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SONIC ARTS UNION

Wolfman

In 1966 Robert Ashley, David Behrman, Gordon Mumma, and I formed The Sonic Arts Union. I first met Bob and Gordon at the Feldman-Brown Concert in 1963. They had driven down to New York from Ann Arbor. Gordon and Bob lived in Ann Arbor and were part of a different musical culture. Often I didn't quite understand what they were talking about. The two of them had founded an independent electronic music studio in Ann Arbor. It had nothing to do with the University of Michigan Department of Music, even though they had been there as students. They got a hold of a couple of tape recorders and invited composers from all over the country to come and make electronic music.

Bob was interested in speech; he had worked in the language lab at the University of Michigan and learned a great deal about the formation of speech, as well as psychoacoustics. Gordon played the French horn, a skill he maintained throughout several works with electronics. David lived in New York. I had met him earlier through Christian Wolff at Harvard, later in the early Sixties at Darmstadt where I heard his early work, *Canons*, for piano (David Tudor) and percussion (Christoph Caskell). We were all trained in music, not in science or electronics, but when electronic music became a necessity, Gordon and David were inspired enough to learn electronic circuitry by themselves. I had been involved in a concert in New York a few years earlier, organized by Ben Paterson and Philip Corner under the name Sonic Arts Group, so I suggested we simply steal that name. It was

just a name on a program. So we called ourselves the Sonic Arts Group.

We weren't really a group, however. We didn't improvise, we didn't collaborate. We simply shared equipment and played in each other's pieces. One night, Bob called me and said he'd changed the name to Sonic Arts Union. He didn't like the name Sonic Arts Group because people called us SAG. Bob hated silly acronyms. I agreed. We never met and argued about anything; if one of us decided something, it was fine with the rest of us. So we became the Sonic Arts Union. SAU sounded awkward, but at least it wasn't SAG. The Beatles, The Rolling Stones, and REM were good names.

One of the signature works of the early Sixties was Robert Ashley's *Wolfman* (1964) for amplified voice and tape. It was the loudest piece of music anyone had heard at that time. I suppose you could say that it was the reverse side of Feldman's coin. Morty's sounds are so soft you have to lean toward the performers to hear what's going on. Sometimes you wonder if you are hearing all of them. In *Wolfman* you lean back and let them come to you. The sounds are so powerful that you are in a continual state of analysis, your mind constantly moves in an effort to isolate the minutest details. Ashley is a close-up, Feldman, a long shot. Or perhaps it is the other way around. You have to lean into Feldman's softness but you instinctively back away from Ashley's loudness. It's the difference between a microscope and a telescope.

Throughout the piece the volume level is turned up so high that feedback is created between a microphone and loudspeakers positioned around the hall. If left unattended feedback grows and grows to unbearable levels. The British call it "howl-round." There are several ways to control feedback: one is to use a compressor/limiter, an audio circuit designed to limit abrupt sound spikes while recording, so as not to get distortion. Another is to shift the pitch of the feedback slightly so that there is no steady tone to continually reinforce itself. Nicolas Collins does that in his work *Pea*

Soup. He uses a phase shifter that slightly shifts the pitch of feedback strands in an installation environment. Because the pitch of the feedback is continually changing, even by extremely small increments, the feedback, which relies on a single sustained pitch for its buildup, cannot establish itself. A third way is to introduce a sound into the loop between the microphone and loudspeaker. This is what Ashley does in *Wolfman*. He "sings" into a microphone positioned close to his mouth. In a prose score he gives four components that the performer varies during the performance: pitch, loudness, vowel, and closure. The vowel is changed by moving the tongue from the front to the back of the mouth, thereby changing the size of the oral cavity. As he does so, a range of vowels is produced, from *i* (long) to *h* (deep and heavily aspirated). By closure Bob means a continuum between jaws closed with lips pursed to jaw open with lips drawn as far as possible. What he is actually doing is coupling—a small room of variable size (the human mouth) changes to a large one of fixed size (the concert hall). What an idea!

Bob wrote out a set of instructions to guide the performer in moving through these parameters. In order to manage the four components he invented a simple process of controlled improvisation. You could start at any point, then gradually vary one of the four parameters while keeping the other three constant. Then you would alter a second parameter, keeping the other three constant. You couldn't change any of the variables until the three others had been changed. This produced an evolving structure that was always moving ahead. It was a simple and effective way of preventing crescendos and diminuendos, risings up and fallings back, and other banal gestures that improvisers are prone to rely on.

Because the microphone is so close to the performer's mouth it takes only the slightest effort by the performer to effect an enormous change. This gives the work a great sense of irony. Soft sounds control loud sounds. You are watching what looks like a performer screaming into a microphone when actually he is

barely making a sound. *Wolfman* is an homage to amplification. Bob used to perform that piece so loudly listeners would leave the concert hall. They were not accustomed to hearing such loud sounds. Often, the concert sponsors or sound technicians would complain that the volume was so high the speakers would be damaged (as if Bob didn't know enough about loudspeaker capability). They would try to lower the levels. Actually Bob had a precise idea about the volume: he required one half watt of power per person in the audience.

Performances of *Wolfman* had a sinister aspect to them. Bob used to stage them as if they were a nightclub performance, his face close to the mike, lit by a spotlight. Sometimes he would put a light directly under his chin, pointing up, so that his face would be luridly transfigured. It was frightening. The theatricality, however, was a decoy masking the true identity of the work. *Wolfman* was really a study in amplification and resonance.

People sometimes thought that their ears were getting hurt, but that was more psychological than physical. Bob used to say it was like ballroom dancing. If your partner liked you, she wouldn't feel uncomfortable if you squeezed her. But if she didn't like you, she would say it hurt. I never felt uncomfortable performing or listening to *Wolfman*. One of the experiences of listening was riding the threshold of loudness. You would constantly examine whether or not the sounds were loud enough to hurt you (they never were). At what point would they simply be too loud to bear? There was something exhilarating about that.

Bob had created two tapes to accompany the performance: *Wolfman*, about six minutes' duration, and *The Fourth of July*, about eighteen minutes long. For the *Fourth of July* Bob recorded the sounds of a neighbor's backyard picnic with a parabolic microphone. The chief characteristic of a parabola is that a wave of any kind that strikes any point on its surface is reflected to a central focal point. A mike placed at that point will receive multiples of

the same signal from all the points of reflection. The FBI uses parabolic mikes for eavesdropping and to pick out individual speakers in a crowd. They are also used to pick up quarterbacks calling signals in football games and individual birds in bird recording.

Hornpipe

Hornpipe (1967) is a milestone of experimental music. You can understand why Gordon Mumma would call it *Hornpipe* since he played the French horn. The term also refers to a popular dance form in the seventeenth century. Gordon had designed a box of electronics he called the Cybersonic Console. Cybernetics was a branch of engineering pioneered by Norbert Wiener of MIT. It refers to self-regulating systems. The Balinese irrigate their rice fields using bamboo pipes, which, as they fill up with water, become unbalanced. This causes them to spill their contents into the next pool of water, so as to combat flooding. When the pipe is empty, it rocks back to its original position and starts filling up again.

Gordon would walk out on stage with his French horn, wearing his Console on his belt. It consisted of a microphone and eight variable resonance circuits. He designed and built it himself. He was the only person who knew exactly how it worked. The microphone was inserted into the bell of the horn and would listen to what was happening in the room. Gordon would play sounds into the room, the microphone would pick them up and the Console would do an analysis of the room's acoustics. Depending on how he set the parameters on the Console, it would respond to the acoustical situation. It contained a bank of filters. *Hornpipe* was one of the first musical works that used acoustical testing of an environment as a formal structure for music.

Music of a given time and period is made for the spaces in which it's played. Chamber music, usually performed in small, dry rooms, may have a complexity that works composed for larger

spaces may not have. A typical reverberation time for a large concert hall is about two seconds. Opera houses have shorter times, for the sake of the clarity of understanding the words. Any conductor knows that there is no absolute tempo at which a work should move. So much depends on the reverberation time of the space. One may rehearse a Bach cantata at one set of tempos, then have to slow them down or speed them up in performance. Reflective surfaces surround a performance of a Beethoven symphony, but Beethoven's intention was not to articulate the space; it had to do with all the musical things we are well acquainted with.

Sometimes Gordon would substitute an oboe (double) reed for the normal French horn mouthpiece, turning that mellow brass sound into a raucous shawm-like instrument. The reeds vibrate against one another, producing that rich, grainy medieval oboe sound. Gordon loves abrasive sounds. Perhaps abrasive is a bad adjective; instead let's say rich or complex. He worked with electronics so much he learned to love these complex sound aggregates. He always chose the most extreme sounds to put in, and made no attempt to make them beautiful. The climax of the work occurs when the system becomes saturated and unstable and the electronic sounds kick in. The composer/performer doesn't determine when this happens, the circuitry does. It's a magical moment.

Dresden Interleaf

Right away the title *Dresden Interleaf* reminds one of the firebombing of Dresden, Germany, on February 13, 1945. World War II in Europe was virtually over. The English and the Americans decided to punish the Germans by devising a pattern of saturation bombing of the city of Dresden. They also wanted to learn something about bombing, if you can imagine that. They divided the city of Dresden into a grid and sent twelve hundred airplanes over, dropping incendiary bombs, and for two days covered every square inch of the city, methodically and geometrically. They de-

stroyed the whole city. They didn't need to do it, the war was already won. It was a cold-blooded exercise in warfare. Gordon Mumma's *Dresden Interleaf* is meant to be played between any other two pieces, as a sort of disruption.

Dresden Interleaf is a tape collage composition made of found material, including a choral fragment from Mendelssohn's *Reformation Symphony*. (The "Dresden Amen" is played in the first movement and referenced in the third.) There's also a sound track from a World War II movie, in which aircraft pilots are talking to one another during a bombing mission. In live performances Gordon used model airplane engines as part of the sound material. He'd start them up and they'd make that raucous sputtering noise. You could see the smoke and smell the gasoline. It was wonderful. *Dresden Interleaf* is classical electronic music from the Sixties; you can't make these sounds with a synthesizer. They're analog sounds made by hours of recording, splicing, and overdubbing with homemade equipment.

Mesa

Mesa is a large-scale work for bandoneon and electronics by Gordon Mumma. It was commissioned by the Merce Cunningham Dance Company for their dance, *Place*, and was written for David Tudor.

The bandoneon is a type of Argentine accordion made popular by tango composer Astor Piazzolla. It was invented in the early nineteenth century by German inventor Heinrich Band, who intended it to be used in folk music and religious services. Immigrants and sailors brought it to Argentina in the late nineteenth century. It is similar to the piano accordion but has buttons on both sides of the instrument rather than keys on a keyboard. On some bandoneons the buttons in their "out" position have different pitches than in their "in" position. This makes it devilishly difficult to play but it was right up David Tudor's alley.

Gordon routed the sounds of the bandoneon to his Cybersonic Console, which extended the dynamic range of the instrument and shifted the pitches enharmonically, creating the raucous timbres that Gordon loved so much. The stereo characteristics of the bandoneon — the right and left sides of the instruments are separate — were expanded into a quadraphonic soundscape. Different parts of the timbral spectra are heard in different channels of the quadraphonic playback.

The salient characteristic of *Mesa* is instantaneous change in loudness. Such extreme abruptness was hardly ever experienced in music before, except in some of Karlheinz Stockhausen's piano pieces (*Klavierstücke*) in which the dynamic contrasts are so extreme and abrupt that David Tudor's first recordings were unacceptable because of print-through. Print-through is caused by the bleeding of a signal to adjacent layers of tape, as it is stored on its reel. It is heard as a backward and forward pre-echo and is therefore unusable.

The title refers to the geological formation of mesas, table-shaped mountains vertical on their sides and flat on top. It also relates to the monolithic structure of certain semiconductors (mesa diodes?) used in electronic circuitry of the time. (Coincidentally, the abrupt on–sustain–off characteristics of *Mesa* relates in a way to the plateau dynamics of the baroque era.) Gordon made a special version for the Sonic Arts Union by substituting harmonicas (mouth organs) for bandoneons, keeping the reedy quality of the original sound material.

Runthrough

David Behrman's *Runthrough* (1967–1968) is an improvisation for four players. Two players work dials and switches that control various sound generators and modulators while the other two shine small flashlights onto photo resistors housed in tin cans, distributing sounds to four loudspeakers deployed around the

concert space. A photo resistor, the kind that will cause an alarm to go off if an intruder breaks a beam of light, is simply a semiconductor which, when illuminated, drops in resistance. The photo resistors were housed in Campbell Soup cans. Each player would rotate a small flashlight into a tin can, spinning the sounds at various speeds around the space. Two players control the placement of the sounds, the other two had control of the sounds themselves. David designed and built his own configuration of homemade components, all of which could be found in commercially available synthesizers at the time, including sine, pulse, and ramp wave oscillators, voltage control amplifiers, and ring modulators. David's system is designed for a specific work, not as a common denominator of what a large consumer public wanted. It sounds better than store-bought synthesizers. It has the mark of a master craftsman.

Sine waves are pure, without overtones; pulse waves are complex, their timbre varies depending on how long their duty cycle or "on" portion is relative to its complete cycle. When it is on half the time, it is called a square wave and consists of all odd-numbered overtones or harmonics. The nomenclature of these wave forms is derived from the shapes they assume when viewed on an oscilloscope, a device consisting of a cathode ray tube and fluorescent screen — the vertical axis representing the amplitude (loudness) of the signal, the horizontal, the frequency (pitch). A voltage control amplifier is simply an amplifier that can be controlled by an external signal. A ring modulator produces the sums and differences of two or more frequencies fed into its input while suppressing the original signals. It was simple to make; its name is derived from the ring-like arrangement of its four diodes.

The most exciting possibility that voltage control offered the composer was that virtually every component could be used as a sound source and a control signal. One of the salient characteristics of *Runthrough* — slow crescendos followed by thumps of

sound — was generated by ramp waves controlling voltage control amplifiers. A ramp wave, also known as a sawtooth wave, rises from zero to a pre-determined level, then falls abruptly to zero again. In the audio range its timbre consists of all the overtones above the fundamental frequency, decreasing in loudness the higher up you go. When tuned below audibility, that is, too low to be heard as sounds by the human ear, it may be used as a control voltage, imparting its envelope (shape) to whatever components it is patched into.

One of the characteristics of electronic music is that it is steady state; once it's turned on it stays on. With wind or brass instruments, for example, you only have a certain amount of air, so there have to be short silences between sounds, to allow players to breathe. String players have to change bow every few seconds causing very short silences that are mitigated by playing legato (smoothly). And so, conventional music is made of melodic and rhythmic material that stops and starts. With electronics it is seductive and natural to let these sounds change a little bit, stay on a long time, and fill up a space.

Runthrough has an all-over form, similar to Jackson Pollack's action paintings, that is, you hear everything there is to hear most of the time. Conceived as a quasi-improvised performance work, *Runthrough* allows ample time for the possibilities offered by his circuitry to unfold. There are, however, abrupt changes in rhythm, texture, and loudness that can only be achieved by the electronic medium. The circuit, amplifier, and loudspeaker are quicker than the bowed string or blown column of air. The only other work that matched and perhaps exceeded these quick shifts of level change was Gordon Mumma's *Mesa*, in which sustained planes of softness and loudness alternate instantaneously. Listening to a recording of *Runthrough* one is struck by how much of the acoustic space one can hear. This time-space, as well as the repetitive rhythmic figures that dominate the performance, served to

articulate the acoustic characteristics of the space. (I imagine the vocalizations of thousands of tiny whales echoing off the walls of the room.) Listening to *Runthrough* is an exhilarating experience.

Wave Train

In 1998 the Wadsworth Athenaeum in Hartford asked me to give a talk about wave phenomena in conjunction with an exhibition of Lee Lozano's *Wave Paintings*. Lozano (1930–1999) had made a series of eleven large canvases each 96 inches high and 42 inches wide consisting of wavy lines of varying size, from two 48-inch waves to 192 half-inch ripples. She said they were a reference to the electromagnetic spectrum.

As I was thinking about what to talk about two other works from the Sixties immediately came to mind: Michael Snow's *Wavelength* and David Behrman's *Wave Train*. In Snow's film the camera moves closer and closer to a point between two windows on one wall of the room, finally focusing on a picture of ocean waves. The film is forty-five minutes long but seems to have been taken over a two or three-day time span. The movement toward the wall seems continuous but was actually filmed in steps. There was something about the purity and neutrality of waves and their motions that attracted certain artists who wanted to make nonsubjective and at the same time expressive works. There is a chapter in Italo Calvino's *Mr. Palomar*, in which the hero, sitting on a beach, muses on the transient nature of ocean waves. Where do they begin? Where do they end? How does one differentiate them?

In *Wave Train* David Behrman explores the resonant characteristics of a grand piano with feedback. Guitar microphones are placed in various locations on the strings of the piano; then the gains on the mikes' amplifiers are raised to the point of feedback, exciting the strings. The performer's job is to ride the feedback, raising and lowering the volume levels, creating arcs of sound

waves. David likens this activity to surfing where one is constantly monitoring one's position along a surging wave front. From time to time, the mikes are repositioned (when the gains are down) to explore different parts of the piano.

Wave Songs

Instead of giving a lecture on wave phenomena I asked the Athenaeum if I could compose a work honoring Lozano's *Wave Paintings*. They agreed. I wrote *Wave Songs*, eleven solos for female voice with two pure wave oscillators. I took the proportions of the paintings as the basis of my musical miniatures. In each solo two oscillators are tuned relative to the size of the waves in the corresponding painting. Throughout the work the singer sings against the oscillator tones creating audible beats at speeds determined by the distances between the tones. Each painting is 96 inches high; each song lasts 96 seconds. In each painting the number of inches is divided by the size of the waves; in each solo the oscillators are tuned inversely to the size of the waves. For example, in the *Two-Wave Painting* each wave measures 48 inches (ninety-six divided by two). In the first solo the oscillators are tuned 48 cycles apart producing audible beats 48 times a second. In each succeeding solo the distance between the oscillator tones becomes narrower until, in *Solo XI*, corresponding to the *192-Wave Painting*, they are within a half a cycle of each other, producing one beat every two seconds. While the number of waves in Lozano's paintings increase as they get smaller, the number of beats in the solos decrease as the tunings get closer. The reason for this contrariness is because in order to imitate the *Two-Wave Painting*, for example, I would have had to tune the two oscillators over a minute and a half time span (one beat every 48 seconds), a tempo I thought to be too slow for human performance.

The Athenaeum kindly let me invite Joan La Barbara to come to Hartford to perform the piece. She performed it in the Ma-

trix Gallery, a small exhibition space within the Athenaeum, surrounded by the eleven Lozano paintings. The artist had stipulated that the paintings be leaned up against the walls so that the texture of the paintings could be more physically perceived. I imagined the work as a mini opera with Joan taking the part of Lee Lozano, singing her paintings into existence or perhaps simply humming to herself as she worked on them.

It was extremely hot on the day of the performance. Shelly Casto of the Wadsworth was thoughtful enough to procure several hundred paper fans for the audience to cool themselves with during the performances. There was no air conditioning in the gallery. We soon discovered, however, that the fanning motion disturbed the sound waves. Pure (sine) waves, having no overtones, may be perceived physically particularly if the acoustics of the room are dry enough, that is, if they don't reflect too much sound. If you move around the room you can feel their presence. Even if you move a little, you can disturb them. It's like standing in a pool of water and sending out ripples with small movements of your body.

Unforeseen Events

Unforeseen Events (1991) is one of a long series of interactive computer pieces by David Behrman. Starting as far back as 1977 David has composed works for human performers and computer, upgrading his equipment as technological times change. *On the Other Ocean* and *Figure in a Clearing* utilized the rudimentary toy-like Kim-1 microcomputer. For these works David designed six pitch-sensing circuits that could remember the order and timing of pitches played into them through microphones. Two performers improvised on these pitches causing changes in harmonies stored in two homemade synthesizers.

In most of his pieces David collaborates with other musicians not so much out of shyness but from a firm belief in the artistic

strength of such a way of working. In *Unforeseen Events* he collaborated with Ben Neill, who plays a modified trumpet that he developed in the mid-Eighties with the help of Robert Moog. It includes MIDI controllers that are connected directly to the computer.

Unforeseen Events is in four parts. In all of them the computer responds to trumpet calls, long tones, and single notes, creating harmonies, chords, and arpeggiated figures that sustain or change pitch and timbre in subtle ways. In Part Two, *Fishing for Complements*, the composer listens to what's going on and enters changes into the computer. In Part Three, *Witch Grass*, only when the performer pauses do the harmonies move away from their origins and don't stop until the performer plays again.

In all his works Behrman avoids the pitfall of many interactive works, that is, direct cause and effect, first cousin to call and response, a technique that appears in many world musics but sounds out of place in experimental music. Call and response is oppressive. Each player *must* respond to what is given by another. It's too predictable, too. It only works when something gets in the way between the call and its answer. As you listen to Behrman's pieces you only get glimmers of directness; most of the time the relationships are interrupted and distant and therefore engage the listener in tantalizing ways.

Years ago I went to India to collaborate with a group of Indian musicians. Before I left I recorded empty spaces at Wesleyan that I planned to playback in various performance spaces in India. The idea was to bring my spaces into theirs. I had recorded Crowell Hall in January. Because of the cold weather the windows expanded and contracted periodically making loud, sharp cracking sounds. The North Indian tabla player, having been trained in call and response, would invariably slap one of his drums following a sharp sound. It was absolutely predicable and useless for my purposes. As we were rehearsing Wesleyan English professor Joe Reed, who joined in our trip, came to the door of the space

and looked in. I explained my predicament and asked for his advice. He immediately suggested that the drummer hit his drum *before* he heard a window crack. What a wonderful solution! Now we had unpredictability, anticipation, and the element of time. Something banal in music was turned on its head. Now you had response and call, which was much more interesting.

Vespers

In the late Sixties I was looking for something outside of music that would inspire me. I didn't want to write the kind of music that everyone else did. It didn't interest me to write for conventional musical instruments. It didn't even interest me to play an instrument, actually, although I was making a living as a choral conductor. I wanted to find my own idea. Virgil Thomson gave a lecture once in which he said, "What I demand from a composer is that he be original." The audience booed him. They didn't like the idea that a composer would think he or she had to be original.

I began to read *Listening in the Dark* by Donald Griffin, a pioneering work in echolocation. Griffin had also written a more popular book on this subject, *Echoes of Bats and Men*. It was a comprehensive study of the sound sending and receiving acuity of bats. Griffin discovered how bats avoid obstacles and hunt for food. He extended wires across his lab and observed how bats avoided hitting them. They were extremely skilled in doing this. Because sound waves have to be smaller than the objects they're bouncing off of, bats learned to emit trains of extremely high pulse waves, so high we humans can't hear them. Low sounds have longer wavelengths; they spread out, they can even go around corners. High sounds, with shorter wavelengths, are more directional. You can actually measure the wavelength of any musical sound. Here is a simple formula for doing so:

Wavelength = speed of sound (ca. 1130 feet/second)/frequency.

So A-natural at 440 cycles per second has a wavelength of about 2.6 ft.

When the echoes from a flying insect come back to the bat, it can tell how far away the insect is, where it is, and how fast it's moving. Griffin's book gave me a lot of ideas. I began thinking of sounds in terms of short and long wavelengths, not as high and low pitches or notes written in time from left to right on a page. I was truly impressed by these creatures that employ sound so exquisitely for survival.

There was an interesting program on television the other night. A young man has learned how to echolocate skillfully enough to negotiate through his neighborhood without bumping into things. He makes clicks by snapping his tongue against his palate. It was uncanny. He could tell you what every object was. It was the first time, I think, that a human being has learned how to echolocate.

It often happens that when you are looking for something and your mind is prepared sufficiently you find it almost as if by accident. I happened to meet a man in Cambridge, Massachusetts, who was working for a company called *Listening Incorporated*. The company was trying to develop ways of communicating with dolphins. They were manufacturing a device called a Sondol (sonar-dolphin), a hand-held pulse wave oscillator. You know what sonar does. You send out a sound wave, it reflects off an approaching ship, for example, bounces back and tells you how far away it is. Radar is similar but it employs radio waves. I borrowed a prototype of a Sondol and turned it on. I adjusted the pulse rate — you couldn't change the volume or any other parameter — and immediately heard reflections off the surrounding environment. It was beautiful! When I beamed it at a wall I heard that the echoes that came back differed from the pulses that went out. If I aimed it at glass window I noticed that the echo was different from that which came from the wall. I visualized the sounds getting squashed on the impact. If we had perfect hearing, we should be

able to tell how far away that wall is. Because sound travels about 1130 feet per second in air (under water it's five times faster), if it returns to you in a second, you can assume that the reflective surface is about 600 feet away. Half a second out, half a second back. The echoes are beautiful outdoors; you can hear the leaves on trees. By aiming the Sondol at certain angles one can create multiple echoes. They ricochet all over the room. Musicians ask to borrow my Sondols for concerts but I can't let them have them; they're one of a kind and can't be replaced if lost.

One night I had a vivid dream. (When you're deeply involved in a project, you start dreaming about it.) I saw humans — astronauts perhaps, I may have been one of them — exploring a dark space in an alien environment. They were beaming sound guns into darkened rooms, collecting information about those rooms and relaying it back to Earth. It was kind of a science fiction idea.

I bought four Sondols from *Listening Incorporated* and thought about making a performance piece. In those days you often didn't know how your piece was going to go until the day of the concert. In 1968 I was invited to Ann Arbor, Michigan, to the *Once Festival* Bob Ashley and Gordon Mumma had organized. I decided to present a piece with four performers playing Sondols. Not until the dress rehearsal was I clear about the form of the performance. Nothing in my training could help me organize the structure. I couldn't use what I'd learned in school because that had to do with notes and pitches and meters and rhythms. This piece had to do with pulse waves echoing off walls, ceilings, and floors of enclosed spaces.

The performance took place in the Michigan Union Ballroom, a huge space on the University of Michigan campus. I blindfolded the performers and stationed them in the four corners of the room. As a sort of prologue to the performance I walked around the room. My shoes, which had leather soles, made sharp, clicking sounds. I pulled apart the drapes on the windows to make the

room more reverberant. I stacked up some chairs and positioned a couple of potted plants as obstacles. I hoped that the performers, as they approached the plants and chairs, would hear echoes coming back from them and could avoid walking into them.

Instead of writing a score that stipulates when each player plays and in what combinations I simply asked them to move to a central point in the darkened space, listening to their echoes as they moved. I gave them the task of orienting themselves in the dark, avoiding obstacles, and arriving at a predetermined goal. If they followed this simple task rather than imposing their own ideas about something musical everything would fall into place. For example, when four people are playing at the same time, the texture is so dense that none of them can hear his own echoes. The players have to stop playing every once in awhile to allow each other a clear sound-image to follow. So silence is built into the performance. I didn't indicate when it should occur. Stops, starts, silences, density, and texture are built into the task of orienting oneself by mean of echolocation. A performance of *Vespers* gives you an acoustic signature of the room, as if one were taking a slow sound photograph over a long period of time. You hear what the room sounds like. That was mysterious to me and wonderful. It really turned me on.

I called the piece *Vespers* for two reasons. Vespers is one of the seven canonical hours the Catholic Church held in the late afternoon or early evening. Although I am not religious I thought of it as a ritual in some way. *Vespers* also refers to the common bat of North America, of the family *vespertilionidae*. I wanted to pay homage to these courageous and supremely skillful creatures that are so maligned by our culture. Bats are just fabulous! They scoop up insects with their wings. They do all sorts of fancy things.

Once we performed *Vespers* in Finland. I had bought five hundred little toy crickets to take along with me. You know those metal toy crickets you can buy for a few cents each? They make sharp

clicking sounds. Toward the end of the performance I passed a bunch of them out to people in the audience. Three hundred people or so began playing their crickets. The hall was ringing! The sound image of that room was marvelous. The room was being used as an instrument. Then a professor from the local music conservatory went out and got his violin. He started playing it in the middle of the performance. Can you believe that? People around him started making vulgar vocal sounds, or banal rhythms by clapping. If people were going to interfere with my pieces I wish they'd do something more interesting. I was depressed. After the concert as I was walking through the streets of Helsinki I could hear people that had been at the concert playing their little crickets. At two o'clock in the morning I could hear the loveliest trains of ticks and their accompanying echoes. It was beautiful. Some people finally got the point of the piece.

I Am Sitting in a Room

One day during the fall of 1968 I bumped into Edmond Dewan in the hallway of the Brandeis Music Department. In casual conversation he remarked that a professor at MIT named Bose had just given a lecture in which he described a way of testing a loudspeaker he was designing. He recycled sounds into his speakers to hear if their responses were flat. That's all I remember of our conversation. I picked up on the idea and decided to make some preliminary experiments in one of the practice rooms at Brandeis. I made sounds of various kinds and recycled them into the room over and over again. The results were strident; the room was too bright acoustically.

During the spring of 1969, I was living in an apartment at 454 High Street, Middletown, Connecticut. I was teaching during the spring semester at Wesleyan. It was a sordid habitat, the kind universities rent to part-time faculty. It had a green shag rug, heavy drapes on the windows, and an old armchair. I mention

this because it has a lot to do with the acoustics of the room. The kitchen was supplied with one pot, a skillet, and a coffee cup. But that was okay; I was by myself and ate out a lot anyway.

One night I borrowed two Nagra tape recorders from the Music Department. They had purchased them for ethnological field recording. At that time Nagra machines were the *sine qua non* of the recording industry. They were the finest portable reel-to-reel recorders for films and field recording. Any Hollywood Western you ever saw was probably recorded with a Nagra. They were beautiful machines. I had a Beyer microphone, a single KLH loudspeaker, and a Dynaco amplifier. I set the mike up in the living room, sat down in the armchair, and wrote out a text that explained what I was about to do. In those days, there was a genre of work in which the process of the composition was the content of the work. I remember a Judson Church dancer, Trisha Brown I believe, describing her motions as she was doing them. I decided that the work would have no poetic or aesthetic content. The art was someplace else.

I placed the two machines on a table outside the door so the spinning reels wouldn't make noise. I unplugged the refrigerator, turned off the heat. I waited until the radiator pipes had cooled and the room got quiet. I waited until after 11 o'clock when a nearby bar, *The Three Coins*, closed. It was snowing that night so it was relatively quiet outside. There was not a lot of traffic going by. I went outside into the hallway, turned on one of the Nagras and, returning to the living room, read the text into the microphone. When I was finished, I went back out into the hallway, stopped the machine, rewound the tape, and listened to the results through headphones. The levels on the meters were okay. They hadn't peaked into the red zone. That would have indicated distortion. I transferred the tape to the second recorder, which was routed through the amplifier to the loudspeaker. I had positioned it on the chair I had been sitting in. I wanted the copy to

sound as much like my original speech as possible. I wanted it to sound as if I were there in person actually talking in the room.

I went back outside the room and played this copy into the room again, recording it on the first recorder. I repeated this procedure until I had sixteen versions, one original and fifteen copies. I stayed up all night doing it. As the process continued more and more of the resonances of the room came forth; the intelligibility of the speech disappeared. Speech became music. It was magical.

I chose speech to test the space because it is rich in sounds. It has fundamental tones (formants) and lots of noisy stuff—p's, t's, s's, k's. It was crucial to avoid poetic references—poems, prayers, anything with high aesthetic value. I felt that would only get in the way. I wanted the acoustic exploration to be paramount, the room acoustics and it's gradual transformation to be the point of the piece.

Imagine a room so many meters long. Now imagine a sound wave that fits the room, which reflects off the wall in sync with itself. It will be louder (constructive interference). This is called a standing wave. If the wave doesn't fit it will bounce back out of sync and dissipate its energy (destructive interference). This is a simplistic model of what happens in *I Am Sitting in a Room*. All the components of my speech that related to the physical dimensions of the room are reinforced; those that don't, disappear. Think of yourself singing in the shower. You instinctively find the resonant frequency(-ies) of the small space you are in. Your voice sounds rich because it reinforces itself.

While the procedure of the work was repetitive, the rate of change of the resonance went at its own speed. I was careful not to influence the results in any way. I didn't raise or lower volume levels on purpose to make the process go faster or slower. I did have to carefully monitor the levels, however, in order to keep the recording from distorting or getting too soft. I did this minimally. I wanted the room to do the work.

I've made several versions of *I Am Sitting in a Room*, one for the dance *Dune* by Viola Farber, another in my house on 7 Miles Avenue. Each one sounds different. A couple of years ago some folks in Toulouse made several versions of the work. One of them was in a dialect peculiar to that region in France.

Chambers

In 1968, composer Pauline Oliveros, who was on the faculty of the University of California in San Diego, invited me out to be a guest artist. Every day I used to drive out on Route 1, along the ocean from La Jolla to Leucadia, and I would pass by a seashell shop. One day I stopped to buy several conch shells, some rather large. Pauline and I sawed the ends off them to make them into wind instruments. It's not the first time shells have been used as trumpets; they've been used in many cultures as that. I thought about when you're a child: you put a seashell up to your ear, and you hear the ocean. You hear the sounds around you resonating in the interior of the shell. I started to think of those shells as small rooms that had special resonant characteristics.

When I came home, I composed *Chambers*. The score consists of two lists: one is a collection of resonant objects one can find; the second is a list of ways of making them sound. It started as a conceptual piece that has several versions. One is that you find, collect, or make small resonant environments that you would put a sound in somehow, and hear the sound of the environment that the sound was originally made in in this new environment, and you would hear the change in the sound. I made a performance piece in 1968 for the Museum of Modern Art in New York. I gave everybody money and sent them out to buy materials for the performance. We had brought along suitcases, boots, bags, lunch boxes, vases, pots, pans, and other small, enclosed chambers. All we needed were sound sources that functioned by themselves. In a couple of hours the players came back with toy airplanes, trucks,

sirens, whistles, radios, and electric shavers. Anything that was battery-operated or that you could wind up and would sound for a couple of minutes. Up until two hours before the concert we didn't know exactly what we were going to do. That's what you did in those days. You'd get an idea, go to the performance space, and execute it. You didn't rehearse or practice your part. I staged it simply. We started outside the room and came in through the doors. Each performer walked in with his sounding object. The performer simply walked through the room. The audience heard the movement of the sound, where it was going, and tried to figure out what was in it. I let each player decide where to put his chamber down. The performance consisted of bringing sounds into the space. You could hear the original or recorded sound in its chamber come through the space. That's all it was. The score for *Chambers* consists of lists of resonant spaces or objects—cisterns, bowls, bottles, etc.—along with ways of making them sound—rubbing, jiggling, burning, etc.

In 1994 we had a festival here of my work. I wanted Wesleyan students to participate in it, so I asked the students in Music 109 to collect resonant objects and sounds. We performed it at noontime in Crowell Hall. Everybody carried in their object, one by one, and filled up the hall with sounds. There were about sixty performers finally sitting on stage with their objects. It was wonderful. The sounds were so quiet and the texture so thick.

I've also done *Chambers* as an installation. I collected sixteen objects when I was performing in Europe. I bought some pots and pans in Amsterdam, and various things, and then I recorded environmental sounds with a cassette tape recorder. I would get on a tram, for example, and record a sound for an hour or so. I made a lot of recordings of public spaces. In large restaurants, you can hear the sounds of forks and knives, of tinkling glasses. You can get a sonic idea of the activities in those spaces. For installations I simply mount the resonant objects on sculpture stands. My fa-

vorite one was the sound of the huge railroad station in Cologne, Germany, heard inside a thimble. I used a single earphone as a loudspeaker. Visitors walk in and hear all these sounds in funny little objects.

A few weeks ago two players did a version of *Chambers* at the Greenwich House Music School in New York. They played garden hoses as wind instruments, starting outside the small concert hall. One slowly climbed a stairway up several flights playing as he went; the other walked downstairs and outside into a courtyard a couple of floors below. The dispersal of the sounds as they receded into the distance was beautiful.

15
LONG STRING INSTRUMENT

Ellen Fullman said something beautiful about her piece, *The Long String Instrument* (1980). She said that the activity of its composition had become her personal music school. It led her to read and study as the information she sought got put to use in very practical ways, and that the piece is a microcosm for the history of music. Why did she say it's a microcosm of the history of music? One of the earliest examples of writing we've got about music is by Pythagoras, a mathematician in fifth-century B.C. Greece. He invented the monochord, a single string, which when plucked and bowed allows one to observe its modes of vibration. Pythagoras was interested in the nature of sound, making him the first experimental composer.

The first thing one observes is that the string vibrates as a whole. You can see it moving up and down its entire length. The sound it produces as it vibrates as a whole is the fundamental pitch. That's the tone you hear and identify. Its pitch is determined by the tautness, weight, mass, and length of the string. Any mechanical system that moves periodically faster than sixteen times a second makes a musical sound. The pitch of an organ pipe is determined by how long it is; the column of air is vibrating in that length. All things being equal the longer the vibrating medium, the lower the sound; the shorter, the higher. That's why the piccolo sounds higher than the tuba. At the same time the string vibrates as a whole, it vibrates in half, producing a sound an octave higher than the fundamental. The string also vibrates in thirds, fourths, fifths and so on. Each mode of vibration produces

a tone that is heard at the same time as the fundamental, but so quietly that you don't hear it individually. You hear it as timbre. That's why musical sounds are so interesting and have such beautiful timbres, they're composed of so many overtones. At first, Ellen worked with long strings in a haphazard way, then she got interested in tunings and trying to figure out what the basic principles were. She was relearning the history of acoustics.

It's difficult to understand how something can vibrate in half at the same time it's vibrating as a whole and in thirds. It's hard to believe that strings vibrate simultaneously in all these ways. The overtones contribute to the timbre of the sound. Just because I move my arm one way, doesn't mean my elbow can't be moving at the same time. There's a myth about basketball superstar Michael Jordan. Some people think that when he's in mid-air he can jump up even higher. That's why he's called "Air Jordan." But that's physically impossible. He would have nothing solid to jump against. They discovered that he simply changes his center of gravity. He can move his body while he's up in the air in a way that makes it seem as if he were jumping higher. Physical systems are hard to explain. Every physics book I've ever read never quite explains these things enough. How can you explain the magic of sound? Every model is too simple. I think the question has to do with whether there are certain innate properties, perhaps universal properties, that have to do with acoustics. I don't think that this phenomenon is ever adequately explained. It just happens.

Several years ago Ellen Fullman did a beautiful performance of *The Long String Instrument* in the old Field House at Wesleyan. She extended her strings all the way down the basketball court. Regulation length for a college court is ninety-four feet so her wire must have been close to that. The strings were tuned to sound boxes positioned under the baskets. During the performance she and an assistant walked forward and back down the court between the strings, stroking them with rosined fingers. The pitch

stays the same no matter where they are on the wire but the timbre changes. She tuned the wires by putting clamps at certain points on the wire to shorten the lengths of the strings. It's similar to the way a violinist stops a string. Let's bow any open string. If you stop it with your first finger a perfect fourth above, it produces a harmonic two octaves higher because the sounding part of the string is shorter. A flutist, a wind player, will press a key down shortening the length of the air tube. A brass player does the same thing with valves.

The two performers slowly walked forward and backward as in a dream, stroking the strings on either side of them. Before the concert I asked her how long she was going to play and she said an hour. I thought that seemed too long, but it wasn't. Everyone was mesmerized.

Music on a Long Thin Wire

The idea for *Music on a Long in Wire* (1977) came out of a physics class at Wesleyan I taught with physicist John Trefny. We set up a modern version of the Pythagorean monochord by extending a wire across the top of a lab table, an electromagnet straddling one end. We began stopping and plucking the string in various ways and observing the modes of vibration. I went home one night and dreamed of an extremely long wire. I dreamed of a wire that reached up to the moon. Do you know the *Running Fence* by Christo? He constructed a fence that ran hundreds of miles across California. Perhaps I was inspired by that work. Anyway, I knew that by greatly extending the length of the wire the result would sound amazing.

I'm not primarily concerned about tuning in *Music on a Long Thin Wire*. I don't try to control it. I simply take the longest length that I can and listen to what happens. I recently installed *Music on a Long Thin Wire* in the Stadtgalerie in Kiel, Germany. It was one hundred and twenty feet long. The gallery space was a quarter of

a circle and my wire went across it. There was almost no room for anybody to walk around. You don't know what a quarter of a circle really is until you walk around in it. The architecture was perfectly symmetrical. The wire was extended between two wooden tables. (I specify wooden tables because the sound of wood is beautiful.) I placed wooden bridges with notches cut into them for the wire to fit into, on each table. Contact microphones were embedded in the bridges. These microphones were routed to separate amplifiers and speakers. When the wire vibrated, the microphones picked up the sound in the wood. What made the wire vibrate was an electrical current provided by an audio oscillator. The oscillator is routed into an amplifier, and the amplifier goes into one end of the wire. The other is routed by a long cable to the other side of the amp, forming a loop. A current alone was not enough to make the wire move so I placed a horseshoe magnet over the wire at one end. The magnet creates a flux field across the wire causing it to move. It's like a loudspeaker without a cone. I sent away for a U.S. Navy surplus horseshoe magnet through the Edmund Scientific Catalog. God knows what the Navy did with horseshoe magnets. It weighs about thirty pounds. I have to hide it in my luggage when I bring it over to Europe on an airplane. If they know it's a magnet they won't let me take it, they think it'll throw the plane off course. If they ask me what it is I say it's a sculpture. Sometimes, though, I simply remove one of the poles of the magnet and carry it in another piece of luggage. I don't know the power of the magnet, I just work with it empirically. I simply install it and turn on the amplifier. I find a pitch on the oscillator that makes the wire vibrate. Since the wire is so long it makes wonderful sounds, but more important, they change all of the time because the wire's slack, it's not under tension the way piano strings are. Footsteps, temperature changes, air currents also cause the wire to change. It's a fragile system.

Music on a Long Thin Wire started as a performance piece but I

never knew what to tell the players to do. I played it with oscillators. You could change the pitch of the oscillators, and the sound would spectacularly change. But it was too spectacular. It was like playing a giant guitar. I had no language for it. Once you've made a change, then what do you do? Unless you have a musical language, it just doesn't make sense, so I thought it would be mysterious if it just played itself. You could create a system that would play itself. And this is what it's doing. I'm not touching a thing here. I recorded this in darkness up in the rotunda of the U.S. Custom House in New York. I was up there by myself. The wire was ninety feet long. Once I tuned it and raised the volume level I never touched it. I was listening to all of those changes. And I didn't think any thing was really happening. It's not that too much is happening, except overtones come out and you can hear them. There seem to be chords trying to come out. All of sudden this silvery chord appears. I swear to you I never touched it. I recorded four twenty-minute versions for a double long-playing recording. Each side has a different tuning. I made the tunings by ear. I don't remember what pitches I used.

Radial Arcs

British physicist William Duddell was one of the first inventors of electronic music. Quite by accident. In 1899 he was working on a project to try to mitigate the constant sizzling noise made by arc lights, caused by constant sparking between two carbon electrodes. He was unable to eliminate the sound, but he learned that by controlling the electric current of the high-voltage oscillator that caused the sparking, he could vary the tones generated by the sparks. He wired the arc lights to a keyboard, inventing what may have been the first electronic (keyboard) musical instrument. He called these phenomena "singing arcs."

Ron Kuivila's *Radial Arcs*, exhibited as part of the 1988 *Ars Electronica Festival*, Linz, consisted of ninety-six coordinated singing

arcs distributed throughout the exhibition space. They were driven by a computer-controlled high voltage oscillator. Wires were extended in radial patterns mirroring the architecture of the Brucknerhaus where it was presented. A bridge was constructed so that the viewer/listener could walk through these lightning fields with relative safety even though 12,000 volts of electricity were shooting around them. Kuivila reduced the size of the work so as to lessen any feeling of violence—the spark gap as bug zapper. However, the fact that the work was constructed using stun gun transformers nonetheless gave it a sinister feeling.

In an earlier installation, *Parallel Lines* (1985), pairs of wires were extended around the room, placed close enough together so sparks, leaping from one wire to another, were generated at various points along their lengths producing hundreds of miniature lightning storms. Spark gaps, defined as spaces between two electrodes across which a discharge of electricity may take place, produce sounds that flows in all directions at once, giving them a mysterious presence.

Perfect Lives

Sometime around 1970 or so, the Sonic Arts Union was performing at Antioch College in Yellow Springs, Ohio. After the concert, Bob and I went out for a drink. Since Yellow Springs was dry, we had to drive to Xenia (coincidentally, the name of John Cage's first wife), Ohio. We drove through cornfields. You know how straight those roads are. Pretty soon we came upon a roadhouse. We went in and the first thing we saw was a huge electric organ. It was just sitting there idle. I think it was a Wurlitzer. There was a row of men and women sitting up at the bar talking to each other very seriously. It seemed to me that none of the couples was married because they were having such interesting conversations. They were having fun, smoking and drinking. We sat down and Bob started talking about Jimmy Smith, the jazz organist, and the legendary pianist Bud Powell. After awhile we went into Xenia to get something to eat. When we stopped at the same roadhouse on our way back, the scene was exactly the same. Here were these lives going on and on. It felt timeless.

Since the early Eighties, Robert Ashley has made a series of operas to be shown on television. The first one he made was called *Perfect Lives* (1978–1980), subtitled *Private Parts*. The work consists of seven episodes. Each one is twenty-five minutes and so many seconds, the length of time of a half-hour TV program, including announcements. I would be hard put to explain what the opera is about, except that the Mid-Western American landscape plays an important role. The locales for each scene — *The Bank*, *The Bar*, *The Church*, *The Backyard*, *The Living Room* — are places that people go practically every day. There's no reason you couldn't write an opera about them. The action doesn't take place in a palace or on a battlefield. *Perfect Lives* is about everyday American life.

When landscape is the idea you don't have to worry about the story. You don't have to worry about a narrative because a land-

scape exists by itself and says so much. Shifting visual images. A landscape has no intended story. In writing about this work in an essay called "And So It Goes Depending" Bob says, "I was only typing what I had rehearsed again and again in speech . . . I discovered that I could sort out in the piles of typed paragraphs, those that had come from different rhythmic sources, and by that I mean paragraphs of repetitions of certain simple phrases and a variety of different word combinations. Some of which made sense, and others not so much." Robert Rauschenberg told me once that as a child he had difficulty reading and writing. He would look at a page and see only the patterns of all the A's, for example. If you read a page of text and you see visual patterns instead of meanings on the page, then you must be dyslexic. We think of it as a sort of sickness. Ashley finds rhymes as he's reading prose.

Elsewhere Bob says he has lost his taste for mechanical amplification, including the piano whose sounds are amplified by a soundboard. He says his taste is to want every sound to be electronically amplified:

> I've lost my taste for the tempo of mechanical life. In it's representation in, say, vocal projection. I like sounds that formally were too soft or too short or too quick. In any tradition, those sounds to the degree that they are recognized are called nuance. They are recognized as attachments to the main form. Wonderful violinists have a sense of nuance, or the nuances are the smaller details or the small inflections on something. They do the smallest possible things that one can to make a string sound wonderfully. Now we are all in blizzard of nuance, so dense that the main form is lost.

Perhaps Bob means that we concentrate on everything that's incidental, that's not really essential. That's something to think about. He also goes so far as to state, "I think on New Years Eve, I'll

sit like many other people in the world and watch it on television. And not go out in the world, but watch the world on television."

He also talks about how essential collaboration is. For example, the piano playing in *Perfect Lives* is by Blue "Gene" Tyranny (the tyranny of one's genes). There was a beautiful Hollywood actress in the Forties named Gene Tierney (*Leave Her to Heaven, 1945*). Imagine writing an opera and leaving the music up to someone else! What an extreme idea! Bob worked for years with the ONCE Group in Ann Arbor, Michigan. He was sort of the father figure and even if he didn't generate all the ideas, nobody would have gotten them if he hadn't been there. Everyone wanted to think creatively when in his presence.

Dust

Robert Ashley has composed over twenty-six operas over a span of thirty years. He originally planned them as operas for television but so far only one has actually appeared on television. They are so different that TV producers won't touch them. But no matter, really, because they sound wonderful simply presented in concert as oratorios. Webster's Dictionary defines an oratorio as a lengthy choral work usually of a religious nature consisting chiefly of recitatives, arias, and choruses without action or scenery. This might describe Ashley's operas but without the religiosity. In *Celestial Excursions*, for example, the performers simply sit at tables facing the audience. In *Dust* they stand behind opaque plasma screens. And in *The Making of Concrete* they step out in front of a table to tell their stories reading from what look like oversize playing cards. The simplicity of these presentations makes it easy for the viewer to listen to the music without the distraction of histrionics.

Virtually all Bob's operas have employed the same five performers: singers Jackie Humbert, Joan La Barbara, Sam Ashley, Tom Buckner, and sound engineer Tom Hamilton. They remind me of the Duke Ellington Band that included among others Harry

Carney, Barney Bigard, and Johnny Hodges, who made Ellington's sound so strange and beautiful.

Opera as we know it has traditionally consisted chiefly of recitatives, arias, choruses, and orchestral interludes. *Grove's Dictionary of Music* defines recitative as "a type of vocal writing, normally for a single voice, which follows closely the natural rhythm and accentuation of speech, without necessarily being governed by a regular tempo or organized in a specific form." The *Harvard Dictionary of Music* says, "Recitative is a vocal style designed to imitate and emphasize the natural inflections of human speech."

Recitative has been present in opera since Monteverdi's great *Orfeo* of 1607. Then it went into decline. In Gluck's *Orfeo ed Eurydice* of 1762 it became conventional, simply moving the action forward between arias. Gluck did, however, perfect the aria form, creating utterly simple although asymmetrical song-like pieces. Stravinsky, in his *Rake's Progress* of 1954 resurrected the dry (sec) recitative with solo harpsichord cadential punctuations, a blatant reference to Mozart in whose operas recitatives are much like patter songs.

Arias are solos that exist out of time. Often they are still moments where the action stops and something musical happens, not in an active sense but how the singer feels at that moment. In Monteverdi's *Orfeo* (1607) there are no true arias, only places where arias would be appropriate. What propels the work along to an unparalleled degree are the recitatives. The words dominate the music, the melodic lines follow and are generated by the words. Ashley's vocal style, with its emphasis on speech, closely resembles Monteverdi's recitative style. In fact we could consider it an advance on Monteverdi.

In *Dust* the characters are homeless people who inhabit a small park outside Ashley's downtown New York loft. Each of them tells a story, sad and funny at the same time. In most of his operas the characters are ordinary folks, not celebrities as in many recent

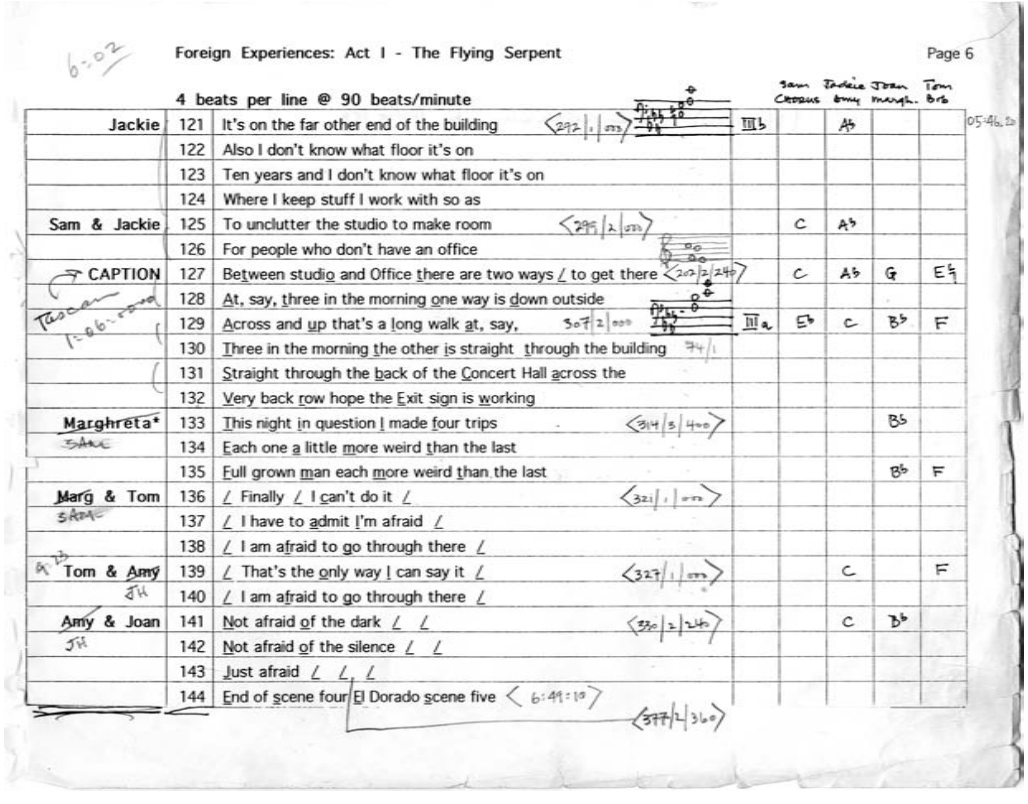
operas, for example, Einstein, Nixon, or Gandhi. Bob insists that everybody has a story worth telling. He said that, when he came to New York from California, he was fascinated by the ranting and raving of those disturbed people who roam the streets of New York. He said that he "studied" ranting as he walked the streets and learned a lot about speech singing from them.

Typically, Bob assigns the singers specific pitches that they extract from given sounding material through headphones or stage monitor loudspeakers. In *Foreign Experiences*, for example, Jackie Humbert is asked to extract the note A-flat from a chord positioned down the right side of the score page. You can see what it looks like in the accompanying illustration.

This chord could be found in any dance band arrangement. However Bob lets the singers alter those pitches to bring out the stress and accents of the words. He discovered an elegant way of producing different vocal characters within a single voice. By giving the singer a high pitch, a certain vocal character is produced; a lower one produces a different character. He may have gotten the idea from Ray Charles, whom Bob greatly admired and who changed his vocal persona to wonderful effect.

The Making of Concrete

The Making of Concrete (2007) consists of intimate stories about four of Bob's close friends from his past. The stories are about illegal activities, including drug dealing and cheating at poker. One of the stories even relates Bob's efforts at the seduction of the girlfriend of one of his closest friends. It's sort of a *True Confessions*. Rather than notating pitches for the singers they take their pitches freely from a dense electronic sound accompaniment that surrounds them. This accompaniment consists of thousands of sound samples that Bob had designed and mixed and spatialized by Tom Hamilton. Hamilton calls himself an "invisible performer."



Foreign Experiences: Act I - The Flying Serpent

Page 6

4 beats per line @ 90 beats/minute

				Sam Cassaus	Jackie Army	Joan marga.	Tom Bris
Jackie	121	It's on the far other end of the building	III♭		A♭		
	122	Also I don't know what floor it's on					
	123	Ten years and I don't know what floor it's on					
	124	Where I keep stuff I work with so as					
Sam & Jackie	125	To unclutter the studio to make room		C	A♭		
	126	For people who don't have an office					
CAPTION	127	Between studio and Office there are two ways / to get there		C	A♭	G	E♭
	128	At, say, three in the morning one way is down outside					
	129	Across and up that's a long walk at, say,	III a	E♭	C	B♭	F
	130	Three in the morning the other is straight through the building					
	131	Straight through the back of the Concert Hall across the					
	132	Very back row hope the Exit sign is working					
Marghreta*	133	This night in question I made four trips				B♭	
SAME	134	Each one a little more weird than the last					
	135	Full grown man each more weird than the last				B♭	F
Marg & Tom	136	/ Finally / I can't do it /					
SAME	137	/ I have to admit I'm afraid /					
	138	/ I am afraid to go through there /					
Tom & Amy	139	/ That's the only way I can say it /			C		F
JH	140	/ I am afraid to go through there /					
Amy & Joan	141	Not afraid of the dark / /			C	B♭	
JH	142	Not afraid of the silence / /					
	143	Just afraid / / /					
	144	End of scene four El Dorado scene five					

Page 6 of Robert Ashley's Foreign Experiences, *1994.*
Used by permission of the composer.

Skin, Meat, Bone

In 1994 Anthony Braxton asked me to do a festival of my music at Wesleyan. I didn't want to do it. I thought it was too egotistic to do a festival of one's own work at one's own school. Anthony, who was Chair of the Music Department at the time, insisted. Someone suggested I simply do two concerts, one on a Friday night, another on Saturday, and that's it. I decided against it. I decided that it would be one week long and without the academic stuff—no panel discussions, no papers, just concerts and installations.

A few years before, I had flown into New York from Europe and immediately went to the Brooklyn Academy of Music to see *Black Rider* by Robert Wilson. I was jet lagged and almost fell asleep up in the balcony. I started dreaming about how much I would love to collaborate with Wilson on a theater work. That's like saying I want to be in a movie with Christopher Plummer. So when I began thinking about what to do I thought about collaborating with artists I admired. I asked Sol LeWitt to supply a wall drawing for the Zilhka Gallery and invited John Ashbery, whom I had met in Germany a couple of years before, to do a reading on the Poetry Series. I wrote to Bob Wilson, whom I had met a few times, but somebody told me he never reads his mail. He collects all of his faxes and has somebody read them to him. He can't be bothered, he's so busy. Finally, I called Ronald Vance, an old friend of mine from college who worked for Bob, and asked his advice. He told me to come to an installation Bob was mounting the following week in Soho. I showed up and Ronald introduced me to him. Bob said that he would love to make something for Wesleyan and that I should make plans to visit him at his summer workshop in Watermill, Long Island, the following summer. Every summer Bob develops pieces at Watermill. Students from all over the world come to work on theater productions. We arranged for me to come to Watermill in late August. In the meantime he told me to get in touch with Keith McDermott, an actor with whom he often worked.

I filled my car up in with materials, including a motor-driven door I could steer with a remote control model sailboat steering device. It would zigzag across the space slowly. As it did so, it would reflect and move across the space a high pitched sound wave beamed at it. I thought Bob would like that, it would give him something to see. I also brought a digital delay system that could recycle sounds in real time. I thought that actors could do a live version of *I Am Sitting in a Room* somewhere in the course of the work. I also brought a glass tube and a Bunsen burner. When a flame is inserted in the tube, it excites the tube at its resonant frequency, making a beautiful sound. I thought it would look beautiful on stage. Bob is a genius with props and objects on stage. In *Orlando*, a little gold box suddenly appears on the floor from nowhere. He collects props from all over the world. He has a collection of over a hundred chairs stored at Watermill, including a regal throne he designed for a production of *King Lear*. As we rehearsed Bob would ask for certain props as he went along: a certain fabric, a circular paper hat, a roll of paper towel, a three-pronged wooden rake. He was thinking geometrically, I think; the hat was a circle, the rake a trident, the paper towel a cylinder, and so on. Anyway, I showed Bob all my things.

The next morning he asked for seven apprentice actors. They came into his studio and sat on the floor. One by one he asked them to get up and begin slowly walking across the floor. He added actors one by one, asking them to maintain the body positions — hands on hips, arms folded etc. — they had when seated, and proceeded to choreograph them walking forward and back across the room in beautiful patterns. As I sat watching I asked Bob to stop for a moment while I tuned a pure wave oscillator to middle D, a tone all of them could hum. I instructed the actors to hum only when they were moving. Because the pitch of their humming could not exactly match the oscillator tone, audible beating — bumps of sound as the waves collide — could be clearly heard.

During another scene I noticed an actor walking slowly across the back of the stage and asked Bob if we could stop while I got a snare drum for the actor to carry with him. The drum would resonate only when it moved through crests of oscillator-generated sound waves flowing from a pair of loudspeakers. I would interrupt Bob as I got ideas and without hesitation he would stop his work to let this happen. He never suggested changes. Everything I proposed flowed smoothly into the piece. Bob outlined nine scenes: three portraits (close-ups); three still lives (medium shots); three landscapes (long shots). The form was ABC, ABC, ABC. Bob choreographed a scene a day for nine days. I supplied sound for each scene. What a thrill.

The actors wore white tee shirts with no pockets, pressed tan khaki pants and sneakers. No jewelry, watches or earrings. Keith McDermott had come to campus a few weeks earlier to audition the student actors. He had them walk across the stage taking two minutes to do so. He worked hard on their posture, telling them to imagine they could see behind them, to think of the space behind them. Some of these students had never been on the stage before, they just came in and auditioned. They looked like statues that stepped off the Parthenon frieze. Look at that lighting! Up in back there's a white scrim. Bob wanted a white scrim from ceiling to floor with not a single wrinkle in it.

Bob doesn't start with a libretto or text or plot. He is totally visual. As he talks with you he is constantly drawing on a piece of paper. His theater works are spectacles and could be wordless. Any text he uses is simply layered on or placed into the action in some way. The texts we used in this work are taken from *I Remember*, a book by Joe Brainard, that simply consists of short sentences that begin with the phrase "I remember." You finish the sentence with a memory, something simple and unpretentious. It has been used in teaching young children to get started writing. We let the students invent their own sentences. In one scene they

were recycled through the space as in *I Am Sitting in a Room*. Here are a couple of examples:

"I remember going to the park with my mother."
"I remember getting chewing gum stuck in my hair."
"I remember my brother putting his pants on backwards."

In one scene a couple of actors took turns waving around a video camera. They simply picked it up in one hand and swung it wherever their arms moved so the images are totally random. In another I put sounds of whispering through the delay system using shorter delays than in the *I Remember* section. Three of the actors wore lavaliere microphones, enough to pick up everybody's sounds. Bob had to persuade the actors not to look sad, just to whisper, that's all. There wasn't any reason to show emotion. In one scene he added a few giggles. I didn't particularly like the giggling, but it gives a mysterious quality to the work. In another scene the actors carried sticks that made beautiful sounds when they softly hit each other. In the second portrait I put closely tuned pure sound waves in citronella pails hoping that the audience could hear the sounds beating against one another. In another an actor washes his feet. Throughout the work various actors would do little mysterious activities like that. Bob sees the motions simply as visual, such as bringing a pail down on one's head. He doesn't intend it to mean anything in particular and yet there is meaning in it. Each audience member supplies meaning for him or herself. For one of the still lives I found three small resonant objects: a milk bottle, a conch shell, and a purple vase I picked up at a tag sale a couple of hours before the performance. Originally we were going to use a hollow ostrich egg but during rehearsal a stagehand dropped it and it shattered. The actors inserted miniature microphones in them. As they recited their *I Remember* sentences into the objects the resonances modulated the speech.

When Bob was constructing the last landscape at Watermill a sudden windstorm came up. He ran to the window and saw trees swaying and being blown by the wind. He asked a couple of assistants go outside and collect armfuls of dead and live limbs. Then he asked for a sheaf of wheat. In the final landscape first the actors bring the dead limbs in, then they run off and bring in the green ones, waving them as they do so. The trees have such a beautiful presence on stage. One actor runs in circles carrying the sheaf of wheat. The moving door appears in the last scene, too. It moves very slowly migrating across the stage beaming the high sound across the audience. It was controlled with a remote control device, by a student in the balcony.

Skin, Meat, Bone was presented at Wesleyan in 1994 with fourteen student actors. As Bob was sketching out the work, he said: "You know, I think of it as the skin, meat and bone of my work." When the time came to give the work a title, I sent him a fax suggesting *Skin, Meat, Bone*. He answered: "How about *Skin, Meat, Bone: The Wesleyan Project*"? I said okay.

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WORDS

Empty Words

When John Cage came to Wesleyan in the early Seventies, he carried with him the journals of Thoreau. He said he found wonderful things on every page, not to mention phrases concerned with sound. He said that Thoreau thought about sounds the way electronic musicians thought about them. Thoreau described the sounds of telegraph wires he heard for the first time. Concord, Massachusetts, 1851. Thoreau would hear the wires singing. They were Aeolian harps. Imagine hearing telegraph wires humming for the first time! Thoreau was excited about the sounds of nature and about the new sounds. Anyway, in *Empty Words* (1973–1978) Cage subjected the texts of Thoreau to chance operations on five levels: letters, syllables, words, phrases, and sentences. There were twenty-five combinations of these so he simply related the number sixty-four to the number twenty-five. He used the *I Ching* to choose pages and lines of the text as well as random combinations of the components listed above. Then he worked them together to make a text, which he would then recite in a half chant or dramatic sound-inflected style. It sounded like an ancient soothsayer or shaman chanting.

The text is in four parts. The first consists of combinations of letters, syllables, words, and phrases. The second part consists of letters, syllables, and words. The third, only letters and syllables, and by the fourth part, there is nothing left but individual letters and silences. For all-night performances, the windows would be opened at dawn to let in the outside sounds.

Cage performed part of *Empty Words* in Crowell Hall in the early Seventies. He came to this class and threw the *I Ching* to generate a score for altering the volume, balance, bass, and treble controls on an amplifier. At twenty-seven seconds, for example, the treble control is rotated to three o'clock, increasing the high frequencies. Then the bass is boosted. Simple manipulations such as these give the performance an electronic quality. The chance operations serve to interdict the syntax, destroy the meaning, and turn speech into music. Cage isn't making speech superhuman; he's not elevating the human voice the way you find in opera, making it grander and more serious than it really is. By simply rearranging everyday speech he makes it musical. He's showing how we are connected to the technological world, too.

In Sara, Mencken Christ and Beethoven
There Were Men and Women

What a beautiful title! Sara is writer Sara Powell Haardt, writer and spouse of H. L. Mencken, American journalist and critic. We all know who Christ is and, of course, Beethoven. This poem is by John Barton Wolgamot, an obscure figure who worked as manager of the Little Carnegie Cinema in New York. The poem, written in 1944, was discovered by poet and publisher (Burning Deck) Keith Waldrop as he was browsing through a used bookstore. He showed it to Bob Ashley who immediately took a liking to it, so much that he decided to make a large vocal work out of its text. It is a litany of famous people.

In Sara, Mencken (1972) consists of a hundred and twenty-eight stanzas, each one a single run-on sentence occupying its own page. Here is the first one:

> In its very truly great manners of Ludwig van Beethoven very heroically the very cruelly ancestral death of Sarah Powell Haardt had very ironically come amongst his very really grand men and

women to Rafael Sabatini, George Ade, Margaret Strom Jameson, Ford Madox Hueffer, Jean-Jacques Bernard, Louis Bromfield, Friedrich Wilhelm Nietzche, and Helen Brown Norden very titanically.

The stanzas are virtually of the same construction with the exception of four variables, including names and adverbs. Bob looked at this and saw that there were no stopping points or punctuation marks along the way to give the reader pause, except for commas separating the names. Realizing this he decided to read each stanza in one breath. He recorded all of them, then spliced out the spaces between them producing one entire uninterrupted reading. This gives the listener little or no time to breathe creating a somewhat uneasy feeling. Along with composer Paul DeMarinis, Bob devised seven configurations of Moog synthesizer modules, filters actually, that analyze seven components of his voice, including fundamental frequencies, plosive attacks, and harmonics. As the vocal sounds flow through the components they trigger electronic sounds creating a rich and varied tapestry of sound. Ashley's voice creates the accompaniment. The recording is about forty minutes long.

Americans love lists. The Lewis and Clark expedition went out West and listed all the flowers. In *In Sara, Mencken*, there is a litany of names. Fourteen of them — seven men and seven women — reappear often, numerous others are repeated several times and hundreds of others occur only once, creating a sort of hierarchy of names that suggests a certain form not readily discernable to the listener. Nonetheless, they acquire a kind of beautiful grandeur.

Automatic Writing

Automatic writing was a technique used by the surrealists to generate images that didn't come from their rational consciousness. You can see why John Cage was interested in the surrealists. I met Cage once a couple of years ago in Germany, before he

died. He had been sick and had gone to a German doctor, who ran a magnet over his body to make his diagnosis. And John said, "Oh, it was wonderful. He didn't have to use his intelligence!" Anyway, the idea is that there's intelligence that comes from various sources, in one case magnetism, and in another automatic writing. In the Forties, John Cage, Virgil Thomson, Lou Harrison, and others wrote pieces in which each one would write a section. They would agree on such things as meter and length but otherwise wouldn't know what the others were writing. They called it *Exquisite Corpse*, after a parlor game used by the surrealists in 1925.

In some of my composition classes, the first thing I do when I see that student composers are stuck for ideas is to suggest that they try automatic writing. I may give them thirty seconds to think about it, then write down what immediately comes to mind. It's a way to get unstuck when you can't work. It can give you beautiful and unexpected results.

In the Seventies many people were envious of my speech impediment—I stutter. (See the last sentence of "*I Am Sitting in a Room*.") People would come up to me and explain that although one couldn't tell from hearing them talk, in fact they stuttered. I never believed them and was amused by their desire to suffer the embarrassment that comes with stuttering. Anyway, Bob Ashley used to tell me that secretly he stuttered. I told him that I really didn't believe that he did. A few years later he came up with the notion that he had Tourette's Syndrome.

In the liner notes to the recording of *Automatic Writing* (1979), Bob states that he thinks he has a touch of Tourette's. It is an imaginative way of explaining involuntary speech, which is the basic sound source of the recording of *Automatic Writing*. These involuntary utterances, processed by a switching circuit designed by Paul DeMarinis, as well as intermittent whispers in French, some mysterious organ music, and ambient sounds as if heard through

the walls of an apartment next door, make up the sound material of the piece.

Recently mezzo soprano Priscilla Dunstan presented the idea that there are universal sound reflexes in babies from birth to three months old. For example, "Neh" means "I'm hungry"; "Owh" means "I'm sleepy." If she is correct (her theory is yet to be proven) then what we thought of as simply random grunts and gurgles may now be considered as involuntary signals common to all human infants. We could, I suppose, analyze Bob's utterances as having meaning, to him at least, if not to everyone. One could indicate anguish, sadness, regret.

In those days many people distrusted language or at least grammar. William Burroughs once said, "Language is a virus from outer space." N. O. Brown said somewhere that when he hears grammar he thinks of an army marching.

Love Is a Good Example

I remember touring with Bob Ashley in the Midwest. At parties after concerts we would often stand around listening to people speaking. If he listened attentively, he could hear the singsongy inflections in ordinary folks' speech. The more one listens to everyday speech the more it sounds like melody. Simple phrases such as "Are you going to the movies tonight?" "Well, I don't know, I guess so," are inherently musical. There are wonderful melodies in everyday speech. "Love is a good example" is a musical phrase by itself but it becomes more so because of the way Bob accentuates certain words and resonances.

There's a fine line between speech and song. When did human beings begin singing? Chant is simply sustaining a pitch, or two or three pitches, and reciting a text before it gets more florid and melismatic (several notes sung on one syllable). *Love Is a Good Example* (1987) is an unaccompanied vocal solo that exhibits a very different way of thinking about words, song, and speech. I find

myself having a problem figuring out where it lies. What name do I give it? Do I call it music? Do I call it song? Do I call it some sort of exaggerated speech? Then I think what a ridiculous task I've put on myself that I've got to give it a label. The more I listen to it the more it sounds like music. Its form even resembles a rondo; the refrain, "Love, sure, is a good example," comes back and back again—twenty-six times, in fact. Think of refrains in poetry and music. But each time the word "sure" is repeated Bob says it in a different way to give it a different meaning. It may sound optimistic or sarcastic depending on how Bob enunciates it.

The words are in columns, and he indicates a metronome marking of 72 beats per minute. Each grouping is in a three-beat rhythm and follows it more or less accurately. The "sti" in the word "statistics" is a grace note.

She Was a Visitor

She Was a Visitor by Bob Ashley is a choral work. The title refers to a young woman we knew who died by her own hand. John Cage has a story about a suicide. A young child kills himself. A Buddhist monk was asked, "Why would he do such a thing?" The monk answered that perhaps he was correcting an error. I don't know what I think about that story. "She was a visitor" is a more beautiful way of saying it.

Throughout the course of the piece a speaker repeats the phrase, "She was a visitor." Bob notates the phrase in $\frac{3}{4}$ time. "She was a" and "visitor" are notated in triplets. Triplets are when you squash three notes into the time it takes for two notes to sound. Bob embeds two sets of three in a rhythmic pattern of three. The chorus is split into any number of groups each having a leader. From time to time the leaders choose a phoneme as the main speaker is pronouncing it. Say you decide on "sh" from "she." You wait for the speaker to utter "sh" from the word "She," then you sustain the sound for one breath. As you do so the rest of the group picks

up that phoneme — they don't know in advance what it is going to be — and sustain it for one breath also. Because reaction times vary the sounds spread out through the groups. It's a way of taking apart an English phrase and isolating the phonemes in it, making choral music. There's no "s" sound in the piece. There's only "sh," "ih," "oo," "ah," "zz," "uh," "v," "ih," "zz," "ih," "t," and "er." It isn't pronounced "visit-or." Bob is from the Midwest. He pronounces it "visiter."

Different Trains

The title *Different Trains* (1988) refers to the trains that took Jewish people to Auschwitz and other death camps during World War II versus the trains that, as a young boy, Steve Reich used to take from New York to Los Angeles, to visit one of his divorced parents. To depict the rhythm of the wheels of the trains he used the *paradiddle*, a basic drum pattern that all drummers practice to acquire right and left hand equality. The alternation of the right and left hands follows this pattern: RLRRLRLL. Try playing this yourself and see how difficult it is to keep both hands rhythmically even. For melodic material Steve recorded various voices, including a retired Pullman porter crying out departure times for these fast trains, for example, "New York to Chicago" and "Chicago to Los Angeles," in addition to fragments of interviews with Holocaust survivors. He listened carefully to the inflections of these recordings, then wrote them down in musical notation for the string players. During a performance you can hear the recorded voices as well as their instrumental counterparts.

Throughout the piece you hear the wailing of train whistles, too. When Steve came to Wesleyan in the late Eighties for a performance of his *Octet*, he showed a group of graduate composers how, by routing the sounds through a Casio sampler and using the keyboard, he could change the pitch of any train whistle to fit the harmony of the string music. Even though the piece was writ-

ten for the four players of the Kronos Quartet, Steve instructs the players to overdub parts of the music three times forming a sixteen-voice texture.

This is not the first time that everyday speech has been used in music. The Czech composer Leoš Janáček (1854–1928) used to jot down in a notebook fragments of speech he overheard on the streets of his hometown, Brno. He was interested in the pitch curves and rhythms, paying attention to the moods of the speakers. He would then notate them and use them as material for his operas.