Smalltalk

reading list

Smalltalk introduced the world to Object Oriented programming, a way of representing software as a network of interconnected and intercommunicating little computers. It has influenced nearly every programming language since, including Objective C, Java, and Swift.

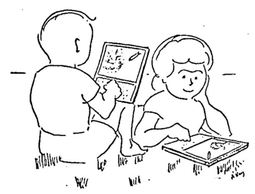
This reading list contains books, essays, and videos detailing the time and place from which Smalltalk emerged, the mindsets and visions of its creators, and the influences Smalltalk has had on computer systems and their programming languages.

Jason Brennan, May 2015.

Much of the genesis of Smalltalk is explained in Alan Kay's *Personal Computer for Children of All Ages* wherein he describes the **Dynabook** computer. The Dynabook was to be a personal dynamic computer, with a flat screen and a keyboard (today's iPads bear a striking resemblance).

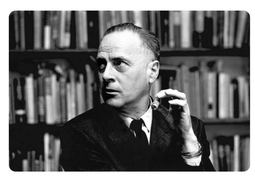
The Dynabook's system software was intended to be built and modified by anyone, for books and music, but more importantly for understanding complex systems.

The Smalltalk software and hardware that came out of Xerox PARC were in direct pursuit of the Dynabook vision. Kay went so far as to call the Alto computers "interim Dynabooks."



Thanks to **Marshall McLuhan**'s studies on media and our relationships with them, Alan correctly recognized the potential for the personal computer *as a medium* when the contemporary viewpoint had the computer as a vehicle at best.

See McLuhan's *Understanding Media* for more reference on the topic of media and our relationships with them.



McLuhan's big idea, distilled to the pull quote "the medium is the message" is we *change our thinking* in order to adapt to different media. It's the medium, not the message, that entails how we change.

McLuhan argues, for example, that Gutenberg's invention of a movable type production system, and therefor the arrival of the printing press in medieval Europe, ushered in repeatable, rational thought, the Age of Reason, the Scientific Revolution, and the concept of nationalism—all more or less accidentally.

Ivan Sutherland's *Sketchpad* (1963), introduced the graphical user interface, constraint based programming, and the first "master / instance" form of computer objects all in one year in one project. The project was deeply influential to future graphical personal computers, and to Smalltalk's development.

When asked how he invented so many important concepts in one year, Sutherland replied "Well, I didn't know it was hard."

See Sutherland's *original paper* or *this video* of a software demonstration.

Doug Engelbart's *Online System* (1968) was created with the help of fellow SRI researchers to augment human intellect. The system introduced the concept of *hypertext*, multiple views of interconnected data, groundbreaking networked collaboration, simultaneous typing and chorded keyboards, and the mouse as an input device. The system was jaw-dropping even by today's standards, and reshaped the computer as a personal device.

See Engelbart's *Augmenting Human Intellect* manifesto and his team's *Mother of All Demos* presenting some early completed work.

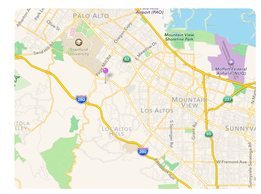
Smalltalk was created over the course of a decade starting in 1970 at Xerox's **Palo Alto Research Center** (better known as Xerox PARC) by the company's *Learning Research Group*.

When people think about Smalltalk as a professional programming language it's almost always **Smalltalk-80** (released in 1980) they're thinking about, but in fact Smalltalk had dozens of versions and revisions in the preceding decade.

Smalltalk was originally intended as a medium of expression, and not as a professional developer tool until much later.

Alan Kay, influenced by the media studies of Marshall McLuhan and inspired by the revelatory work being done with computers in 1960s California, began the Smalltalk project as a personal dynamic medium of expression on personal computers. Alan gave the concept **Object Oriented Programming** its name and its first true form in Smalltalk.

See *The Early History of Smalltalk* for more information.



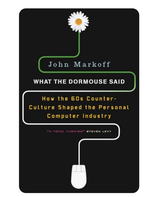
Adele Goldberg not only helped develop Smalltalk at PARC but was also responsible for early **testing with students**. She wrote much of the official Smalltalk documentation and helped establish what would become **OOP Design Patterns**.

It should be noted while she is often credited for her work with Smalltalk, few other women are acknowledged for any contributions made to its development, as is often the case in technology history.

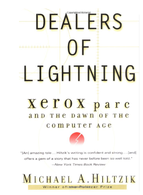
See *Personal Dynamic Media* and Adele's chapter of *Points of View* (pp 9)

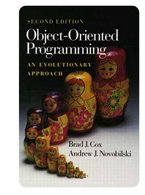
Dan Ingalls is responsible for many of the early implementations of Smalltalk, having built around 80 implementations of it in the 1970s. He helped build the **bitblt** algorithm for rapidly moving regions of memory. The algorithm helped make overlapping windows possible.

For the history in Silicon Valley leading up to the inspiration and creation of Smalltalk, see John Markoff's *What the Dormouse Said*.



For the history of Xerox PARC in the decade that lead to not only Smalltalk, but other innovations like ethernet and the laser printer, see Michael Hiltzik's *Dealers of Lightning*.



For a deep look at the technical details of the Smalltalk system, see the famous issue of *Byte Magazine*.

For the influences of Smalltalk on **Objective C**, and other object oriented programming languages, see Brad Cox and Andrew J Novobilski's *Object Oriented Programming: An Evolutionary Approach*.