Computer music comes of age

COMPUTER MUSIC audiences have grown tremendously in recent years, perhaps due to this area's fascination with computers" says John Chowning. "But once these computer 'types' hear our music, they come to enjoy it for its musical qualities."

Chowning is director of the Music Department's Center for Computer Research in Music and Acoustics, otherwise known as CCRMA, pronounced "karma."

The first CCRMA concert was held at Stanford's Art Museum in 1978. About 450 people attended. Their first outdoor concert in 1980 at DC Power Lab, home of CCRMA, attracted about 600 people and the NBC Nightly News team.

Their two concerts this summer, on July 16 and 17 in Frost Amphitheater, attracted over 1,000 people each.

"Everyone is surprised that computer music doesn't sound the way they thought it would. It's not the bleeps and bloops of Hollywood," says Chowning. "They are impressed by how rich and elegant and carefully composed the music sounds. A lot of people come back to our concerts—they like what they hear, and they like being outside under the stars."

July's concerts featured new music by CCRMA composers Chris Chafe, David Jaffe, Janis Mattox, Michael McNabb, Bill Schottstaedt, and Malcolm Singer; plus works by guest composers Dexter Morrill, Bruce Pennycook, and Jean-Claude Risset and guest appearances by soprano Neva Pilgrim.

Morrill (A.M. '62) is professor of music at Colgate University and director of the Computer Music Studio there.

Pilgrim specializes in contemporary music and has been artist-in-residence at the Cleveland Institute of Music and Oberlin.

Pennycook (D.M.A. '78) is assistant professor of Music, Computing, and Information Science at Queen's University in Canada, where he has developed a computer music facility.

Risset has set up computer sound synthesis systems in France and was head of the computer department at IRCAM in Paris.

CCRMA's Success Story

Chowning arrived at Stanford in 1962 as a graduate student in composition. He had behind him a music degree from Wittenberg College in Ohio, three years playing in a Navy band on an aircraft carrier in the Mediterranean, and three years studying composition in Paris with Boulanger.

"Largely as a result of my exposure to electronic music in Paris, I inquired about the possibility of electronic music here," recalls Chowning. "There was no studio, and

certainly no interest. However, Stanford did have a good computer system for the time—an IBM 7090. It was the beginning of the Artificial Intelligence (AI) Project here."

In 1963 Chowning read an article by Max Mathews of Bell Labs on synthesizing sound using computers. It fascinated him. He wrote to Mathews, and Mathews generously sent Chowning his Music IV program.

David Poole, a Stanford mathematics undergraduate, helped Chowning get the program going on the 7090. They made their first sound in September, 1964. By 1966 Chowning's adviser, music professor Leland Smith, was also involved in the new music.

In 1966 Chowning received his D.M.A. in composition, joined the Music Department faculty, and moved up to the DC Power Lab to continue his work in computer music. Built in the early '60s by GTE but never completed, the Lab had been acquired by Stanford and housed the Artificial Intelligence Project of the Computer Science Department. It sits in lonely and somewhat dilapidated splendor among the foothills on West Arastradero Road.

"We needed to use their facilities, so we became rather tenacious parasites," recalls Chowning. "Leland and I had one room up there, and worked mostly at night and on weekends so as not to abuse our hosts. Loren Rush joined us in 1968."

By 1975, the computer music people up at DC Power Lab were ready to launch their own separate program. "We felt the Center was necessary because our work was so different from the usual Music Department activity," explains Chowning.

With a $350,000 grant from the National Science Foundation, and the support of Music Department chairman Albert Cohen, the Center for Computer Research in Music and Acoustics was formed. Co-founders with Chowning were Andy Moorer, now head of audio development at Lucasfilms; Loren Rush, D.M.A. '70 and senior research associate at CCRMA; and John Grey, then a research associate in psychology specializing in psycho-acoustics.

Since 1975, CCRMA has received over $1 million from NSF to support its work. "These grants have been based on the scientific aspects of our work in psycho-acoustics and signal processing," says Chowning.

In 1979 the Artificial Intelligence Project moved back to campus, leaving CCRMA sole occupant of the hilltop facility. The extra space was badly needed—by that time many of the students and researchers working at CCRMA weren't even musicians.

"About half the people working here are from other departments," explains Chowning—"engineering, psychology, speech and hearing from the Medical Center, computer sciences. It's difficult to imagine an environment so effectively inter-disciplinary."

However, AI's departure in 1979 meant CCRMA had to get its own computer system. The National Endowment for the Arts provided an initial grant of $160,000 for equipment, and has provided $12,000 every year since. CCRMA also got help from the University, industry, and Doreen Townsend—a generous San Francisco benefactor.

CCRMA decided to buy a Foonley computer from Foonley Corp. in Mountain View, Calif. President of the company is Dave Poole—the same Dave Poole who helped Chowning set up his first computer programs in the early '60s.

This past January, System Development Foundation in Palo Alto awarded CCRMA a $300,000 grant to upgrade its computer system. The grant will be used to trade in the F2 Foonley for the new F4 Foonley, and to buy SUN (Stanford University Network) "smart" work stations. "Getting this grant was a great coup," says Chowning.

It has been followed by an even greater coup: SDF recently awarded CCRMA another grant for $2.3 million to support ongoing work for the next five years.

One of CCRMA's NSF grants came in 1980 to support research in automatic music transcription. "This is a very interesting research area involving signal processing, artificial intelligence, and automatic notation," says Chowning. "It's a terribly complicated problem, but Leland Smith's manuscripting system has already solved the problem of automatic music notation."

This grant is part of the Industry-University Joint Research Program. CCRMA researchers are working with scientists from Systems Control Technology in Palo Alto. "It's an important interface between technology and the arts," says Chowning.

John Chowning (second from right) discusses work in progress with CCRMA researcher/composers David Jaffe, John Gordon, and Bill Schottstaedt.

The rest of the world has also taken notice of CCRMA. In the early '70s, visiting Hungarian composer Gyorgy Ligeti was very impressed by what he saw and learned at CC____ reported back to Pierre Boulez, com____ d conductor, who in turn conta____ howning for help in setting up a similar center in Paris.

So started the close relationship between CCRMA and IRCAM (*Institut de Recherche et de Coordination Acoustique-Musique*) in Paris, which Boulez directs. Chowning flew to England and France in 1973 and '74 to help plan IRCAM. In 1975 Boulez, composer Luciano Berio, and other Europeans involved in establishing IRCAM came to CCRMA for an intensive summer workshop in computer music taught by CCRMA's staff and Risset.

CCRMA has given a workshop in computer-generated music every summer since 1968. They are always over-subscribed.

Chatting with Chowning

Q: How has your early musical training affected your computer composing?

A: The rigorous education I got in music, especially in harmony and counterpoint, is still an important part of the way I think — especially counterpoint. Improvisation also affects me deeply. The freedom you have in improvisation seems opposite to the rigor of counterpoint.

And I get a great deal of inspiration from computer programming languages. The idea of a procedural language reeks of music somehow. I've just barely touched that domain. It's clear to me from watching others work in this lab, using programs like Bill Schottstaedt's *Pla*, that computer languages are extraordinary resources.

It's much easier to do things in modern, high-level language than it was with Fortran or assembler, for example. More and more, the musical idea evolves from a kind of cyclical interaction with the language. One asks something of the language, and it yields more than was asked for. That's not surprising, since the language represents thousands of years of thought about thought.

Q: Many of the compositions produced at CCRMA, including your own work, are "tape music." They are recorded and performance is a matter of playing back a tape. What do you say to people who don't believe in music concerts without performers?

A: To go into a space and listen to a tape is clearly something people like to do. It is an important experience because one shares the event in a communal way that is deeper as a result of being shared.

We can present music in a concert situation in a way impossible at home, using very fine audio equipment in a carefully planned context. Our audience has grown to the point where we now attract nearly a thousand people to a concert. That's rather extraordinary for nothing but "tape music!"

Sure, we would all like to have more performance involved. I don't think any of us working in the medium feel that performance is to be excluded — quite the contrary. For years we have wished that digital systems were cheaper and smaller so we could introduce the performer in the complex.

Q: Are works composed at CCRMA performed widely?

A: Oh yes! All over the world. This spring we had a sold-out performance of CCRMA works at the San Francisco Museum of Modern Art. Michael McNabb (D.M.A. '80) and Chris Chafe have just shared second prize at a competition sponsored by the *Groupe de Musique Experimentale de Bourges*. No first prize was given! I think it's too bad that there's not more programming of contemporary music.

Q: Are you glad you came to Stanford?

A: Yes! Not many universities would have allowed me the freedom to do what I have done. Stanford's strong Electrical Engineering and Computer Science departments, along with its strong commitment to the humanities, was the key to our getting going. The University is small enough for departmental boundaries to be "violated."

Q: Do you foresee CCRMA growing?

A: I think CCRMA is just the right size. Part of the magic of this place is that everyone knows everyone else. It's big enough to be rich, but not so big that you lose contact with the people and the work that's going on.