

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?

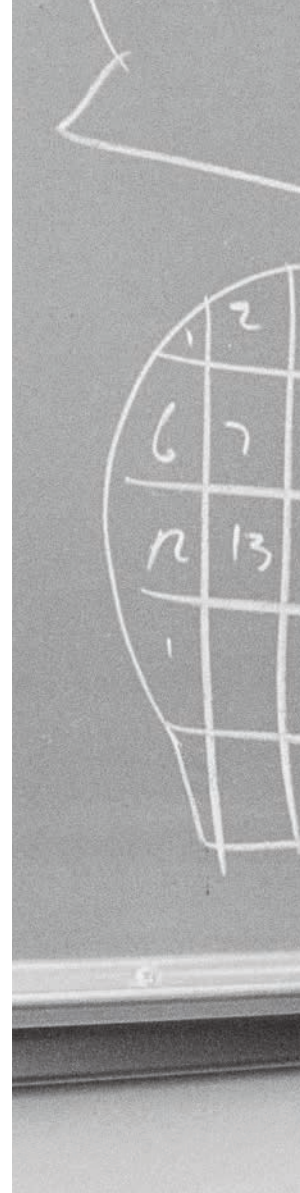
Optics, to me, is a beautiful thing. I can see art in so many optical phenomena that you see every day. In solid-state physics, I think you're looking at interesting designs the whole way through—the mathematical designs of inverse space and things like that. I did my doctoral thesis at MIT on ferroelectricity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

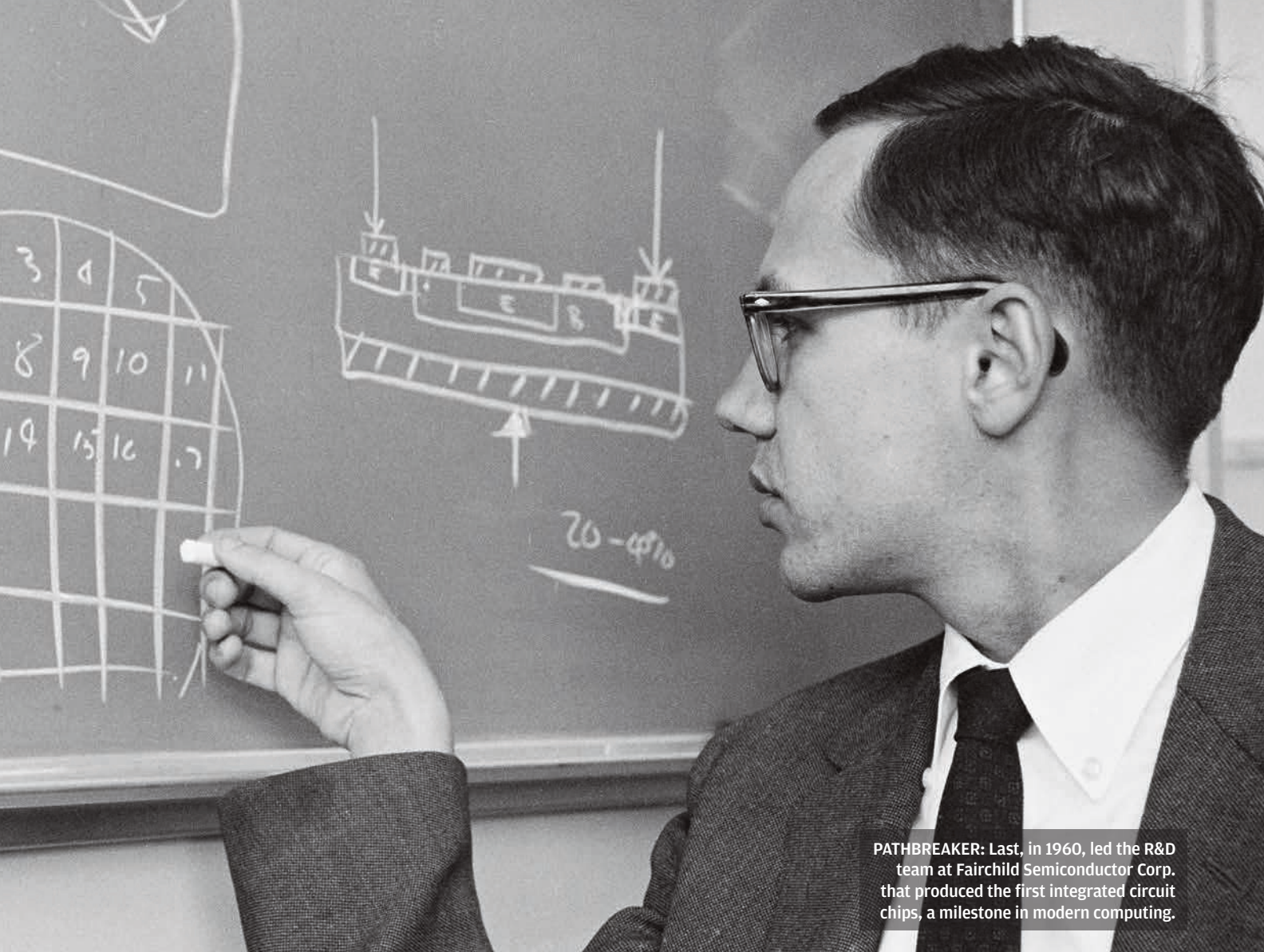
As a young physicist, I'd go to Physical Society meetings in New York, and for the first time I had a chance to go to museums and see art of the sort that I grew to really appreciate, abstract art. In the early days of my

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 McClelland 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**

STAR TREK'S Half-Century Voyage



ROCHESTER FACULTY AND ALUMNI HAVE COMPOSED ITS THEME, WRITTEN EPISODES, AND REFLECTED DEEPLY ON WHY STAR TREK RESONATES.

By Karen McCally '02 (PhD)

With additional reporting by Sofia Tokar and Dawn Wendt

IT'S A VOYAGE THAT BEGAN 50 YEARS AGO, on Thursday evening, September 8, 1966. The television series *Star Trek*, a western for Cold War America, introduced us to Captain Kirk, Mr. Spock, and the starship *Enterprise*, inviting us “to boldly go where no man has gone before.”

The show attracted a small but passionate following in its three-season run. That fan base would grow exponentially in size and influence in the 1970s, as a generation of latchkey kids tuned in to *Star Trek* reruns, a staple of after-school broadcast lineups. From that decade forward, *Star Trek* grew as a franchise. Including the television series *Star Trek: Discovery*, slated for a January 2017 release, the franchise consists of six television series and 13 films, as well as books, magazines, comic books, action figures, games, and other memorabilia.

Rochester faculty and alumni have made important contributions to the show, starting with its iconic theme, the work of composer Alexander Courage '41E.

Reginald Barclay, the awkward, brilliant *Next Generation* lieutenant whom cohorts derisively nickname “Broccoli”—before he ends up saving the *Enterprise*—is the creation of Rochester English professor Sarah Higley.

From the beginning, *Star Trek* has attracted a cerebral sort. It

had geek appeal long before geekdom became the badge of honor it is today. We shouldn't be surprised, then, to find an abundance of steadfast fans among Rochester faculty and alumni.

Many work in science and technology. The series and films may not always depict scientific principles accurately (see “A Physicist's Take,” p. 45), but they invite us to imagine what a high-tech future might look like.

Humanists who love *Star Trek* say it stimulates the social imagination, inspiring us to think about a society liberated from constraints we often don't question.

Perhaps one reason for this crossdisciplinary appeal can be found in creator Gene Roddenberry's account of his own inspiration for the show. Looking to explore the changes and conflicts of the 1960s, Roddenberry found television executives wary.

“You really couldn't talk about anything you cared to talk about,” he said in an oral history conducted by Edward Gross and Mark Altman, and published earlier this year. “It seemed to me that perhaps if I wanted to talk about sex, religion, politics, make some comments against Vietnam, and so on, that if I had similar situations involving these subjects happening on other planets to little green people, indeed it might get by, and it did.”



'WAGON TRAIN TO THE STARS': The Starship *Enterprise* soars across space. *Star Trek* creator Gene Roddenberry envisioned the show as a modern day western—in his words, “a wagon train to the stars.”

TRANSPPOSED

PROD# M R P ORIGINAL MAIN TITLE (REVISED) 67/68

Handwritten musical score for Star Trek. The score is for a 4/4 piece, transposed. It includes parts for various instruments and vocalists:

- 3 Flts:** 1st Piccolo, 1st & 2nd Flutes. Notes include "No vib." and "p".
- 10b. W.W.:** 10 Bassoons/Woodwinds.
- 2 Clar.:** 2 Clarinets. Notes include "No vib." and "p".
- 2 Basses:** 2 Bassoons. Notes include "p".
- 3 Trumps.:** 3 Trumpets.
- 3 Tromps.:** 3 Trombones.
- Tuba:** Tuba part.
- Drum:** Drum part with notes "F.I. STAR TREK SKY", "SPACE", "PAUSE", and "THE FINAL FRONTIER".
- Soprano:** Soprano part with notes "AND VERY TWIN" and "p".
- Organ:** Organ part with notes "1", "2", "3", "4".
- Bass:** Bass part.
- 1 Harp:** Harp part with notes "p".
- Celeste:** Celeste part.
- 1 Pno.:** Piano part with notes "Notes off." and "SOFT HAMMERS".
- Vibra:** Vibraphone part.

The score is divided into four measures, with a total duration of 1 1/2 minutes. The tempo is marked as 4/4. The score is handwritten and includes various performance instructions and dynamics.

A Memorable Score
 A reproduction of the original Alexander Courage '41E score of the Star Trek theme is part of the Alexander Courage Collection at Eastman's Sibley Music Library. The collection includes many of Courage's original scores, scripts, sketches, notes, and recordings for films and television productions; arranged scores for pops orchestras and awards broadcasts; and sheet music, personal papers, and professional as well as personal photographs.

The Story of a Theme

Alexander Courage '41E Composer

"I have to confess to the world," said the late Alexander Courage '41E in 2000, "that I am not a science fiction fan." Oh, the irony.

From its eerie first notes, to its arresting fanfare, to its soaring climax, the theme that Courage composed for *Star Trek* in 1966 is among the most iconic in all of film or television.

Over his career, Courage was a prominent film and television composer with credits on films such as *Funny Face*, *Guys and Dolls*, *Showboat*, and *Doctor Dolittle*; and television series *Wagon Train*, *Peyton Place*, *Daniel Boone*, and *The Waltons*.

But it was his work on *Star Trek* that led to greatest acclaim.

In a tribute to Courage that appeared in *Rochester Review* following Courage's death in 2008, television and film composer Jeff Beal '85E wrote that theme music is "often at its most resonant when the use of an unforgettable melody somehow captures the feeling and essence of a dramatic world."

Courage "understood this well," wrote Beal, whose credits include the theme for the Netflix series *House of Cards*. "How could we ever separate the strains of his *Star Trek* theme from the

What's that Sound?

During the opening of *Star Trek*, the *Enterprise* races across the screen. What's the sound that accompanies it? It's Alexander Courage breathing into a microphone.

Producers tried a variety of electronics to try to get just the right sound, but with no success. "I said, 'Look, it won't cost you anything,'" Courage told music journalist John Burlingame in 2000. Watching the screen as the *Enterprise* flew by, Courage delivered a breathy roar into the mic. "And that's what they used," he said.

triumphant French horns and the theremin-like female vocal?"

When he was hired to compose for *Star Trek*, he saw it as just another job for "just another show," Courage recalled in that same 2000 interview, conducted by film and music journalist John Burlingame for *Emmytvlegends.org*.

"Little did I know when I wrote that first A flat for the flute that it was going to go down in history somehow," he said. "It was a very strange feeling."

Hope in a Fractious Age

Jeffrey Tucker Associate Professor of English

"There was a kind of utopian vision that the show offered," says Jeffrey Tucker, a science fiction expert who teaches a course on utopian literature.

"A key aspect of utopian philosophy is the notion of hope. Hope is a forward-looking psychological process, and just the notion that the status quo can be revised and improved—and even, I think my father said, that the species will survive and exist into the 22nd

or 23rd century—in the mid-to-late 1960s that idea probably had a lot of weight. It was during the Cold War. It was the Vietnam era." And the species does more than survive in *Star Trek*, Tucker adds. It "expands its scope and explores the final frontier, and engages with other civilizations in a mostly constructive way, as opposed to destructive.

Certainly there are conflicts, and wars and battles represented, but the

whole idea is about exploration and sharing, cultural and economic exchange as opposed to domination."

Tucker notes there are opposing interpretations, namely one that sees the starship's exploration as a form of colonialism. "To what extent are the *Enterprise* and the Federation of Planets instruments of economic and military dominance, and to what extent are they vehicles for cultural and economic exchange? I think the creators intended the latter," he says, "but if we're to be responsible audiences, we have to be open to that other way of responding to the story, or at least be aware of how the history of colonialism and expansionism at least shadow, if not shape, the stories in the classic series." As for the later series, "I think *Next Generation* and the subsequent series worked harder to get out of that mind-set," he adds.

My father watched *Star Trek*. He was a big fan. When I was a kid, the show was in reruns, and I watched those with him. I don't know that I really got the concepts. I think I watched it because it was colorful, and it was a bonding experience with Dad, who read a lot of science fiction. And that's sort of where my interest in the genre came from.

What Gender Is that Alien?

Tucker notes that *The Next Generation* explored gender identity long before the idea of fluid gender identity or the word transgender moved beyond relatively small communities and into the American popular discourse.

In the episode "The Host," the starship doctor discovers that members of an alien race are actually human hosts with a symbiotic creature (Tucker describes it as a worm) living within them. They share a consciousness, but the worm's lifespan exceeds that of humans. When the human host dies, the worm enters another host.

"The worm and the human host share a consciousness," he says. "But the worm can live for centuries. When its host dies, the worm leaves and goes to another human host. What happens if it goes from a female host to a male host? All of that female host's memories and identities go along with the worm into its new host. So is that human male, female, both, or something else?"



LIVE LONG AND PROSPER: Mr. Spock figurine from the 2009 film *Star Trek*.

Introducing Holodiction

Sarah Higley Professor of English

Sarah Higley was in her third year of teaching medieval English literature at Rochester when she drafted a script for *Star Trek: Next Generation*. Having grown up on *The Original Series*, she started watching *The Next Generation* and quickly found herself both intrigued and skeptical.

Higley was fascinated by the holodeck, which had become a major feature of the *Enterprise* starting early in the first season. The holodeck was an enclosed room programmed to simulate any environment and create any holographic characters its users chose. "It was a rich source of role play for those who entered it," Higley says. But she found its portrayal "too wholesome. Crew members engaged in all sorts of adventures in the holodeck without psychological repercussions. Here we were, addicted to television. Where was the addiction to something like the holodeck?"

"I started writing this story about Reginald Endicott Barclay III," she says, "who was not well-adjusted, but who was a genius, and was admitted into the academy, and got on the *Enterprise*, but gradually started slipping, because of his unhappiness and his cynicism, into the holodeck." Her intention was to introduce a more three-dimensional character, and one more flawed and less heroic than characters such as Picard, La Forge, or Riker. And Barclay modified them in the holodeck, creating caricatures of them. She submitted her script, which she titled "Hollow Pursuits," and it was accepted—provided she rewrite it. The show's coproducer Michael Piller "wanted all of the episodes to have a certain quality to them. He wanted them to be

I started watching the show as a teenager, and was drawn to Mr. Spock. I thought he was one of those uncrack-able, admirable, intellectual individuals that I hadn't seen before. I was also in competition with my best friend, Phyllis, who loved the swagger of Captain Kirk, and I didn't go for it. I wanted a nut to crack.

upbeat," she says. The producers loved the concept that Higley coined as holodiction, but were lukewarm about Barclay.

"They told me, 'we like the premise, we like the whole idea of holodiction, but you have to have something that this character, Reginald Barclay, will solve, so that he stops being a Walter Mitty character and becomes the hero of the day.'"

She responded to the producers' wishes, and when she viewed the finished episode, discovered something startling.

"When I saw the episode, I realized how much of it was an analogy of me writing an episode for *Star Trek*," she says. Barclay was "an alien element" who repurposes the holodeck, refashioning his crew members to serve his psychological needs. But he's forced, in the end, to abandon the holodeck. He saves the starship from a technical malfunction that threatened to destroy it. At the end of the episode, he bids goodbye to his simulated versions of the crew members to take his place among the real ones. "And I thought, 'My god, that is me!'" Higley says. "I was told umpteen times how I could and couldn't portray the characters. I was projecting that onto Reginald Barclay."

Higley has mixed feelings about her experience working with *The Next Generation's* showrunners. As a scholar, she retains control over her published work to an extent not possible in the world of television and film. But even with the compromises she had to make, the episode crystallized a basic truth about virtual reality. It's a wondrous technology, with the capacity to enhance our lives in this world—or, very often, and at least for some of us, to lead us away from it.

STAR TREK: "Hollow Pursuits" - 2/9/90 - TEASER

1 CONTINUED:

The Holo-Guard groans, Barclay smirks, takes a gulp of synthehol and gestures with the glass at Holo-Riker.

BARCLAY

"Insubordination."

Holo-Riker seizes his arm and slops the drink; Barclay turns quickly, gets a half-nelson on Holo-Riker and strains him painfully against the counter.

BARCLAY

Riker, you're nothing but a pretty mannequin dressed up in a fancy uniform. You're full of hot air and nothing else, and if Picard has a problem with me, he can come and tell me himself...

Barclay gives him one last hard push before releasing him. Defeated, Holo-Riker slips wearily down and leans against the bar. Barclay moves threateningly at Holo-Geordi, who retreats, runs out of the room, scared to death. Barclay saunters over to the table where Holo-Troi is seated. He picks up her willing hand.

HOLO-TROI

I feel your confidence, your arrogant resolve. It excites me.

COM VOICE OF THE REAL GEORDI --

GEORDI'S COM VOICE

...ent Barclay, report to Main

MARKUP: Showrunners were keen on the basic elements of Higley's script, but wanted substantial changes to highlighted sections.



Jonathan Frakes as William T. Riker in *Star Trek: The Next Generation*.

William T. Riker and William H. Riker

Fans may have noticed that *The Next Generation*'s Commander William T. Riker bears the same first and last name as the late William H. Riker, the influential founding chair of Rochester's political science department. Is there any connection? In fact, no. Putting the rumor to rest are professors Gerald Gamm and Richard Niemi, both of whom declare there is "absolutely no connection" between the two Rikers.

Detail and Heart

Thomas Perry '74 (PhD) Novelist and screenwriter

Thomas Perry and his wife, Jo Perry, are both trained as scholars of literature, and both turned to novel and screenwriting as their profession. They'd been writing steadily for the CBS prime-time television series *Simon & Simon* in 1990 when they cowrote "Reunion," episode 80 of *Star Trek: The Next Generation*.

"Jo and I liked *Star Trek*, and Mike Piller, who had been a producer and head writer for a couple of seasons when we were coproducers of *Simon & Simon*, was working as a writer and coproducer on *Star Trek*," Thomas Perry says. "Mike called us and asked if we wanted to write an episode. Because we liked and respected Mike, we were happy to do it."

"Reunion" tells the story of an ambassador who makes a visit to the *Enterprise* to alert Captain Picard that the leader of the Klingon Empire has been poisoned. Picard is to choose the successor, a competition between two rivals.

"One reason for the show's success," Perry says, "is that the stories were all about human emotions, and not about futuristic hardware. We were already used to Mike Piller asking for stories with heart, and on that show, his bosses seemed to support that policy. This gave the show a timelessness, which contributed to its longevity. Human nature doesn't go out of date."

That's not to say that the show's creators didn't put great effort into the depiction of "futuristic hardware." Says Perry:

"The first thing a freelance writer doing an episode noticed was how meticulously the show was run. Every television show had what was called a bible. It contained a description of every previous episode, so the staff didn't have to listen to pitches for episodes they'd already done, or turn out an episode that contradicted an earlier one. At *Star Trek*, the bible was seven booklets, if I recall correctly. There was one about the physics of the fictional universe, another about the starship *Enterprise* and its gadgets, another about the anthropology of *Star Trek*. Everything on that show seemed to be run with similar precision and attention to detail."

ADAM FENSTER (SCRIPT, FIGURINE); AF ARCHIVE/ALAMY (FRAKES, SHATNER, BROOKS); PHOTOS 12/ALAMY (STEWART); UNITED ARCHIVES GMBH/ALAMY (MULGREW)

Star Trek: A Brief Overview

Star Trek began as a television series created by Gene Roddenberry. It's since grown into a multibillion-dollar media franchise consisting of several additional series, all distinct iterations derived from the original, as well as 13 films. Here's a timeline of the major *Star Trek* television series, as well as a brief synopsis of each:

Star Trek: The Original Series 1966-69

Set in the 23rd century, introduces the spaceship known as the starship *Enterprise* and its crew. Leading the mission—to seek new civilizations within the galaxy, "to boldly go where no man has gone before"—is **Captain James Kirk** (William Shatner), an Earthling with a wild streak, and first officer **Spock** (Leonard Nimoy). Spock is half-Vulcan, an alien being dominated by reason over emotion. Although cancelled after three seasons, *Star Trek* gained a small, cult-like following that greatly expanded during the 1970s, when the show was in reruns.



The Next Generation 1987-94

Set in the 24th century, introduces a new starship with a new crew, led by **Captain Jean-Luc Picard** (Patrick Stewart). The mission remains the same, albeit updated with the gender-neutral call "to boldly go where no one has gone before."



Deep Space Nine 1993-99

Set in the 24th century, introduces the space station Deep Space 9, led by **Captain Benjamin Sisko** (Avery Brooks), and situated in the most distant regions of explored space. The discovery of a wormhole sends the crew into vast uncharted territory.

Voyager 1995-2001

Set in the 24th century, introduces **Captain Kathryn Janeway** (Kate Mulgrew) of the U.S.S. *Voyager*. Janeway and her crew are trapped by alien technology 70,000 light-years from Earth. The mission is to return home.



Enterprise 2001-05

Prequel to *The Original Series*, *Enterprise* takes place in the 22nd century, before the founding of the United Federation of Planets.

Discovery To be released in 2017

Also a prequel, *Discovery* will cover the period between the end of *Enterprise* and the beginning of *The Original Series*.

From top: William Shatner, Patrick Stewart, Avery Brooks, and Kate Mulgrew.





Lt. Nyota Uhura
(Nichelle Nichols)

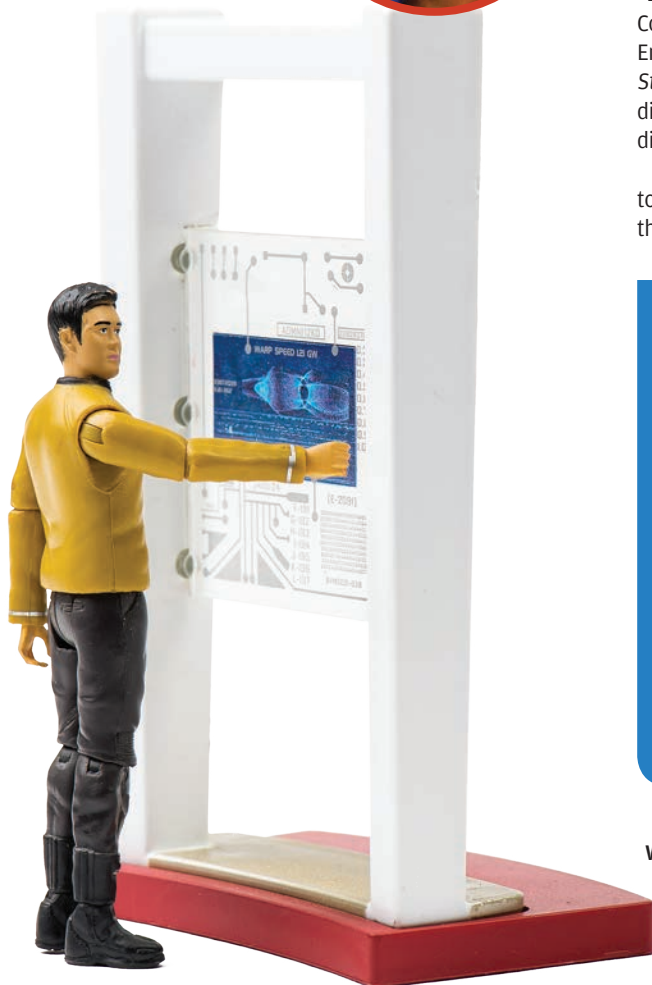
What's Your Server?

In the earliest days of email, as we collectively marveled at our newly expanded capacity for instantaneous communication, the staff of Academic Technology Services was inspired to name the University's servers after *Star Trek* characters. Which email server were you on?

- **uhura** (Lieutenant Nyota Uhura)
- **troi** (Deanna Troi)
- **riker** (William Riker)
- **laforge** (Geordi LaForge)
- **picard** (Jean-Luc Picard)
- **guinan** (Guinan)
- **ro** (Ensign Ro)



Lt. Commander Geordi La Forge (LeVar Burton)



The Next Generation ... Voyage to Heterotopia

Aviva Dove-Viebahn '10 (PhD) Honors Faculty Fellow, Barrett, The Honors College at Arizona State University

Science fiction has often been perceived as the province, primarily, of men—fantasy worlds chock full of gadgets and ultrapowerful humanoids. The irony, says Aviva Dove-Viebahn, is that science fiction “allows you to really play with social norms and to buck social norms”—including gender roles and stereotypes.



B'Elanna Torres (Roxann Dawson)

As a teenager, Dove-Viebahn was captivated by *Voyager* in large part because of the show's female lead, Captain Janeway.

Janeway “was a scientist and an explorer,” she says, “and fully invested in this role without being super girly, and without being masculine either.”

She was also drawn to the character B'Elanna Torres. “I'm biracial,” Dove-Viebahn says. “And B'Elanna Torres is half Klingon and half human. She struggles with this idea of being a hybrid. And

as a biracial teenager, coming to terms with the two sides of my identity, I was really drawn to her storyline, too.”

As a graduate student in visual and cultural studies at Rochester, Dove-Viebahn published an article in *Women's Studies*, a major interdisciplinary journal, entitled “Embodying Hybridity, (En)gendering Community: Captain Janeway and the Enactment of a Feminist Heterotopia on *Star Trek: Voyager*.” A heterotopia “emphasizes diversity rather than consensus,” she says. “Heterotopias offer a place for people to be different, but to still be able to collaborate.

“A collaborative space in which everyone's voice is given equal merit—that functions to me as a kind of ideal feminist space. And of course Captain Janeway as leader of that space adds an extra feminist layer to that.”

When I was a kid, maybe seven or eight, I started watching The Next Generation with my mom. I got really into it. And when Voyager came on, that was the first series I watched from beginning to end, again, with my mom. My dad watched too, but he wasn't as into Star Trek as my mom and me.

Inspired by Star Trek

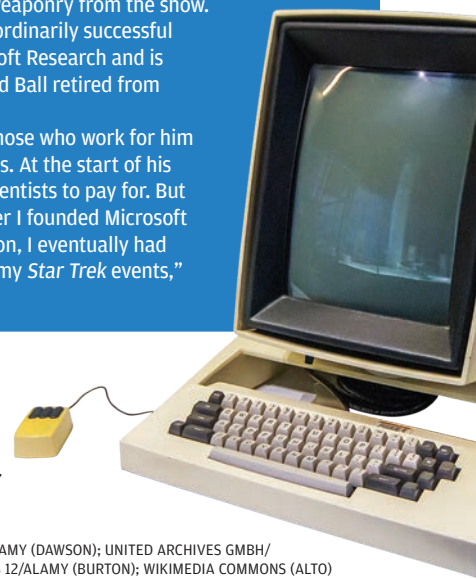
As graduate students in computer science at Rochester, Rick Rashid '80 (PhD) and Gene Ball '82 (PhD) codeveloped the *Star Trek*-inspired *Alto Trek*, one of the earliest networked computer games. Designed for play on the Xerox Alto computer, the game involved play in a universe of 16 star systems and included spaceships (named *Klingon*, *Romulan*, and *Terran*) and weaponry from the show.

Rashid and Ball went on to long and extraordinarily successful careers at Microsoft—Rashid founded Microsoft Research and is a chief technology officer at the company, and Ball retired from Microsoft as a senior scientist.

Since 1980, Rashid has regularly treated those who work for him to viewings of the *Star Trek* franchise's movies. At the start of his career, he only had a few fellow computer scientists to pay for. But as his success grew, so did the tradition. “After I founded Microsoft Research in 1991 and built out the organization, I eventually had hundreds of employees and their families at my *Star Trek* events,” he says.

WARP SPEED: Figurine and control panel from the 2009 film *Star Trek*.

Xerox's Alto Computer



A Physicist's Take

Dan Watson Professor of Physics and Astronomy

Among people in science and technology, *Star Trek* fans abound. Dan Watson, chair of the physics and astronomy department, is among them.

But that's not because the series or films illuminate much about science. Watson shows *Star Trek* films to his introductory astronomy students to show what's *wrong* with their depiction of physical science. "Astronomy 102 students learn enough about strong gravity, black holes, and time machines to detect the mistakes, and doing so is a good exercise for them," he says.

Watson regrets that the franchise's film creators in particular didn't place greater importance on scientific accuracy. They "had many more

resources to use to get it right," he says, compared to the creators of *The Original Series*, for example.

As for *Star Trek*'s technological gadgetry, he says, "We joke about holodecks, food replicators, and warp drives, but I suspect most of us are attracted to the same sorts of things that draw the humanities folks in." To the extent that there are films or television shows that inspire the imaginations of budding scientists, Watson says *2001: A Space Odyssey* is probably the best example.

"At least in part, this is due to Kubrick's and Clarke's attention to scientific accuracy in matters that are currently within our grasp," he says, referring to Stanley Kubrick and Arthur Clarke, who wrote the screenplay.

Star Trek's Moral Universe

William FitzPatrick Gideon Webster Burbank
Professor of Intellectual and Moral Philosophy

"From its very beginning," says William FitzPatrick, *Star Trek* "explored themes of good and evil, power and moral corruption, peace and inescapable violence, and racism and equality; and in particular, took up issues concerning the moral standing of wildly diverse kinds of beings, from humanoids to intelligent energy clouds to sentient androids."

Many episodes inspired deep reflection. But one of FitzPatrick's favorites is "City on the Edge of Forever," which originally aired in spring 1967, during the first season.

Here's his take:

"Kirk, Spock, and McCoy are transported back in time, to 1930s Earth, and Kirk and Spock realize that Edith Keeler, with whom Kirk has fallen madly in love (what else is new?), must be allowed to die in a street accident. If she doesn't, the course of history will be radically changed, with the Germans winning World War II and everything the *Enterprise* crew know of their world vanishing in an instant, having never come to be.

"The situation raises basic moral questions about how to weigh one person's welfare against the larger good, how to balance special duties to those we love against impartial duties of beneficence, and the potential moral distinctions between letting someone die, preventing someone from being saved, and killing directly (for example, by shooting someone), for the sake of a greater good.

"One philosophical view, utilitarianism, tends to downplay such distinctions concerning means, holding that all that really matters is acting in whatever way will maximize the overall, impartially conceived good—the good as conceived 'from the point of view of the universe,' as Sidgwick famously put it. Often people hear a utilitarian message in Spock's famous quote from *The Wrath of Khan*: 'the needs of the many outweigh the needs of the few, or the one,' and they might read

Star Trek was the first television show I remember watching. I was about seven when it was first in reruns, and it was my first exposure not only to science fiction but also to serious moral reflection. It posed intriguing and dramatic moral dilemmas that fueled my later interest in moral philosophy. It was much more intellectually challenging than what I was getting in Sunday school.



William Shatner and Barbara Bouchet in "By Any Other Name" (1968).

Captain Kirk: He's No Kantian

"Spock relies always on logic, by which he means, roughly, strict rationality; McCoy is the voice of emotionally laden human experience and response; and Kirk is often the one putting both elements together," says FitzPatrick.

"Kirk also embodies an intuitive sense of when to follow rules and when to break them. The Prime Directive—the rule not to interfere with the natural development of alien civilizations—seems to exist primarily to be violated by Kirk whenever he judges that more important values are at stake, much to the displeasure of the Starfleet higher-ups. There's a certain practical wisdom, in Aristotle's sense, in knowing when to depart from fixed rules or algorithms. Kirk is much more of an Aristotelian than a Kantian in this sense, relying on virtues and practical wisdom for situational appraisals rather than simply applying rules.

"His wisdom is limited, of course, by his excessive fondness for aliens wearing miniskirts and sporting '60s hairdos."

it into the Keeler case as well. But that is a mistake, I think, and an oversimplification . . . The heavy focus throughout the series on the importance of individual dignity, freedom, and rights precludes any simple utilitarian interpretation of its moral sensibility. There are also plenty of opposing pulls from impartial rationality, personal emotion, and intuition that cannot be codified by any appeal simply to logic."

A Class on the Cusp

From 'professionalism to protest,'
members of the Class of 1966
ushered in 'the '60s.'

By Robin L. Flanigan

As a senior, Cecily Drucker '66, two months before graduation, padded down the hall of her residence hall to the pay phone. Her father had called.

"He was furious at me," she recalls. "I don't know how he found out about what I was doing, but he said, 'You're going to get kicked out of school, and I spent all this money on your education.' I pushed back. I said, 'I'm doing this. Sorry.'"

Drucker had become a de facto leader in a plan gaining momentum with students on campus. They wanted to stop then President W. Allen Wallis from presenting Richard Nixon, at the time in private practice, with an honorary degree.

CHANGING TIMES: While the 1960s ushered in dramatic social transformations, "everything still felt gradual" when the Class of 1966 was on campus, says Betsey Weingart Cullen '66, cochair of the class's 50th reunion in October.

Comments Nixon had made at Rutgers University warning against the perils of academic freedom prompted their protest, in which members of the faculty

became involved, as well. Wallis had worked with then Vice President Nixon as an economic advisor to President Eisenhower, and the degree was to be conferred at commencement, where Nixon was to be the guest speaker.

Soon after that phone call, several of the plan's student leaders were called into the president's office.

"The image I have in my mind is that we were sitting like these little church mice on a sofa, and he was sitting, larger than life, behind a desk at the end of this really long room," says Drucker, of Mill Valley, California, a political science major who retired after 42 years of practicing real estate tax law and transactions. "He said that what we were doing was an embarrassment to the

University and he wanted us to stop. We were meek, but we weren't backing down."

The Class of 1966, celebrating its 50th reunion at Meliora Weekend, October 6 to 9, was on the forefront of change in many ways—including being on the brink of the protest movement that helped define the '60s—between freshman and senior years.

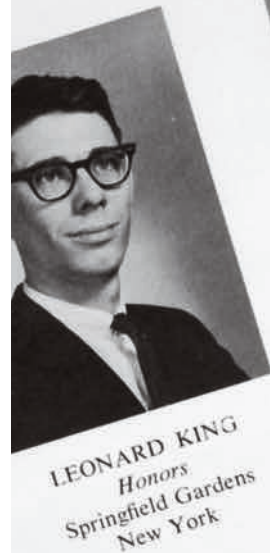
Students saw policies relax—from strict curfews to floating curfews to one of the first coed dorms in the country. The Towers, a pair of high-rise residence halls with floors for men and for women, opened in 1963.

They saw professional dynamics relax. History major Betsey Weingart Cullen '66, cochair of the class reunion, remembers a professor telling students he wanted to be addressed by his first name. "He said, 'Call me Bernie,' and it was just such a shock to me," she says. "I did it, but I always felt I had crossed over a formal barrier between student and teacher."

They received diplomas in the middle of a revolutionary decade that also saw the start of the women's movement, the gay rights movement, and the environmental movement.

And they found themselves regularly in the midst of events that would make history. In anger, they hung Fidel Castro in effigy during the Cuban Missile Crisis in 1962. In tears, they mourned President John F. Kennedy's assassination in 1963. Congress passed the Civil Rights Act of 1964, yet race-related violence, including in Rochester, carried on. The United States swiftly increased military forces in South Vietnam in 1965. The Cold War continued through it all.

"There was a strong feeling that the world was very turbulent, and it was hard to understand everything that was going on," says Marc Holzer '66, a political science





RICHARD DAVIS
Honors
Flushing, New York



DAVID HOFFMAN
Honors
Lawrence, New York



LAWRENCE COHEN
Far Rockaway, New York

ACKALL
ors
New York



JANE SPEYER
Honors
Flushing, New York



ELIZABETH WEINGART
Honors
Port Washington, New York



STEVEN WOHL
Honors
Brooklyn, New York



LEWIS ESTABROOKS
West Bridgewater, Massachusetts



MARK HOROWITZ
Little Neck, New York



Camp Sites

1924: The first Frosh Camp is held at the YMCA's Camp Cory on Keuka Lake. Twenty-nine freshman men, 11 upperclassmen, and one faculty member attend. Women students go to a three-day "house party," hosted by members of the junior class, at Camp Wacona at Sea Breeze amusement park.

1938: Camp activities for men move to the new facilities of the River Campus, with two exceptions: before classes begin in 1961 and 1962, the men return to Camp Cory.

1967: Women attend Frosh Camp for the last time.

2005: The orientation program launches a modern counterpart to Frosh Camp: Freshman Orientation Outing Treks (FOOT). At the start of every year, about 100 freshmen are chosen to take part in the three-day pre-orientation program, hiking, biking, camping, and exploring New York parks.

2016: Orientation for new students in Arts, Sciences & Engineering is a weeklong experience that aims to introduce incoming students to each other, the campus, and the local community, with a parallel two-day program for parents.

—Robin L. Flanigan

major who served as both student body president and class president. He remembers successfully advocating for funding, as chair of the finance board, to support Student Peace Union members traveling south for civil rights demonstrations, despite opposition from more conservative members.

Now living in Cambridge, Massachusetts, Holzer is founding dean emeritus of the School of Public Affairs Administration and holds the title of University Professor at Rutgers. "To some extent, my class was a tran-



CAMPUS POLITICS: New York Senate candidate Robert Kennedy (left) visited campus in 1964, while former Vice President Richard Nixon delivered the class's commencement address in 1966.

sition point from professionalism to protest," he says. "There was more of a political awakening by the time we left campus."

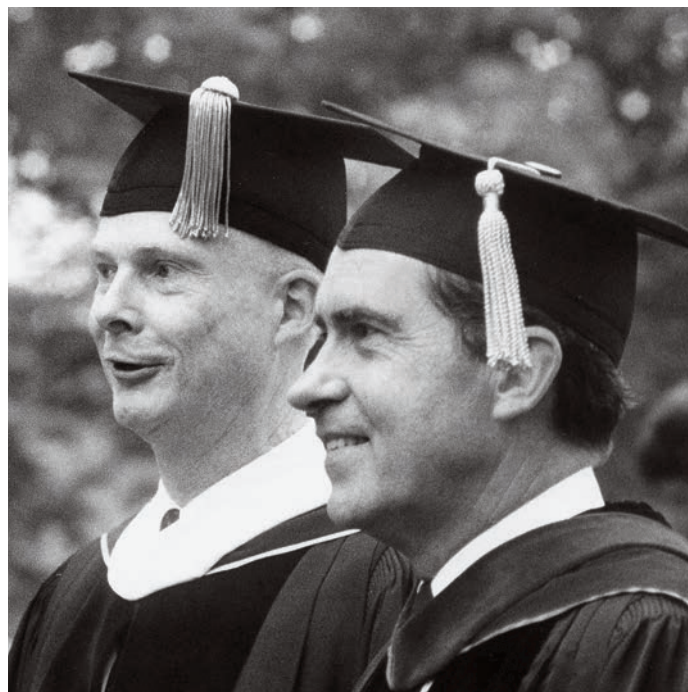
The class had started its Rochester years in a quieter fashion. Days after arriving as freshmen, the men and women of the class left for Frosh Camp, where they sang, hiked, played games, and met new classmates, in some cases establishing lifelong friendships. Cullen reminisces about being in the outdoors at Frosh Camp, charged with writing a class song and cheer—and learning the schoolwide clap—before reciting the cheer from memory:

*We're the class forever strong,
Can't be beat—
Can't go wrong,
We're the class with all the zest,
We can take it—
We're the best,
We are smart—
Know all the tricks
U of R, U of R—'66*

"It speaks of common identity," she says. "Shared activities build loyalty and a greater sense of community."

And they learned "The Genesee," Rochester's alma mater, set to music by Herve Dwight Wilkins, from the Class of 1866 and great-grandfather of Jocelyn Trueblood '66 (see sidebar). But while such songs lend continuity to the Rochester experience over generations, music also reflected the changing times.

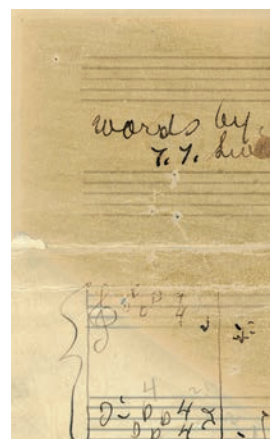
For Richard (Richie) Woodrow '66, the musical theater shows that he composed while on campus in the 1960s inadvertently reflected a cultural awakening. The former English major interrupts himself to analyze the



evolution of his theatrical work during his years at the University, acknowledging that he had never before noticed the subject matter moving over time toward more pressing concerns.

"They were all in the format of the old American musical, quite formulaic and upbeat and fun, and yet they started to get more serious," he says. "They were becoming more centered on politics, ideology, breaking boundaries, and a changing world. I think what we were striving for was this notion that things aren't quite what they seem. We recognized that everything wasn't all fluff."

During their years on campus, the antiwar movement began to stir. In the spring of 1966, the newly formed Student Peace Union organized a "Vigil for Peace in Vietnam," held from noon to midnight on the Eastman Quadrangle, timed to coincide with Parents' Weekend and the ROTC Sunset Parade. According to the first issue of the group's newsletter that April, the vigil was quiet, though not without opposition. They were counterpicked twice, and endured some hurled iceballs and eggs. Eighteen months later, protesters had propelled the University into national headlines as they staged a sit-in against Dow Chemical, maker of napalm, recruiting on campus.



Cullen laughs as she recounts her first foray into protesting. “We led a campaign to preserve the tradition of the freshman beanies,” she says, referring to the blue and yellow hats that had the wearer’s graduation year embroidered on the front. “They were going to eliminate them our sophomore year, so we started a letter-writing campaign, but we were on a sinking ship by that point. We lost.”

Drucker and the other students opposing Nixon’s honorary degree did not. Though Nixon spoke—on academic freedom—at graduation, Wallis’s office circulated a press release beforehand, saying that Nixon’s acceptance of the invitation to speak was not contingent on receiving an honorary degree, and that, in fact, it was his policy not to accept them.

As for Nixon’s speech, “everybody was really respectful of him,” Drucker says.

But most student demonstrators were respectful while still making their case, notes reunion cochair Larry Cohen ’66, who majored in general science and took part “in a fair number of protests.”

“There were hundreds of us,” says Cohen, a Los Angeles resident and a radiology professor at the Keck School of Medicine of the University of Southern California. “We didn’t storm the dean’s office or do anything crazy like that, but there were all kinds of sit-ins where we blocked traffic on River Boulevard—what is now Wilson Boulevard—to protest the Vietnam War. We wanted to be heard and seen

and to show that we knew things were going on in the world and we didn’t like it.

“We’d shut down the campus, and if there was traffic, that was just too bad. You had to find another way out of there.”

For all the turmoil of the times, there were a lot of changes to celebrate as well. For Cohen, who married Jane Zimelis Cohen ’67, one of them was the chance to live in the Towers. “You were on somewhat better behavior, and you cleaned up a lot more because you never knew when someone was going to pop into your suite,” he says. “It just changed our whole lifestyle. That’s one of my favorite memories.”

Hundreds of members of the Class of 1966 will exchange memories at their reunion during Meliora Weekend.

“What we’ll do is stop time, turn back the clock for a few days,” says Cullen.

Back to a time when freshmen, still largely anchored in the more staid 1950s, emerged in 1966 as seniors living on the cusp of great social change.

“It was a very challenging time to be alive, especially as we moved farther on into the ’60s,” adds Cullen. “But everything still felt gradual.

“When you’re in college, a year is a long time. When you’re in your 70s, like I am, a year goes very quickly.”

Recalling a ‘Golden Past’

Since the late 19th century, Rochester students have sung about “many fair and famous streams” as they give voice to “The Genesee,” Rochester’s alma mater. Most know it by heart.

But Jocelyn Trueblood ’66 keeps a copy tucked away in her genealogy papers. That’s because she is the great-granddaughter of its musical arranger, Herve Dwight Wilkins, who graduated from Rochester a century before her, in 1866, and became a church organist and music teacher in Rochester. He based the tune on an old English melody, and it has ever since accompanied the words of poet Thomas Swinburne, a member of the Class of 1892 who spent five years at Rochester but didn’t complete his degree.

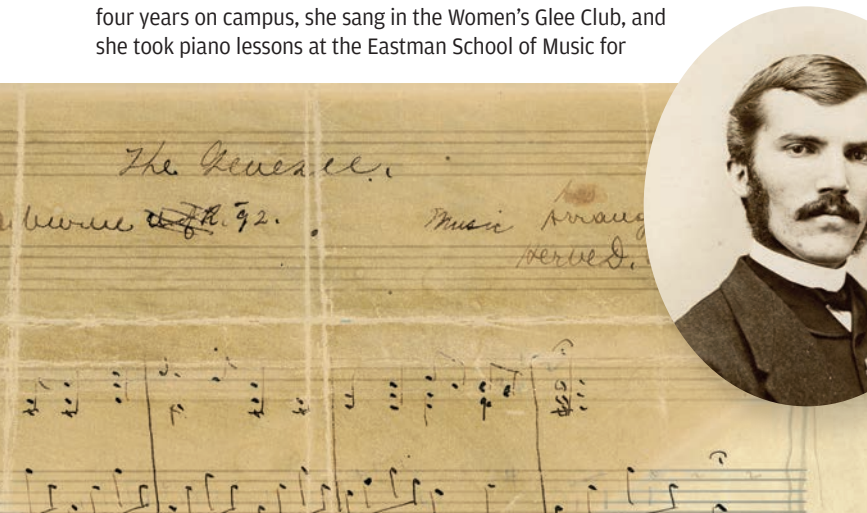
Trueblood’s mother told her about the family’s musical history shortly before Trueblood left for college. Since then, she has read an account of Wilkins—written by his daughter, and her great-aunt, in November 1913, the year Wilkins died—from which she learned of his belief in the “expressive power of music as a vehicle and aid to worship.”

You could say it struck a chord. “I see music as an aid to meditation, to peacefulness within me, and in that way, I feel very connected to him, this creative force,” says Trueblood, who majored in English and minored in psychology. “I feel very grateful to him for passing that on.”

In 2009, she retired from a 30-year career in mental health in New York City. And now, as it has for years, music suffuses her life. For all four years on campus, she sang in the Women’s Glee Club, and she took piano lessons at the Eastman School of Music for



FAMILY HISTORY: Jocelyn Trueblood ’66 shares the musical bent of her great-grandfather, Herve Dwight Wilkins, Class of 1866. He arranged the tune for “The Genesee,” Rochester’s alma mater.



credit. Now living in Tappan, New York, she continues to sing in a local choral group, although she says other members don’t necessarily share her reverence for timing, dynamics, and diction—a rigor honed at the University by Ward Woodbury Jr., the first director of music on the River Campus. She also once was directed in one of his own works by the legendary Howard Hanson—famed as a composer, conductor, and music educator, he led the Eastman School for 40 years.

“It’s a joyful seriousness,” Trueblood says. “I love to be in the zone and not thinking about anything but the music that’s in front of me.”

Her great-grandfather likely knew that feeling well, too.

—Robin L. Flanigan