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Hopcroft J E & Ullman J D. *Formal languages and their relation to automata.* Reading, MA: Addison-Wesley, 1969. 242 p.
[Cornell University, Ithaca, NY and Bell Telephone Laboratories, Murray Hill, NJ]

This book organized the existing knowledge of automata theory and formal languages that was scattered through journals and technical reports. The intent was to provide a textbook and reference source to facilitate the creation of courses in the emerging discipline of computer science and provide a basis for further research. As such it shaped the field for over a decade. It has since been replaced by *Introduction to Automata Theory, Languages, and Computation.*[1] [The *SCI®* and *SSCI®* indicate that this book has been cited in over 555 publications.]

The Emergence of Computer Science

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By the mid-1960s, a substantial body of material on automata theory and formal languages had been developed by researchers in a wide spectrum of disciplines. The material was scattered over many journals and existed, with the exception of two books of collected essays,[2,3] as isolated pieces of information rather than as a single coherent body of knowledge. The lack of a reference work or textbook was impeding the emergence of a discipline and created a formidable entry barrier for new researchers to the field. Thus, after teaching a graduate course in the subject at Princeton University in 1964, Jeffrey D. Ullman and I undertook the task of producing a textbook.

Ullman obtained his PhD at Princeton in 1965 and accepted a job at Bell Telephone Laboratories in Murray Hill, New Jersey. While at Bell, he also agreed to teach a course at Columbia University in the fall of 1965. I was teaching the equivalent course at Princeton. We began our book by establishing a list of chapters and then partitioning this list in half, with one of us taking responsibility for the odd-numbered chapters and one for the even-numbered. Starting with the small set of notes that I had written the year before, we produced the book as the semester proceeded. Class lectures covered chapters at the rate of one per week. With two of us collaborating, we each needed to produce a chapter every two weeks. I would spend one week writing a chapter and teaching the material. During the next week, I would rely on the arrival of Ullman's new chapter for teaching and begin writing my next chapter, and so on. At the end of the semester, we had a good first copy of the book. We took another year to delete redundant material and to augment, refine, and polish proofs. Basically, we each rewrote the chapters the other had written. At the end of the editing process, one could not distinguish who had written what.

Perhaps the success of the book came from our efforts to present a cogent description of the essence of each proof before actually giving the proof. Numerous examples and homework exercises developed the reader's skill quickly and enabled him or her to convert the intuitive sketches into the rigorous proofs that followed. Once this skill was established, many of the proofs were probably never read. In some sense the treatment was both rigorous and understandable. Curiously, when the book was revised in 1979 and expanded from its 242 pages to 418 pages, the comments from faculty were negative and those from students overwhelmingly positive. It seems that our attempts to lower the level of our presentation for the benefit of students by including more detail and explanations had an adverse effect on the faculty, who then had to sift through the added material in order to outline and prepare their lectures.

1. **Hopcroft J E & Ullman J D.** *Introduction to automata theory, languages, and computation.* Reading, MA: Addison-Wesley, 1979. 418 p. (Cited 295 times.)
2. **Moore E F,** ed. *Sequential machines, selected papers.* Reading, MA: Addison-Wesley, 1964. 266 p.
3. **Shannon C E & McCarthy J,** eds. *Automata studies.* Princeton, NJ: Princeton University Press, 1956. 285 p.

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