historical situation of the computer, its place in time. He traces its genesis as far back as classical Greek civilization. In doing so, as the author candidly admits, he is forced to make many broad and conclusory generalizations in his explication of historical thought at various periods in time. Similarly, in detailing the mechanism and functions of the computer, the author necessarily utilizes uncharacteristically broad and basic descriptions. In both cases, Bolter reacts to concerns for the breadth of the topic, the time period he seeks to cover, and the nature of the dual audiences - technical and literary—that he seeks to reach. As a matter of convenience and clarification for non-technical readers, the author includes a glossary of computer and other technical terms.

The analysis in Turing's Man flows to a variety of isolated aspects of the evolution and compilation of a computer. Chapters discuss the finite components of the computer world: logic, time and electronic space. The author tracks society's concept of subjects such as time, paralleling that analysis with the technological evolutions that accompanied and often gave rise to the changes in society's viewpoint. For example, in one interesting discourse, Bolter discusses the evolution of the clock, an underlying analogy to the computer which runs throughout the book, and how its popularization and accessibility to the average man changed the nature and perception of time. Bolter also considers electronic memory, language, and artificial intelligence as distinct con-
cepts. The chapter on language presents perhaps the best illustration of the author's analytical approach and will thus be considered briefly.

Bolter's analysis of electronic language is based upon the distinction between natural and artificial language. Natural languages, such as English, were created through the centuries via a process that was neither "self-conscious" nor "rational." By contrast, artificial languages are not evolved over time, but are created rapidly and intentionally, to serve a rational function and purpose. A further refinement of the distinction between these two language forms provides the central question and underlying tension between them: succinctly put, is the proper purpose of language to evoke, as the natural languages can, or merely to denote, as the unambiguous artificial languages can, or merely to denote, as the unambiguous artificial languages were specifically designed to do? Bolter spends the greater part of the language chapter presenting the competing arguments for each of these positions.

Bolter presents a brief explanation of computer languages, and their hierarchical nature, detailing the differences between machine, assembly, and high-level compiler languages. He then turns to establishing, in some detail, the tension between poetry and logic: in the former, the words develop a relationship with the objects they describe, the words control the object; with the latter, the words serve merely as symbols, connotatively defunct. Bolter also discusses the different effects of oral as compared with written language, emphasizing the emotive aggressiveness of the former.

The author then looks to the evolution of languages, considering first the classical Greek view of the spoken and written word. As a largely oral society, the Greeks seemed to focus on the poetic over the logical, as spoken word is inherently connotative and wholly dependent upon the tone and demeanor of the speaker. Next, Bolter considers the Western European view of the use and meaning of language. The advent of the printing press emancipated western man from the confines of the oral language tradition inherited from the Greeks. Books emerged as a dominant force, and vision replaced hearing as the operative learning sense. The language of mathematics and the use of logical symbols as a writing and communication convention evolved and grew in popularity. Bolter concludes that, for the past two centuries, western languages have been moving away from the poetic and towards the logical.

Finally, the computer embodies the next stage in the evolution of logical language. Its languages are "drained of connotations and are given meaning solely by initial definition and by syntactic relations to other symbols." Bolter asserts that the computer reinterprets content in terms of structure, effecting the "triumph of structure over content." The mind has been eliminated from the act of reading, and as such,
there is "no possibility of resonance or analogy interfering with the rules of logic." The way in which linguists consider language has been altered: language is perceived in algebraic structure and draws meaning from form and association.

Each chapter in Turing's Man contains logical deductions and conclusions designed to perplex and challenge the beliefs of much of modern society, and in particular, the students of the humanities, the arts and philosophy. It is Bolter's conclusion, however, that presents the most troubling images of the present and future. Bolter's thesis is that Turing's Man, and all he engenders, is not just a possibility, but rather a substantial reality of human evolution. A subtle shift occurs at this point in Bolter's presentation: no longer is the question whether Turing's Man is an acceptable evolution, but, assuming his present existence and his predictable and substantial impact on the thought and philosophy of society, the question becomes what can be done, internally, to temper his machine-like existence with the softer mettle of history, culture and art. Thus, inevitably, this final chapter of Bolter's work is the most unsettling.

Bolter's description of the arrival of Turing's Man as factual occurrence is preceded by his characteristic tracing of the development of the men from whom this man evolved. Bolter identifies three periods of human evolution: Socrates, Faust and Turing. Socrates, representing ancient times, is an age of surprising superficiality, a time intent upon discovering the physical limits of man's world and wholly uncomfortable with the notion of infinity. By contrast, Faust's age is that of exploration, and of a search for deeper meanings and explanation of the conditions of man's world. Faustians are devoted to the concept of infinity: their Christian God embodying fully the idea of infinite and unknown. Bolter asserts that much of modern society is still operating in the Faustian mode, and as such, has produced the waste and other excesses appurtenant to a belief in infinite and ever-expanding resources. Another significant aspect of the Faustian age is a keen awareness of its place in history, a knowledge of and interest in that which came before and that which is to come. Significantly, this emphasis on historical situation is not found in the classic Socrates period, nor is it found in the perspective of Turing's Man, an omission some consider to be the fatal aspect of the Turing age.

Bolter sees the Turing age as the logical successor of the Industrial Age. Following the goal of replacing nature with machine, it is consistent to assume that at some point man's very thinking functions might be displaced by more efficient and rational machines. Like the men of the Socrates age, Turing's Man foregoes deeper understanding, opting instead for rational function. As is amply displayed by Turing's logic machine and the von Neumann computer it spawned, Turing's Man is
limited to and defined by the capability specifications of the computer machine. This acceptance, and even elevation, of the finite at the expense of the infinite is directly at odds with the basic precepts of western culture, precepts that Bolter sees as waning. Traditional concepts of religion, which prescribe worship of the infinite, must be excised or at least substantially altered. Turing's Man reduces human intellect to a set of formal rules; all of man's rational thought processes can be explained through analogy to the central processing unit in the von Neumann machine.

Bolter's analysis also recognizes the positive aspects which emerge during the Turing age. For instance, because he is unaware of his place in the historical progression of time, the computer man is not burdened with traditions and the other baggage of history, thus he is able to operate unfettered "within the intellectual world of his own making." Moreover, unlike the men of the fading western culture, Turing's Man solves problems within the finite limitations of the materials available to him, rather than relying upon expansion ad infinitum.

In the final analysis, some will perceive the "evil's" of the Turing age as outweighing any perceived benefits or efficiencies. Turing's Man possesses "superficial attitudes toward human and social motives" and is "insensitive to his historical and intellectual context for his work." His economic attitudes and policies leave no room for the further development, or even preservation, of the arts, humanities, and culture. To those who are troubled by the Turing Age scenario, Bolter concludes by offering a challenge: that they produce a vigorous reaction to these "tendencies" and "preferences" of the computer man, a reaction that must parallel, and equal, in force and effect, the Romantic period response to the industrial revolution. The author suggests that this can be done most practically by building into the machine itself "a bias for the humane treatment of human beings." This reformation of the computer age from within can be accomplished by "finding compelling uses for computers that respect the differences between men and machines." Bolter sees this task as designed for "those who feel most isolated in the computer age: the artist, the poet, the historian, the humanist."

A crucial portion of Bolter's conclusion concerns the computer as a tool, as compared to the computer as a machine. The author effectively argues and substantiates the position that computers are most efficiently used as a partner of man, extending his intelligence and problem solving capabilities, rather than as a replacement for human intelligence, after having been taught through great time and expense to think as man does. For example, one important aspect of the computer as a tool is the hierarchical benefit to be derived. The concept of the computer hierarchy is a strong undercurrent throughout the book. Bolter posits that a new kind of amateurism can arise through the use
of the computer hierarchy: non-specialists can reap the benefits of the hierarchy of stored knowledge and skills located in the computer's memory banks and thus introduce creative thought into situations usually accessible only to specialists.

Bolter's book provides a fascinating view of the evolving world of computers. Through his carefully structured analysis, he lends computers and computer men a background and legitimacy rarely accorded them by students of the arts and humanities. Bolter also presents a perspective on the present and future that is both intriguing and frightening. Finally, for those whose knowledge of the computer is limited, Bolter has presented an accessible primer in the ways of the computer so that, in preparing the reaction to the "tendencies" of the Turing age, the reactors can be "informed by some sympathy for and knowledge of [the] proposed subject, technology."

David M. Walsh, Student,
University of Southern California Law Center