

AT THE
INTERSECTION
of
OPTICS & ART

**AN INTERVIEW WITH SILICON VALLEY PIONEER,
DISTINGUISHED ART COLLECTOR, AND AUTHOR JAY LAST '51.**

Interview by Peter Lennie

*Robert L. and Mary L. Sproull Dean of the Faculty of Arts, Sciences & Engineering
and professor of brain and cognitive sciences*

Edited and condensed by Karen McCally '02 (PhD)



THE GEOMETRY OF ART: Last, who has long favored art based on simple geometric forms, poses before a banner by Robert Indiana. The banner, displayed in Last's Beverly Hills home, is based on a 1928 painting by American modernist Charles Demuth.

JAY LAST '51

has had an extraordinary career in science and art.

As an early leader in the development of semiconductors, he helped usher in the computer revolution. His keen interest in design and form led him to collect African art, becoming part of the first generation of Westerners to devote serious attention to the continent's visual art traditions.

In academic settings, science and art tend to dwell in separate departments, and often in different schools. But, says Last, "I don't separate the two in my mind." He reflected on their convergence in a memoir, *African Art and Silicon Chips: A Life in Science and Art* (Sierra Vista Books), published in 2015.

In June, Peter Lennie, the Robert L. and Mary L. Sproull Dean of the Faculty in Arts, Sciences & Engineering, visited Last at his home in Beverly Hills, California. Over the course of an afternoon, Last spoke with Lennie about his education at Rochester, the connections between optics and art, and science's relationship to the humanities.

GROWING UP

What kind of an education did you receive growing up?

I lived in a relatively small town in western Pennsylvania. The teachers were very conscientious, and they did their jobs well. The only problem was that they weren't teaching me fast enough. There was a very good public library, and I read huge amounts of stuff in that library. By the time I left for college, I bet I'd read most of the stuff there. I certainly developed quite an interest in what the world was like by all of this reading I was doing.

What was it like coming to Rochester?

When I was in high school, I didn't know if I was going to have the chance to go to college. So I learned to weld and I learned to type. And I thought, at least I've got a couple of skills that can keep me going. I applied to Rochester and the Bausch & Lomb scholarship. I didn't apply any place else or for anything else. I don't know what my backup would've been if I hadn't gotten that.

I was never challenged in high school, and then I came to Rochester, and it was just the exact opposite. I realized I was just an average student there instead of being one of the brighter ones in my high school

class. And I was in optics, which requires a very large amount of laboratory work, which is very time consuming. I always felt overworked, with not enough time, and not enough time to sleep, and that continued pretty much the whole way through Rochester.

ART THROUGH THE LENS OF A SCIENTIST

How did you develop your interest in art?

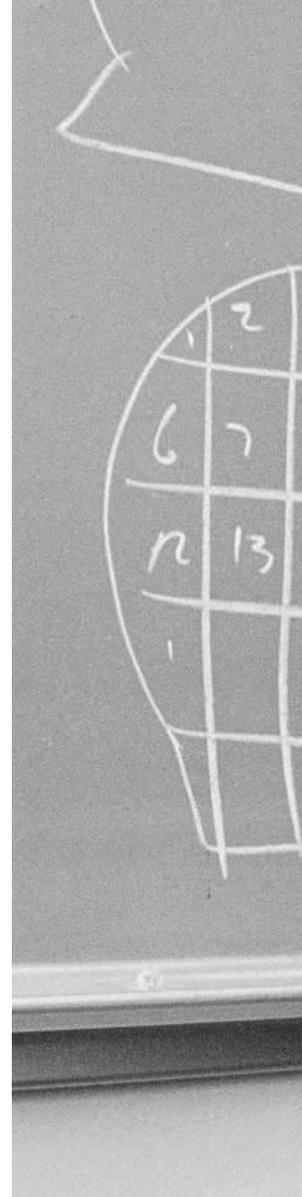
Optics, to me, is a beautiful thing. I can see art in so many optical phenomena that you see every day. In solid-state physics, I think you're looking at interesting designs the whole way through—the mathematical designs of inverse space and things like that. I did my doctoral thesis at MIT on ferroelectricity involving perovskite structures, and having a feel for crystal structures helped me to work my way through a lot of problems.

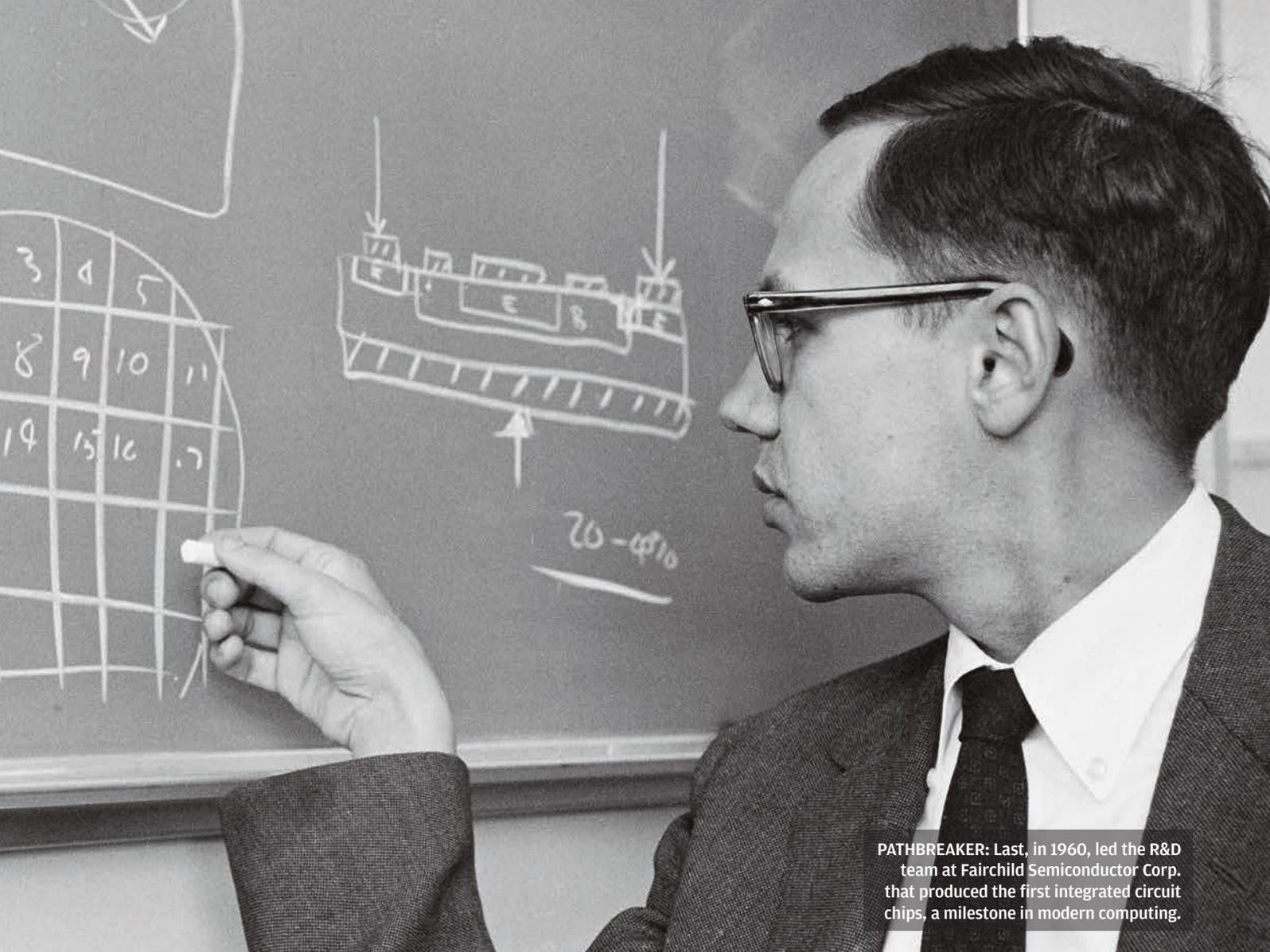
As a young physicist, I'd go to Physical Society meetings in New York, and for the first time I had a chance to go to museums and see art of the sort that I grew to really appreciate, abstract art. In the early days of my

Physicist

Last began his career at Shockley Semiconductor in 1956, and left with seven other colleagues to form Fairchild Semiconductor Corp. the following year. Fairchild became the leader of the new semiconductor industry and an incubator of the high-tech companies in the San Francisco Bay Area that gave the region the designation Silicon Valley.

Last moved to Teledyne Inc. in the 1960s, from which he retired as vice president of technology to devote more time to art collecting and philanthropic projects.





PATHBREAKER: Last, in 1960, led the R&D team at Fairchild Semiconductor Corp. that produced the first integrated circuit chips, a milestone in modern computing.

collecting, I and many of my friends were becoming interested in art because it was interesting geometry to us. And the way I've collected art, the pieces I really appreciate the most are usually the simplest design forms, or the most imaginative design forms.

Are there other ways in which your training as a scientist has helped you appreciate art?

Yes, understanding materials allows me to appreciate what the artist went through to create it. For example, Africans developed metallurgy at a very early time. Some of the best African pieces are from Benin and Nigeria, made in the 1500s and 1600s with extremely sophisticated metallurgic technology. There have been great efforts to discover how this technology managed to migrate into Africa at this time, and of course it didn't. It was created there. It's beautiful work, but understanding metallurgy certainly adds to my experience of the art.

The appreciation for color that I developed in my work in optics was what really got me interested in lithography. When I came to Southern California and went to flea markets, I saw that there were small labels on the ends of boxes of oranges, and the labels were no longer used, but every packing house in Southern California had stacks of these things. They were gathered up by dealers and they started selling them. I built a big collection of these, which I donated to the Huntington Library.

Gordon McCelland and I ended up writing a book, *California*

Orange Box Labels, and we included a chapter on the lithographic process used to make the labels. I set out to learn more about color lithography. How did it work from a scientific point of view? It produces remarkable work with a relatively simple technique, but there's an awful lot of tough scientific stuff involved in doing this properly. And I looked, and there really wasn't a good book that had been written on this from a standpoint of the history of American color lithography. So I set out to write it, and it took me a decade. The book, *The Color Explosion*, is now the standard book on American color lithography.

What drew you from science to artistic pursuits?

I've spent the second half of my life essentially in nonscientific work, but I just don't separate the two in my mind.

I had a very interesting career at Teledyne, which had been started by Henry Singleton, who was just a remarkable individual for his ability to build and run a company. Teledyne was growing rapidly. When I joined, we had just one company, and by the time I left, we had 150 companies. I was vice president of technology, and my job was to try to make sense of where our divisions were overlapping and how they could cooperate. And having a broad technical background, I didn't need depth in every area, but I needed quite a breadth, going to some electronics division one day, or to somebody building oil well measuring equipment the next day—it was just a fascinating job.



SIMPLE FORM, HIGH TECH: Whistle (top), a Hungana (Democratic Republic of the Congo) piece from the late 19th/early 20th century, reflects Last's preference for simple forms. Relief plaque with crocodile (Benin/Nigeria), a 16th-century piece, showcases Africa's advanced metallurgic technology.

Collector and Philanthropist

A collector of African art for nearly 50 years, Last has donated more than 600 objects to UCLA's Fowler Museum since the 1970s.

Also a collector of commercial prints, Last has donated thousands of printed artifacts to the Huntington Library in San Marino, California, where they're held as the Jay T. Last Collection of Lithographic and Social History.

Last is also founder of the Archaeological Conservancy, which has saved hundreds of archaeological sites by purchasing them from private owners and developing plans for conservation.

He has contributed to several University initiatives, including the College Writing, Speaking, and Argument Program, the Humanities Center, and the Language Center.

And I continued that until Teledyne started changing from a growth mode to consolidation. My interest decreased, and I left and started working more and more in various art projects. That was a turning point in my life. I left what was essentially a day-to-day science job and turned to art and other humanistic things.

LIFE AS A COLLECTOR

How did you begin to develop your African art collection?

When I started collecting it, it wasn't very actively collected, and it wasn't very appreciated. Nelson Rockefeller took quite an interest in it in the late '50s, and that made quite an interest develop in New York. The art was very low priced, and it was flowing in from Africa, with the jet plane and the ease in transportation. I started collecting at the time when it really started coming in in large quantities. For the next 20 years, it was a golden time for collecting.

Your collection is particularly strong in Lega art, that is, the art of the Lega people of present-day Congo. What drew you to this particular tradition?

Originally I got interested in it because it was very simple. Then I met Daniel Biebuyck, who was a great scholar of Lega art and lived among the Lega for many years. In extensive conversations with him, I became very appreciative of what the Lega were doing with their art. They would have great ceremonies where they would take out this art, which was usually concealed, and use it to illustrate various aphorisms. They had thousands of aphorisms, and the art was used to remind people of them. One example is a very simple figure that I have, with two eyes, and a little dot above one of the eyes. That dot reminds the Lega of the saying, "I thought my father was asleep, but he had his third eye open to watch after me." And these are just beautiful, and the whole society is structured around using this art as an educational device.

I'd been interested in art as objects rather than the way the objects were used, but Lega art got me interested in the social uses of the art.

Scholars have consulted your lithography collection based on a similar interest—that is, the social significance of the pieces—haven't they?

My collection, which now resides at the Huntington Library, has been used far beyond looking at the technical aspects of lithography. It's turned into a very widely used collection for the discussion of social history. I'm amazed at the breadth of the sort of things people are interested in. There's a fellow doing work on the dozens and dozens of small bits of land, islands, that the United States owns all over the world. The United States wanted them because birds rested there, and they were going to mine guano [manure from seabirds, used as fertilizer]. This fellow came to my collection at the Huntington and said, "What do you have on guano?" I had beautiful pictures of birds, guano, and guano mines. You can never tell what people might be interested in when you have a broad collection.

THOUGHTS ON LIBERAL EDUCATION

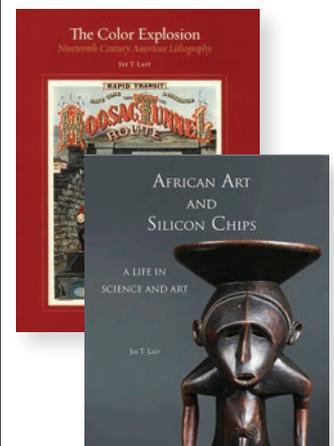
Would you say you received a liberal education at Rochester?

I didn't think in those terms then. I was really interested in optics, and this was the part of my life when I was learning optics. I took essentially all of the optics courses that were offered.



Author

Last is the author of *African Art and Silicon Chips: A Life in Science and Art* (2015) and *The Color Explosion: Nineteenth-Century American Lithography* (2006); and, with Gordon McLelland, five books on California art, including topics such as fruit box labels and watercolors.





CROSSING DISCIPLINES: Lennie and Last discuss the interrelationship of science, art, and the humanities at Last's home.

I enjoyed courses in other disciplines. A course on contemporary European governments, for example, at a time when the governments in Europe were in great flux. I found that an extremely valuable course for me. It really opened my eyes to what was going on in Europe at the end of the Second World War. I took a very valuable course in literature, a survey from the pre-Biblical days to the present, which opened my eyes to many things. I read *Moby-Dick*, and I had to read it in two evenings. Three or four years ago I went back and read it more leisurely and realized what a wonderful book it was. I'd still kept all of those books.

My advice to somebody going into a scientific trade today would be, don't underestimate how the humanities can make your life a lot richer.

Do you think a humanistic education makes one a better scientist?

At the very least I think that the understanding of the world you gain through the humanities enables you to put science into a broader context. Looking at the history of science, which was never taught to me in science courses, would have been very valuable. Thermodynamics, for example, would have been a lot more interesting to me if I saw it in the context of the industrial revolution. Sometimes things have to all be in place for the science to be a meaningful advance.

Humanities are also important in learning to write well. A good writer has a real edge in being able to express his thoughts well.

The fact that I read so much helps me appreciate the skill it takes to write well. I think a lot of good writers started by being avid readers. The two best writers I know, two of my dear friends, a lawyer and a venture capitalist, both got their undergraduate degrees in history, where they read steadily.

Do you think scientific education makes one a better humanist?

Yes. I'm appalled at the scientific ignorance, as well as the ignorance about statistics, among the people who are making decisions about science. If there were some way to have our political leaders learn more about science and statistics, or get more people with that knowledge interested in politics, it would help.

Given the breadth of your interests, how do you think we might encourage more people in the humanities to explore science, and vice versa?

I'd favor an approach where science or humanities education is tied in with the experience the students already have—as an addition to their present knowledge and experience—rather than as some foreign intrusion that doesn't relate to anything else in their lives. Both science and humanities can be very dull and tedious if one is in over one's head, or if the material is presented in an uninspiring way. But both disciplines are full of interest if they are presented in a manner where they complement each other and make each a rich addition to one's life. **R**