

A review of the books: "The making of a new science" by Giorgio Ausiello, and "Valley of Genius" by Adam Fisher

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History teaches, but it has no pupils.

Antonio Gramsci

Given the actual political, economical and social situation, the 1919 quote from Gramsci seems as a prophecy. Moreover, this lack of historical interest also is manifested in some of the university teaching at least in scientific subjects, including the "young" discipline of *computer science*. In my personal experience, many of the recent computer science graduates have a very little (or null) knowledge of how and why the field of computer science evolved.

I believe one of the reasons for this lack of interest has its roots in the new trend of many universities to turn the studies of computer science into professional training schools. Indeed, there is a strong need for computer science technicians, in software and hardware, but also there is a need for universities, to educate scientists that will make advance the field in the future. To foresee and implement the future development of computer science, we should understand the failures and successes in the recent history of computer science. The two books I would review here could add valid new information to the history of computer science and information technology. Both books cover events that happened approximately in the time span from the sixties to the end of the century, but while one of them deals with the development of the theoretical foundations of computer science, the second book is an account of the technological developments that took place in Silicon Valley. A caveat for the reader: Personally I know quite well what was going on in the development of theoretical computer science, while I'm an external observer to the history of Silicon Valley tech companies.

***The making of a new science: A personal Journey Through the Early Years of Theoretical Computer Science* Giorgio Ausiello, Springer (2018)**

As the title indicates, the book narrates the *intimate* journey of the author through the genesis and development of theoretical computer science in Europe, Italy and the US.

The book follows a chronological sequence of events, but the narration is guided by the professional evolution of the author, and by his different travels in Europe and in the US. Most chapters have an interesting structure of a juxtaposing the scientific development, usually covering worldwide progress in the field, with the political and social efforts in defining a framework for the development of the discipline of computer science, that part being basically focused in Italy and at the European community level.

The main focus of the book is to narrate the scientific, social and political efforts of a large group of researchers to establish the framework to develop high quality studies and research in theoretical computer science in Europe, through the eyes of one important player in those efforts. It is neither an exhaustive relation of scientific achievements, nor a taxonomy of the different research fields of computer science. Therefore, the list of mentioned researchers in theoretical computer science does not pretend to be an exhaustive one. Personally, I would have appreciated an index of the acronyms used through the book and of the people mentioned, as it would have simplified writing this review. However, I guess the author intentionally left out this index, to avoid converting it in a who-was-who for theoretical computer science in Europe.

A very concise abstract of the evolution in the role of theoretical computer science is reflected in the following quotation of Christos Papadimitriou (pg. 231 in the book),

"In the 1980s, we the theoreticians, owned the field of computer science in the sense that we knew how compilers should be designed, how operating systems should work, how databases should be organized for efficient access. Our responsibility and main mission was to outfit all areas of computer science with rigor and the power of mathematics. In a sense, we were exercising complete intellectual hegemony over the rest of computer science. We knew it. Then the internet happened".

As the quote perfectly conveys, the development of theoretical computer science in the early sixties was coupled with the general development of computer science, and the book presents a nice survey of the early development of the different areas of theoretical computer science, many of which would get an "independent" status, after some years.

A brief outline of the chapters' contents: In the first chapter, the author describes the deep impression that attending a series of lectures by Corrado Böhm in 1963, causing him:

"As students, through Corrado's lectures, we could perceive that a new science was being born, arising from the roots of mathematical logic and projecting its light on the future of computers and computer programming"

In the year 1966, G. Ausiello graduated in Physics under the direction of Corrado Böhm. For his final project, he defined a new language for hybrid computers.

The two first chapters also narrate the incipient excitement among scientists in Europe and in the particular case of Italy for the new discipline of computer science. For instance, the book describes the pioneer work being carried out in Europe to define new programming languages, and the lively pan-European joint conferences. A particularly relevant conference was IFIP 1968, which took place in Edinburgh, where the Algol-68 language was presented.

Chapter 3 reflects on the author long visit to Manuel Blum in 1969 , at UC Berkeley and the subsequent trips to other leading academical institutions in the US. The chapter presents a nice exposition of the new research trends at the time, in areas as recursion theory, algorithmic machine theory, algorithmic analysis, data structure, and other areas of theoretical computer science.

Chapter 4 deals with the return to Italy, and the local *power struggle* for the establishment and control of computer science. Personally, as somebody living in a Mediterranean country, I was very amused while reading about all those open and hidden maneuvers between established professors, fields, centers, and other institutions. The chapter also describes the continuing efforts for increasing the personal contacts between researchers of different countries, including researchers from outside the European area, with the aim to coordinate efforts in the final establishment of theoretical computer science in Europe.

For the European theoretical computer scientists of a certain age, chapters 5 and 6 should have a particular historical interest. The title of Chapter 5, "*Informatique Theorique*" is quite self-explicative, it deals with the sequence of historical developments, which ended with the creation in 1972 of the "European Association for Theoretical Computer Science" (EATCS), aimed to coordinate the efforts of European researchers in the different areas of theoretical computer science. An indication of EATCS' success is the fact that soon after the launching of the association, a large proportion of its members were researchers working outside Europe

The association also started in 1973 a Bulletin to disseminate research news, announcements and reports of conferences and schools, and other useful information among their members. As a nice example of material published in the Bulletin, I would like to point out a quote extracted from a guest column by Joe Goguen in the 36th. issue of the Bulletin,

October 1989, entitle *Memories of ADJ*, which is reproduced in pg. 140 of the book ¹:

"In fact I proposed the rather grandiose project of providing a uniform, rigorous, abstract treatment of theoretical computer science, similar to what Bourbaki had done for mathematics, but using category theory explicitly, instead of secretly and implicitly, as Bourbaki had done."

As explained in the book, the creation of EATCS was a big stimulus towards the expansion and consolidation of computer science in European universities and research centers. A particularly nice item in Chapter 5 is the report on the 1972 IBM *Conference in Computer Computations*, at the Thomas J. Watson research center in Yorktown Heights, which was a keystone for algorithms and complexity².

Chapter 6 has also a self-explicative title: *The Journal*. It refers to the "difficult birth" of *Theoretical Computer Science* (TCS) as the "official journal" of EATCS. The book does a fantastic job at explaining the computer science journal situation in 1974-75, and the important role that TCS played for a long time. There is a detailed account of the articles that appeared in the first issue of the journal in 1975, which is a nice testimony of the large number of different topics that the field of theoretical computer science covered in those early years. However, the book shuffles under the rug the details of the end of the agreement EATCS-Elsevier in 1999, when TCS stopped being the flagship journal of EATCS.

Chapters 7 to 9 start with a long stay of the author at Cornell university in 1975, and the visits the author did to other US universities. As in Chapter 3, these chapters give a vision of the most relevant research that was going on in theoretical computer science and operation research. The same chapters also explain in detail the establishment of an incipient network between different European research groups, which were working on topics in theoretical computer science, through the organization of schools, symposiums, conferences and visits.

The last chapter, which has the title *Europe Strikes Back*, starts in 1980 and basically covers the growth of theoretical computer science in Europe until the end of the nineties. It contains a very illustrative account of the important role played by the European community in promoting and supporting the computing science research in Europe, starting with the programs ESPRIT1 and ESPRIT2, and continuing with subsequent framework programs. I believe that in the current difficult moments of the European union, this chapter in the book should be obligate lecture for European researchers.

¹The whole paper is easily accessible in internet <https://www.semanticscholar.org/paper/Memories-of-ADJ-Goguen/>, and I consider it an excellent description of the type of intensive, coordinate research in theoretical computer science, that was done in those years, and the book describes.

²D.Karp famous paper *Reducibility among Combinatorial Problems* was presented at that conference.

I would like to finish this brief summary of *The Making of a New Science* with another quote from C. Papadimitriou, which it is also the last sentence in the last chapter of the book:

"The Internet deeply changed computer science, and theoretical computer science changed too: it moved toward math and opened up to the other sciences."

The book ends with an appendix containing copies of some "historical jewels", for example the scientific programs of the first STOC (Marina del Rey, Ca, May 1969) and the first ICALP (INRIA, Paris, July 1972), the proceedings of which were published by North-Holland, the predecessor company of Elsevier, as a volume in the collection IFIP Publications. Some other documents in the appendix deal with the gestation of the EATCS as well as copies of some the letters from European researchers explaining the need for the European union to support the development of computer science in Europe .

A nice contribution of the book is the presentation of the development of theoretical computer science, not as a discipline created by a few outstanding isolated researchers, but by a whole swarm of researchers with different backgrounds and abilities, whose synergy set the foundations to reach the theoretical computer science level that we have today in Europe.

I believe all the people that made some contribution to the development of computer science in Europe during those years should be grateful to Giorgio Ausiello, for the effort to write his personal view of the development of the field, so the new generations of researchers can learn that the status of computer science in Europe today was not a given gift from the heavens.

***Valley of Genius: The uncensored History of Silicon Valley* Adam Fisher, Twelve (Hachette) (2018)**

As already said, this book has differences with the previous one, but it covers the historical development of some of the most well known computer technical industrial developments, in approximately the same time span as *The making of a new science*. One first big difference between both books is the style in which they are written. Adam Fisher is a journalist, who was not directly involved in the sequence of events narrated in the book, which is Silicon Valley as a generator of technological ideas and products that would change the way of life for a large part of humanity.

From my point of view, the style that he uses to explain the history of Silicon Valley is just extraordinary: He structures the books in interconnected chapters, where each one deals with a different technological development (a product/company), and shapes the narrative of the chapter as a conversation among the main relevant people involved in the technical or financial development of the product/company. It is like these people were talking

around a coffee table, except that those conversations never took place, they are made up by individual quotations taken from different places and cut-and-pasted by Fisher into each chapter narrative. To make this puzzling work a convincing and pleasant chronicle, it probably took the author a lot of hard work.

The resulting book has an important characteristic: the history is not only narrated by the few well-known "geniuses" as Steve Jobs, Steve Wozniak, Dough Engelbart, Stewart Brand, Mark Zuckerberg, Erik Schmidt, Larry Page, Sergey Brin, and so on, but there is also the view given by the not-so-well-known "geniuses", not only computer scientists, but also investors and journalists that made possible the Silicon Valley technological development and its associate cyber-mystic. However, It is also true that, throughout the book, Apple and Steve Jobs have a prominent relevance. In particular, the last chapter of the main text seems to be a tribute of Fisher to Jobs, including a narration of the last days of Jobs and his funeral, as remembered by some of the witnesses. Otherwise the chapter is a bit out-of-place in the general narrative.

The book starts with a preface by Fisher, which I strongly recommend not to skip, as it gives an overview of how he constructed the narrative. The book splits the history of Silicon Valley technological development into two different periods: First the quest for a personal computer, and second the rise of the WEB and its associated development.

The main story starts with the account of the well-known 1968 *mother of all demonstrations* by Doug Engelbar, where he presented the basic elements of the on-line personal computer: Navigation capability, the mouse, hypertext and others. After it goes to cover topics as the role of Xerox-Park in the 70's, the Atari computer, the Apple II, the Mac, the Well, Google, Netscape, Napster, Facebook. Pixar is the only company outside of Silicon Valley that the book treats in depth, due to the fact that a great part of the Pixar's success was strongly connected to events and people in Silicon Valley, in particular S. Jobs.

Another nice characteristic of the narrative is to frame the technological and commercial development inside the countercultural movement in the California of the sixties. As described by the authors themselves, in the late 60's and 70's many of the players' *"modus vivendi"* could be summed up as *sex, acid and very hard work*³, where hard work means sleeping often in the working place. The book emphasizes the important role that Stewart Brand's counterculture bible, *The whole earth Catalog*, had on many of the early participants in the Silicon Valley development. The book also dedicates a chapter to the parallel development of cyber-culture magazines, in particular Mondo2000 in 1984 and Wired in 1993. As argued in the book, Wired was responsible for making global the cyber sub-culture that was specific to Bay Area 60's and 70's. In spite of the countercultural roots of the Silicon Valley developers, in the nineties the measure of success in Silicon Valley was the amount of money owned or valued.

³Small variation on the famous title' song by Ian Dury.

The book ends with an epilogue about the future of Silicon Valley, followed by a section where there is a list of the main achievements for the participants in the text. This book also does not have a classic appendix, but given the particular narrative used by Fisher, it is not easy to use it as a reference book.

The final section has as title *Notes on sources* and it contains a nice bibliography of books and papers on the same topic as the one treated in the book.

From my point of view, one of the absences of the book are the ethical and sociological issues associated with Silicon Valley's technological development, which in the last times have become daily news.

An enjoyable book to read, in particular by people related to the computer science field.