



Oral History of David Cope

Interviewed by:
Chris Garcia

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Garcia: Today is December 7th, 2017. And today, I'm here with--

Cope: David Cope.

Garcia: So, let's start with your early life. Where did you grow up?

Cope: I was born in San Francisco but only spent six months there since I was a blue baby and wasn't given much chance to survive. But I found that out later. Accordingly we moved to L.A. And then I was told that that wasn't very good for me either. My asthma was just horrific. So we had to move to a much dryer climate in Phoenix, Arizona. This was in 1945, '46, right around there and spent my teenage years there. I then went to Arizona State University. So, I spent my early years through twenty-two there.

Garcia: Oh, wow. Okay, and what did your parents do?

Cope: My father was an accountant for a tractor company. My mother was a piano teacher.

Garcia: Oh, wow, that might explain some things.

Cope: Yeah, it might.

Garcia: So, as a kid, did you read a lot of science fiction?

Cope: Yes, a lot of science, too, with George Gamow mostly as my great hero in life science wise. He wrote a large number of books on really important issues. I enjoyed reading those. And then I was an Asimov fan and a Clarke fan and a Bradbury fan. Another of my was Philip Jose Farmer, and beyond that, Fredric Brown.

Garcia: "Arena," great story.

Cope: Yeah, and I loved "What Mad Universe."

Garcia: Oh, yeah.

Cope: That is a classic. And I have, thanks to a very dear friend, five different copies or publications of that book.

Garcia: Oh, wow.

Cope:

Published in the '40s or '50s.

Garcia: Great. And do you think that had an effect on you as you grew up?

Cope: Yes. I was a very serious amateur astronomer and built telescopes, radio and visual, through much of my youth. I was very fond of building radios and so forth and I think probably had one of the first functioning radio telescopes in Arizona at the age of fifteen back in 1956. It wasn't a popular item in the state at that particular time. And I had one with an antenna on my roof of my parents' house. And that brought a lot of questions from neighbors as you might imagine.

Garcia: So, when did you start studying music?

Cope: As soon as I could sit on a piano bench, a proper bench, and raise my hands up to the keyboard. I was probably two and a half. And my mother was my first teacher.

Garcia: And so, that-- your first instrument then would have been the piano. Did you study a lot of different instruments?

Cope: About the only thing I was doing at the time was studying instruments and listening. My parents had a bunch of seventy-eight recordings and I used to-- I really got used to those. A funny story about that was the fact that seventy-eights couldn't contain a whole piece of classical music. So, I remember the Rachmaninoff second piano concerto. It would stop about a third of the way through the first movement and click down this automatic system. And I listened to this piece so often that I assumed the breaks were part of the piece. Then when I attended the first live performance, I was very critical because I thought they'd left out all those parts where the disks were changing. So, I listened to a lot of music. I was in love with classical music. So, I read a lot of interesting information about the composers, and so on.

Garcia: And when did you start composing?

Cope: I think I was seven.

Garcia: Wow.

Cope: It wasn't any good, but it was--

Garcia: Well, you've got to start somewhere.

Cope: Yeah.

Garcia: Do, do, do, do, do. There we go. And so, when did you first encounter a computer?

Cope: I encountered them in science fiction films and in science fiction novels. But aside from that, physically, probably in 1975: an IBM mainframe at Miami University in Oxford, Ohio.

Garcia: Really? And do you remember what you thought when you first saw it?

Cope: No, I'd been pretty well prepared by reading books and seeing pictures. I pretty much knew it's going to be operated via punch cards. I was surprised by the size. I don't know why. I guess because I've seen Babbage's, and I'd seen photos of what he was working with. It seemed to me, unless they were doing something funny with the photographs, that it was much smaller and doing quite similar kinds of things. But no, I wasn't surprised.

Garcia: Oh, wow. And was that the first computer you ever used personally?

Cope: You know, I don't know. It's the first one that I can remember actually using seriously.

Garcia: Yeah, and what--

Cope: FORTRAN.

Garcia: Oh, FORTRAN, of course. What was-- what were you using your computers for early on in your career?

Cope: Composing.

Garcia: Just composing? Excellent.

Cope: That's the first thing I did.

Garcia: And so, do you remember-- you were working in FORTRAN. Do you remember what sort of-- were you writing programs or just operating other ones that already existed?

Cope: I was mostly using probabilities at that time. And it was mostly dealing on paper with diagrams of how I was going to input the information and output the information to something that I could read and make a musical score from. It was a choral piece that was performed in the same year. And it was just ghastly, just ghastly.

Garcia: Yeah, what was it called?

Cope: HagCopCom.

Garcia: HagCopCom, okay.

Cope: Summers Hagerman a European who was studying at the time at Miami as a graduate student in computer science and was somebody who was very much involved with the computer there, and he and I got together, and worked on this thing. So, HagCopCom is H-A-G from Hagerman, C-O-P for Cope, and C-O-M for computer.

Garcia: HagCopCom.

Cope: Yes.

Garcia: Yeah, that makes sense.

Cope: It did for us.

Garcia: I wasn't sure if it was computer or composition.

Cope: Yeah, it could be either one. But it was computer.

Garcia: Yeah.

Cope: It took two or three months to write.

Garcia: Oh, wow, how long was it?

Cope: About eight minutes.

Garcia: That's actually a fairly good size thing for seventy-five.

Cope: It was for chorus.

Garcia: Oh, really?

Cope: Yeah, which-- and it may have been the chorus that made it sound so awful, but I don't know. They weren't very happy with having to do this. And particularly, when they discovered its source.

Garcia: And had you been composing for electronic instruments before that?

Cope: Yes. Yes, a lot, but analog computers essentially, basically a Moog synthesizer, and that was it. But I had done lots of things like commercial backgrounds. I mean it was in southwest Ohio. These kinds of things rather unique at the time. I was busy going to various schools and so forth and taking the Moog with me and showing how it worked- and then creating something on the spot for the students with a sequencer, which to me was more like a computer. It was a lot of fun. So, I took all those jobs not because they paid much of anything, but because it was fun to do. I mean it really was. I learned more and more about the instrument that I was using and the fact that it was an analog computer of sorts.

Garcia: And so, did you ever actually interact with Bob Moog?

Cope: Well, I did hear him speak. But I have not shaken his hand or said hello or anything. All I know is that I saw him. Apparently, this was one of his favorite things to do. The Moog synthesizer he demonstrated stopped working and so he said, "I'll show you now how to fix these damn things." Wham. And it worked immediately. So, I have a feeling it was staged as part of his ongoing act because he had quite a sense of humor.

Garcia: Oh, yeah. Yeah, we had some great stories about that with Mark Mothersbaugh we got a couple weeks ago that were just wonderful.

Garcia: I should have mentioned-- I wish I had known. What sort of challenges do electronics and computers present to a composer, or is it just another instrument?

Cope: Yeah, it's another instrument. I won't say just another instrument because a lot of people are not interested in all the knobs and stuff, and they don't consider them particularly musical. So, they end up getting quite confused. And so, there are not many people who wanted to do that. But yeah, it's-- in the right circumstances, it's just another instrument.

Garcia: Excellent. And what were sort of the first software pro-- or some of the early software programs that you were developing? What were they used for? Was it just generation and composition, or score creat-- was it just the creation of tones or the creation of scores, of written scores and such?

Cope: Mostly it was musically related. And most of it was composition. I didn't publish any of those early compositions because I didn't feel I really knew what I was doing yet. But I liked doing it. I read a lot about it.

Garcia: And were you working with technologists or other composers, or were you just on your own?

Cope: I was on my own. I've always been on my own. It's a tendency. I won't say that in recent years because I do have people now and particularly, my friend Keith Muscutt who helped me think through some things. But nonetheless, I tend to work on my own a great deal.

Garcia: Okay, we're going to transition a little bit into EMI? And so, what are the origins of EMI?

Cope: Well, fundamentally, I had a composer's block. And I'll just state it like that. I mean it's just like a writer's block. I couldn't figure out why C was any better than C sharp to start off with and where they were going or how they were moving. I'd just really reached my-- probably my mid-thirties at that particular point. And I had a commission for an opera. And I'd already spent the commission on my four sons and wife and me. And as a result, I needed to do something. I knew a lot of people in the AI department at UCSC at that particular point. So, I consulted with them. And they all came to roughly the same kind of advice, which was, essentially, why don't you-- since you can program, why don't you write a program that will create your music for you. I thought that was a very good idea. And so, that's what I tried to do. And over a period of seven or eight years, I eventually did exactly that.

Garcia: Oh, wow. Okay, and so, you-- did you start it once you got to UCSC? Or was it already percolating at that point?

Cope: No, I came to UCSC in 1977 and the block didn't occur until 1980, three years after I'd been there.

Garcia: Oh, okay.

Cope: But I'd done a lot of work in the electronic music laboratory at the university. And I was very happy to have that available to me. And it was made available by the faculty and staff there, wonderfully so. I mean they were just terrific. So, I spent some time, as much time as I could possibly afford, working on the technical aspects of things.

Garcia: And do you remember what hardware the initial versions were running on?

Cope: Well, the actual computer that I used to write not something by EMI at that point, but something that turned into EMI was an Apple IIe of all things. And then-- I mean that took a great deal of time. And I mean I work from a standpoint of data driven-- work with a lot of musical data, analyzing it, and then producing a new piece in the style of the music in the database. That required getting a lot of that data into code. And in this case, it meant five parameters and their values for each and every note of these compositions from past generations of composers. And so, it was before MIDI, musical instrument digital interface, MIDI, which makes it much easier. So, I had to put all of those five parameters into every single note of a piece. For example, I did the entire Bach three hundred and seventy-one chorales and most of Mozart's sonatas, quite a bit of work that became just routine. Get up in the morning and work. Just like exercising, I'd just do it. And it took years.

Garcia: And so, do you see EMI as a composer or as a composer's tool?

Cope: Tool. There's magical going on in there. It's basically addition and very simple arithmetic, not even-- I mean you can get beyond that by including calculus and so forth into the program. But as far as the hardware is concerned, it's simple binary math.

Garcia: Cool. And so, as you've gone on, I know you were-- you're talking about sort of the search for style as a thing. And how did that sort of come about?

Cope: Well, I knew my opera had to be in my style. That's why I got the commission. So, somebody was curious about how it would work in a Cope-style opera. And so, I tried to figure out what style was and realized there was only two books in the entire library at that time that had anything to do with musical

style. And neither one of them really had actually anything to do with musical style. They just said things like Baroque music has trills. And they had these instruments they played, but nothing about the musical inherent style. It was then I knew that I had a problem to face. What was the style of music? I eventually didn't face it, essentially, because I-- because EMI works on the basis of having a lot of data to work from. The style's in the data. So, I've never really learned a great deal about at least historical styles and my own style that I'd like to learn. So, I will probably continue, as I have over the past, whenever I had a spare moment, which isn't often, and work with style in that way. I'd like to go back, could I, to your question about-- oh, god. The one before this one, having to do with is a computer a tool or not?

Garcia: Yeah.

Cope: Yeah, I envision a time in which, even though I'm not a futurist, I envision a time when it will not be a tool. But I have yet to find anything that my computer does that isn't programmed by a human being. It's a tool. It's a really, really, really sophisticated shovel. And the reason I'm taking a little extra time here on this is because I often get questions about how computers write the music. Well, they really don't. I mean they're just like a slide rule. That's an early example of a computer that's not electronic. And it's a tool that we use. And so, the music that comes out is a combination of my programmed interpretation, I suppose, of the data that's in the database. And that data is by other human beings. So, there's really nothing about it that's not a tool that I know of right now. AI and all of deep learning and so forth is fun to talk about, but I still think the machine is a tool. Even though we don't quite know what's going on in there, that doesn't make it less a tool.

Garcia: Cool. Actually, that's a great segue to the next step.

Cope: Oh, good.

Garcia: So, this is going to be about sort of reactions to EMI.

Cope: Uh huh.

Garcia: And so, the first one is what was the reaction of you to the works that they were putting out, that EMI was composing?

Cope: Well I've got to be honest with you. I've coded a number of EMIs, most of which failed. And when I finally figured out the combination that would actually work, that is data-based rather than rule-based, I suffered through some rather bad times. But when the first composition, the Mozart sonata movement, came out, I was floored. It's one of those situations where I'm sure we've all-- all of us in this room right now, would be aware of in the sense that sometimes, it gets worse before it finally gets better; just clicks

into place. And so, it just got worse and worse and worse. I was feeling depressed and not getting anything out of the program. All of a sudden, it was exactly right. And I couldn't believe it. It was one of those really true a-ha moments in which I actually felt that maybe it was playing one of the real Mozart sonatas. I just couldn't believe this was something new that I'd not heard before. But it was.

Garcia: And what was the reaction of the sort of the field, the field of-- the music establishment to what EMI was putting out?

Cope: Well, we should also include the scientific aspect of it. By then, I was very much involved. So, I'll take them both at the same time because they were completely and diametrically opposed to one another. Yeah, the musical one was, "Where's the soul? What are you doing? You're trying to put us all out of work," etc. The scientific community was just amazingly happy with the results and wanted to know how I did it and ended up with a lot of book contracts and so forth. And that was really, really satisfying.

Garcia: And so, was it difficult to get works done by EMI published?

Cope: Oh, impossible, completely impossible, and even recorded. I went through more than a hundred recording companies before a particular company, which I'll actually name here, Centaur Records, would actually say yes. And they did, and I've published quite a few CDs with them. It was an amazing moment. I can remember the exact timing when it came in the mail that he said, "Yes, I'll be happy to do this. This sounds like it'd really be fun." But everybody else's view was 'good god, no.' In fact, one little story here occurred on the same day or neighboring days when I received a letter of rejection from a company who published CD recordings of new music saying 'no, they would not release this album because it was not new music. It was old musical styles. The fact that it was composed by a computer is not germane to the issue here. The following day an email from a company who produced classical music of composers who've long been dead wrote that this was not classical music since it was composed recently.

Garcia: <Laughs>

Cope: I remember getting those two really close to one another and feeling like well, if that's the case, then there is really no way to do this. If both sides say no for what seemed to them to be really, really good reasons, I wasn't going to send any more requests out. But my requests had already been sent, because I sent them in bunches, so, Centaur didn't know about these, and they accepted.

Garcia: Oh, nice. Now, has there ever been a composer who EMI just can't seem to compose in their style?

Cope: Well, Beethoven was the first one that I encountered. The reason is obvious. Beethoven doesn't have the same kind of style that Mozart did when he composed forty-one plus symphonies. Where Beethoven only composed nine plus a half and, of those nine, they're all very, very different and unique. Therefore, it's difficult to pin down a style. I mean certainly, there's a style there. But there's so little of a database; you put one sonata in, you put the next sonata in, and you've got to put five more because those two are so different from each other in very obvious ways if you listen to them. So, it's more the better. I mean basically, Chopin mazurkas, of which there are fifty-six and they're all in the same style, that's great. That's perfect. But if you're going to take the Planets by Gustav Holst, for example, there's no way to go. There's only one of them. And none of the rest of his works are anything like that particular one. So, you put that in the database and you're going to get out something that pretty much sounds like that data. And people will say, "Well, god that's a loser. It's the same thing."

Garcia: Yeah. Do you think there is a composer who is best suited towards EMI? Is it Chopin or one of the--

Cope: Oh, it's Bach. If you try to do the seventh Brandenburg Concerto, which I and EMI did, it's a problem because there's only six there. So, that was a tough one. But I often use for examples Bach chorales because there's over four hundred of them. And they're all in the same style. I mean they're all very much the Lutheran chorale style of the time. And therefore, it's fairly easy.

Garcia: And have you ever worked with non-Western music?

Cope: Yes.

Garcia: Oh, any particular styles?

Cope: Yeah, absolutely, Balinese gamelan style.

Garcia: Oh, wow.

Cope: And some of it's recorded.

Garcia: Oh, excellent. Fantastic. Okay, we're going to go on to some other projects now.

Cope: Okay.

Garcia: Although EMI will sneak back in a couple times. Can you talk about some of the other composers and technologists you might have encountered in your travels? Did anyone sort of have an influence on bringing you onward and forward?

Cope: In terms of?

Garcia: In terms of-- well, let's start actually with in terms of music.

Cope: In general.

Garcia: Yeah, in general.

Cope: In my life.

Garcia: Yeah.

Cope: Sure. But there are so many of them that I couldn't even begin to-- I mean Messiaen , for example, was an influence when I first met him. It was quite an extraordinary event for me. Lutoslawski, these are European composers for the most part, Cage, at length, and, good grief, Jerry Hiller, Lejaren Hiller, but I'm-- even though he's been dead for quite some time now, I guess I'm allowed to still call him Jerry. We were not close, but certainly friends. There's no question. How many composers do you want?

Garcia: Actually, that's a great place to sort of-- Hiller, what sort of interactions did you have? Was it just you happened to be running in the same circle? Or did you sort of have an information exchange?

Cope: No, I didn't run in circles. Well, I may have run in circles for a while but without other people.

Garcia: Yeah.

Cope: I think so. With him and Cage and his appearance in the magazine that you have copies.

Garcia: Source.

Cope: Source, music of the avant-garde.

Garcia: Oh, yeah.

Cope: And they had a piece in there together. And I knew both of them.

Garcia: <Laughs> About how you encountered and what sort of interaction you had with Jerry Hiller.

Cope: Oh, with Jerry Hiller himself. I immediately wanted to make a recording Jerry Hiller's music. I was the head of a very small recording company at the time. This was very early on, in '78, '79, maybe '80, somewhere in there. And so, I spoke to him on the telephone often. And then we'd go to the same conferences and I'd see him there. And we'd talk about. He was a really nice guy. I don't know if he was an influence on me and my music. But his book from the 1960 "Experimental Music" was so early that it still amazes me that it was written then because it was only Xenakis and him really, although there were a couple of other Europeans that were doing this kind of thing. And of course, Cage was doing everything.

Garcia: And how did you meet Cage? What was that?

Cope: Well, UCSC brought him-- one of the first things I decided to do when I came to this campus -- was not start a series so much, but actually get as many people as I could on campus to do their shtic, to do what they did in real life. Luckily enough, we had San Francisco, CCRMA, CNMAT wasn't around then, but CCRMA at Stanford was and they'd bring people in. I'd sort of hitch a ride on them and ask if they'd come down for a tenth of the cost. And I got them here. So, we had lots and lots of people for the first two or three years coming in. A lot of fun.

Garcia: Excellent. And let's see. So, when you first got into the field, what was the computer music field like?

Cope: Well, when I arrived at UCSC, that first year, 1977, it was just an amazing sequence of events. I couldn't possibly portray it to you at the time. I mean I was down at Carl Fravel's house. We were making circuitries, building instruments with circuits. So, I was soldering away and having just enormous fun putting loud speakers on things and writing compositions for these little miniature devices. I also took Stanford's summer workshop in computer music. I think it was the second one, or maybe the first, I don't know exactly. I met John Chowning who actually showed me a list-- actually gave me a list of the people who were attending at that time. And it was amazing. UCSC was amazingly different than the schools that I had worked at previously, which were very formal with ties and the whole thing. UCSC, at the time, and probably still is to a degree, quite a bit less so. Informal. I mean everybody—particularly the students all called us by first names, the professors and so forth. It was great. They had all the electronic gear available to me at the university. To be able to communicate and work with people who I'd read about in writing my books, particularly "New Directions in Music," for so long but never had a chance to meet, they

were either here or coming down from the Bay Area. FLEMM had already taken place a while before. That was the first-- god, FLEM, F-- FLEM, F-L-E-M-M-- what was it called? First Live Electronic Music concert. I don't know what that name meant at the time. I think it took place while I was in Santa Cruz for my interview. But even the interview that I had for the job was strange. I mean, to be honest, they wanted me. And I didn't know that. So, I came here and tried to treat it as any other kind of interview I'd had for a job because frankly, I wanted out of Ohio, not so much because of the school being bad because I was the only composer there and I was in charge of the electronic music studio and everything. It was great, but because it was Ohio, which is next to Indiana, which is next to all these Midwestern states who vote for people like the current president I had some problems. So, yeah, that first year was amazing. I mean I had a student who was very, very gifted. He wasn't a college student. He hadn't even gone to college I don't think. But he was of that age. And he knew like five different programming languages at the time. And he wanted to have composition lessons. So, we just exchanged lessons. We'd meet once a week and-- an hour for me, and an hour for him. I mean it was just that much-- I'd never heard of such a thing. But it seemed reasonable to me. So, he taught me a couple of languages beyond FORTRAN, which I think already at the time going out of style. And I taught him how to write fugues. And I still know him. He's relatively strong in his field, which is live electronic music with computers. I should say live computer music, improvisational kinds of things. Scot Lancaster is his name.

Garcia: Oh, yeah pretty--

Cope: You know Scot?

Garcia: Yeah, pretty well known, actually. I think I just heard a piece of his on Relevant Tones.

Cope: Yeah, well he's a great guy. And I've known him since he was that student who came to visit me and asked me the question, could I teach him if he'd teach me.

Garcia: Wow.

Cope: I said what the hell, why not.

Garcia: Oh, that's great. And--

Cope: So, I'm his student as much as he is of mine.

Garcia: That's true. It's not a mentor-mentee relationship. It's a ment relationship.

Cope: Yes, a ment. A C-ment, relationship.

Garcia: That's good. Now, when did your workshops sort of begin, and what was the sort of the evolution of that?

Cope: Oh, well I thought the workshop that John Chowning ran here at- Stanford was great. We started off coming at nine o'clock in the morning and ending up finishing at five in the afternoon for a few days. But two or three days later we began working at one in the morning and finished about eleven in the morning, so we wouldn't bother the AI faculty. it was just simply amazing. And so, I felt that something like that, along those lines, with algorithmic composition with computers would be something that I would really like to be doing. So, I created it. I found an administrator who would take care of the administrative work and the clean work, I suppose, but didn't teach in the workshop and really didn't have that much acquaintance with the subject but seemed like he enjoyed working with me. And we put it together. It lasted for fourteen years. This last summer was the first time it didn't occur.

Garcia: Hm. Ah, and were there any sort of significant people, you think, who went through those workshops that really, really went forward with what they were doing?

Cope: Well, I think it's hard to say at this time, because a lot of the people who I would say, even though we had an age range from 19 to 75 or something like that, most of the weight, most of the numbers of people were down in the lower age bracket. We'd usually get one or two in the upper ages and they were faculty members someplace and were doing it just to see what it was about, so it was mostly younger people. Even those people are still in their early to mid-thirties, since they were going to college at the time, and it's hard to imagine somebody being, you know, quote, "big time" at that stage of life, though certainly V. J. Manzo, for example, has published a number of books which have become very, very popular and very much used in both classrooms and enough interested people having to do with computer composition and other things. So yes. There have been people who've done that, but I think you won't notice their names so much for another 20 years.

Garcia: Yeah. I know the new Google music generation program that they're doing, a couple of them mentioned that they had taken the workshop two years ago.

Cope: Really?

Garcia: And was like-- and I didn't get a chance to talk to them afterward. <laughs>

Cope: Oh, too bad.

Garcia: But yeah. I would've loved to have known that.

Cope: Yeah.

Garcia: Okay. What--

Cope: I didn't know that. They hadn't even told me.

Garcia: <laughs>

Cope: This is Magenta--

Garcia: Oh.

Cope: --you're talking about?

Garcia: Yeah.

Cope: Yeah, yeah.

Garcia: Yeah. And which sounds really interesting. I just want to see what they pull off. <laughs>

Cope: Yeah. Me too.

Garcia: Can you tell us a little bit about Sorcerer?

Cope: Well, Sorcerer is the reverse of EMI, essentially. EMI goes down into the music and comes out with the style of that music and the new composition with a form that's similar to the forms inside, et cetera. Sorcerer is a kind of a program in which you put a target composition and then a database of music you think the target composition's composer might have been listening to prior to or during the composition that's in the database, and what you come out with is a diagram of possible connections to those pieces.

Garcia: Oh, wow.

Cope: It works really good and came about as a result that during one composing run of a piece by Beethoven, this is before Sorcerer, only with EMI, as I was trying to get <laughs> the whole thing to work with Beethoven, I said, "You know, that sounds so familiar. It's probably one of Beethoven's other pieces," and I looked it up and I discovered that the database was entirely Mozart and it came out about two notes shy of being identical to the Beethoven piece.

Garcia: Wow.

Cope: It came out of Mozart entirely, and, you know, that got me thinking seriously about the Picasso and Stravinsky discussion about, you know, Good composers borrow and great composers steal.

Garcia: <laughs>

Cope: And Picasso was mad at Stravinsky and they were close friends. Picasso said, "Stravinsky borrowed that from me." <laughs> That's the little quip that goes on, and <laughs> I realized it was damn true. So it was kind of one of those aha moments when you realize that-- and I've said this many times in public, so certainly doesn't bother me to say it here-- that that's what composers do. We borrow and steal music from other composers and what makes a good composer a great composer, good or great, is how much of the original music that we've stolen or borrowed things from, how much of it, in contiguous form, sounds like the original.

Garcia: Hm.

Cope: It's little fragments of pieces. We don't actually recognize them very much in the context of a larger composition, but if they're not, then we're just getting away with murder. It sounds like a quote.

Garcia: Yeah, and what-- Gratis? Or Gradus? I can never...

Cope: Gradus.

Garcia: Gradus. Okay.

Cope: It's from a book written in the distant past called "Gradus ad Parnassum," and this is the first attempt to have me write a program that actually learns things on its own. Not that EMI doesn't do it to a certain degree or any one of my other programs, but Gradus does it entirely. Writing two-part counterpoint according to style, historical style, a particular historical style, is very difficult to do. What you do is you get

a cantus firmus, so one of the lines is already written, and the second line you have to write to finish that, and there are highly restrictive rules on how you can write that line. So what you usually do is go, "Oops."

Garcia: <laughs>

Cope: "Now how far do I have to go back before I can make a change and go the other direction and then, 'Oops'?" and so students actually can spend a whole night trying to get one of these two-part things of only three or four measures to work, because there's all kinds of different places this can go but the rules prohibit certain actions you could possibly take, and so what basically Gradus does is learn how to do this during the first writing of one, and then you get another one and it just writes it right off.

Garcia: Yeah.

Cope: And it's great, you know. I thought my students would use it. When I showed them how it worked, the students in a counterpoint class, of all things would simply go ahead and grab the code from my website, compile it, run it, and get their assignments done just like that. Not one of them ever did.

Garcia: <laughs>

Cope: They were too afraid of computers in those days, I guess. Or, you know, too afraid of computational languages. I even told them, "Here it is. Download it. Just do this and run it and then you can copy down the results." It's already trained on what you want to know.

Garcia: Luckily I downloaded it for the museum the other day, so...

Cope: Oh, good.

<laughter>

Garcia: Yeah. So we're going to move into Emily Howell.

Cope: Emily Howell.

Garcia: And so can you describe sort of what led to Emily?

Cope: Sure. It's very easy. By the time 2003, 2004 rolled around, I was so sick and tired of having people ask me "Has your program finished Schubert's Unfinished Symphony?" and you can just imagine there's so many unfinished works. Beethoven's 10th, Mahler's 10th, et cetera, that it's simply a field day if you like doing that sort of thing. But I had different dreams when I was growing up and different dreams after I retired to spend my time than, fulfilling these nonpaying jobs and not having the results performed, because performers were still very fearful of it, and so I didn't-- I decided I just had to stop this. I didn't want to destroy the program, so I destroyed the databases instead. Not all of them. A couple of them I retained for demonstrations of the program and how it works. During that time I actually thought of doing this in the '90s, but I didn't. I kept putting it off and finally in, again, 2003 or 4, probably just around the curve of the year there, I discovered that I had to do it and I was going to build Emily Howell instead. Now, Emily Howell is a program that unlike EMI is Interactive with the user and is able to communicate musically as well as verbally. Doesn't matter what language. You can just make up one if you wish. But it learns it on its own and it has an association network as its base, which I can describe later on in detail if you want, but it's-- I don't think it'd be very interesting to people to hear. More interesting to see, I guess. But yeah. Essentially the point of Emily Howell was to create new styles of music. The exact opposite of Emmy, and so Emily Howell tries to create music in a new style and its data is EMI's output. All of EMI's output that I have agreed to can be heard because there's certainly pieces that failed. I didn't include those, and that therefore, the results would be kind of combinations of styles that were-- you remember I was talking about that when I was talking about borrowing and stealing, that in fact, the amount of information she steals little bitty things, stitches them together, and you get something really new that way. Where listeners cannot hear enough of anything of the past composer's work, to be able to identify its influence on the particular piece that you're having the program write for you, and so Emily Howell has been doing well. People often get the two mixed up, but thankfully you did not.

Garcia: <laughs>

Cope: And that's great.

Garcia: Yeah. And so what is the relationship between the user and the program? How did that sort of, that interaction between them work?

Cope: Well, you start typically, and it doesn't have to be this way, but you typically start by creating some kind of an interface that is built on language. That is where you ask a question or you make a statement and the program does in essence what you sort of want it to do. Now, that takes usually a day or so of constant input. Output. Input. Output. To get the program even to recognize its own name, no less your name and what you're talking about. But during that time, you gain a kind of a rapport set up. So the following day you can spend on music, and what happens is you just treat the music like a language, so you keep your particular language, spoken language, involved in the process and you add in the music and then as you work with the machine you simply listen to what its output is as the result of your input of small fragments. Very tiny fragments. You listen very carefully to what it produces and then either grant it

permission to continue or deny it permission to continue. Unfortunately, I decided that I was going to make those denials and agreements not shall I say finite? Not absolute. They're just little hints. Don't do that again. It might do it again the next time because of the weightings that are involved in the association net. It may not in fact actually follow your instructions initially, but it will eventually and in so doing it also involves changes in the entire network about what things mean and you can say, "Yes. I love that Emily Howell," or, "No. Start fresh," or Inputting nos and yeses, the program, will in fact, adhere to your comments and make an attempt and you can say, "No, I don't want that there either," and it'll be removed either once or twice, depending on how many times you have to convince it to do that, and so you're-- it's a conversation. You're talking to yourself, right, but it's yourself that you've forgotten, all the inputs and outputs you've made over the last two or three days, and so in the process you can get pretty confused. I don't treat it as a version of myself, I treat it as a version of Emily Howell. Which gets actually kind of confusing or less confusing than intimidating at times, because, there's times late at night when I work with her or when I have worked at it, where I actually start talking to Emily Howell as if she were really Emily Howell. A person.

Garcia: <laughs>

Cope: The name comes from the fact that Emily and EMI are not so distant relatives to each other, and Howell is my middle name, name of my computer account at UCSC.

Garcia: <laughs>

Cope: Haven't I?

Garcia: Yeah.

Cope: I talked too long that time.

Garcia: Now, here's a philosophical question.

Cope: Oh, good.

Garcia: In the interactions between Emily Howell and the user, which has anyone else actually done deep-scale work with Emily Howell?

Cope: Not deep-- no. Because it's extremely <laughs> time-consuming.

Garcia: <laughs>

Cope: But yes. Short ones. I've had people do it all over the place. I've had students in my classes use it, and there typically were a hundred people in my class when I was teaching who used it. They all got the code. They all supposedly used it. I'm sure there were some who didn't but...

Garcia: <laughs>

Cope: They did, and they had the fun or agony of this themselves. So it's been used by lots and lots of people, and the source code's available for anybody who wants to download it.

Garcia: Mm, nice. And so do you see the relationship between the user and Emily Howell as a mentor/mentee or as a artist/critic?

Cope: Of those choices, I would take the first.

Garcia: Okay.

Cope: Absolutely. Over the second. Again, the machine is still very, very much of a tool.

Garcia: Mm-hm. Okay. That's what I was hoping you would say. <laughs> Reaffirms my beliefs.
<laughs>

Cope: Good. Good.

Garcia: All right. So let's go to some of the other work you've done. When did you become interested in the visual arts?

Cope: I think I was eight. I wasn't interested in it. Frankly.

Garcia: <laughs>

Cope: But my mother and father said that I was, so I guess I was.

<laughter>

Cope: So I was sent to Arizona School of Art, whose fame was built on the fact that every Halloween the letters on top of the building were all on little runners, so we moved the “F” on “of” over to the “A-R-T.”

Garcia: <laughs>

Cope: Doesn’t sound like much, but for us it was a thrill, because it was a rather--

Garcia: <laughs>

Cope: Yeah. So I spent seven years there every Saturday morning--

Garcia: Oh, wow.

Cope: --painting and-- oil painting and watercolor and, oh, my God. From all kinds of pottery creation, et cetera. No nudes though, and I couldn’t understand why we didn’t have some nudes to work from.

Garcia: <laughs>

Cope: I guess it was because I was eight.

Garcia: <laughs>

Cope: Maybe, I suppose. I don’t know.

<laughter>

Garcia: And so when did you start working with computer-generated visual art?

Cope: I waited until I knew what I was doing. I had no commissions to have to pay back, <laughs> because I couldn’t finish the opera, so I-- by the way, I did finish the opera, in about, I don’t know, less than a day.

Garcia: <laughs>

Cope: Using EMI. But that was about eight, nine years later. Got the greatest reviews of my entire career.

Garcia: Oh, wow.

Cope: Which made me think.

Garcia: <laughs> What was it called?

Cope: It was called-- oh, crutch. Cradle-- God. This is embarrassing.

Garcia: Yeah. I should remember.

Cope: "Cradle Falling."

Garcia: "Cradle Falling," okay.

Cope: Yeah.

Garcia: Yes. That's been recorded, if I'm correct.

Cope: If it has, I was not privy to it.

Garcia: Okay.

Cope: But it could very well have. What was--

Garcia: <laughs> So when did you start doing visual art generation?

Cope: Okay. Yeah. I started probably in about 2007, but I didn't consider anything that came out of it successful in my terms until maybe 2012, something like that, and since that time it's done more than 500 paintings and 20 books available on Amazon. Called "Ars Ingenero 'Generated Art,' in Latin.

Garcia: That makes so much sense. <laughs>

Cope: It does.

Garcia: And so what do you think was the limitation holding back your program from actually generating good visual art?

Cope: Well, it was me. I mean, essentially I couldn't get exactly the handle on the subject as I wanted. I had different ways of going about doing it, and they were mostly unsuccessful, very primitive, very simplistic, and not very consoling or, you know, they didn't impress me at all. Until I discovered some things. Well, part of it was just discovering basically thoroughly how the screen works on a Macintosh and what RGB stands for, and a variety of things. Understanding some math, particularly nonlinear math. A lot of things had to come together and it was the same process as I went through with EMI, which was just trial and error and most of the time screwing it up for the first three or four years, and then finally, you know, I took a walk which is what I generally do. I take a long, long, long, long, long walk and think it through and stop trying to fill myself full of information that other people have used and try to think of what would work. All I want is art, and I wanted the art to be very, very, very high-quality in terms of output. So at 15,000 dpi, by 15,000 dpi, which is pretty--

Garcia: That's beefy.

Cope: Pretty good.

Garcia: <laughs>

Cope: Yeah. So you could make it, you know, large and not see, even with a magnifying glass, not see pixels, and I wanted to skip that. So those were sort of the outer limits of what I was able to do. The rest of the time I was trying to figure out how I could take images from the Hubble Space Telescope, winding our way back to the beginning of our conversation about science, and high level, high quality, high grade images, and, you know, somehow turning the nonlinear math with the RGB from the color photographs, because nonlinear math is you either color it or just fake color it yourself or it's going to stay black and white. So I used the color from the images of NASA and stuffed them together in ways and decided that what was coming out was pretty interesting. Interesting enough to put on the front room walls of my house and sooner or later having sold quite a few pieces now, for not great amounts of money. But I'm not expecting to make a lot of money from it but I'd like to be known as a professional rather than an amateur. So even a penny would probably <laughs> do it.

Garcia: <laughs>

Cope: Because all I had to do was give them something that didn't cost me anything in the first place except for the data, which was essentially stuff I'd retrieved from the internet. Like the NASA photographs.

Garcia: Yeah.

Cope: Does that answer your question?

Garcia: Mm-hm. Oh, yeah.

Cope: Okay.

Garcia: Did you see it as fundamentally harder to do visual art generation than music?

Cope: Yes. But the other one's the hardest of all.

Garcia: Is the writing?

Cope: Yeah.

Garcia: Yeah. So when did you get interested in-- well, first, when did you get interested in just writing and storytelling sort of things?

Cope: Oh, I was in my youth. I wrote a novel before I was 18. I wrote an epic poem before then. I loved short stories, and then I got out of it and I think I wrote one novel throughout my entire teaching career and it was terrible. Just terrible. I destroyed it and I would destroy it again if I find it anyplace else.

Garcia: <laughs>

Cope: Mimeographed or Xeroxed or whatever. It was just terrible, and then when I started, I started writing myself, so I really knew what I was up against, so I wrote 25 novels over a period of maybe five years or so, and they started off terrible. Not terrible. They were written poorly. They were good books in terms of plot and so forth, I think. Only good, but they were good, I think. But, you know, the writing was bad, so I learned, and so I'm constantly rewriting those books. Last night I was up late working on one of the books just rewriting it. So I can understand this process really, intimately and well, and I have a plan that I believe will work. And when I get all the data in the right order and so forth, I will set about to write

the third volume, which doesn't exist, of "Alice in Wonderland" and "Through the Looking Glass" fame, and see what happens. It's more like EMI in the sense that it's got a database of the Lewis Carroll originals. That's all set up. But it—the novel writing, playwriting, that kind of stuff, is just incredibly difficult. At least I have found it that. Art is-- turns out to be the easiest for me, and while we can argue about whether it's any good or not, it's turned out to be the easiest with music in between.

Garcia: Hm. And so you've written, well, I guess you have coded a program <laughs> to do haiku in particular.

Cope: Yeah.

Garcia: And so where did that sort of start? Did you, like, go back and look at some of the other attempts to do that, like Racktor [ph?] and so forth? Or where did that-- what was the genesis?

Cope: Well, I just wanted to do it. That's all. I have no other excuse for it except that I've always liked haiku, and I guess it's because when you look at a haiku it's pretty useless to you. They... <laughs> They're problematic to understand. They really are, and to a degree, that's the point, and so I figured I was even if I failed I was going to succeed in some way. So that was fun. So that was the reason why I suppose I did it first. I've done sonnets since, some of which our machine created. I shouldn't say it that way because it's a tool, so we should go back and say I used my tool to produce some of these. But the thing you're referring to, is a book that's published that's called "From the Fiery Night," I believe.

Garcia: Mm-hm.

Cope: It sells quite amazingly so. It is just staggering to me that so many people want to read this, and I invite people in the preface to the book to send me their guesses as to which ones are which, and I've received, you know, dozens of answers.

Garcia: Wow.

Cope: And I have to go through them like I'm grading a paper from one of the classes I no longer teach, and it's funny. I feel badly about the way in which I advertised the book. I said, "Some of these are composed or created, written, by a computer and some are written, composed, by famous Japanese haiku poets. Now, if you want, you can make guesses as to which is which and send them to me and I will grade them and send them back to you just so you can see how well you did." But for some reason that translated to a lot of readers into, "There's roughly an equal amount of this and an equal amount of that," because that's how they produced their 2,000 guesses.

Garcia: <laughs>

Cope: But it isn't that way at all.

Garcia: <laughs>

Cope: There's only 39 haikus by human beings and all the rest of them--

Garcia: Wow. <laughs>

Cope: --are, yeah, produced by computer. I'm getting back to that tool business from the very beginning.

Garcia: <laughs>

Cope: That we spoke about.

Garcia: Yeah. And so have you noticed the, sort of the trend now that people are doing computer-generated things, like is it "Sunstroke," I think, or "Sunflower." It's a-- there's a whole bunch of, like, short films that are having their scripts generated, if you knew anything about that.

Cope: Yeah. I know about it. I can't tell you how it works but it's pretty obvious. Short things, in very short things like haiku, are generally much easier to do than the rest. I mean, the haiku code is on one page. You can just print it out. I mean, it's nothing.

Garcia: Wow.

Cope: I mean, it's really nothing. People imagine it's some... But, you know, you don't have to worry about character names being consistent, you don't have to worry about whether it's day or night and have all these memories and all this stuff following you along, so there's a certain kind of consistency there and there's a plot and there's all this stuff going on in a short story or a novel, but in the case of something like haiku, and I'm not saying it's simple, and certainly not downgrading haiku, because I love it, but it's not the same. Let's put it that way.

Garcia: Mm-hm.

Cope: And you can create faux haiku and fool people with it, so much easier than doing something like even a very short, short story, which is extraordinarily complex. You just wouldn't believe how complex it is.

Garcia: <laughs> Yeah. And so I had a question and it was going to be a follow-up and it's gone, and let's-- oh. Have you done it in Japanese at all?

Cope: No.

Garcia: I guess--

Cope: It could be.

Garcia: Mm-hm.

Cope: But then I wouldn't understand it. Nor would probably the readers, so... But I have a number of my books on other subjects published in Japanese. Just looking at one yesterday, as a matter of fact, and I couldn't read the first line, so I just don't know. I'd have to learn Japanese, I suppose.

Garcia: Yeah. Well, you've got some time. <laughs>

Cope: Yeah, yeah.

Garcia: Okay. So the last set is sort of the long-view questions, and so the first one is, "What do you think the long-term impact of computer-generated music on the art music world as a whole will be?"

Cope: I can imagine that certain professions where money is involved, it might have consequences. Film music. Music for documentaries. Music, it's already being done, as in music for homemade films, et cetera. So you have a filmic score for it. For very little money, but... and compared to having to write it, you know, getting somebody to come out and score it for you in their own musical style, would be quite a bit more expensive. Otherwise I don't see a problem. I mean, people keep saying to me, "You're going to put all these composers out of work." No. It's not going to happen at all. I mean essentially it's a both/and, it's not a either/or situation. Not either/or, it's either/or.

<laughter>

Cope: Situation. It's really a both/and. I mean, really, if you like one or the other, then choose one or the other and they're not going to go away. I think people will probably end up liking it or they'll have a vestige of their love of the music written by people who they think have similar kinds of a motive and mental images of what they're doing and why they're writing the piece, and this is true of visual arts. I mean, is a sunset, a photograph of a sunset, is-- who made that? I mean, are we going to attribute it to God or to the planets and the sun and some kind of random occurrence or something? Are we going to give the camera credit for it? But yet we all love photographs, I mean, of things, whether abstract or representational, and that's important. I just don't see a problem. I guess I'm naïve, according to the rest of the world, but I don't care.

Garcia: <laughs>

Cope: I try to think through things myself and make my own decisions rather than going along with the crowd.

Garcia: Hm. And so the last one is, "How long do you think before we get to the point where a computer is being used for sort of the majority of literary output?"

Cope: I'm not a futurist, and I have no idea how long that might take. What we're really talking about is when will the first alive computer exist? I mean if current situations allow us to survive the planet earth and the rest of the human race, then I'm quite convinced it will occur. I tend to be somebody who's more attracted to the, "I am a computer" kind of future, that is we are going to start putting more and more pieces of the planet into our brains and into our teeth and into our whatever. I mean, God knows when I was young, nobody wandered around looking, wondering, "Was that real? Is that really your hair? Is that really your teeth?" Teeth are supposed to be alive, at least the roots are. "Is it really your teeth or did you set--" "They're too bright to match your--" hey, I don't know. That didn't happen much then, but it happens now quite frequently. <laughs> We wonder these things, and I think that's wonderful. We're also working seriously with DNA. Grafting and the like. We are right on the edge, literally in the next 50 years, of being able to live for a very long time, granting that no car runs you down or something else happens, because we can actually change our bodies from growing in certain ways, and I've been keeping up with that because I have written a series of books about artificial life and it has taught me a lot because I've had to do a lot of research. There are companies out there doing all manner of things. I think most diseases on this planet are doomed in a fairly short time, and by that I mean 50 years, but-- and maybe faster than that, because things seem to keep doubling with Moore's Law for human beings. But as I usually say, it's all good. I mean, if we can just leave our <laughs> scientists be and put laws down, ethical laws, in a proper way that prohibits certain people from using them indiscreetly, I think we have an incredible future where we'll start living 150 years, 200 years because of this and maybe sometime forever. I don't know. But I certainly know that Darwin had a great idea, and evolution is an absolute of the universe, not just living things, but dead things too. Evolution happens, and it looks like we believe that so much that we're

trying to get a good grip on it and use it for our own means, and we've already done that but, you know, really quick.

Garcia: <laughs>

Cope: I know that I'm going to die. I do. <laughs> I know it like everybody else does. We're going to die.

Garcia: <laughs>

Cope: We're going to die. But yes. It's true. I would love to have some of this available to me so I don't know. I've already had cancer. I don't want it again, thank you very much.

Garcia: Good call.

Cope: Life is great and this silliness by which human beings operate their lives and our own lives is fun.

Garcia: Hm.

END OF THE INTERVIEW