

Alan Kay

by

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Alan Kay, Springfield, MA; Alan Kay is one of the inventors of the Smalltalk programming language and one of the fathers of the idea of Object Oriented Programming. He is the conceiver of the laptop computer and the architect of the modern windowing GUI.

"The best way to predict the future is to invent it."

--Alan Kay

Education

B.S., Mathematics and Molecular Biology, University of Colorado, 1966;

M.S., Electrical Engineering, University of Utah;

Ph.D., Computer Science, University of Utah, 1969;

Professional Experience

Professor, Stanford Artificial Intelligence Laboratory, 1970;

Group Leader, Xerox Palo Alto Research Center, 1972

Programmer, Atari, 1983

Apple Fellow, Apple Computer, 1984

Although Kay was born in Springfield, Massachusetts his family moved to Australia where he lived for the first few years of his life. However, the threat of Japanese invasion during World War II prompted his parents to return to the United States. The gifted youth learned to read by the age of three and was continually pushing his mind and expanding his knowledge as he grew older.(1)

"By the time I got to school, I had already read a couple hundred books. I knew in the first grade that they were lying to me because I had already been exposed to other points of view. School is basically about one point of view -- the one the teacher has or the textbooks have. They don't like the idea of having different points of view, so it was a battle. Of course I would pipe up with my five-year-old voice." (1)

Kay was also exposed to music since early childhood; his mother was both a musician and an artist. He was a soprano soloist in his grade school choir and a proficient guitar player at an early age. Indeed he considered the idea of becoming a professional musician.

When, in 1961, he was expelled from Bethany College in West Virginia for protesting the Jewish quota he relied on his musical talents and made a living in Denver giving guitar lessons. But he found another latent talent when he joined the volunteer service and performed well on a computed programming aptitude test. He was sent to work on an IBM 1401 by the U.S. Air Force.(1)

When he left the Air Force, Kay matriculated at the University of Colorado where he studied Mathematics and Molecular Biology. When he graduated in 1966 he enrolled at the University of Utah in Electrical Engineering.(1)

While studying at the University of Utah he learned to use the innovative SketchPad program developed by Ivan Sutherland and began programming in Simula. Borrowing ideas from these and other programs, as well as from his background in Biology, he formulated his "biological analogy." Kay postulated that

the ideal computer would function like a living organism; each "cell" would behave in accord with others to accomplish an end goal but would also be able to function autonomously. "Cells" could also regroup themselves in order to attack another problem or handle another function.(3)

In the autumn of 1968, Kay first met Seymour Papert at the MIT Artificial Intelligence Laboratory and became interested in the LOGO language. Kay's entire concept of the role of the computer in society was shaken when he watched Papert and his colleagues teaching children how to program in LOGO.

In 1968 I saw two or three things that sort of changed my whole notion of computing. The way we had been thinking about it was sort of Doug Englebart's view that the mainframe was like a railroad, owned by an institution that decided what you could do and when you could do it. Englebart was trying to be like Henry Ford. A personal computer as it was thought of in the sixties was like an automobile. In 1968 I saw Seymour Papert's first work with kids and LOGO, and I saw the first really great handwriting-character-recognition system at Rand. It's a fabulous system. And that had a huge influence on me because it had an intimate feel. When I combined that with the idea that kids had to use it, the concept of a computer became something much more like a supermedium. Something more like a superpaper."(2)

After writing a thesis about graphical object-orientation and being awarded a Ph.D. at the University of Utah he spent two years teaching at the Stanford Artificial Intelligence Laboratory. While there he began thinking about a book-sized computer that the user, especially children, could use in place of paper. He dubbed his project "KiddieKomp." It was at this time that he also began work on the Smalltalk language.

Smalltalk was designed to mimic Kay's biological model of individual entities, or "cells," communicating with each other via messages. Eventually his Smalltalk language would father the genre of Object Oriented Programming languages.

In 1972 Kay took a job at Xerox's Palo Alto Research Center (Xerox PARC) and began using Smalltalk in an educational context. Young children were exposed to computers and their reactions were analyzed. Kay concluded that children learned more through images and sounds than through plain text and, along with other researchers at PARC, Kay developed a simple computer system which made heavy use of graphics and animation. Some of the children became very adept at using this system; in fact, some developed complicated programs of their own with it! (3)

While leading a research group at PARC, Kay also made a model of a laptop computer and contributed to the development of Ethernet, laser printing, and the "client-server" network model. Sadly, the technology to make his prototype laptop called "Dynabook" did not yet exist. Kay, however, pushed Xerox for funds to develop some of his ideas but the Xerox management, not blessed with Kay's foresight, was not willing to commit major resources to development. When Steve Jobs, Jeff Raskin, and some other Apple pioneers visited PARC in 1979, however, they recognized immediately that Kay's ideas were the way of the future. They were impressed with the idea of a windowing GUI and were

astounded with the flexibility of the Smalltalk language. Kay's work at PARC were the seeds from which the Apple Macintosh's look grew. Even Microsoft Windows, the most popular computer operating system in the world today, is a scion of Kay's ideas.

Kay left Xerox in 1983 and, after a brief stint at Atari, became an Apple Fellow in 1984 -- the year the Macintosh, the first mass-marketed GUI-centric computer, was produced. During the next few years Kay lived in Los Angeles but trekked across the country to teach brief stints at MIT and to work at Apple. Most of his time, however, was spent teaching children to use computers at his Open School in West Hollywood, California.[\(3\)](#)

So what is Kay working on now? In a 1991 interview with *Byte* he described "Agent based systems." and said he was in the process of writing a new computer language that constructed simulated intelligence within the computer so as to allow the machine to tell itself what to do. An "agent," according to Kay, was a kernel of intelligence in the computer. In this article Kay predicted agent-based commercial systems by the year 2000. He envisions a computer that can learn from the user and adapt to the user's needs. He also wants to finally mass-produce his "Dynabook."[\(2\)](#)

In my opinion, Kay's most noteworthy contribution to the world of computer science was that of a shifted paradigm; He changed the way both the industry and the world thinks of computers. Before Kay's work a computer was a non-personal box that spat text at you. If you wanted to interact with this machine you had to learn to speak its language. Kay, because of his experience with children, his love of education, his diverse interests, and his genius, recognized that users can and should interact with a computer in different ways and should not be limited to only text. He was among the first to represent objects in a computer as pictures -- a metaphor that he further extended by developing the concept of object orientation. He is, clearly, one of the fathers of the modern PC.

Concerned with the blindness of society to the latent potential that computer offer, Kay worries that the machine he so loves will become some "mass opiate." While the computer could possibly have a negative affect on society and become another television, Kay hopes that it will have a far more beneficial role in the future of humankind.[\(3\)](#)

Kay is enraptured by the potential impact that computing technology can have on the world. He is especially interested in education and hopes that this new technology will create, what he calls, a "skeptical man." He likens the personal computer to the present day book and believes that if everyone had access to a computer, people would be more prone to play "what-if" games with information. He says that "the [information] retrieval systems of the future are not going to retrieve facts but points of view. The weakness of databases is that they let you retrieve facts, while the strength of our culture over the past several hundred years has been our ability to take on multiple points of view. It should be possible for every kid everywhere to test what he or she is being told either against arguments of others or by appeal to computer simulation. The question is: will society nurture that potential or suppress

it?"(2)

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** Photograph from: <http://www.research.apple.com/people/features/kay.gif>

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