

Music at MIT Oral History Project

Leo Beranek

Interviewed

by

Forrest Larson

September 30, 2008

Interview no. 1

**Massachusetts Institute of Technology
Lewis Music Library**

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Contributors

Leo Beranek (b.1914) was MIT Associate Professor of Communications Engineering 1947-1958, a founding partner of Bolt, Beranek and Newman, Inc., and is an internationally respected authority on concert hall acoustics. He worked on the original acoustical design of MIT's Kresge Auditorium in 1955, and has consulted on concert halls and opera houses throughout the world. He was a founding member of the Council for the Arts at MIT. His musical background includes work as a dance band drummer in the late 1930s and as an orchestral timpanist in the 1940s.

Forrest Larson, Library Assistant at the Lewis Music Library, has received training in oral history methodology and practice at Simmons College as well as through the Society of American Archivists. He is a member of the Oral History Association. Forrest is also an active composer and violist.

Interview conducted by Forrest Larson on September 30, 2008 in the MIT Lewis Music Library. Duration of the audio recording is 1:06:24. First of two interviews. Second interview: October 9, 2008.

Music at MIT Oral History Project

The Lewis Music Library's Music at MIT Oral History Project was established in 1999 to document the history of music at MIT. For over 100 years, music has been a vibrant part of the culture at the Massachusetts Institute of Technology. This history covers a wide variety of genres, including orchestral, chamber, and choral musical groups, as well as jazz, musical theater, popular and world music. Establishment of a formal music program in 1947 met the growing needs for professional leadership in many of the performing groups. Shortly thereafter, an academic course curriculum within the Division of Humanities was created. Over the years, the music faculty and alumni have included many distinguished performers, composers and scholars.

Through in-depth recorded audio interviews with current and retired MIT music faculty, staff, former students, and visiting artists, the Music at MIT Oral History Project is preserving this valuable legacy for the historical record. These individuals provide a wealth of information about MIT. Furthermore, their professional lives and activities are often historically important to the world at large. Audio recordings of all interviews are available in the MIT Lewis Music Library.

1. Early life and family (00:17)

FORREST LARSON: It's my honor and privilege to welcome Leo Beranek for an interview. It's September 30th, 2008. We're in the MIT Lewis Music Library. Leo was Associate Professor of Communications Engineering at MIT from 1947 to 1958, and continued as Lecturer from 1958 to 1981. He was also founding member, founding partner of Bolt, Beranek and Newman, Incorporated, 1948 to 1983, and he has been an internationally respected acoustical design consultant. Thank you very much for coming. This is a delight to have you.

LEO BERANEK: I'm very pleased to be here, and I hope I can answer your questions.

FL: Oh, I think you're going to do wonderful. All right, some basic biographical information. Can you tell me what year you were born, and where?

LB: I was born in 1914, actually, in September, and I was born in a small town in Iowa called Solon, S-O-L-O-N, a town with a population of, at that time, of maybe five hundred people. And, but, I was born in the town, and my father had been operating, with his, his father, a livery stable, which meant they were running a taxi business with horses. And then the Model T [automobile] came in, and that business went under. So my father had to go back to farming on the basic Beranek farm that was a homestead farm, and is so designated.

FL: And your father's name was Edward, is that correct?

LB: Edward.

FL: Yeah. Tell me a little bit about your mother, at the time?

LB: Well, my mother was born of German parents. They were born in this country, but they, too, came over, just as the Czechoslovakian parents on my father's side, came over just about 1850. And so the two families had been here since 1850. The German family with my mother's side, my grandfather was a builder. He assembled groups that put up buildings, and he was quite good at this. And my mother then went to Iowa State Teachers College, and learned to handle, at least, elementary school teaching. And before she was married, she did teach in elementary school for a few years. Then after she got married, she stopped that.

FL: And your mother's name was Beatrice?

LB: Beatrice, right.

FL: Yeah. And then, you had a step-mother named Frances, is that correct?

LB: Frances, right. Well, my mother died when I was eleven, and then within a year or so later my father married Frances.

FL: Mm-hm. Tell me a little bit about Frances?

LB: Well, I don't know much about her anymore. She was born of Czechoslovakian—Czech, I should say, use the word—Czech parents, and she had lived in Cedar Rapids, Iowa. And that's about all I know about her. I never really looked up her past.

FL: Okay, okay. And then you had one sibling, a brother named Lyle?

LB: That's right. And he was born seven years after me, and was therefore four years old when my mother died; I was eleven.

FL: So, is Lyle still with us?

LB: No, Lyle deceased about three, four years ago.

FL: Oh, I'm sorry. Tell me a little bit about Lyle—what his profession was?

LB: Well, Lyle stayed on the farm. He decided to be a farmer, and course, Iowa land—very rich. And he had a good farm, and ran a big dairy, and had help on the farm. He employed people to help him. And they both raised animals like hogs and cattle, and they also sold corn, and they sold milk.

FL: Fantastic. I come from a family of—my father's side came from Iowa farms, too, and so I know all about that! [laughs] And tell me about your wife, Phyllis.

LB: Right. Well, Phyllis was born and raised in Boston. She went to the Boston Public Schools, and then went to Forsyth [The Forsyth Institute, Boston, Massachusetts], to be a dental hygienist. And she was very good at languages; she enjoyed literature. Of course, as a dental hygienist, she did not get a real full college education. I got acquainted with her when I had my teeth fixed, [laughs] found that she was a very bright and alert person, and we made friends with each other.

FL: Fantastic. And then, your second wife, Gabriella?

LB: Gabriella.

FL: Yeah.

LB: Well, my wife died in 1982, I think, and then for three years I was, of course, single, and lived in Winchester [Massachusetts], still, in our house. And my wife and I had been very close friends to a couple named Donald and Gabriella Sohn, S-O-H-N. And he was President of the Heritage Travel Agency in town, which at that time was a principal travel agency. And then she decided, apparently, to get a divorce from him, and I heard about this. And since we'd been very close friends, the two couples, then I looked her up, and that's how this ended up in the marriage.

FL: [laughs]

2. Early musical experiences (06:39)

FL: So, going back to your childhood, your first musical experiences, did you take piano lessons like many young people did?

LB: Well, I started to take piano lessons, but I seemed to have so much more to do otherwise, in school and so on, that I didn't get very interested in it. I found that, I found it took a lot of work; it took time. My mother played quite well, and she was very disappointed that I didn't become more proficient. Of course, I learned to read music and play simple things, but nothing that she would say was piano playing. [laughs]

FL: Wow, you said your mother played quite well. Do you remember what kind of music she played, any pieces?

LB: Well, she played standard sort of piano music. I don't remember any details, because I never really was that interested in the piano. But she would sit down and play things, [Franz] Liszt and that kind of thing, that were standard piano fare.

FL: Did she play any ragtime as well, do you remember?

LB: I don't think so. I think it was all more concert pianist type of thing.

FL: Mm-hm. Could she also improvise?

LB: No.

FL: No.

LB: I never heard that.

FL: Uh-huh, yeah. So, you also sang in the church choir, right?

LB: That's right. Well, my mother was director of the church choir. It was a Catholic Church. And I sort of went to two churches, I think I told in my autobiography [Leo Beranek, *Riding the Waves, A Life in Sound, Science, and Industry* (Cambridge, Ma.: MIT Press, 2008) where my grandmother and my mother were Catholics, and my grandfather and his sons—three of them—were all Protestants. The result was that we went to the Protestant Church and the Catholic Church, both. And I used to sing in the Catholic Church choir on Sundays, and we would go to the Methodist Episcopal Church for sermons on Sunday evening! [laughs]

FL: [laughs] What voice part did you sing in the choir?

LB: Oh, I don't know. I was under eleven, so I suppose—I don't know what I was singing!

FL: Oh you probably sang one of the higher parts. Did you sing in the choir after your voice broke?

LB: Not really. I tried a little bit in Cornell [College, Iowa], but I never really had time. I went one time with a choral group and sang a little. I was singing sort of bass, although not a very good bass, and I didn't keep at it. My voice is not very good. It was not very good then, so that was one reason also I didn't get interested.

FL: Uh-huh. Do you remember what kind of music the choir sang? Was there any pieces you remember?

LB: Not particularly, they were out of the standard hymnal.

FL: Yeah. Were there any things with any kind of classical type pieces, [Felix] Mendelssohn or [Johannes] Brahms, or anything like that? Or were they more just, you know—do you remember?

LB: No, all I remember is singing out of the hymnal.

FL: Okay, yeah, so it might have been mostly just singing the hymns?

LB: Right.

FL: Yeah. Were there any particular moments in singing in the church choir that you remember fondly, any experiences with that?

LB: Well, I remember one time she had me sing a solo in the church, and this received criticism, because some other people said their children sang better than I did, and she put me in there because I was her son. And so there was some little bit of annoyance among her friends about this.

FL: Uh-huh. [laughs] Do you remember what song that was that you sang?

LB: No, I don't remember.

FL: Yeah. Did your father play or sing?

LB: No, none.

FL: No, no. Did your family go to concerts?

LB: Well, there were really no concerts in my family. This was Solon, Iowa, and my father went to Mount Vernon [Iowa]. And he never was interested in music, so I did not really go to concerts until I went to Cornell College.

FL: Okay. Did you listen to phonograph records?

LB: No, let's see. We didn't have a phonograph. What we did have was a radio. In those days radio was very simple, and my father bought a one tube Crosley set in 19—I think it was 1924. And I was very interested in this as a mechanical device. I tried to learn how it went. The only thing I can really remember was that I listened many nights to a pianist from the state prison in Jefferson City, Missouri.

FL: Yeah, Harry Snodgrass?

LB: Harry Snodgrass.

FL: Yeah.

LB: And he was called "King of the Ivories" on the air. And he was very fascinating because he talked about his music, and then played it. And he had a very large audience. And he was in the state prison.

FL: Right.

LB: And eventually they pardoned him, and when they pardoned him he didn't play anymore

FL: Right. That was amazing. His career went down right after he left prison. I heard, on the Web there are some web clips of his playing.

LB: Really?

FL: He was an amazing pianist!

LB: Well, it sounded good to me!

FL: Yeah, I was quite impressed. He was in imprisoned for armed robbery.

LB: That's what I heard.

FL: Yeah, yeah. I guess after he was pardoned, he kept to the straight and narrow.

3. Musical experiences during teenage years (12:43)

- FL: So, in your memoir you said that the Solon school band leader urged you to play an instrument, and you chose to play drum. How did that come about?
- LB: Well, actually, the conductor of the band was also the fellow who did most of the teaching. And this was Solon, Iowa, a small town, of course. And he wanted to have a band in our high school, in our school there, which turned out to be a high school band. And he needed some instruments, so he tried to talk me into playing a bass horn. And I did take a bass horn back—now this was already after my mother had died, and we had moved, my father and other son and I had moved into my grandmother's home. And I brought this bass horn home.
- FL: Was it a tuba?
- LB: Yeah, a tuba, yeah. The tuba. And she didn't like this at all! So I gave up on the tuba quick. Then the band guy gave me a trombone. And I wasn't particularly interested in the trombone, and so he then said, "Well, why don't you learn drums?" And so that's what I took up. And he encouraged me to get a marching drum, which was a drum that was about, I would say, fourteen inches in diameter, and it had a depth to it of about fourteen inches. And you would march with it bouncing on your knee. And I think my father had to buy that. I don't know where he got it, except there was musical stores in Cedar Rapids, Iowa, which was about fifteen miles away from Solon. And I think he went to Cedar Rapids to buy this drum.
- FL: And the school band director—do you remember his name?
- LB: I don't. I just don't.
- FL: Yeah. And you took lessons with him, right?
- LB: That's right.
- FL: Yeah.
- LB: And he got a book—I had a book of how to play a drum! [laughs] An instructional book, and also I had a rubber pad on a slanting board, and I could play on the rubber pad without disturbing my grandmother. [laughs]
- FL: Right, right.
- LB: And if I wanted to play the drum I had to go over on the school grounds, which was nearby, and march around out there, making noise!
- FL: What was it like, learning all the rudiments, you know, the basic patterns?
- LB: It seemed that I understood. Of course, I knew how to read music.
- FL: Yeah.
- LB: And I understood measures and beats and so on. And so I could read this drum music, and put the rhythm to it properly.
- FL: Mm-hm, great. And then—
- LB: And I also had a metronome.

FL: Oh! [laughs]

LB: So I could keep my time straight.

FL: Yeah, great! And when did you get a drum set?

LB: Well, I don't remember exactly, but it was about the time I was beginning to be a freshman in high school, and I spent my freshman year still in Solon, Iowa. And my father knew a fellow in Solon who had been a drummer, a dance band drummer. And apparently he knew I was playing drums in the band, and he asked my father if he didn't think I should have a set of trap drums, and my father bought them. And so, and that was sort of done without even consulting me—he just up and bought them!

FL: [laughs]

LB: And then I had to learn those. And so, I then—then I did some listening on the radio. We didn't play many phonograph records, I must say, in Solon, I was mainly interested in radio, and I would listen to bands play in radio. And of course, [John Philip] Sousa's band was very prominent in those days, and it was one that I would try and catch whenever I heard it they were playing on radio. As I remember, the United States Army—Sousa was the United States Army Band. I think they played regularly on the radio, and I'd listen. [Editor's note: Sousa was the conductor of the United States Marine Band until 1892, after which time he led his own band.]

FL: Mm-hm.

LB: And that helped me in the marching band. And then the jazz band I could get from listening to the orchestras.

FL: The dance orchestras?

LB: The dance orchestras.

FL: Yeah, right. How often did you get a chance to hear them?

LB: Say that again?

FL: How often did you get a chance to hear dance orchestras?

LB: Well, I would say on radio this was fairly easy. I can't give you any schedule of listening.

FL: Yeah, right.

LB: Just did it.

FL: But it was fairly common there?

LB: Right.

FL: Were there any particular dance orchestras that caught your ear, that you were interested in?

LB: Well of course, I listened to the big bands, too, which were the thing of that time. And, I don't know, the Dorsey brothers [Tommy & Jimmy], I was always interested in their drumming. And then Cab Calloway had a pretty vigorous drummer, as I remember, that I listened to.

FL: Mm-hm.

LB: Now, I never got to be a spectacular drummer. I didn't try to jazz people with great things. I played, really, basic drums that put a solid foundation in a dance band.

FL: Mm-hm. Can you talk a bit more about what you saw your role as—as you said, you weren't trying to be flashy, but just trying to provide a solid background. Did you do, like, fills between choruses, and stuff like that, sometimes?

LB: Well, sometimes. It was not as flashy as [laughs] the great drummers.

FL: Yeah.

LB: I was not a Gene Krupa.

FL: Yeah.

LB: I was interested in what they did, but I just didn't try to be that flashy. But I say, I did put a good basic beat for the dance band, and did play cymbals and blocks and tom-toms and this kind of thing, when it seemed appropriate.

FL: Right.

LB: But not big, flashy stuff.

FL: Mm-hm. It seemed like an innovative thing that Jo Jones [drummer for the Count Basie Orchestra] had done was using more of the high-hat to provide some rhythmic impulse, and less on the bass drum, which had been more traditional. Did you ever remember hearing about his innovations there?

LB: No, not really.

FL: Not really.

LB: I stuck to the bass drum as the foundation.

FL: Mm-hm. So you played with a group called Polly and his Parrots?

LB: [laughs]

FL: That was led by a saxophonist named Wilbur Powers. Tell me about how you joined that group?

LB: Well, I was, of course—I was now, I should say that at the end of my freshman year, my father—then was when he married Frances—and we moved to Mount Vernon [Iowa], and Mount Vernon, now, was a town now of about three thousand. And it was also the town where Cornell College was in. And incidentally, Cornell College is twelve years older than Cornell [University] Ithaca [New York], and it's a liberal arts school with about a thousand students today, and it was roughly that number then. And so he moved to Mount Vernon and joined with a first cousin of his to open a hardware store, which was called Beranek Hardware.

And so, we'd moved to Mount Vernon, then, at the beginning, or the summer between my freshman and sophomore year, and then I started going to Mount Vernon High School. And then they asked me to play in the high school band in Mount Vernon, or I looked them up and volunteered. Anyhow, they took me to be a drummer in the high school band. And I think there were only two or three of us that

played the drums in the band. And Polly [Wilbur Powers], the saxophone player, I don't know, really, what experience he had as a, prior to my getting to know him, but he was a good saxophone player. And he apparently heard me in the high school band, and then looked me up, and decided they were going to form Polly and his Parrots.

So he put together a group of local people. I remember the bass horn [tuba] player was named Klimo or Klima [correct name: Jake Klimo], and he was a very proper, local man. He was sort of the stationmaster for the Northwestern Railroad that went through Mount Vernon. The Union Pacific Railway went through Mount Vernon. And he—that was the bass horn player. Then we had—I forget now; it's in my autobiography. We had a trumpet player [Bob. Last name unknown], a piano player [Hildred. Last name unknown], and of course, I was drums. And then there was another—what else was it? It was a banjo [Frank. Last name unknown], I think we had.

FL: Oh, uh-huh!

LB: And this group was kind of a crazy group. [laughs] I'd have to almost look it up in my autobiography to get them right; I don't remember their names too well now, except I had kept a record in my diary, and when I wrote down the biography I wrote them down. But the piano player was a young woman, and she kind of stayed away from all the rough talk that went on. But one of the players always was telling stories about his escapades with married women in Mount Vernon. And Polly was also known for chasing young women around. And the bass horn player was very dignified, and I was too busy to be interested in chasing women then, so I didn't get involved in those stories.

FL: Do you remember what kinds of tunes the band played?

LB: Oh, boy. I don't remember things by names.

FL: Were they popular songs, or was it actual kind of big band, kind of—?

LB: It was big band pieces we were playing.

FL: Yeah, mm-hm.

LB: And Polly would pick those. And I usually did not have any music.

FL: Like most drummers, yeah.

LB: Yeah, he would get the pieces, and we'd rehearse, and I'd try and fit in my, what little specialty I did, besides just basic playing, in with what I heard. And he would encourage me when he thought it sounded right.

FL: Mm-hm.

4. Music in college (23:47)

FL: So, you attended Cornell College in Mount Vernon, Iowa, 1931 to 1936. You graduated with a B.A. degree in mathematics and physics? Is that right?

LB: That's correct.

FL: Yeah. You told me you played in the college orchestra. Is that where you started playing timpani?

LB: Yes. First I played just drums, general percussion, in the orchestra. They had a timpani player already. And then the timpani player was going to graduate, and so that would leave them without a timpani player, probably when I was a junior. I can't quite remember which year that transition took place. But I say, first in the orchestra I played general percussion. That could be a bass drum sometimes, and sometimes cymbals, and sometimes snare drum—whatever the music called for.

FL: Did you ever play xylophone or marimba?

LB: Yes, I did.

FL: Oh, you did?

LB: I played the xylophone. We didn't have a marimba, but the band did have a xylophone, which I played. And I wasn't terribly brilliant on that, but I could get the pieces right. And so that was also part of my percussion that went in the orchestra. Then the timpani player was going to graduate, and I think I was going to be a junior. And so the conductor said, "Well, look, you better learn to play the timpani. I don't have any other person. I don't see any other person in Cornell that's available to play timpani."

And so I then—then I should say that the Chicago Symphony came to Mount Vernon, Iowa, every spring, and played one weekend of concerts there. This was in May, and we had the May Music Festival [at Cornell College]. So the Chicago Symphony Orchestra came, and in the orchestra, of course, was their timpani player, whose name was Metzenger, Edward Metzenger.

FL: Right.

LB: And so I—since I had to play timpani, I'd better get acquainted with these drummers! So I took them out to a meal, even though I was in college, and we had a local restaurant there. And they listened to me. And I said to Metzenger, "I'd like to have you teach me to play the timpani." "Well," he said, "Why don't you come to Chicago, and I'll give you lessons?" Well, this wasn't too bad, because you had these very fast, fine, streamliners in those days, high speed. And you could leave Mount Vernon on an early train in the morning, and I could get my lesson with him, and come back on a late afternoon train, and I didn't have to stay in any hotels. It was mainly a matter of getting—the railway fare for students was fairly cheap, and it was one day only.

And so I took lessons from him, I would say, about every two months. It wasn't very often. Maybe at first every month for a little bit, and then I did every two months after that. And he taught me pretty much how to be a good timpani player.

FL: Mm-hm. Besides learning specific things, technical things about the timpani, did he teach you any other larger kind of musical issues, and just kind of being a musician? Were there other things you learned from him about that?

LB: I don't know what that would include, because he would bring up different timpani parts from the symphonies, and then show me how those were to be done, and tried to instruct me also in when to be loud, and when to be looking at the music, and how to judge my level of loudness compared to the rest of the orchestra—which is very important. The timpani cannot be too loud; if it's not loud enough, you're not there. So you've got to pretty well judge.

Another difficult thing for me was tuning. In those days, Cornell did not have a pedal timpani, although Metzenger did. And so I had to tune my six or so screws around the edge.

FL: [laughs]

LB: And I found this difficult—difficult, particularly, since you had to tune them all, when you had to—and that's while the orchestra's playing—and get the thing right. Now, I did not have absolute pitch, but what I tried to do was to induce in me an absolute pitch. So I had a little—what do you call it?

FL: Pitch pipe?

LB: Pitch pipe is the word I wanted—a little pitch pipe, and I carried it with me, and wherever it would seem convenient I would sound the thing. And then I would try and make that note before I would sound it, as time went on. And I found that I could get pretty close, now. I didn't have absolute pitch, but I could get sort of built in to me a pitch that matched this thing. And that meant, then, that in the orchestras I could sort of now start judging from my built in pitch what the score called for. But I had to tune these damn things!

FL: [laughs]

LB: And I found that very difficult. And of course, I never did have, at Cornell, a pedal timpani, which would have been wonderful.

FL: Wow!

LB: Where when you move it—you move all your things at once.

FL: Right. When you have the screws, you can't just—each screw has to be tuned.

LB: Right.

FL: Because otherwise the head is not in tune with itself.

LB: That's right. It's very particular.

FL: Yeah.

LB: And I got by. And in fact, I'll tell you a little anecdote. One of the bass players from the Chicago Symphony's home had been in Mount Vernon. So he came out to visit his parents, when I guess the orchestra wasn't playing in Chicago. And then he came to a concert by the local Cornell College orchestra, and of course, I was the timpani player. And he did compliment me on how I did in that particular performance!

[laughs]

FL: Do you remember what piece you did in that concert, what pieces?

LB: I don't know. I almost think it might have been the *Unfinished Symphony* [Franz Schubert, Symphony No. 8 in B minor]!

FL: Uh-huh.

LB: But I do, the only one I remember particularly that was something that was special that I did was [Antonín] Dvořák's *New World Symphony* [Symphony No. 9 in E Minor ("From the New World") Op. 95].

FL: Yeah.

LB: Later, when I—at Cornell, I took a year off [1941], and went to Cedar Rapids, Iowa, and worked for a company called the Collins Radio Company. And Cedar Rapids had a Cedar Rapids Symphony [Orchestra]. And for some reason, I got to playing kettle drums in the Cedar Rapids Symphony. I don't remember what happened, why. And then, they were having a celebration of Dvořák in Spillville, Iowa. [1941 was the 100th anniversary of Dvořák's birth] Now, it's often said that he wrote part of the *New World Symphony* in Spillville, so they had a festival in Spillville, and the Cedar Rapids Symphony came and played in that festival. [Dvořák spent summer of 1893 in Spillville] And we played the *New World Symphony*, and I remember in particular how that felt, being at a festival.

FL: Fantastic. How long did you play with the Cedar Rapids Symphony?

LB: Just one year, when I was in Cedar Rapids.

FL: Somewhere in my notes I had the name of the conductor that might have—now, where?

LB: Well, I don't have this in my memory.

FL: Yeah. Anyways, I find that in a second. You mentioned that the Chicago Symphony played at the spring festival at Cornell. Was that the first time you had heard a live symphony orchestra?

LB: That's true. I listened, always, on radio, and of course the loudspeakers at that time were pretty poor. Now, to tell you the big thrill I had, I was selling programs to sort of earn my way into the concert. And so I was outside selling programs, and just as the orchestra would start playing, I could push in through a door and sit down; they had a seat for me right near the door. And so the big thrill, the biggest thrill in music I've ever had, is going through that door, and hearing that great orchestra playing. And of course, they were playing some overture [unclear]. It was pretty peppy at the beginning, and it was just absolutely mind-boggling to hear the music this way! I'd never heard anything like it!

FL: That must have left, obviously, a lasting impression on you, because you're—

LB: Yeah. You see, our college symphony never sounded like the Chicago Symphony! [laughs]

FL: Mm-hm. Asking a bit more about the Cedar Rapids Symphony, the conductor could have been this gentleman, Joseph Kitchin?

LB: That sounds familiar.

FL: He was conductor from 1921 through 1952?

LB: Yeah, well that sounds like the name. I wouldn't have remembered it.

FL: Uh-huh. And it started out as an amateur orchestra, but became a professional group. And it was sometime in the early fifties that it became a professional group. When you were playing, was it still an amateur group, do you remember? Or were you paid?

LB: It was a mixture of union players—

FL: Okay, so it was a mixture by that point?

LB: A mixture, yeah.

FL: Yeah, okay.

LB: Of union players and non-union players.

FL: Mm-hm. Do you remember any particular pieces you played with them? So you played the Dvořák?

LB: Yeah.

FL: Was there some others that you remember?

LB: Well, I don't remember now.

FL: Yeah, yeah. Do you remember kind of how they played, how well they played? Was it a pretty decent group, did you—?

LB: It was better than the college symphony.

FL: Mm-hm.

LB: They were more skilled. And of course, they had their solo, their first desk players were probably pretty good. And I always felt that it was a great pleasure to be in that professional group. It seemed like a professional group to me.

FL: Yeah, right. You also mentioned at the 1933 Chicago World's Fair, you also heard the Chicago Symphony and the Detroit Symphony. So I guess you had heard the Chicago Symphony earlier at the Cornell Spring Festival, right? Anything you want to mention more about hearing the Chicago Symphony? And was Frederick Stock conducting?

LB: He was the conductor, and I did get a chance to talk with him. And he was a very warm fellow. He was a fellow who liked to connect with audiences. In fact, he often talked from the stage to his audiences. I remember, for example, one time they had one of these bell trees, and he turned around and spoke to the audience about the history of the bell tree [percussion instrument—set of small bells on a handle]. And then he says, "Well," he says, "Don't worry about the tone quality; it's kind of a jumble anyhow!" [laughs]

FL: [laughs]

LB: And so he did talk. And he would sometimes describe a piece that they were going to play, and point out what was different about it that the audience should listen for.

FL: Mm-hm. Were there any soloists with the Chicago Symphony at any of those concerts you went to, any concerto soloists?

LB: I'm trying to think. What's the matter with—I did get to know the concertmaster.

FL: Do you remember—?

LB: And the concertmaster left there, and became the concertmaster in the Detroit Symphony.

FL: Do you remember who that was, the name? [Mischa Mischakoff]

LB: Oh, gee, I should. It should come to me, but I don't—can't call it up at the minute. It was a good name. He was a very well-known. I think that he reached some retirement age in the Chicago orchestra, and then the Detroit orchestra kept him for a few more years.

FL: Uh-huh. Any comments about the Detroit Symphony? Because you heard them at the Chicago World's Fair?

LB: Well, as far as I was concerned, it was a first-class symphony. I thought that, in my listening to them at the fair, they sounded equally good.

FL: Mm-hm. And the Detroit Symphony conductor was Ossip Gabrilowitsch?

LB: It could have been.

FL: Yeah. But it sounds like those experiences left a lifelong impression on you?

LB: They did. They did.

FL: Yeah.

LB: Now, at the Chicago Fair, each orchestra played two one-hour concerts a day. And so there were four one-hour concerts available, and I was trying to get to one of those each day.

FL: Wow! In your memoir, you also mention at the Fair there were some dance bands that were playing.

LB: That's right, the big bands, mm-hm.

FL: Yeah. Do you remember who some of those groups were?

LB: Well, of course, I remember Cab Calloway. I remember the Dorseys, of course Wayne King. Let's see, what are some more names of that time?

FL: Count Basie, possibly?

LB: Count Basie I don't remember so much.

FL: Oh, or Benny Goodman?

LB: Benny Goodman, yes.

FL: Yeah, wow!

LB: And these big bands also came to Cedar Rapids, Iowa. They had a dance floor there, and it was regular that these big bands would tour the United States, and Cedar Rapids got them regularly, too.

FL: Fantastic.

5. Graduate school and early experiences in acoustics (38:43)

FL: So one of my reasons for asking about some of your musical background—it's just interesting in and of itself, but also I want to ask you: your work as an acoustician. There's a level of musical understanding that you have, that you gained the respect of conductors and musicians, and you understand the performance needs of world-class musicians, and how a hall can affect that. Can you talk about how you kind of got that musical knowledge and expertise, how you got to that level?

LB: Well, I think—let's see, I think, how to express this. First of all, when I came to graduate school [at Harvard University] in 1936, the first year I just studied. The second year I became an assistant to Professor Ted Hunt [Frederick V. Hunt], who was an acoustics man at Harvard. And I got my—eventually, he was my thesis professor also. But he had tickets regularly to the Boston Symphony, and those were in Symphony Hall. And he also had, they had a new baby. And so they wanted some baby sitter, and I was now his assistant, and so he'd have me come sit in his home with the baby while they went to the Symphony.

And then on, I don't know, once a month or so, he'd give me tickets to go to the Symphony, when they didn't go. Maybe it was twice a month; I don't remember. But I got in the Boston Symphony Hall quite often in that period, from 1937 to 1938 or '39. I guess, '37, '38, up until the summer of '39. Then after that, the orchestra played at Sanders Theater [at Harvard University]. They used to have what they called the Cambridge Series at Boston Symphony. And so I would go buy student rush seats to the concerts of the Boston Symphony. So I got to hear the Boston Symphony both in Symphony Hall and also in Sanders Theater.

And I began to get appreciation, and of course being a timpani player, I also paid attention to [laughs] what the percussion section was doing. And I feel that the start of my understanding of what the orchestra needed was listening to music in these two places. Oh, yes! And then, I can't say what year I first went out to Tanglewood [Boston Symphony summer home in Lennox, Ma], but I got to Tanglewood one weekend one summer, and got to hear the orchestra in still a third venue, and began to see there is a difference in these places.

FL: Mm-hm. Did you ever have any music theory or music history courses in college?

LB: No.

FL: No, no. So, I think you—looks like you just made it a personal mission to learn this stuff on your own?

LB: That's right.

FL: I was also wondering: your experience as a percussionist. Did it help you train your ear to hear qualities and parameters of sound? There's particular kinds of non-musical things that percussionists have to kind of pay attention to, and they're

sensitive to other kinds of sounds. Do you think that also helped you in your acoustics work, you know?

LB: I don't know. [laughs] It probably did! It would be something subconscious!

FL: Mm-hm. I just wondered about that. I also wonder, as an acoustician, and some of the work you did with noise abatement and aircraft engines, you were obviously listening to these—you had to listen to these sounds very attentively. Did some of those sounds fascinate you, just on a, just because they were fun to listen to, or aesthetic, you just enjoyed the sound? You know, there are certain engines that have real rich pitch and harmony. Did you ever find yourself listening—?

LB: I never found anything very favorable about any engines I dealt with! [laughs]

FL: Uh-huh.

LB: They were all nuisances.

FL: Uh-huh.

LB: One of the things I spent a lot of time on when we first formed my consulting company was trying to determine how quiet you want different rooms. You want a symphony hall to be much quieter than you do an office building, and it can be much quieter than a factory building. But now, if you want to write specifications for how the building is built, you've got to have some numbers that you know. What numbers do you have for the acceptable noise levels in a symphony hall? What are acceptable noise levels in a office building, and so on?

And so I went into a detailed study of that, and I did, then, form the basic curves, which, the curves meaning the noise levels that are permissible in about eight different frequency bands, starting with low frequencies and up to high frequencies. And so you get 'em at all frequencies. And those curves are in use today. They're the basic curves on how quiet different venues should be.

FL: Mm-hm, interesting. Tell me about your early childhood interest in science and engineering? It looks like it was kind of through radio that you got into that?

LB: Radio. Well, I think I started to mention that Father bought this one-tube Crosley, and he let me then sort of have it to make it work. He just bought it and brought home. We had to put an antenna up outdoors in those days. You couldn't have rabbit's ears in those old-time sets; they weren't powerful enough. So you had to have an antenna that had to be at least sort of seventy, eighty feet long.

So I had to put that up outdoors, then get it through the window with strips that went under the window. And you had to have a ground, a metal thing you stuck in the ground, which we called a ground post, and a wire that came up from this under the window. And you had the one that came from the antenna through the window. Those two, then, went into the Crosley set. And then I soon figured out how a set really worked, what we're varying is something they called a capacitor. And then I was reading about what—I could get in the library and get some books on radio, and I could read about what made radio work. So I got quite interested in radio.

FL: Mm-hm. And you also mentioned recording speech students at Cornell College.

LB: That's right.

FL: And that got you interested in—?

LB: Well, that was—the speech instructor there talked with me one time, said it would be nice if he could record his students at the beginning of the year, and at the end of the year. But he says, “We can't afford any recording equipment.” So I went and studied the what was being sold, and found that you could buy a recorder that recorded on aluminum discs, of all things. It embossed the signal into them. And I could buy this thing such that if I could get his students to pay me a dollar a record at the beginning of the year and the end of the year, I could afford to buy the machine and make the recordings for him. I didn't make any money off of this, but I did get his recordings made.

And occasionally through the years, I would have Cornell students see that my name was on those records, and they would find out from the Alumni Office how to contact me. And they'd say, “We have these records. Of course, we can't play them, because they're aluminum. Can you figure out a way to transcribe what's on those so we could listen to them?” Well, I found a company, I think, in Seattle, that would take those things. They took a wooden needle, a fiber needle, and to play on the aluminum. And they could do that, and they would transcribe these records. And I actually have a couple records of the Cornell College dance band that I played in, that we—I recorded on those aluminum discs.

FL: Oh, I'd be very interested to hear some of that!

LB: I could give you those.

FL: Yeah!

LB: Yes, okay, yes.

FL: We'd be very interested in hearing that.

6. Harvard University anechoic chamber (48:26)

FL: I want to ask you, when you were director of the Harvard [University] Electro-Acoustics Laboratory, 1940 through '46, you built an anechoic chamber.

LB: Right.

FL: And they sometimes called it Beranek's Box. There's a famous story: the composer John Cage some time in the late forties or early fifties visited that chamber. He wanted to experience silence. And he went in there with the engineer. And he heard a high frequency sound, and a low frequency sound, and the engineer told him it was his blood circulation, and his nervous system. Now, whether that's true or not, but he had the fundamental revelation that really there's no such thing as silence. I'm wondering, when you were in there, what was your experience? What did you hear?

LB: Well, of course, this was the quietest place that anybody's ever been in.

FL: Yeah.

LB: And indeed, what I heard was the blood rushing in my ears. And that is the basis for as quiet as you can get anything.

FL: Mm-hm. What's that experience like, though, in that chamber?

LB: Well, as you walk in, of course, you're carrying the noise of outside with you. And you have to stand for a while to let your ears sort of forget what you'd been listening to. There's a carry-over. You carry that sound with you for a little while. You go into this very quiet room, and gradually, suddenly you become aware that what you're hearing only is the blood rushing in your ears. And it's absolute quiet!

Now, about the John Cage story: I was a professor then at MIT, and somebody called me and wanted to know if I could take John Cage into this chamber. And I says, "I can't; I'm too busy, but I'll give you the name of Professor Hunt," who was still there, "And why don't you call him?" And presumably, Hunt arranged with Cage to come in.

FL: Uh-huh.

LB: I didn't; I couldn't do it.

FL: Oh, that's too bad! It'd have been great!

LB: It would have been a nice story! [laughs]

FL: Yeah! [laughs]

LB: He did get into the chamber; no doubt about it.

FL: Mm-hm, yeah. It was one of those turning points for him as a musician and artist.

7. Teaching and research at MIT (50:58)

FL: So you came to MIT in 1947 to be the Technical Director of the Acoustics Laboratory. An interesting historical note—you might be interested: the first MIT course catalog of 1865 lists a course called "Elementary Mechanics," and Part Four is called "Phenomena in Laws of Musical Sound." And some of the topics were: [reads] "reflection, refraction, "musical sounds, intervals, musical instruments." So right from the very beginning there was some acoustics taught at MIT. I found that—

LB: I never heard that before! [laughs]

FL: I found that really fascinating.

LB: That is fascinating.

FL: So the Acoustics Lab started in 1931, is that correct? That's what I was—my research says. But you came as Technical Director in '47.

LB: The Acoustics Lab formally did not start back then. Where did you get that note on—?

FL: There's a book on the history of the Electrical Engineering Department [Karl L. Wildes and Nilo A. Lindgren: *A Century of Electrical Engineering and Computer*

Science at MIT, 1882-1982, Cambridge, Ma.: MIT Press, 1985] and there's a chapter [Ch. 18] on the Acoustics Lab.

LB: Well, what I knew as the Acoustics Lab did not start until after the war.

FL: Uh-huh.

LB: So if there was—I don't know what was there before. It's true that there was acoustics being taught; no doubt about it. And they must have had some laboratory space they were using. But what we called the Acoustics Laboratory didn't start until after the war.

FL: Okay.

LB: And it started a year before I came there, under Richard Bolt. He was the really—the first—he was there before me by one year.

FL: Okay. So, I was looking through your papers in the [MIT] Archives, and there's a description of, your course description for Course 6.35 and 6.36, and you have this comment: [reads] "Acoustics is a most fascinating subject. Music, architecture, engineering, science, drama, medicine, psychology, and linguistics all seek from it answers to basic questions in their fields." That's an interesting statement. It must be—the interdisciplinary nature of acoustics must have been very interesting to you.

LB: It is, it is. And of course, in those early days, the *Journal of the Acoustical Society of America*, which was founded along in the thirties sometime, had a limited number of papers in them. And the papers—because there weren't that many people in the field. And the papers range from speech and hearing people to musicians, to engineers that were doing concert hall acoustics and so on, to engineers who were quieting machinery.

And underwater sound was always very important, because of war time. And the biggest money during the war went into underwater sound, because that's where the torpedoes and the submarines and all were. And so these things appeared in the *Journal*. And I would read them all. I would be interested in the whole range of things. There were few enough papers that you could take time to read them all. Today you get a journal that's so thick, full of papers, that you really don't have time to really read them all.

FL: Mm-hm. A question that I skipped, I should have asked you earlier: just what is it that got you into the field of acoustics, as opposed to other things that, other directions that you could have gone?

LB: Well of course, I think I tell in my autobiography that in between—the summer between my first and second year in graduate school, Professor Hunt for the first time got money from the Dean to hire an assistant. And then he had to decide who he was going to ask to become his assistant. So he talked with some of the professors that had taught me in that first year that I was in graduate school, and they said that among the students they had, that my grade record was as good as anybody; I had straight A. And also, I seemed to be—have some foundation in practical things, because I'd been fixing radios, you see, back in college, and so I knew practical things about radio.

And they sensed this, or learned it, talking with me. And so they recommended Hunt, he ask me to be his assistant.

Now, he was acoustics. So I became his assistant. In that first year, his plan was to try and invent a phonograph pickup that would be light enough that you could play vinyl records with it. And once he could do that, they went from the old shellac records, which is three minutes per side, to the LP record, which I think was twenty-three minutes per side, and you could use his kind of pickup on it. Now, he made the invention, and this got a big write-up in the journals. And so that was my introduction to acoustics, and he led me into it, right up to my ears. And so I got very interested in the field, and decided to go into it.

FL: Mm-hm.

LB: And of course, as I told you, he had me baby sit and get tickets to the Boston Symphony! [laughs]

FL: Was there something about just listening to sound itself that kind of fascinated you, that kind of put you in that direction? Because you could have gone in many other, you know, technical fields, with the background that you had.

LB: Well, I found it fascinating, because it involved music and speech. And there was this history of [Wallace] Sabine and the Symphony Hall, and things that I'd learned. And it sounded like an interesting field to be in. [Wallace Sabine was the acoustical consultant for the design of Boston Symphony Hall which opened in 1900]

FL: Mm-hm.

LB: And Hunt helped make it interesting.

FL: Mm-hm. So there—probably your musical background was a real contributing factor?

LB: Well, I would think so.

FL: Yeah.

LB: I would think so.

FL: Mm-hm. So the courses you taught at MIT—there were some acoustical engineering courses. What other courses did you teach?

LB: Well, when I came down there, they asked me to both teach a course in—the 6.35 course you mentioned—in acoustics. And they asked me to also take part in the teaching of students in electrical engineering. So the first year that I was there I taught a course in circuit theory. And of course, I had studied—at Harvard I had studied circuit theory as part of my training at Harvard, so I came down there knowing this field. And then the second year, I did electromagnetics. And then the third year I actually did machinery, electrical machinery. But all these things had been, I'd learned about at Harvard, too, so I went down there trained in those fields. And so I not only taught every year an acoustics course, but I also taught electrical engineering, one of the three areas that I mentioned.

FL: I see.

8. Acoustics and violins (58:43)

FL: So in the 6.35 course, I was reading, you taught microphone and speaker design. Did you deal at all with the acoustics of musical instruments in those courses?

LB: No, I never did.

FL: Uh-huh.

LB: I never paid any attention to the design of acoustical instruments.

FL: Uh-huh. Was there anybody in the laboratory doing research on musical instruments that you, at that time, that you can recall?

LB: Well, the only thing that I—now, it gets back to Harvard again—was that Professor [Frederick A.] Saunders, who was an older acoustics man, was interested in studying the sound of violins. And you may remember, in my autobiography, I tell about my day with Jascha Heifetz.

FL: Yeah.

LB: And so, he was interested in trying to determine why the old violins, or in what way they differed from good, modern violins. Why were they still so well-liked? And so he had a recording apparatus, which I sometimes helped run, because I was interested in the electronic side. And that day that he invited Heifetz there, he asked me to be his recording assistant. So I was there running the recording apparatus while he was talking with Heifetz, and getting Heifetz to perform. And we had a small anechoic chamber, not a very good one, but it was dead, at least. And Heifetz performed in that little dead space. And there was a case where he had his Stradivarius, his Guarnerius, and then we bought a violin that we picked up at a pawn shop, and we called the standard of badness, which we gave him to play! [laughs]

FL: [laughs]

LB: And then he played a few notes, some piece on that, and I heard this. I was standing next to his wife, and I said, “Boy, that violin never sounded like that before!” And she said, “He can make anything sound good!” And that’s the story I tell, where then after he got through with these things, I said, “What did you think of our standard of badness?” [laughs] He said, “Well, I was on a worse violin when I was performing in New Delhi, in India. And I came there only with my Strad, and I was to give a concert that evening. And horrors! I opened up my case to rehearse a little, practice a little, and found that the thing had come unglued, because it was hot in the high humidity. No way I could play my Strad! So I asked them to find me a violin.” And in a hurry, he called, and it was after four o’clock, and his concert was at seven-thirty or eight. And they came up with an aluminum violin.

FL: [laughs]

LB: Now, it didn’t look like an aluminum violin, because they’d pasted little wood pieces all over it, and made it look like a wooden violin. So he played his concert on an aluminum violin! He said it was a very—a challenge, because had to compensate for the deficiencies in the violin. Some of the notes were too loud, and some were not—

didn't come out, and he had to sort of figure out how to balance these. And he said when he got through he quick locked it up, and people came up and said how good your Strad sounded!

FL: [laughs] That's such a great story!

LB: But it proved that a great performer can do a lot with an instrument.

FL: Absolutely!

LB: Now, I did ask him, "What was the real difference, in your mind, between these new violins and the old ones?" He said, "Ease of playing." He says, "The old violins are much easier to excite, and to express what I'm doing, than the modern ones." So he was emphasizing ease of getting the sound out of them.

FL: Mm-hm. Do you think that has to do with just the age of the wood, and the newer ones just need time?

LB: Well, yes. I think there were some happy coincidences. They got the right wood, and they got the right varnish that aged right with time. And of course, these violins have been pattered with, too, through the years. None of those old violins are like they were when they were made. They've changed. They, in many cases they've changed even the—what do you call it?

FL: The bass bar, inside?

LB: Well, the bass bar inside, but I'm thinking just the—

FL: The fingerboard?

LB: The fingerboard is the word I want. They changed the fingerboard even, often, and made it a different length, a little bit, on those instruments.

FL: Right.

LB: And then they changed the bass board, and the peg inside, the bass peg inside. And these things are all—

FL: The sound post, they call it?

LB: The sound post. And these were all moved around and changed with time. So these instruments are probably not the same instruments. But good musicians have had those changes made, and they have helped the violin makers who did these changes understand how to make them sound good. And then with the natural wood, varnish, and everything, the tone came out better than anybody could hope for. And you would say, well, maybe they aren't that different?

But there was a demonstration in Philadelphia that I didn't get to, but Hunt did, and told me about it—I think Saunders was there too, the two professors from Harvard. And they said that the demonstration was they put a curtain up, and then they had various violins played behind the curtain. And each of them played the same thing. I don't know whether it was a piece, or scales, or what their demonstration was, but they did the same thing on all the violins. And they had some ten violins in this demonstration. And in the audience, they had people judge whether they were hearing old violins or modern violins. And only one man got them all

right! So the differences aren't that great. There were a lot of listeners there that were professional musicians, and so on. And it's true that the—all of the old violins were judged as being very good, but also were some of the new ones. But only one guy got them all right; he separated the new from the old.

FL: Oh, interesting. While you were teaching at MIT, did you teach any architectural acoustics, or concert hall acoustics?

LB: Well, only as part of my course. I used to spend a couple lectures on it. But I did not—well now, one year Bolt asked me to come over and speak at the course in architectural acoustics, but he mainly did that teaching. And then Newman did, too, afterwards, because Newman became a student of Bolt.

FL: That was Robert Newman?

LB: Robert Newman.

FL: Yeah, right, right. We'll arrange for another, a second session?

LB: That's okay.

FL: Okay? It's an honor to have you today.

LB: Why don't we—do you want to figure out a session?

FL: Sure. Let me turn the tape recorder off here.

[End of Interview]