Two talks by Larry Polansky
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DAY 1
Polansky: It's hard to say who one is in a few words. It's probably best to play pieces and to talk about the pieces, let the pieces show who I am as a composer. I'll just say briefly what I think my background is. These are odd representations. One says what one would like to believe sometimes.

I grew up in New York City, mostly as a jazz musician but also as an American musician (whatever that might mean). Most of my musical interests are those of the vernacular. That's a strange word, but I hope you know what I mean. I didn't have a classical music education growing up. That was acquired piecemeal later on, almost by obligation.

I've always been a guitarist. The guitar is important in my work and in my life as a performer, as a composer, as a thinker. Another thing that's been important to me since I was quite young is the use of the computer. I began to program computers in the very early seventies, and I've been using them ever since, in a serious way. Mainly I've used them to compose, as compositional partners. I've thought a lot about that lately, and had some conflicting thoughts. Sometimes I want to just throw the thing out the window, and never look at a computer or software again. It's hard work, and more appropriately the work of younger people than myself. It's generally much more work to use a computer to write a piece, as David Kant, one of my students who's here today, could tell you, than it is to just sit down and write it by hand. The other day in Hanover, David and I spent about three hours trying to figure out how to get a bass clef. Amy just drew one, and then said to me: "Why don't *you* just draw one?" That's something of a sad comment on my life as a composer — I'll spend three hours trying to do something very simple on the way, and as a strange prerequisite, I hope, to something more interesting.

I've been using the computer in this way more or less all my compositional life. How I've used it has changed, I've tried to continually rethink that. I've been interested mainly in clarifying, making things more transparent and emblematic. I try to model compositional, creative, and conceptual ideas. I have not been as interested—as other people who use the computer have been—in, say, synthesis algorithms. Although I've done a bit of that, largely as a teacher, my focus has generally been in trying to explore deep ideas with reference to mathematics or perceptual algorithms. I'm most interested in a creatively liberating tool. It's ironic that the thing that is ultimately liberating, when it works, is what I want: the thing that makes me less hands-on as a composer. Yet I often feel somehow as if I'm cheating if I don't do it that way. Still, the path to getting things to work is arduous. It's ironic that something so liberating conceptually and creatively also carries with it a tremendous onus of the kind of work and pain you have to pass through to achieve that same liberation.

I don't always use the computer. Yet even when I don't, the pieces are influenced by that way of thinking. I tend to work very formally, and I also try, I think, or I hope, to keep

honesty and transparency present and paramount. I aim for unexplainable explainability. I *like* to articulate things, and I don't want to "pull a fast one on you," to use an American expression. I'm not interested in cosmetics, nor fascinated with gimmickry. I search for deep ideas that lead to magic. But I'd like the deep idea to be explainable, the path to magic followable.

What I thought I'd do today is discuss some pieces that are on a new CD of mine, about a year old, called *The World's Longest Melody*. It's on New World Records. One of the reasons I'll do this is that the group that made the CD, Zwerm—a guitar quartet from Belgium led by a guitarist named Toon Callier — is going to be here in Ostrava. This CD is ostensibly a collection of my music for guitar, centered on one very challenging set of three pieces written in 1996 that Zwerm premiered in 2009. I thought it might be interesting to look at that piece, in this context, and maybe some of the other pieces on this CD, which represent some portion of my compositional ideas.

The first piece on this CD gets played a lot, and I'm not sure how I feel about that. It's called *Ensembles of Note*, and I'll say just a few words about it. It was a response to an interesting call for commissions by a great New York composer/musician named Barbara Benary, who founded and still directs Gamelan Son of Lion, a new-music-do-it-yourself, tin can-ish gamelan in New York. They've been together since the early seventies. Son of Lion is mostly comprised of composers who write primarily process or minimalist music on this non-Indonesian yet Indonesian-influenced gamelan. Some of the composers who have been associated with this group are Philip Corner, Daniel Goode, Barbara, and many other interesting people. For many years they've played a piece called *Eine Kleine Gamelan Music*, which is one of my favorite pieces in the world. It's a one-page process piece by Daniel Goode that I consider to be a perfect one-page process piece, a challenging achievement.

I've played this piece a lot with Dan and other musicians. Some years ago I wrote a computer version, in my language HMSL, that learned the piece, and performed it, and with which one could perform with the computer (which we have done, often). *Eine Kleine…* is such an interesting and explainable piece that I was able write software to function as one (or sixteen) of the musicians in the piece. Son of Lion liked Dan's piece very much, and they often found that many of their other one-page pieces weren't quite so cool as *Eine Kleine…*. Eventually, Barbara put out an open commission for new, great one-page pieces. She called it the "bupkes" commission. Does anyone know what that Yiddish word means? It means nothing — like *really* nothing. For example: "What have you got in your pocket?" "Bupkes!" She offered no money, it was just a request. I wrote *Ensembles of Note* as a response.

It seems like the challenge for such a piece is to engage smart musicians to play interesting things, to let the music be open yet highly structured — but "open" and "structured" in insightful and forward-looking ways. *Ensembles of Notes* [*EoN*] followed the direction of some other musical processes I'd been thinking about, regarding the filling of time spans. Let me play you a recording of the piece, or some of it. It's

ZWERM playing with a sax quartet, and some other of musicians. *EON* gets performed all over the world now as one of those pieces to have in one's compositional repertory.

[plays recording of *Ensembles of Note*]

It's not trivial to play. There's an ostinato, and that was part of the idea — that keeping that ostinato in your head while doing other things is somewhat challenging. As Doug Perkins, a great percussionist friend of mine, said: "You know, if you had just written it in four the piece would be a lot easier." That was part of the idea. Often, when groups play it, they simply assign someone to the ostinato, but that doesn't have to be the case. To me the ostinato is just a time span. It's a fixed length of time, and the musicians are asked to treat that as a time span and gradually fill it with some number of gestures or events over the course of the piece. They don't have to be in rhythm. Most of the musicians on this recording hit eighth notes, but that doesn't have to be the case. They can be anywhere in this abstract time structure, which is elucidated by the ostinato. They do it cumulatively, or they can sit out for a while, or join the ostinato any way they want, with any kinds of sounds. Or they can come in and out with the ostinato. I suggest that everybody end with the ostinato, and most groups do that. But it's surprisingly difficult to play this piece well. Sometimes musicians make parts for themselves. Sometimes people write out their parts, sometimes they try to do it spontaneously. Groups work on it in different ways to try to get their own sound. It challenges a group, it challenges the musicians and yet it's completely open. I'm not actually telling anybody to do anything, which is a good thing to do, or not do. Any questions?

Student: I just was wondering, so there were some electronic sounds in there. Did you have musicians who would press a button and that sound that would happen?

Polansky: In this group of Belgian musicians there's a really smart young composer, Stefan Prins, who does electronics. He works with the group as one of the musicians and finds way to enter that world. I don't know exactly what he is doing in this recording because I wasn't there. He probably has some events that he triggers. One of the ideas of the piece is that once you enter something it's inscribed in the time span. But that is open to interpretation: even if you have some interesting algorithm or patch that you called the "same thing," that would be fine. Does that make sense? I think of that a lot when I play it. Often I'll use a gestural shape, but I may do it on different strings or different parts of the instrument, or with a different sound. As long as I consider it "the same thing," I'm okay with it. Lots of musicians have argued with me about the instructions, whether they allow this sort of thing, but certainly it's open to that.

I'll say a few more words about this piece. One thing, as a composer — and I hope this is one of the few "careerist" things you'll ever hear me say— is that it's nice to have a piece like this that you can hand out, and not worry that musicians will come back to you and say "I can't play that, that's too hard." It's nice to have one or two of those that can be played by anyone from your average college new music ensemble with 32 melodicas, a string bass and a folk singer, to a group like ZWERM who can play the hardest thing

imaginable. Yet this still challenges them. It's nice because it forces one to think and re-think some assumptions about what a composer should be, or how a composer might be relating to musicians. When I play it I'm as humbled, excited, and challenged as the other performers in the group. If, as a composer, you can do this, the other stuff is easy. If you can produce a piece that gives people at diverse levels a real musical experience, and changes their mind about music in some way, some humble way, you've done something interesting. I like composers who have worked with this idea for this reason. Another thing I will say, that is more relevant to where I'm going as a composer, is that this notion of a time span is very important to me. It's become more and more important lately, and has been germinating in my mind for a long time.

This was the third piece I did using this notion. The first was a live computer piece, a duet I did with Douglas Repetto maybe ten or twelve years ago. That piece dealt with an intonation-theoretic way of filling the time span. It was interesting, but not a piece that I've kept. My original idea was: this is really all that music is. There's a block of time, a start and an end, and something happens in between. How one decides what happens is the fundamental, and I suppose, almost trivial question. This is, I'll admit, almost an idiotically obvious thing to say. Obviously that's what music is! If it doesn't invoke time it's maybe another, very alien (but maybe interesting) definition of music. But I think that returning to obvious questions is a good way to progress, so that we don't proceed too quickly on assumptions that may or may not have been what we should or could have assumed. Most of the music we know of is about filling a time span. That early electronic piece of mine was called *Killing Time*, for that reason. It's a pedestrian, or elemental (you choose!) way of thinking about music, filling in space. But it interests me to think about further.

Another piece that preceded *Ensembles of Note* was for my daughter Anna, who played Suzuki piano when she was five or six. I thought Suzuki piano—and I apologize to any Suzuki students—had some problematic ideas of education, and of music. The idea of non-creativity and non-improvisation was unsettling to me, though Anna seemed to like it. She also played Suzuki violin and I learned with her, but it just sometimes seemed a bit creepy. And yet sort of fun, and satisfying. Like cookies you really love, but you ask yourself: why am I eating them? [Shows score.] So I wrote this piece for my daughter, her best friend Eleanor, and Eleanor's little sister Julia, who's now in ninth grade. Eleanor is in college now, and my daughter is college-aged as well. Jack is Eleanor and Julia's dad, who lived a couple doors down, and also played Suzuki piano. The piece is called *Neighborhoods of Note* because they were my next-door neighbors. It's a page of instructions, where one pianist plays "Hot Crossed Buns," this brain-dead Suzuki piece that people are asked to play over and over again, and then the variations are improvised over it. The second pianist simply improvises in the time span of the two repeats of "Hot Crossed Buns." I wrote out one example of some music-improvisational doggerel, which accrues events over the course of "Hot Crossed Buns." This then, was the prototype of *Ensembles of Note*, the notion that completely vanilla mass-produced Suzuki exercises really were just blocks of time, filled for some purpose, as near as I could tell, the

purpose of musical indoctrination. So I wrote another version. That's the earliest example, and the name *Ensembles of Note* comes from that.

Ensembles of Note is from around 1997. Since then I've returned to this idea of repeating time spans, and tried to move it far forward. This past year I've written a number of pieces in variants of this form, including a new quartet for myself, Christian Wolff, and a number of other musicians we often play with. In this piece the time spans are asynchronous, and different lengths, and the musicians add things in different ways. In other pieces I've written out a number of semi-determinate, or completely determinate versions of what the musicians do. I've been exploring this as a basic compositional tool. Whenever I get stuck on an idea, I try to explode it outward. These new pieces are interesting to me, and they've been performed a number of times recently. There's a version for guitar and violin (commissioned by guitarist James Moore) where the two players add events — which I wrote out — but they can move in and out of the ostinato as well, and they have to play these events at the same time. It's challenging, but it's a fun brain exercise for the musicians, who have toured with this piece recently. There's another similar piece for the trombonist Matt Barbier's duo.

But the new piece I'm writing—and I apologize for showing you something that is in an ugly, embryonic state—is for a big ensemble, about nine instruments, called *Ensemble Besides*, from Ghent. It's led by the harpist Jutta Troch, who will be here on Sunday. She asked me to write this piece. I wanted transparency and that explanability I talked about, and I wanted to do it in software, to have the computer write a piece given a complex structural description. I won't play you this piece because it's at least a month or two away from seeing score paper, and it's complicated. [Note: this turned out to be six months—LP] In this piece, the instruments, that is, the individual parts, know the idea. They also know about inventing repeatability structures. But here the notion of time-span is expanded so that each instrument has the complete concept of the piece, and at some fixed length. It's not determined—at a certain point, I'm going to type in the number seventeen and the piece will be seventeen minutes long—but it only works with that number internally. So, for example, instrument one (say, the flute), decides it has certain sections and decides how long these sections are in the piece. Each one of these sections is, in some sense, a whole piece, an "ensembles of note." So a section might have any number of repeats, and the instrument decides how many repeats it has and what to do in that section, and it does an "Ensembles of Note" for each section, and when it gets to a new section it re-initiates its worldview. It's ten or twenty "Ensembles of Note" in a row for each of the nine instruments. The sections are asynchronous, and their decisions are not related except that there is, at the top level, a large set of evolving parametric descriptions of what's happening musically.

[Note: This piece, completed in March 2012, is called *She is Full of Patience*, and was premiered by Besides in March 2012, in Antwerp, Belgium—LP]

Student: So in *Ensembles of Note* you talked about the ostinato and how it was important for the ostinato to be interesting. How are you generating a potentially infinite number of interesting ostinati?

Polansky: This one will have an ostinato, but it won't actually *be* an ostinato, since it won't repeat. So there'll be some other kind of line down here [points to diagram], and the instruments will be yanked out of their behavior at various points to join this. This is going to be a score, completely read, so instead of the musicians saying "I'm going to go to the ostinato for one whole phrase," they might be pulled there for a beat, or two beats, and orchestrated by their own processes. [Note: This did not, in fact, end up being part of the finished piece—LP]

Other student: What will the cycle be?

Polansky: I'm not sure yet. I haven't written the ostinato algorithm, but I've been thinking a lot about it. The programming is tricky, the timing is tricky because each musician is in hisr own time-world, and they have to go to the ostinato that is in its own time world. If you've ever written something like this in software, you will know that, as in the joke about the secret of Jewish humor, timing is [waits a few seconds] everything. The same kind of process happens here: getting the musicians in and out of the ostinato in interesting ways involves tricky code.

Another thing about the piece is that there are large scale curves, harmonic curves, density curves, even things that govern the number of repeats, which are all musical trajectories that the instruments know about. They all play the same piece at a high level, with a heterophonic form resulting. Heterophony is central to much of what I do.

They also know how to pick their musical material independently of how long they have to play it. I've always found that funny in the original, when you're playing it you think, "Do I have enough time to do that?" and you make decisions about that. Well, here the software instruments don't have to think about that, because they might pick thirty notes to play there, and then the computer rescales everything. A lot of these decisions are independent of formal constraints, which couldn't happen in live performance. When you have a computer, you can do things, formally and compositionally, that humans can't do. One of those is the multi-pass consideration of time, where one can do complex re-scalings. This is all interesting to me, because it's a generalization of the "Ensembles of Note" process.

Student: Each section follows the additive process of *Ensembles of Note*?

Polansky: Yes, although that's not implemented yet. The software picks some number of events, whose characteristics are based on common large curves, and they add themselves in over the number of repeats. [Note: They do this, in the final score, through an implementation of the "dissonant counterpoint" algorithm," or statistical feedback — LP]

Student: And the curves span the entire piece, not these individual events?

Polansky: Right, and there are canonic interpretations of density. The musicians (that is, the software) are all looking to these same curves.

Student: So my question then is what if, when it starts a new "Ensembles of Note," the density is very high and drops off quickly?

Polansky: They don't care. They're just looking at the beginning of the "piece," they don't pay any attention in the interim, even though values are changing continuously. They don't update themselves moment by moment, but section by section. That sounds like a simple answer, but that took me a long time to decide. They make themselves a new piece here (points to a spot on the curve). They're all doing it asynchronously, so these curves are a structure, the large-scale form of the piece.

Student: And so you get a representation of the curve that has as good a resolution as the overlapping sections.

Polansky: That's right, it's sampled. But mainly, they use these values to instantiate a new "piece-let," which shouldn't change. It's a kind of musical identity that is constant for a while. This is true of life, right? You're not always looking up. The sampling rate might be so low that you have some kind of nasty fold-over.

I mean, in all of these matters, we could geek out forever, and I'm happy to geek out for a little while, of course. But the main idea of talking about this is to emphasize the concept of "opening up the idea." Often a composer decides: "I've got one good idea." As Henry Cowell said, or maybe I'm pretending that he said it: "You're lucky if you have three good ideas in your life. You're very lucky." Often a composer has a good idea, or two good ideas, and gets stuck in them, or beats them to death. That's a natural, perhaps unavoidable thing for us to do. But it seems that one of the advantages of software, of having a powerful collaborative expansive intelligence, which is also admittedly a recalcitrant and somewhat hostile intelligence, is that we can use it to liberate ourselves from some of our own preconceptions. One way I try to do this is by generalizing ideas as soon as I can. If I can say: "What's the big idea of this time span?," then more possibilities open up—possibilities that might not have opened up had I used a more conventional way of working. This has advantages and disadvantages."

Student: Isn't there a point where it becomes so dense that you can't really hear the process anymore? And it seems to me that the ability to hear the process is really important.

Polansky: It depends on what happens, right? Sometimes with these kinds of programs, the compositional process ends up being mainly about the tweaking of large-scale formal values.

Student: So are you going to work out what's going to happen?

Polansky: No. I'll let it get ugly, which is often my predilection — I'm averse to cosmetics. Here's how I think of it. When you plant a garden—is anybody a gardener in here? —you plant lettuce, and you put in lots of seeds. With something like lettuce, there's no way to put one seed in, another seed in, and hope that your lettuce plants are evenly spaced. Generally the way I do it, and admittedly I'm a lousy gardener, is to just dump an envelope of lettuce in a furrow, and when they start growing I weed them out. You can't plan a lettuce grove. And I think the compositional process is similar. As James Tenney might say, the idea is to make a forest, but one doesn't put trees in a forest one by one. We design the process that makes forests. That's a much more beautiful, more interesting thing to do. Perhaps when you do that, maybe your forest is overrun with elms, and you don't want that. You don't start pulling out each elms, you go back to look at wherever elms came from in the process, and you look at the whole thing. You make another forest. Maybe then you have too many spruces, or gophers. You can't care where the individual trees are, but about the totality of wildlife in that forest. It's not so much the ecology, as, in my way of thinking, the heterology.

Student: So when are you going to start doing that?

Polansky: Well, in this piece, I'm a ways off. Hopefully, while I'm here I'll get to work on it. But generally, in my software, compositions like this are a long, and painstaking process — to get the code right. I think about questions like: Is this so dense that it's meaningless? What big number is in charge of meaningless density? I don't want meaninglessness, but neither do I want tidiness. I don't want to pick out *things*, or micromanage a forest. I want a forest that I can walk around in and maybe live in for a while.

Student: So can you just explain what exactly you want the players to do?

Polansky: In this piece they're just going to read a score. I was talking to David Kant — David was also working on a computer piece using similar software—and he said: "I'm doing a lot of work to make it easy for the humans." That's a good way to put it, and I'm doing something similar here. This particular piece is not primarily about challenging the human performers in far out ways. I'm hoping it'll be manageable, because these musicians can pretty much read anything you put in front of them. It's hard for me, as a composer, but I hope it's not hard for them. Different pieces have a different balance of this relationship. I'm interested in both kinds, in different places on that continuum. But in this particular piece, since my main goal is to "open up" the formal idea, I want to take the brunt of the pain, and make it easier for the musicians. In the next piece this may not be the case. [Note: It turned out to be, in fact, quite challenging for the musicians, in some different ways—LP]

Can I show you? It's interesting to talk about this, but let's see what happens when I run the program (in its current state). Right now it doesn't do much. It structures itself: nine

instruments create time spans and numbers of repeats and spit out, at the moment, completely meaningless data for their notes. There's no rhyme or reason to the actual low level notes that get played now, and the *EoN* incremental process is not yet implemented. But we can see the central notion of the piece, where an instrument figures out its structure over time. For example, in these five or eight lines of code [shows code], the instrument asks: "How long is the piece, what are my repeats, what is the structure of this section?" Then it uses some simple processes to figure out *who* it is. This is kind of a nice feeling—"hit go" and you set all these individual composers to work [hits go]. Each composer is now learning, capable of being refined. I'll just run this. This is like taking your pencil on a blank orchestra score, drawing a blob here, a blob there. In its current form it's kind of gross and undetermined and the sound is ugly (just General MIDI). But it runs, more or less. This is what I'm working on while I'm here in Ostrava, when I'm not having inspiring and interesting talks with all of you.

It's actually playing [music plays] as it figures out what it's supposed to be doing. It's playing the piece and notating it at the same time. What you're seeing is its attempt to figure out who it is at any point. It gives me information about where it is in the piece, what the repeat lengths are, and it does some complex time scalings as well. Most of the data you see scrolling by is meaningful only to me as a programmer trying to debug it. I think this is a one minute version. And so it finishes, and hopefully it notates itself [program finishes].

Let's try it again. It's always different. I've taught it to kind of live a little bit. I like this part of the process. I like watching the computer learn a compositional idea. In the end, it notates itself in conventional notation and goes straight to score.

Student: Could you talk a little about the algorithm? How it works a little bit?

Polansky: Yes, I could, without getting too technical?

Student: No, not technically, but how it works, evolutionarily?

Polansky: Well, right now the actual lowest level note selection is completely random, a kind of compositional placeholder. It's just picking random notes within a range, because what I've been interested in at the moment is getting the time sectionality working. There's nothing much going on at the lowest and very highest level. The tricky part was figuring out the time structure, which has to do with certain kinds of ranges of minima and maxima and distributions, and the relationship of repeats and section lengths to the length of the piece. I didn't want a tremendous amount of variation. There's a curve that evolves over the course of the piece from, in this case, larger time lengths to smaller time lengths and back. But that will change. I did another piece with this software, and I might change that part, because it would be a different piece, a different curve. I'm trying to think on very general formal levels, and whenever I code I'm trying to think of not only this piece, but also the ten pieces that might emanate from the idea. I'm trying to implement an idea, not just a piece, which is an instantiation of that idea.

Student: Yeah.

Polansky: So right now there are lots of algorithms at work in the code. I'm using a language written in Java called JMSL, which stands for Java Music Specification Language, written by Nick Didkovsky. JMSL is based on a language I wrote in the 1980s along with two other people—Phil Burk and David Rosenboom—called HMSL, or Hierarchical Music Specification Language, which deals with specifying musical structures heterarchically. For example, you specify structures that contain any complexity of smaller structures. I used HMSL in a lot of pieces. The Java version, JMSL also implements this high level conception of musical structure. Nick did and does a fantastic job with JMSL, and it's a great gift to composers like me. You still have to be a serious JAVA programmer, but there are extraordinary musical tools in JMSL that are very useful.

Student: When you generate this data, do you interact, do you change by hand what you want? How do you interact with this procedural generation?

Polansky: Again, in each piece it's different. My general principle, my idea with writing these sorts of pieces, is that forest metaphor I talked about. If a tree is really not supposed to be in a forest, something's wrong with the notion of a forest. Once I get the software right, I generally take what I get. But that takes a very long time, and a lot of thought. If it doesn't look like a forest I go back to a "God level" — I don't haul out the chainsaw. I don't move leaves to different branches. I try to act at a high level because that's the perspective that interests me. This is more challenging to me than saying: "Wouldn't this be a neat sound to pop in about here?" I don't think: "How would Kyle like that branch?" [looks at Kyle] "Is that branch a little too long?" In this kind of piece, I don't want to think like that as a composer.

Okay, I think I'll put that piece aside for now. I wanted to give you a sense of where my composing mind is in the actual present. The computer geek section is over. Unless you want more, and then I'm happy to do it at a different time.

I'll talk about another piece that's on the CD, which I think is fun. These pieces have a playful and odd genesis. They're called the *tooaytoods*. They are each two seconds long. I'm not sure why this idea came to me or if it's really a good idea, but it's been a fun project. But I can tell you *how* it happened.

Like many composers, especially in the U.S, I've got a job. I teach at Dartmouth College. Some of you know Christian Wolff — he was my close colleague there, where he taught for a long time. For a number of years I had the very dismal experience of being the chairperson of the music department. I don't recommend that anybody ever do this, that is, be chairman of anything. The main role seems to be to attend meetings with lots of people in which nothing happens. You have no interest in these meetings because there's no interest to be had, but by dint of being a responsible colleague you sit through these

meetings congenially, and try to pay attention. They often hand out agendas which I wouldn't read and wouldn't care much about, and I often found myself doodling on the back of the agendas.

One day I drew some staves, and wrote a two-second piano piece during a particularly dull meeting. I think it looked like I was taking notes, so I hope it didn't offend anyone. I wrote three or four of these. I liked the idea of trying to pull off an interesting and complete musical structure in such a short amount of time. It's an arbitrary limit, they could be "threeaytoods" or "fouraytoods" or "twopointsevenaytoods," but for some reason I liked the name *tooaytoods*. I began by writing eleven piano pieces. The challenge was to make them complete and coherent, and as is my usual goal, transparent pieces. I eventually did more. The set now includes more pieces, including ones for solo violin, string quartet pieces, about eight of them now, about fourteen piano pieces, and one for twelve cellos and winds. I think, Tom [Buckner], you were at the concert when that last one was played, and you dropped your program, picked it up, and said: "When's your piece coming?" I answered that it had just happened while you were looking down. These are interesting to do, and a good way to try out structural ideas, because it won't take too long. My good friend Michael Byron has wisely made me promise to never to joke about these pieces, although I confess I find that promise difficult to keep.

Here's one of the first eleven, for piano, that is easy to explain. The title [*viiityviiiinii*] is read to be "88 in two," if you parse those Roman numerals. It's every note on the piano once in two seconds. It's doable. It's remotely doable, but it's doable. That was one of the challenges of the piece, to be on that edge. Since I wrote it I've found that if one asks other composers, many of them have also written such a piece. I asked Christian and he said: "Yeah, I wrote a piece like that in 1953." David Mahler also has such a piece. The idea seems to occur to a composer exactly once in their life, and thankfully only once. Neither David's or Christian's piece is two seconds long though. I'm more succinct than those guys [laughs].

Each *tooaytood* has an idea. Here are two copies of the score I can pass around, and I might as well play a recording of them for you. Surprisingly, a lot of people have played these pieces, and most of them have taken more than two seconds per piece because they're difficult. That's fine with me. I think the first time I heard them in two seconds was when my friend Kyle Gann, who was fascinated with the first four or five, ran to his Yamaha MIDI Disklavier and typed them in, and we heard them in the right tempo.

There's a remarkable Japanese pianist who does play them up to tempo. One day I got this live recording of the first eleven, and they were in fact completely accurate and in two seconds. His name is Kentaru Noda. He's one heck of a piano player, and very energetic. He's done a lot of really difficult music.

[Shows *tooaytood #12b,* piano]

These little numbers in the score are grupetti, that is, they're an indication that this is a quintuplet, but it's only one sixteenth of a sixteenth-note quintuplet. My friend Clarence Barlow calls these *interruplets*. We have this very simple situation in conventional notation [shows sequence: eighth-note, three quarter-notes, eighth-note]. This maybe isn't exactly the way you'd like to notate it, but nobody would have any problem doing this. We interrupt the duplet. There's no reason why we shouldn't be able to do this [points to interrupted triplet] and not that [duplet]. I began to work with that as an experiment first in some percussion pieces [called *nickerballs*, from the *tetherball* series] and then in the two little *tooaytoods* for Joan [Pollack, an Australian pianist]. She played it fine. I made her a little practice tape. I've used this rhythmic idea a lot since, and lately, including the first movement of the large *Three Pieces for Two Pianos*, in which the second piano part consists of interrupted tuplet rhythms of up to seven, where 7-5-3 are all combined. The reason I was able to do that was because Joe Kubera is the pianist. Joe is the kind of musician who looks at this and doesn't scream at you, but says: "Oh, I'll work on that," and then goes home for two months and does it. That's the kind of musician we all hope for — a composer's definition of heaven is to be surrounded by Joe Kuberas. He plays it beautifully. In that piece [*Three Pieces for Two Pianos*] the other pianist never does anything like that, though that part is challenging as well. Joe's part is in counterpoint to the more conventionally conceived rhythmic structure in the other piano part.

I've used this idea in a number of pieces now, working on how to get people to deal with this simple expansion of the notion of how we think of rhythm in conventional Western music. It's one of those interesting ideas: "Why not?" Why don't we have this available to us? I've thought of writing a little "pedagogy" for it, a set of interruplet ear training exercises, but life is too short!

You see something like it in the *Music of Changes*, or *Imaginary Landscape #3*. When Cage used fractional and proportional notation systems, he'd often notate something very similar to this. You also see in it Stockhausen, of course, and in some other music, in a very different way, where composers serialized time structures. I'm more interested in the liberation of the notion of what we consider an easy rhythm. If one practices this, one can do it. Why not learn what a third of a triplet is? It's no big deal. So that's an example of one of the things that I tend to try out in the later *tooaytoods*.

[Question about tempos of the *tooaytoods* from a student, specifically regarding the Zwerm guitar quartet transcriptions]

Well, you know a lot of composers are a bit screwy about their tempos. They write one thing and the musicians do another. I just consider this is one of those cases. How fast do you play the second movement of Beethoven's Third Symphony? I made the time length explicit, but musicians are my friends. As a performer, I know what it means to play a difficult piece, so I like that they did what they did. What Zwerm did, especially nicely, was to let the final notes ring.

Tom Buckner: It makes a tremendous difference with a pianist like Joe, who has played the Cage *Music of Changes*, and he actually does each proportional thing the exact millisecond it appears on the page. That has a character that no other performance of that piece will ever have. And the same with this, where the guy got all the notes to go that fast, that makes it unique and special. Otherwise it sort of sounds like music.

Polansky: Right, if you don't take it seriously, it's not the same. I guess my response to that is what makes Joe Joe, or David Tudor David Tudor, or Zwerm Zwerm, is the exceptional focus that they bring to the score. Nothing is done out of laziness or non-thought.

Tom: [about Zwerm] They probably could play it faster if they had to.

Polansky: They probably could. But it was okay. Back to the notion of performance, I think, especially with the Cage pieces, and I've talked to Christian a bit about this, that what that kind of notational difficulty does is to make the performer focus a kind of attention that brings a different variety of intention to the piece. It's not so much whether the note got played at the right millisecond, but whether the performer was trying to do so. There's other ways in which this focus can be elicited other than a striving for ultimate rhythmic accuracy, but that's one way.

Tom: It's like in *Music for…*[?], in the voice part of that you have the proportional notation to put your sounds in, and if I measure it out in centimeters and put it in tempo and put it right where it belongs whether I'm totally on that night it changes the whole character of the session to such an extent that when I did it with the Abrams trio in the rehearsal, they came back and said: "What were you doing?" And I said: "Oh, I did it the way I saw Tudor do it." And they said: "Well, we'll do it from now on," because you can hear the difference immediately. Nobody can tell whether I did it perfectly, but the fact that I was trying to do it exactly.

Polansky: Right, it makes one look and listen harder. Again, I'm not so interested whether they can physically do it. For example, there are recordings of the *tooaytoods* that Philip Thomas does, which are wonderful. They're a little longer, maybe four-to-five seconds, but he paid very close attention. His attention to the sound and the fluidity of them is just magnificent.

Let me move on to another piece, the central piece of the CD, called *for jim, ben, and lou*. I wrote this in 1996 for harp, guitar and percussion, commissioned by a group in Los Angeles that never actually performed it. It was too hard for the time they could devote to it. This has happened to me a number of times: I go out on a limb, do some extreme things and pay the price of not hearing the piece for a while. But I'm patient and wait for the right people to come along, and am thankful for them. In the case of *for jim, ben, and lou*, I took the opportunity to write some things that stretched performers in some very odd ways.

In this piece I'm interested, as in a lot of my music, with the idea of experimental intonation, of working with tuning systems and harmony as a formal idea. This is a pretty recalcitrant set of instruments with which to try and work with adaptive tuning systems, those that change in real time. I've done this in my electronic pieces (like *B'rey'sheet*) but it's much harder to do with instruments. (An earlier, much performed piece for two guitars, *ii-v-i*, is one of the first places I tried it.) I wanted to see if I could write complex, adaptive, non-scalar pieces for a normal guitar, harp, and some percussion instruments. I also wanted to pay my respects to three composers who have been very close friends and older generation mentors to me. In this case, Jim Tenney, Ben Johnston, and Lou Harrison, only one of whom, sadly, is still with us. But all three were very active at the time I wrote this piece, and they've been people who have meant a lot in my life musically and personally. I named, and explicitly wrote a piece, for each one. Not in their style, because that wouldn't be possible, but paying attention to some idea that I inferred from a lifelong relationship with these composers.

I'll say a few words about each piece, and pass out the score. The first one is called "Preamble," and like a Bach prelude, it's an explication of the tuning. Like an *alap* or like the *pathetan* in Javanese music—an *a priori* elucidation of the tuning system, of the mode or the scale, but in my own way. I'll explain what that way is. The second one is "Rue Plats" which is a setting of a Yiddish folk song, a worker's song, on a poem by Morris Rosenfeld, a 1920s New York Yiddish poet. It's a wistful song about the hardships of life and what might happen afterwards. It's beautiful, and also quite well known. This piece is dedicated to Ben, and one of the explicit references is to Ben's relationship to Christian religious music as source material for his rhythmically and intonationally complex rhythmic string quartets. If you haven't heard the Ben Johnston string quartets, you should. They're masterpieces.

The third one, dedicated to Lou Harrison is a computer-written piece, which of course Lou would have hated. He hated the whole idea of machines—he didn't even like speakers—but I liked that about him and it didn't affect our close friendship. I decided to embody Lou in software a little bit.

These pieces were all written in 1995, but were not performed until about four years ago (2007) when Toon Callier, a guitarist in Antwerp, put together a trio to take them on. It became a multi-year project. They've now played it many times, performing all over Europe. It's become a centerpiece of their ensemble. Here's a copy of the score. I only have one copy, but maybe you can pass it around. I can show you some of it on the screen. I thought perhaps I'd just walk you through the main idea of each piece and then you'll hear them live in a few days.

The first one, "Preamble for Jim Tenney," has a structure that I've used since the late seventies. I call it the "psaltery" form. I have a little diagram of this somewhere [shows psaltery diagram]. This was the diagram for a tape piece, called *Psaltery*, a seventeen minute piece I did in the late seventies, where all the sound is based on one bowed Appalachian psaltery note. There are three harmonic series based on C, E, and G and then

back to C. *Psaltery* is a continuous modulation (by replacement morphing), in the intonation of the harmonic series', between these three sets of pitches. First the C is built up, which then morphs, or is replaced, with a "nearest-neighbor algorithm" by the series on E. Then the same thing happens on the series on G, then back to C, which drops out from the highest prime down. I've used this as a harmonic form in many pieces since then. *Psaltery* is the purest, and first form of it. There's now a very general live computer piece called *freeHorn* that generalizes this to any harmonic relationships, any replacement algorithm, any time structure, or number of harmonic series.

The "Preamble" is for guitar and harp, and it uses the idea of what I call *paratactical intonation*, or adaptive tuning. The guitar changes its tuning over the course of the piece and that's done, physically, by the percussionist. It's odd: the guitarist plays some very difficult stuff, mostly concentrating on harmonics, octaves, things that are "in tune" and the percussionist is in charge of turning the pegs to very precise tunings as the piece progresses, continuously. This is why the original group looked at it and said: "You're out of your mind," and why nobody did it for a long time. But when Toon decided to do it, the percussionist, Jeroen Stevens, who is a remarkably creative and open-minded guy (and I'm really lucky to have him playing my work) said: "Sure, that sounds like fun." You can barely see him do it during performance— it's very subtle — but he's retuning the guitar throughout the piece to precise rational tunings. The instructions for the guitar tuning are in the score.

Oddly, the idea came to me first not from some complicated new music notion of adaptive intonation, but from an old comedy routine by the Smothers Brothers, who were an American folk comedy duo that told jokes and did folk songs (and who were, nicely, political activists). Often they would do a bit where one would play guitar with the left hand, and the other would play with the right hand, and they'd whack each other, and the dumb brother would retune the guitar and make it sound bad—a whole "shtick." They had a funny choreography of the guitar, which was also a common vaudeville idea, as well as in the work of guitarists from Roy Smeck, to, well, Jimi Hendrix! I loved that idea of two people playing the guitar in the piece dedicated to Tenney, as a kind of a gentle joke. It wasn't meant so much as an extended technique challenge, but as a play on the choreography of two musicians [shows score]. The rest of the piece is precisely notated, the tuner's part is in the middle. He has to learn a lot about tuning systems and then perform his part without jerking the guitar around (and this is for a percussionist!). The harp is retuned completely, enabling these pitches. Again, the form of the piece is that it just modulates from a C harmonic series to an E harmonic series to G and then back.

The rest of the piece is more freely written. The rhythms are related to the number of the harmonic entering and leaving. This is an extension of Cowell's "Rhythmicana" idea, where pitch is related to rhythm. But more importantly to me in is its genesis in our physical and cognitive predilection for simple rational relationships. The musical challenge is to build use that preference to encompass more complex abilities and musics. This is always important to me: to take a fundamental principle and develop it. To see how far one can get, while knowing clearly where one is coming from.

So that's the first one.

Student: Why a percussionist?

Polansky: Because the commission was for percussion, harp and guitar. I figure percussionists have got to be useful for something! [laughs] Although as a guitarist, I should talk!

The next one is more conventional. It's a song, a beautiful Yiddish song, which the musicians sing in Yiddish. The harp is retuned completely but the guitar is not, it's left in the usual 12TET. The guitar does different things to interact with the harp, often playing just parts of chords where the equal temperament of the guitar is close the tuning system. It's all in E minor. I wanted to find a way to not do anything too unusual in this one, uh, except for retuning the whole harp, and to have the guitar "adapt." The ensemble is treated as a kind of street musician band from another planet. I was trying for an ensemble sound that one might hear on a street, maybe a street, on another planet, if they have streets on other planets, with just three musicians. They clap, rub sandpaper, and the percussion sound is intentionally very austere, very simple. Besides a bass drum and a cymbal, the percussionist is asked to find milk cans to play on, in a reference to the Warsaw ghetto, where poetry and diaries were written in Hebrew/Yiddish script and buried in milk cans. Jeroen, the percussionist, didn't really want to use milk cans, so he asked: "My uncle is a brewer, may I use beer cans?" I said: "Of course." I liked the notion of moving it culturally, and especially, in terms of beverage choice, to Belgium. The musicians also do an Appalachian vocal technique called "eefing," which makes use of ingressive singing.

The song is sung more or less straight, with inter-verse interludes. Jutta says there are four measures in this piece that are the hardest four measures of harp she's ever had to play, partly because of the retuning. But she does them perfectly. One of the ridiculous things that I do in this piece, which I've paid heavily for, is to specify that the harp be retuned between the first and second movement—the entire harp, because each octave is different. It's a different tuning for the first piece, but the same tuning for the second and third. Jutta can do it in about seven minutes now, but if I happen to be present at the gig, I am called upon to stand up and tell jokes or something for seven minutes while Jutta retunes. Sometimes I'll tell jokes about Jutta retuning the harp, try to distract her (which I never can). It's ridiculously impractical, but oddly not fatal in this piece, and I'm very happy I did it. It pushes a wonderful boundary, makes something transparent that was previously obscure.

The third movement is *The World's Longest Melody*, a title I've used in a number of pieces. This phrase comes from a "melody" description/generation algorithm that I've used often. This movement is subtitled "The Ever-Widening Half-Step (for Lou Harrison)" and is the only one of the three written by computer. There are a number of interesting ideas—at least interesting to me—that I could talk about. The harp retains the

tuning of the second movement. The guitar is retuned to generate a wide variety of complex, that is to say, compound rational pitch relationships based on open strings, seventh fret, and octaves. The guitarist only plays harmonics, octaves, double octaves, and perfect fifths, so every fingering is the result of an odd "gappy" tablature [shows score]. I notate string number, fret (or harmonic), and down below the resultant actual melody (between harp and guitar). The guitarist jumps all over the guitar. It's not so much like a guitar anymore, but a weird six-string monochord that only has three bridges, and, of course, harmonics are also possible. For many years, since the early seventies, I've made pieces using complicated intonational systems on conventional instruments—treating instruments in their essence, as strings, resonators, and pieces of wood.

The computer knows what I'll call the gamut of the piece: every possible pitch on harp and guitar (given the guitar intonational constraints) [shows chart]. You see these ratios on one side, and cents values, and this column shows which instrument has the note (harp, or guitar, or both). It's all the possible notes of the piece based on the harp tuning and what the guitar can do. The computer knows this (by computing it, so that I could, for example, make a slight alteration in the guitar or harp tuning) and knows where they are on the instruments. It treats them just as one big scale. It doesn't care who plays a note, it just knows that it wants a pitch at a given point. If it picks a note that's on the guitar it also indicates where and how that is to be played.

Next, the melody algorithm takes over. It has two basic ideas. One is that there's a notion, a very simple, primitive, but powerful notion, of *the probability of going in the direction that you previously went in*. That's what I call the "World's Longest Melody." What's the probability that you'll keep going "up" if you previously "went up" (with no preset definition of what "going up" might mean)? As that probability changes, the curvature, or the contour, changes. It's one of the most primitive, simple ways I could think of to specify all melodies. It's the contour of all melodies, based on the first derivative, the first order finite difference function, or the inertia. If the inertia is zero, the probability is something like 0, the melody just wiggles back and forth. It can't continue its directional motion. If the number is in the middle, say .5, the melody changes directions randomly. If the number is high, it'll just go up or down depending on how it started. It's how stubborn the melody is, the trajectory length. There are many ways to think about it. Note that I'm using the term "melody" to simply mean "ordered set of values"—we could be talking about any value that has some concept of "greater than" and "less then" (durations, dynamics, harmonic distance—whatever).

The computer knows all that, and it knows the tuning system. From this it tries to evolve some notion of what a half step is. That, along with other more poetic things in the piece, are homages to Lou, who was interested all his life in ratios of the form 4/3, 5/4, 6/5: called superparticular ratios: ratios where the numerator is one higher than the denominator. They're also called epimores, a fundamental building block of tuning systems. They're the simplest possible relationships, but you can also have 211/210, and that's not simple, of course, from a harmonic standpoint. One interesting thing about them is that as the numbers get bigger they become smaller. So this is a perfect fifth,

major third, minor third, this is some really tiny minor second [3/2, 5/4, 6/5, … 211/210]. That's also an instant, succinct one-phrase definition of how tuning happens: the closer the numbers, the smaller the pitch ratio. Each of the five sections of the piece, all of which are a continuous hocketed melody, work with widening or narrowing that half step in certain ways.

The large form of that piece [that is, *for jim, ben and lou*] is a C major triad. The first piece [*Preamble*] is in C, the second [*Rue Plats*] in E, and the third [*The World's Longest Melody*] is in G. But that latter piece goes through a five-movement modulation on G itself. It's pretty complicated, I guess, both from a compositional and performance perspective, and I can see why the average group is not going to take a crack at this piece. The third movement is especially difficult, a nutty hocket between the two instruments. The guitar part is crazy enough to begin with, but it's also in hocket with the harp part, which, like the guitar, plays many harmonics because they're part of the gamut. The percussion part—kind of a reward for the first movement—is easy. Jeroen just improvises these metrical units, and can play whatever he wants on hand drums, or something simple. That part is intended to highlight the "mixed accents" of the phrases, to quote Ruth Crawford Seeger, to whom the overall form of this piece also refers.

Two more things about this piece. One, I'm as happy with this third movement as any piece I've ever written. Things came together, and I love the transparency, the elegance of it. Second, it's also one of the hardest pieces I've ever written for humans to play.

Toon and Jutta play it at about half of the notated tempo. And they're correct. For the notated tempo, you'd need a robot. That was "my bad," as my daughter might say. At times, over the course of my life, when I've written something difficult (like *51 Melodies*, or *51 Harmonies*), I've had the usual conversations with musicians about tempo, them saying it "can't be played that fast," and then I'll pick up my guitar and say "but yeah, here it is." In the case of *51 Melodies*, I was lucky to have Nick Didkovsky as my partner in crime, and he loves this kind of challenge and plays that piece beautifully, more than beautifully, with me. But in the case of *51 Harmonies*, [a 1996 commission from the Basel Conservatory and WDR, for electric guitar, three percussionists, and four live computers] and some other pieces, it has to do with musical culture: I'm looking for a different sound, not a classical sound where every note is perfectly formed. Sometimes it's sound where speed and energy are about one-tenth of a percent more important than perfect accuracy. By sacrificing that iota of accuracy, or classical "polish" (which I don't really like anyway) there is a tremendous benefit in terms of energy, feel, and tempo possibility. I try these things out, and know they *can* be done, even if, sometimes as a guitarist, I leave it to my younger friends who are either more foolish than I (thankfully) or have more time to practice! Often I'm right, or close to right, but in the case of *The World's Longest Melody* there was no argument. When Toon said: "this is the maximum tempo at which we can do it," I believed him because these folks are unbelievably believable: hard-working, virtuosic, fearless musicians. If they say: "this is the maximum tempo," that is the definition of the maximum tempo.

[plays *for jim, ben and lou*]

Polansky: Questions? Thoughts?

Student: All the pitches come from these three harmonic series?

Polansky: Not in the third movement, no, that is the case only in the first movement. In the first movement, they're all from the harmonic series on C, E, and G, up to the thirteenth harmonic. In the second movement they're free, based on the tune. In the third, there are a lot of pitches in the gamut.

Student: Because the third one sounds serial. It doesn't sound so harmonic.

Polansky: It's completely chromatic, in a large rational tuning space, with a great many notes to the octave. Each octave is different, but it's highly organized in "ratio-space." The concept of harmony in the third piece is melodic, horizontal harmony.

Student: Right, it's not so consonant.

Polansky: In fact, there's a very strict measure of what consonance means in the third movement based on the width of the half-step. This deals a bit with concepts like the critical band. There are many different ways of dealing with tuning. I like to think of this piece as *adaptive*. There's no scale in any of the pieces (except in the second one a little bit). I'm not interested in the notion of a scale, but in a fertile adaptive, rich, explorable system of harmony that is integral to the form of the piece.

Buckner: The pulse that is in the third movement, why does that occur? That seems, for the listener, to be a prominent aspect of one's perspective of the piece. But it doesn't seem to be very important. So all those other things to me as a listener are almost subservient to this pulse.

Polansky: Right, it could be just the way one listens. In the third movement, it's partly the way the recording or the speakers are, but it's true that in the third movement I wanted to reduce the notion of the percussionist's role to really a kind of a time keeper. And the action is not happening there, but some people (not me) tend to hear the percussion. The more you hear the piece, the more the percussion part recedes.

Buckner: Well, it makes it a little bit louder than you maybe want it to be. Because for me it's just that you have a different perception of a lot of music. That some detail of the music which may not be the primary purpose of the piece becomes what you hear most.

Polansky: Sometimes that happens, yes. Or sometimes on second listening it may happen. Often, I play with that, because I think it's an important part of our skill as a listener, to listen "in," without necessarily always being handed the key on a giant platter.

Student: The first movement, you say that the rhythms are related to the tuning ratios.

Polansky: Freely, but yes. Freely related, because at any given time there's a cloud of harmonic relationships (because of the retuning and the modulations) so often it's not strictly pulsed—often a new harmonic will announce itself with an even time division, and these intonationally related grupetti are derived from the tuning evolution. But it's also metrically complicated in other ways. There are a few, structural but momentary pulsed areas in the first movement where that Rhythmicana idea is quite clear.

Student: And then in the third movement, was there maybe not a natural relationship between the pitch system and the rhythmic system?

Polansky: There's no relationship. In fact, there's no rhythmic system other than the simple phrase divisions. The percussionist is elucidating the phrase lengths in different subdivisions. There's a phrase structure to the melody, which is divided into five sections. I mentioned the Ruth Crawford Seeger piano piece [*Study in Mixed Accents*]. I took the large form of that piece and used it in a funny, skeletal way. So the percussion is just playing the phrases. His metrical units are the phrases. [Note: My solo piano piece, *The Casten Variation*, has a much closer relationship to, in fact is a kind of analysis/resynthesis of, the Crawford Seeger work--LP] The harp/guitar part are just running eighth notes.

Student: I mean, could you not find as natural a relationship, or did you just do that regardless?

Polansky: I didn't think of one. And I guess I didn't really want one. I really just wanted this simple melody. A simple melody that is complexly generated. And I wanted a quotidian percussion part, just pounding the beat. In a way I was, and continue to be, interested in how facile and un-insightful we often are on first listening, and how unsatisfactory that is to me as a human being. We are attracted to prominence, to what I call the "cosmetic," but we have to realize soon that prominence is not importance, that quite often the most salient thing is the most salient because it's not *doing* anything important, it's just the most familiar. I think that's an important lesson in listening to music, and also, in my opinion, one of the most beautiful things to elucidate as a composer. Much of the music I love most rewards close listening, doesn't punish it.

Buckner: Is it there because it's necessary for them to have the pulse for them to play it? Or is it there because you want to hear it?

Polansky: A little of both.

Buckner: Because it reminds me of what Katrina Krinsky told me of an early rehearsal for *In* C. Terry Riley was doing the piece without the pulse, and she said: "Why don't I just beat the pulse and it'll keep everybody together?" That's what everybody likes about *In C*.

Polansky: Right, except maybe for the person playing it, right? [laughs] It's a complicated idea, one that I don't think we really pay enough attention to. I have different feelings about it at different times and my general reaction would be next time to try something else. For example, in *Ensembles of Note*, I was really interested in that pulse which *is* prominent, but in a way, it's the least important piece of the structure, and inarguably arbitrary. It's no big deal for me to write a cool four measure rhythmic figure. One has to just get over that. That's the challenge, to listen deeply, not shallowly. Let's not elevate the simple, let's use it as a stepping stone to the complex. To listen with a questioning, probing mind/ear, not one that only gets its answers from the surface of things.

It turns out, though, that in the third piece they don't need that pulse. They can't need it because they have to learn the piece without it. They had to practice an enormous amount to be able to do that hocket. So now he follows them more than they follow him.

Buckner: Have you heard it without it?

Polansky: Oh yeah, a lot! [laughs] I've stayed at their house while they've practiced it, in the weirdest way possible. I've heard them each practicing it separately, in different rooms, their own parts, like a decoupled hocket. I took a nap on their couch once, mid-way between Jutta's studio and Toon's, and heard this bizarre, wonderful hocket. It would have been a great piece, and maybe if I were a hipper composer I would have written that one [laughs] [or maybe I still will]. I've heard them practicing their parts individually—yeah, I've heard them do it a lot by themselves. But when the percussion part is added, there's flexibility. Sometimes in performance Jeroen is a little less active, sometimes he's louder. Again, I like the idea of live musicians playing it, with an open part. A different percussionist would play it differently, and I like that.

Student: So the "world's longest melody" is a box with a single note. And you just write them out. Do you turn that knob? Is there a meta-melody?

Polansky: That's good, I like that description. As you know, I like this notion of getting primitive and putting a knob on some clear, essential form, and for that knob to be very powerful. Nick [Didkovsky] describes this in my pieces, and I'm paraphrasing, that "two lines of code generates thirty pieces." That's an interesting challenge to me. It's about the knob. In this case one can change a probability, and change what's changing that probability, and that's all that changes. But one can also change what is meant by going up and going down. I have, in fact, some independent software called the "World's Longest Melody" which I used to improvise with. It's basically just that knob with a great many sonic ramifications.

Student: Right, but are we hearing sort of a contour, a choreographed knob-turning?

Polansky: Well, not "me-choreographed," but in the larger case it's a sinusoid for each section, and the sinusoid has a different amplitude and frequency, and the sinusoid turns the knob. I'm modulating the second derivative of something. The five sections have different sets of parameters. If you know the Ruth Crawford Seeger piece, you'll recognize that the middle section is the longest and has the greatest scope. I used that idea, in a funny way, with the notion of the half-step expanding to where it's only a half-step in terms of its "superparticularity": in no other way would we consider it a "half-step."

Student: When you're talking about the harmonic series, you mean the overtone series?

Polansky: I don't like to use the word overtone, but that's a good question. You could say that it's just the integers. And pitches tuned to integer relationships. Or you could say: "that which occurs in a Fourier analysis of a [perfectly] periodic signal," or what we think the "harmonics" are of a string. Or one could describe it in any way one wants: tuning space, number theory, DSP, divine design. It's really none of those things or all of those things, depending on whether we're considering it acoustically, mathematically, perceptually, compositionally.

Other Student: So when you don't want to say overtone series and you want to say harmonic series, is that like an ontological claim? Or a cosmological claim?

Polansky: Yes—no—I mean, I don't exactly know what the word ontological means, but I do know that it's not cosmological.

Student: Isn't it?

Polansky: Well, in a way. I'm trying to acknowledge that over history there have been a lot of uses for these terms, and a lot of justifications for music. Even Schoenberg pays homage to the overtone series in the tuning of equal temperament. None of these limitations are satisfactory, like Partch's notion of the harmonic series as the generator for tuning. It's not really the harmonic series only, or entirely. It could more succinctly be described as integers and the relationship of integers. The reason I don't like to use "overtone" is because it's not really true. They're not really overtones—that comes from what I am told is a bad translation of the German, from Helmholtz's "obertöne." It's a mistaken acoustical reference in my opinion, and also, an oversimplification of a complex, aggregate idea, in the same way that words like "timbre" and "race" are. These are also words I dislike, and try to avoid using.

Student: But harmonic also, because they're harmonic partials.

Polansky: Well, "partials" is not a bad term, because in some very simple way, that's true, but they're not necessarily going to be harmonic. There are harmonic and aharmonic partials and everything in between. I'm comfortable with that word if we're really talking about what happens when you compute a Fourier analysis of a periodic signal. I like the

term harmonic series because it's a set of numbers without a connotation to a musical, acoustic or perceptual thing. We all know what the harmonic series is: integers. Integer multiples of some number, generally, the number one. That seems like a perceptually, musically, historically neutral term, and one of the best I can think of offhand. You could also call them rational tunings. But all rational tunings, in fact all tunings, are some subset of rational tuning, which is taking the numbers one through whatever, and multiplying some fundamental frequency by them. I'd like to be cosmological, but I don't think I'm smart enough.

Student: I think the answer is yes.

Polansky: Does that make sense then? People throw these words around are a lot, I think carelessly. Not that it's of any great import whether we use the word overtone or partial or harmonic or veeblefetzer. We can call them anything. But it's good to think about it because thinking about it allows us to go to a new place. Does that answer the question?

Student: Just to clarify, could you give us an example? You said you use the C harmonic series, the E, could you maybe just show us the C harmonic series there?

Polansky: Sure, it's in all these scores. But let me just do the odd harmonics, because the even ones are just octaves. So here's C, and I'll reduce them to an octave: 1, 3, 5, 7, 9, 11. That's what those pitches are [draws on board]. If we want to relate them to [12-tone equal] tempered intonation, that's +2, -14, -31, +4, -49, the cents deviations from tempered. But that's just one simple way of thinking of them. So that's C, right? Now what I do in the *Psaltery* set in the first piece, is I take this one [E] and I build its series. And now these are all off by -14 cents already. So this one [fifth of E] is now -12 [from 12TET]. It's actually the fifteenth harmonic of that [C]. But what I do in these other pieces is that these have their own sets of intonation on G. That's the kind of thing that interests me: now you have something B-flat-ish that has a very different intonation. The eleventh harmonic on this one [E] is -63 cents, actually more like an [equal tempered] A, but a cognate. So in *Psaltery* I modulate these pitches, and I do that in the *Preamble* as well. It's a continual set of modulations between these cognates in a kind of a best-fit algorithm. There's a whole other structure to this idea which specifies the entry of pitches from the most complex prime down. A new modulation is one in which the outer harmonies come in first and build the fundamental.

Student: So is that what's happening with the guitar being detuned? It's being detuned to a different harmonic series?

Polansky: Yes. I mean, the whole piece is doing that and what happens in the guitar makes that possible with whatever the [fixed] harp tuning is. It's kind of a complicated crossword puzzle to get these instruments to do this conceptual idea, but that's the orchestrational challenge. In *freeHorn* the software just does it. I don't have to worry about tuning pegs.

Student: Is there something related to this conception in writing? Because you said [something similar about] the two second pieces, also harmonic.

Polansky: I like the term "Rhythmicana." It was Henry Cowell's term, and he talks about these ideas in *New Musical Resources* around 1916. It's a famous and wonderful book, and it essentially says: "Here are some idea to try." What he suggests is to use this kind of relationship, like 3 to 2, as a pitch relationship *and* a rhythmic relationship. He argues for what he calls "tempo melodies," where melodies are built in this way. The composer Johanna Beyer did this in her early clarinet pieces from 1931, and a lot of composers have dealt with this concept over the last seventy years. I like it because it's an explainable and expansive way to deal with pitch that's very clear and rooted in whatever basic principles we might consider basic principles: cognition, evolution, mathematics, whatever you like. It doesn't involve style, convention, "cosmetics," anything like that. Simple, rational relationships are what we as humans deal with. So in this case if that [points to the board] came in the *Preamble* it might come in as a triplet, and this [points] as a septuplet, and this as an eleven-tuplet. But the piece deals with this freely like an *alap* or a *pathetan*. These are melodic and rhythmic "germs." We're "lining out" (to use a term from a musical idiom that I've loved for my whole life) the harmonic world we're about to enter. There's performer freedom in, for example, a Javanese *pathetan*, where the musicians will fool around with the mode. In this case I'm writing out that fooling around.

Student: If it's really important that we be able to hear that scale that you create, why do you pick instruments with different frequency ranges in the timbre itself? Like, you can tune the harp all you want, but they already have a lingering frequency content in the timbre itself. So why go through all that when just through the fact that since we're listening to different instruments it's hard to hear that?

Polansky: Well, you know it's *hard* to hear anything. Because if you relate the frequency content of the spectrum, which is an evolutionary pitch content, then you can never have any tuning system unless you work only with sine waves. Yet, every culture that we know of in every part of the world has centrally dealt with not just the idea of pitch but an organized sense of pitch based somewhat on a concept of fundamentals. Which nobody seems to really understand—but we seem to do it.

Student: Well, that's connected to a culture and history. This is not.

Polansky: Right, which is why I'm doing that. Because I'm trying to evolve that culture and history. Which is to say we're no better at hearing that than we are at any new music we create. We're no better naturally at hearing an augmented sixth chord—that's hard too, and we spend enormous number of educational hours training to do it. Everything new that comes along in music is difficult for us.

Student: So what would Lou think of this?

Polansky: Well, Lou is the main culprit behind some of these ideas. He dealt with very interesting pitch systems. He built aluminum gamelans and tuned them in just intonation. In this regard, by the way, I'm not so sure I go all the way with you that the content of the spectra should, or does necessarily, reflect a fundamental or a scale. That idea is developed in the work of Bill Sethares and other people who are fitting spectra to tuning systems. It's an interesting idea, but there are other interesting ideas, just as important I think, ones that I'm more interested in. My feeling of how tuning systems evolve—and if you've got a spare couple of hours, I'll read you a recent mathematical paper we wrote on it on it—has very little to do with the spectra of the instruments. I think we can focus on the fundamental pitches. Spectral peaks are certainly a factor, sometimes, but there are others, and it's hard to say which are the most salient. I think there are fundamental relationships, and ideal relationships that are at least equally as important. I can refer you to a recent article of mine called "Optimal Tuning Systems," which is about the idea that a generalized consideration of "well-temperament" is essential to this evolution.

Student: So I have another question. I was wondering if you could maybe go over again how you came up with that "longest melody," very basic.

Polansky: Right, here's the "World's Longest Melody" algorithm: the probability that a melody continues in the direction that it previously went. If it went up, and the probability is 1.0, then it'll go up again. If it's 0.9, then it will probably go up again, but eventually it might go down and then it will probably keep going down. It's a directional repeat probability. It doesn't have any knowledge of whether it went up by a minor third, or anything like that. It doesn't care. In a lot of my theoretical work I separate contour and magnitude. In this case, there's no concept of magnitude, we don't really care how much something went up, we just care whether it went up or down. That's motivated by my feeling, well-justified by experimental evidence I think, that our perception of contour is more basic than that of magnitude, at least in conventional melodic, and maybe most musical circumstances. When a kid sings "Happy Birthday," she may sing "Happy Birthday" out of tune, or with the wrong pitches but it's still "Happy Birthday": the contour will remain. I've looked at contour a lot in my theoretical work and tried to pull apart some of the fundamental questions. The "TWLM" algorithm (my acronym) only deals with what I call contour, but I think contour is more fundamental to melody, to shape, than magnitude. It's nice though, because it's a knob that will change the whole behavior of a melodic system.

Student: But these values? Where do they come from?

Polansky: Well, you choose them. And you can turn them, and modulate them. They're descriptive of a very deep, general idea. I call it "The World's Longest Melody" because that is the most succinct way to describe all melodies that could ever exist, given some very restricted but clear notion of what melody is. I'm interested in those kinds of things, because in them, we know what we're talking about.

Student: What about the probability that it'll repeat, that it'll be a repeated pitch?

Polansky: Well, that's in there, but not if the values are restricted to up and down, as they are in this instance. Another version incorporates what I call a *ternary contour*, in which there is the possibility of 0, 1, or -1. Something that can go up, down, or stay the same. Depending on how one writes the two lines of code, there are those options. One can, in fact, generate these ideas to n-ary contours, in which case, they eventually become equivalent to magnitude (which is simply a categorical version of n-ary contour). But in the piece we were talking about I exclude "sameness," using what I call a binary contour: 1 or 0.

Student: Isn't it more mathematics than music?

Polansky: No. The mathematics is pretty simple. The way I describe that algorithm is in an English sentence: what's the likelihood—if I don't use the word probability—what's the likelihood of something going up or down, or more simply, of going up if it went up? There's nothing particularly mathematical about that, though ironically, it's basic to the laws of the calculus! It's about perception, about the form—all forms, not just mathematical abstractions of them, or worse, stylistic ideas of form. Composers need to think deeply about form, not just assume our instincts and "the miserable certainties" of our own cleverness [laughs] will plumb that depth!

We need to be able and interested in articulating music in terms that don't necessitate style. Style is a word that has a lot to do with "fashion," and I don't much want to talk style or fashion, at least at the moment.

Buckner: Isn't there something other than style that makes certain melodies sound melodic and other melodies sound arbitrary?

Polansky: I think there are lots of things, but I don't really know you mean by the words "melodic" or "arbitrary."

Buckner: And they don't just sound melodic to me because they're in my culture. I think in other cultures they sound very effective, and a lot of theory allows for what makes something effective. And if you just take all that out of it what are you left with?

Polansky: Well, I'll agree with you on everything except that there's a lot of theory out there.

Buckner: Well, in music theory they define how to make the melody, and how it relates to harmony.

Polansky: I'd like to take friendly issue with the term "music theory." I don't think that much of what people write and teach about music is actually theory. I think it's pedagogy and style. When we ask deep questions, and trying to arrive at a concepts free of "style," some of "music theory" appears to be pedagogically polemical—trying to teach

something that you already know, and, to use that quote again, are "miserably certain" of. Inculcation, if you will. But pedagogical dogma doesn't generally investigate the reasons for its knowing, that would be dangerous and unsettling, and contraindicated if your view of a pedagogue is one who is certain.

I love music, all music. But my job as a composer is to ask difficult, interesting, forward-looking, painful questions. Often that means questioning deeply held and precious conventions. It's true, for example, that I love Roy Acuff's music, and I don't exactly know why I love Roy Acuff's music. I'm probably not going to stop loving Roy Acuff's music. But I'm not really questioning that here, since I don't think that's a problem. I'm asking a deeper question, which, if enough people ask these questions, may lead five thousand years from now to an interesting theory of why Roy Acuff's music is beautiful to me. I'm not claiming to go there.

I do think people are beginning to think in more interesting theoretical ways about music, but that's in its infancy. But pedagogical style-imitation theories—like if you do this and this you'll sort of sound like Bach…? I don't call that theory. I call that lazy pedagogy, which also serves as dogma, the propaganda that perpetuates false educational veracity. It tends to empower and unjustifiably elevate the people who learned it themselves, who pass it on, establishing a kind of professional jargon, an academic and somewhat ridicoulous hazing ritual. It's descriptive, an inscription of style. I'm trying to do something different. I'm not sure that what I do, or what anyone does, is music *theory* either, because there's not really a "test." Theory has to have hypotheses, and tests. So, to be more humble, I would put it in the "wacky compositional idea" category [laughs] and leave it at that. I'm fine with that.

Buckner: Sometimes you'll do something like this with the result that you choose to call your composition a composition. I'm sure there are examples of people who choose not to call it that. The question is, by what criteria do you accept or reject the things that are generated by these variations on ways of finding new behavior that you find fascinating? And at some point you're exercising some kind of human decision-making process.

Polansky: I think, at all times, I'm being human. I guess I'd answer that by drawing a Venn Diagram [laughs, and draws picture on the white board]. Here's the circle of my brain on any given day thinking about strange ideas. And here's the circle of my pieces. Here's the intersection, right here. It's very small. That's my point. So this is my brain, and I'm thinking about a lot of stuff, and I'm coding and writing theoretical pieces, but at a certain point the intersection of me as a human, all my experiences, my relationships with humans and what I want to have happen in the world is that small intersection. A lot smaller than that, probably. That's why it's music and not science. I'm a composer, not a scientist. I'm extremely happy about that limitation! [laughs] This is what makes me a human being [points to one side], and this is what makes me a free-ranging computer algorithm [points to other side], and I don't want to be the latter. So I put my energy into that little intersection. It's how you turn all this other nonsense into a human being playing a guitar, writing a piece. That's where you put your energy. We have to put a lot

of energy into systems that are naturally prone to disorder. Enthalpy is harder for us than entropy. What we do as composers is take a completely chaotic universe, a musical universe that is, I'd like to emphasize, considerably larger than most of us think, and try to impose a weird human order. That's culture or style or whatever. And my *style* is that little piece [points]. Yours may be up here, and Cecilia's may be down there — we all interact with this cloud in different ways. That's wonderful, and uncontrollable, and a good thing I think, because if we were all at the same intersection we'd be the majority of music. It's also heterophonic. There are plenty of people, most in fact, who want to be co-intersective, which is how one becomes popular, successful.

Buckner: But the aspects of the majority of music that we all like, that are natural, they're not necessarily stylistic. These things that people actually do, before they try to do something different. It's not stylistic, it's observing what they have in common. They come out of very different cultures, and they have very different things like work songs. Maybe that's too simple.

Polansky: Well, I agree. Even singing.

Buckner: Yes, it's the music that comes out of everyday people's lives. Some aspect of that, I think has to be in music that we will end up responding to.

Polansky: Let me add something to my agreement with you. There's something intrinsically human that I would call *xenophilia*: the love of the new. It's not odd to love the new—it's how many species breed. It's common to many species, and I think it explains in large part how we as humanity move forward, if you can say that the motion is indeed forward. Maybe it is just undirected motion, no goal, like evolution. The main thing I guess I'd like to say is, I pretty much love all music, and I hope that this is evident in my work. I try to love new things, and I feel it's the composer's job to generate some new things to love. We also love old things: trees and birds have been around for a while. But as humans we have this urge, and I hate to quote Ezra Pound, but I will: to "make it new." We want this at a very basic, evolutionary level. There's something about the notion of complexity dying that is the equivalent, for us, to morbidity. We sense and avoid it. This happens in insect species, in breeding and mating, and especially in higher species like birds. Let me back up and apologize: I'm just a musician and I have no real qualifications to be speaking about evolution, but that won't stop me for a few sentences. We have a very developed sense of xenophilia, quite nuanced, otherwise we wouldn't be composers and artists, or build beautiful buildings, or invent new types of guitar picks. The fact that we're having this impassioned conversation, at a large institute constructed for and devoted to fostering such conversations gives evidence to our want and need to do this. So let's cherish it as an intrinsic part of our nature. Yes, we all love pop music and singer-songwriters and circle drumming and heavy metal guitar solos, but we also love the new.

Student: One way of putting that is that novelty is a musical universal.

Polansky: Right, I like that. Novelty is a musical universal. I think that's the case in all cultures. There's no culture that plays the same music it played one thousand years ago or even fifty years ago. It's a nice check and balance.

Day Two
Polansky: The first thing I'd like to talk about, and *do* with you concerns a project that has interested me for a number of years now. I'll tell you a short story, and then we'll get into it.

I was on a recording session in Italy, maybe eight or nine years ago for Christian Wolff, the *Exercises*. It was a wonderful session. There were about ten terrific musicians, and we were there for a week recording. We stayed in a kind of an inn, an old farmhouse in Umbria, and recorded in the beautiful barn there. One night the pianist, Frederic Rzewski came down after dinner, and he had written an anti-war round. The Iraq war had recently begun. Frederic was moved by the situation and had gone up to his room and written an eight-voice round. Do you know what I mean when I say round? Well, you'll know in a minute. We'll do some of them.

Frederic's round was called "No More War," in typical Frederic, direct fashion. He handed it out to everybody at the table, some of the best musicians I know. The experience was fascinating to me—not because I've never sung a round before, I had, and had written a few—but because some of the musicians at that table were shy about singing, even after having several pitchers of homemade wine. We weren't on stage or anything, but they just were a bit reluctant to sing, or maybe they just didn't particularly enjoy doing it that night, I don't know. Frederic wasn't asking us to perform, but just sing as a group for fun.

For some reason I was inspired by and interested in that experience. When I got home I wrote several rounds of my own. And—in my typical way of overreacting to situations—I started compiling a book, which I've now been making cumulatively for about seven years. I add things to it, and every time I make a new "edition" there are more rounds in it. It started out with maybe ten or fifteen rounds, Frederic's round, Ruth Crawford Seeger's (which I found in the Library of Congress), a couple of mine, and a few others. As the years went by, and I kept making new "editions," it grew bigger and bigger. The rounds are mostly by composers I know, and when someone sends me one, I add it to the book. I often suggest that people write one, or if they have one, to send it to me. When I get enough new ones, or some time has passed, I make fifty or so new copies of this book. I make them by hand. I photocopy them, and I have a little binding machine—I do them one by one. They get harder and harder to make (and to bind) as they get bigger. There are now about 275 rounds in the book, and the next edition with have fifty or sixty more. I give them away. Some friends have ten or so different editions of this project, each one including the previous.

It's become an interesting and fun project for me. I use it in lots of ways: when people come over for dinner, when I teach kids, in my music theory classes. Other people use

them as well in all kinds of circumstances, and they've started to be performed quite often: in concerts, in schools, singing groups, informally, etc. They're extremely useful and also a lot of fun—a round is a way to express a musical idea quickly, and they teach themselves. Everyone gets to sing—professionals, non-musicians, kids, whoever. They're great as a way to tell stories, commemorate an event, or set some text or found locution that one is charmed by.

I thought that today we could start off this talk by singing a few. I photocopied maybe eight or ten from the book, and I made fifteen copies of each. I'd like you to share and we'll sing some of them. Can we do that? Now if anyone is philosophically opposed to doing this, that's too bad, because you cannot leave the room until you've sung. I would also like to tell you something that a musician I know and have worked with a bit said, an American folk musician named Pete Seeger. He says: "There is no bad singing, only quiet singing." I don't want anyone to say "I can't sing" or "I sing terribly." That's not the point. Put that affectation away for now. I'm not a singer, I'm a guitar player, and I promise to sing loud.

I also have two copies of the round book here. I'll pass this around so you can see some of the other rounds. There's a copy of all of the rounds on my website. I keep that up-to-date, even before I print a new book. The book is free, by the way, you simply have to ask me for one and I will send it to you. But sometimes I run out. So they're always on the website, where you can get them.

I thought we'd do a couple of rounds at the beginning of this talk. Then I'll talk about computers and mathematics and put you to sleep. Then we'll wake up and do another round.

The first round has a nice story associated with it, and by extension, about the book itself. I'm always looking for rounds that are out in the world somewhere, that need a home, or by composer friends, or some that have particular historical interest to me. I'm not interested in well-known rounds, like "Sumer is Acumen In," or something like that. I'm interested in odd ones, ones that are new in some way. This one, "Cows take a vacation," that should be pretty easy English for everybody, I can even sign it! I found it when I was guest lecturing at Princeton University. I was working with the contemporary music ensemble, and I made them all sing rounds, some pretty difficult ones in fact. One of the best singers in the class, Amy Coenen, came to me at the end of the class, and said: "You know, my father, when we were taking car trips across the United States, he would make us sing this round. He wasn't a composer and couldn't write music, but he just made up this round that we would sing while we drove." I asked her to write it down for me. She ripped out a page from her notebook, drew the staves, and wrote down "Cows Take a Vacation." It's a good round to start with. It's not only easy, it's true.

Here is my standard way of doing rounds. We sing them twice together in unison, and then we'll break up into four groups. We'll sing the round maybe two to three times,

maybe. Then I'll do this [makes ending motion]. We'll stop, but you have to finish your round, so in this case group four always gets a solo at the end.

[Everyone sings "Cows…"]

"Cows…" is a good one, because it appeared in such an unusual, gentle way. It has become a favorite. Let's do one more, another easy one from an unusual source, and then move on to one of mine. This next one—I apologize for the religious aspect of this one, but I assure you I'm not religious—is a round from the Shakers. The Shakers are a fascinating, egalitarian, millennial, communal, and also, unfortunately, celibate sect. They've been around for over two hundred years. There are three or four Shakers left, but the group has had an amazing history, and very large at various times. Partly as a result of living in New Hampshire, which is an important place in Shaker history, I've become interested in Shaker music over the years. What attracted me to them, frankly, is the enormous body of unique music in Shakerism.

For many years, learning the music, I thought that they never had any rounds, because they were thought to be too ornate. A long time ago, my friend and Shaker music expert Mary Ann Haagen and I brought a group of Dartmouth students to Sabbathday Lake, Maine, where Eldress Frances and the remaining Shakers live. We spent a good part of the weekend singing with them, learning new songs from them, and singing songs from our repertory that were from other historic communities. At one point, before we sang a well-known song ("Come Life, Shaker Life"), I mentioned to Sister Frances that I often sang that song as a round with my daughter. I asked her if they ever did it that way. She kind of scowled at me with a smile on her face and said: "Larry, we're Shakers, we don't sing rounds!" It was a wonderfully "duh!" moment, even though Sister Frances, who I've known for a while, said it in a loving, very dry sense of humor way. But some years later, Mary Ann, who is a serious scholar with an equally dry sense of humor brought out this round at a rehearsal. She had just found it in an archive. I thought it was quite lovely, and was very touched.

[All sing the Shaker round, "The Lord will Comfort Zion…"]

Much of my life and work is about community. Musical community, whether running Frog Peak Music or working with other computer programmers, or playing music. The rounds project is a way to bring composition into that kind of activity, and have fun as well. It opens up to so many people in different ways, and is welcoming and transforming. It's something, maybe one of the few things, we could do here so easily as a group, along with perhaps, free improvisation or a process piece or something. It reminds us that at some level the reason we do music is because we love the activity of it. It precludes nothing, but reminds us of something important that might get overlooked.

Next I'd like to talk about a piece that's going to be performed here next weekend, a choral piece called *Three New Hampshire Songs*. I'd like to describe that piece and play a recording I have of it. I have a copy of the score here.

These pieces are from 1999. I should explain that New Hampshire is a state in New England, the Northeastern part of the United States. It's quite cold and remote there, where I live. The state has the reputation of being socially conservative, far to the right. It is, in general, quite poor, and extremely rural in many parts. It's also mountainous. Much of the state is occupied by the White Mountains, which are magnificently beautiful. It's been an interesting experience to live there for so long, out of the city, in a place with lots of history, not all of which I'm happy about. I decided to write a piece that was just an expression of my feelings about living there, and I dedicated each of these three pieces to sets of friends, couples who had been important to me there. I decided to use texts that were from New Hampshire, indigenous texts. The first one is called "Litany." A litany is a list of grievances, a long complaint.

The text is from an odd and disturbing piece of paper that my ex-wife and I had to sign before we adopted a child. We have an adopted daughter, and we had to swear that we were not homosexuals in order to be allowed to adopt her. We signed the document, somewhat ashamedly, because otherwise we could not have completed our adoption. However the language and poetry of it fascinated me. I had to keep from laughing at some of it, it was so ridiculous, but the rhythm and the seriousness of it was very striking. I set it to music, though I feel like it kind of set itself. In the piece, where we had to write our names, the chorus just says their names, and where we had to enter the date, the chorus says whatever date it is. In the introduction to the score, I mention that we knew other couples who had to sign this document, an anti-homosexual document. I know a couple that took it home and burned it in protest. I set it to music. The good news is that this law was repealed a few years later.

The second piece is something that my fellow New Hampshirites will recognize. We have a state license plate that says "live free or die," which is thought to be a libertarian motto. Everyone in the United States knows this saying—if they know one thing about New Hampshire, they know that our license plates on our cars say "live free or die." But it seems to me to be easily reinterpreted, that it could be seen not as "live free,"—to live free of government (which in New Hampshire often means forming Christian militias who refuse to pay taxes, that sort of thing)—but as simple verbs: live, free, die. Three activities. Three beautiful human activities, which we all do. It also seemed one could use different prepositions and connectives ("or," "and," "not," "nor") if one wanted. So the second one is called "Proposition: Three verbs and a logical operator."

The third is a bit more complicated. It's based on the Shaker "abecedarius," a folk/educational literary form. Each letter consists of four animals, but only the first in each group starts with a consecutive letter of the alphabet. For example the first quatrain, for the letter "A" is: "Alligator, beetle, porcupine, whale." This form is common in American folk traditions in teaching the letters of the alphabet, and this particular one is often thought to be the "Shaker abecdarius." It's not, it's some Protestant sect that I can't remember now, but usually, mistakenly, it's attributed to the Shakers. I set the text, 26 quartets of animals, some of which are poetically strange ("mud turtle, bear,"

"angleworm, dog"). This third one I called "Doggerel," but it's also *Four Voice Canon #12*. So those are the three texts.

Musically they all use the harmonic series exclusively. The pitches in each piece are from the harmonic series, usually up to the seventeenth partial. The singers are asked to sing in the intonations of the harmonic series. Each piece is in a different key, off a different fundamental. The group that premiered them asked my permission to sing them all in the same key, and that was fine. In each case, there's a correspondence between the rhythms of the harmonic series and the music. In the first one, the model is that of a bandpass filter which gradually decreases its bandwidth for each independent voice. The singers begin by singing any pitch, or indefinite pitches, on their rhythms. Gradually, as they move through the text they close in on their harmonic series pitch. It's like seventeen bandpass filters, with high overlapping bandwidths at first, all tightening up over time. I don't write that out, but just say: "Do this." I was interested in the inexactness of singers acting like bandpass filters. In the second piece, each singer has only one note. Their rhythmic information is from the tuplets, the idea I referred to the other day as the Rhythmicana. There's a complex cumulative process at work as well.

Here's the first one, "Litany" [shows score] There are sixteen individual parts, and you can see that they're just singing the rhythm of the words. I notated myself speaking this text. They gradually get to their note. Acoustically, the most complex pitches come in first, and you gradually start hearing the fundamental, which finally enters. It's a simple way of using "primes" to control a notion of dissonance and consonance, using the harmonic series.

In the next one, "Proposition," everybody just sings some version of "live free or die," but, for example, when the seventeenth partial is being sung it is always in a (generally sparsely populated) grupetto of seventeen against whatever the tempo is. It's a big polyrhythm, like in the *tooaytoods*, and another version of the Rhythmicana idea. There are some other things at work, but at the largest level the voices get thinner and thinner and close in on the Rhythmicana, only primes. There'll never be two notes at the same time, because no prime division of something will coordinate with any other prime division. I was going for this funny thing at the end, which is next to impossible for a group to sing, where you get one measure where nothing—since they're all odd numbers—should occur at the same time. [shows score] The difference between the middle seventeenth and the middle fifteenth of something is pretty small. As things get higher in the harmonic series, things get closer together.

The third one is all parts, there's no score. It's one of a set of pieces of mine, of which there are about thirty right now, called the "four voice canons." I've been making these since 1975, many of them computer generated, and they all have a similar form. The form is what I call a mensuration canon. [draws on board simple diagram] They are canons in varieties of ways, but the first voice generally enters first and its durations are proportional to the other voices in the canon, proportional to their length, which also determines their starting point. They generally end together. Often there is a gradual

buildup of density. What is happening is quite transparent, but I'm searching for different kinds of heterophony. By heterophony I mean that there are rules, or principles, or forms, for doing what they're doing. These are interesting rules, but there's no general rule for how micro-events relate. This is the way I guess I wish the world would act. We all have principles and ideas that we follow during the day, but these principles don't necessarily govern small interactions. If we trust them things can become interesting and free, because we all follow interesting and independent paths. As every one of these voices is doing something cool, I hope, together they're doing something cooler. But I don't legislate what happens moment by moment. In "Doggerel" the tenor, bass, alto, and soprano parts are all in different tempi. They start at different points of the piece, (inversely) related to their tempo. It needs four conductors, one conducts three against two, and five against two, and seven against four, in the end. They simply conduct in four, but in their own new tempo. If they do that correctly, all will end together, but it is difficult.

Each part has the same text, on successively higher pitches of the harmonic series. In the soprano part it is a much narrower range, but in the bass part it is octaves, fifths, and a major third (harmonics 2–5). Each singer's part is the same set of permutations of four objects, transposed to the set of four subsequent harmonic series pitches. It's a strict canon, and not just by tempo. It's for sixteen singers. Each of the four basses, sopranos, tenors and altos only has one pitch to sing, and they hocket. The pitch moves around in the measure depending on the animal. It's four parts of four hockets. It's nice to see it performed, because things are moving around spatially. It's quite simple to sing, though.

There are now a lot of these canons. If you're interested I'll leave a Cold Blue CD, a collection of them, in the library. Any questions?

Student: Do you construct each line with the thought of how they'll fit together eventually?

Polansky: No. The point is to not do that, or rather, do something more interesting. What I like about this process is the clear, complex form in which everyone does the same thing, but the result is unpredictable. One gets its complexity for free. By "for free" I don't mean that it comes as a result, which it does, but that there is no aesthetic or philosophical payment or compromise to be made. No debt incurred. I think that's a difference between heterophony and polyphony. I'm not interested in resolving the vertical, in micromanaging relationships. I'm interested in creating a new form, which makes its own decisions. I like to back up a step and say "everybody be cool, and nice to each other." It doesn't tell you what you do in every possible instant, but that's okay.

The performers are the York Vocal Index, a group in England that specializes in contemporary music and also one-to-a-part choral music. Bill Brooks, who is a great composer, performer, and scholar, is the conductor and director of the group. They made tuning tapes, and in the last movement used independent click tracks. I don't think those are necessarily needed, but they had a lot of time to prepare, and it helped with the

precision of the tempi and tuning. My hope, though, is that people just learn the new pitches. And the rhythms: one can do seventeen against four—it's not that hard if you just practice it slowly. You just have to learn it. With a conductor, one can't get too far off.

I'll show the score as we listen. They're quite short. I'll play the first two from the live performance, but the third one is from the Cold Blue *Four Voice Canons* CD.

Thank you all for coming.