

# The Music of the Voyager Interstellar Record

Stephanie Nelson

Larry Polansky

---

**ABSTRACT** *An experiment in applied communication at the margins, approximately 90 minutes of music was selected from cultures around the world by Carl Sagan and his associates and placed aboard the two Voyager spacecraft in 1977. Both spacecraft have now reached the outer edges of our solar system and are heading toward deep space. This gift of music and other information about us has only the slimmest chance of ever being retrieved by extraterrestrials—the closest encounter with a star system that could contain life will occur 40,000 years from now. The gesture is principally examined in this paper for what it says about us as homo musicus, beings who sing as well as speak. The Voyager music selection team believed that the inclusion of musical sound texts could capture something quintessential about human selfhood that could not be communicated by other means. Several questions are raised and the Voyager Record critiqued from the issues they present: How does one portray the diversity of human music-making? What is music, and can it adequately be represented as a sound text? How is musical perception tied to the human body and human cognitive processes, and are these factors likely to be prohibitive of non-human musical apprehension? What role does music play as a signifier of human selves and cultures? As an applied communication project, the Voyager Record is also measured against some recent prescriptives by communication scholars for an applied communication research agenda.*

---

I don't see it mentioned, but please, NASA, please,  
Include on your intergalactic L.P.'s  
The sound of our music. Please give them a song.

---

We would like to thank Bob Brown, Jody Diamond, Eric Eisenberg, Tim Ferris, Walt Fisher, Jon Lomberg, Nancy Lutkehaus, Susan McClary, and Peter Monge. Stephanie Nelson's work described in this paper is sponsored by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

---

*what does sending  
music to the stars  
reveal about  
humanity?*

---



Stephanie Nelson is a doctoral candidate in communication arts & sciences at the University of Southern California, and a Technical Writer Specialist at the NASA/Jet Propulsion Laboratory.



Larry Polansky is a composer and Assistant Professor of Music at Dartmouth College.

To not put in music would surely be wrong.  
 Without Bach or Mozart, the picture's not whole.  
 You'd give them our minds; would you leave out our soul?

Charles Osgood,  
 CBS News Broadcast  
 May 12, 1977  
 (Sagan *et al.*, 1978, p. 35)

Music provides "a vehicle for the expression of ideas and emotions not revealed in ordinary discourse," wrote Alan Merriam in *The Anthropology of Music* (1964, p. 219).<sup>1</sup> This is an important insight into the human condition. A more common adage is that music is "the universal language." But this platitude is usually taken in a provincial sense—by *universe* we mean only our small planet and a single species upon it.

The belief that music expresses something essential about what it means to be human has a long tradition in Western culture. Socrates, the father of logos, is said to have spent his final days composing music instead of words. Shortly before he went mad, Nietzsche remarked, "It ought to have sung, this new soul, not spoken!" (Zuckerlandl, 1973, p. 2). Music-making seems to be a universal human activity: anthropological evidence has failed to turn up a single culture that does not sing as well as speak.

Language and music are not the only miracles of daily life. The night sky, with its countless stars and endless spaces, is another. We are now aware that to look into space is to look back in time—there is tremendous mystery in this gaze outward. Music and the heavens have long been intertwined. Plato remarked that "as the eyes are framed for astronomy, so the ears are framed for the movements of harmony, and these are in some sort sister sciences" (*Republic*, 530d). Musical lyrics in many cultures commonly refer to the heavens (as do four songs on NASA's Voyager Record).

If intelligent beings exist on other worlds, are they musical? Or is music a unique result of our human social, geo-evolutionary, biological, and cognitive makeup? The human brain's processing of music is a complex phenomenon in which diverse auditory stimuli are processed as a series of gestalts. Pitch recognition is an astounding example of this—our ability to extract pitch fundamentals from complex frequency data is at best a poorly understood accomplishment. We can only speculate about whether other "minds" have the capability to perceive and process humanly generated musical signals into an understandable (or more important, meaningful) range and time scale.<sup>2</sup> If extraterrestrials can decode and translate the music of the Voyager Record, and if the concepts of "signal" and "message" are meaningful to them, then it is possible that some of the patterns in

1. However, Merriam was quick to add that of all the functions of music, "the communication function is perhaps least known and understood" (1964, p. 223).

2. The concept of *signal* itself (in an information-theoretic sense of the term) may have little or no applicability to an "Other's" cognitive apparatus.

the music might be appreciated at least in a mathematical sense. Whether or not extraterrestrials will understand what these signals mean to *us* is another question. But music's psychological appeal is also inherent in its form, and, as rhetorician Kenneth Burke understood, its form is closely related to nature and human biology (Burke, 1968, p. 31). If there are others out there who share something of our cognitive and physical makeup, it is possible that some of the formal appeal of music might be appreciated by them. While our environments may differ widely, there may also be natural and biological commonalities, for both they and we are literally made from the same stardust. This is what Carl Sagan and the Voyager Record team were banking on when they undertook the ambitious Voyager Record project.<sup>3</sup>

This paper has several threads, and is exploratory rather than assertive. After a brief explanation of the Voyager Record (which also contained videotaped photos of earth, and audiotaped earth sounds and human speech), we will address the issues of choosing the music. Three-quarters of the Voyager Record playing time—nearly 90 minutes—is devoted to representing the diversity of human music-making activity. The criteria for the selection of the music, according to project member Timothy Ferris, was that it be economically and geographically representative, and that it be “good music” (1991). What is good music? When asked what message he would send to other civilizations in space, Lewis Thomas, president of the Sloan-Kettering Institute, replied, “I would send the complete works of Bach, but that would be boasting” (Sagan *et al.*, 1978, p. 13). It is natural for members of cultures, social classes, and age groups to best understand and most appreciate the complexities and achievements of their own musical traditions. Musicologist Susan McClary has said that “struggles over musical propriety are themselves political struggles over whose music, whose images of pleasure or beauty, whose rules of order shall prevail” (McClary, 1990, p. 28). As will be discussed below, Alan Lomax and Robert Brown, the two ethnomusicologists who were members of the Voyager Record project, differed in their views about the possibility of making an objective selection of music.

Second, we'll discuss the representation of music as an audio text. In what sense can a sound text, like the Voyager Record, stand in for music-making, which is something women and men do in cultural space-time? Can musical sonic artifacts be interpreted apart from their social frameworks and contexts?

Third, we will address cognitive issues of music apprehension. Cognitive musicologists still have many unanswered questions about human musical perception, and have not speculated a great deal about extraterrestrial perception. Kathryn Vaughn has said that there is no reason why intelligent beings with any sort of acoustical perception structure ought not to be able to apprehend music (1992). But Owen Lovejoy has remarked that humans are not so much intelligent animals as

---

3. Those chiefly responsible for the contents of the Voyager Record are astronomers Frank Drake and Carl Sagan, writers Ann Druyan, Timothy Ferris, and Linda Salzman-Sagan, artist Jon Lomberg, and ethnomusicologists Robert Brown and Alan Lomax.

cognitive animals—it is our ability to symbolize, via the neurophysiological character of speech, that makes us capable of abstract communication (1982, p. 325). Lovejoy posits that the unique combination of circumstances that produced mankind, which have been unduplicated here on Earth, is highly unlikely to have occurred elsewhere in the universe (1982, p. 327).

Fourth, what does sending music to the stars reveal about humanity as *homo musicus*, a species who makes and responds to music? Carl Sagan admits that in large part, the aim of the Voyager Record project was to stimulate reflexive thinking about what it means to be one species—beyond nations, cultures, races, histories, economies, and styles (Sagan *et al.*, 1978). Philosopher Stephen Toulmin, who served as a consultant to the project, urged that the messages focus on communities and cooperation rather than on the achievements of individuals (Sagan *et al.*, 1978, p. 12). The Voyager music furthers this ideal, for music-making is often a collective and cooperative activity.<sup>4</sup>

The Voyager Record can be viewed as a time capsule—the efforts of a certain group of Western men and women in a certain historical moment to represent both the diversity and the “universality” of what it means to be human. Their efforts are especially compelling in light of the possibility that the Voyager Record could become Earth’s longest surviving artifact; the twin records are predicted to travel unharmed through deep space on the two Voyager spacecraft long after our sun has gone cold and our solar system fallen silent.

The inclusion of music in this historic artifact is an admirable attempt at a more holistic portrayal of our species, yet it is also in many respects a romanticization of music, because the Voyager Record team looked to music as aesthetic and affective expression rather than as a rich source of cultural, cognitive, and biological data about our species. While we will be critical of the Voyager Record for a number of reasons, we believe that the record represents a remarkable experiment in applied communication. As Peter Ehrenhaus has stated, at its most valuable, applied communication has the “potential to serve as a vehicle for dialogue about the nature and obligations of membership in a human community” (1991, p. 127). The Voyager Record offers a unique perspective from which to reflexively reflect upon our species as *homo musicus*, and to holistically investigate the purposes that music serves for humanity—what it communicates to us, and what it might communicate about us to Others.

---

4. However, a disturbing characteristic of the published description of the record is the tremendous disparity of attribution of composers or performers between Western and non-Western musics. That is, Western composers and performers (Bach, Blind Willie Johnson, Mozart, etc.) are named, while non-Western musics tend to be simply named by ethnic category or country of origin (“Pygmy Girls’ Initiation Song,” “Japanese Shakuhachi,” “Senegalese Percussion”). This makes it seem as if Western music is made by individuals, and non-Western music by groups. In Ferris’s notes on the music (Sagan *et al.*, 1978, pp. 161–209) ethnomusicologist Robert Brown is fully credited with recording “Pusparwarna,” a standard classical gamelan work, but the name of the ensemble that recorded it is not mentioned, even though that information is readily available. It is instead cited as “recorded ... in the reception hall of one of the four major royal courts of Java” (Sagan *et al.*, 1978, pp. 173). This lack of proper attribution of non-Western music is a frequent occurrence (Diamond, 1990).

## THE VOYAGER RECORD

Describe the world. Not just that multicolored ball in the spacecraft photos, but the *world*—its place in space, its diverse biota, its wide-ranging cultures with their lifestyles, arts and technologies—everything, or at least enough to get the idea across. And do it on one long-playing record.

Oh, there's one stipulation: Assume not only that your audience doesn't speak your language, but that it has never even heard of the earth or the rest of the solar system.<sup>5</sup> An audience that lives, say, on a planet orbiting another star, light-years away from anything you would recognize as home.

Jonathan Eberhart, *Science News* 112,  
August 20, 1977, p. 124

Sagan and company took on the task of describing the world to extraterrestrials and wading their way through the red tape of doing so. The audio/video record (116 pictures were also recorded on the audio frequency spectrum) incorporated bootstrap technology, seat-of-the-pants legal finagling, and political tip-toeing. It was conceived, coordinated, and recorded in a remarkably short time on a shoestring budget (see Sagan *et al.*, 1978, especially Chapter 1). It was a labor of love and an exercise in frustration. NASA vetoed photographs displaying full frontal nudity and imposed other constraints. Acquiring the rights to the music proved a formidable task<sup>6</sup> (e.g., all four Beatles okayed the inclusion of "Here Comes the Sun," but didn't own the rights to the music).

On June 16, 1977, President Jimmy Carter wrote a letter to the "awesome universe" that was digitized and recorded as a part of two hours of pictures, spoken greetings, Earth sounds, and music (Sagan *et al.*, 1978, p. 28). The wax masters were hand-carried to CBS records, which cut the copper disks, and the records were mounted to the outer body of the two Voyager spacecraft in meteorite-resistant aluminum cases, along with a ceramic stylus and playing instructions. The first record was launched aboard a Titan missile on August 20, 1977, and the second followed a few weeks later.

Table 1 lists the music on the Voyager record; in the center of the record, a picture of the Earth taken from a space satellite was laminated in place and the words inscribed: "To the makers of music, all worlds, all times." Figure 1 explains the

5. Actually, if there are beings capable of finding and translating the Voyager Record, it is also possible that they will indeed have heard of us. Humans have been quite noisily broadcasting their existence to the universe for approximately 40 years through various radio frequency signals, particularly military, weather satellite, and television acquisition signals. These signals travel at the speed of light and are likely bathing close to 40,000 stars by now. However, contrary to popular lore about Earth leakage, a civilization with a technology similar to, or even more advanced than ours, might only be able to detect the video carrier signal and will not likely be able to detect the information content of the signal. In other words, they might know on Alpha Centauri (four lightyears away) that we were broadcasting something four years ago, but they won't know it was "Miami Vice" (thank goodness!). See Sullivan, 1982.

6. NASA acquired only one-time rights to the music, and copyright and profit considerations prevented commercial release of the record until this year. It is now available on CD-ROM from Warner New Media. The package is entitled "Murmurs of Earth."

TABLE 1  
 Voyager Music in Sequence (Sagan *et al.*, 1978, pp. 204-205)

1. Bach, Brandenburg Concerto No. 2 in F, First Movement, Munich Bach Orchestra, Karl Richter, conductor (4:40).
2. Java, court gamelan, "Kinds of Flowers," recorded by Robert Brown (4:43).
3. Senegal, percussion, recorded by Charles Duvelle (2:08).
4. Zaire, Pygmy girls' initiation song, recorded by Colin Turnbull (0:56).
5. Australia, Aborigine songs, "Morning Star" and "Devil Bird," recorded by Sandra LeBrun Holmes (1:26).
6. Mexico. "El Cascabel," performed by Lorenzo Barcelata and the Mariachi Mexico (3:14).
7. "Johnny B. Goode," written and performed by Chuck Berry (2:38).
8. New Guinea, men's house song, recorded by Robert MacLennan (1:20).
9. Japan, shakuhachi, "Cranes in Their Nest," performed by Coro [sic: should be Goro] Yamaguchi (4:51).
10. Bach, "Gavotte en rondeaux" from the Partita No. 3 in E major for violin, performed by Arthur Grumiaux (2:55).
11. Mozart, *The Magic Flute*, Queen of the Night aria, no. 14. Edda Moser, soprano. Bavarian State Opera, Munich, Wolfgang Saivallish, conductor (2:55).
12. Georgian S.S.R., chorus, "Tchakrulo," collected by Radio Moscow (2:18).
13. Peru, panpipes and drum, collected by Casa de la Cultura, Lima (0:52).
14. "Melancholy Blues," performed by Louis Armstrong and his Hot Seven (3:05).
15. Azerbaijan S.S.R., bagpipes, recorded by Radio Moscow (2:30).
16. Stravinsky, *Rite of Spring*, Sacrificial Dance, Columbia Symphony Orchestra, Igor Stravinsky, conductor (4:35).
17. Bach. *The Well-Tempered Clavier*, Book 2, Prelude and Fugue in C, No. 1. Glenn Gould, piano (4:48).
18. Beethoven, Fifth Symphony, First Movement, the Philharmonia Orchestra, Otto Klemperer, conductor (7:20).
19. Bulgaria, "Izlel je Delyo Hagdutin," sung by Valya Balkanska (4:59).
20. Navajo Indians, Night Chant, recorded by Willard Rhodes (0:57).
21. Holborne, *Paueans, Galliards, Almains and Other Short Aeirs*, "The Fairie Round," performed by David Munrow and the Early Music Consort of London (1:17).
22. Solomon Islands, panpipes, collected by the Solomon Islands Broadcasting Service (1:12).
23. Peru, wedding song, recorded by John Cohen (0:38).
24. China, ch'in, "Flowing Streams," performed by Kuan P'ing-hu (7:37).
25. India, raga, "Jaat Kahan Ho," sung by Surshri Kesar Bai Kerkar (3:30).
26. "Dark Was the Night," written and performed by Blind Willie Johnson (3:15).
27. Beethoven, String Quartet No. 13 in B flat, Opus 130, Cavatina, performed by the Budapest String Quartet (6:37).

playing instructions that were inscribed on the outer plaque. While it's a bit of a stretch to imagine extraterrestrials assembling a phonograph from used spacecraft parts, the record "jacket" does provide a careful tutorial about how the record should be played. A description of the Voyager Record and the thinking that went into it is documented in Sagan *et al.*'s *Murmurs of Earth* (1978), which presents a compelling argument that the playing instructions will indeed be decipherable by any extraterrestrials who might possess intelligence and technological status similar to our own.

There is a wealth of data encoded on the Voyager Record, but the majority of the playing time of the record is devoted to Earth's music. Timothy Ferris remarked that music "seemed a natural choice given the form of the message—the fact that we were making a record" (1991). Sagan took a more divisive stance that dichotomized intellect and emotion, relegating music to the latter pole:

I was delighted with the suggestion of sending a record for a different reason: we could send music. Our previous messages had contained information about what we perceive

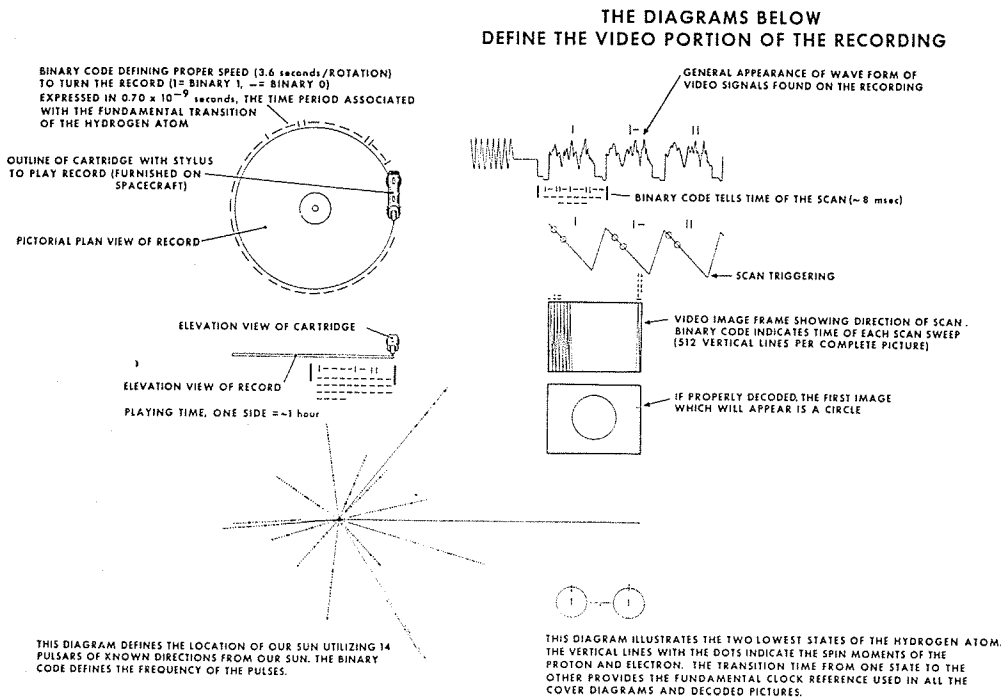


Figure 1. Voyager Record Playing Instructions (undated NASA press release)

and how we think. But there is much more about human beings than perceiving and thinking. We are feeling creatures. However, our emotional life is more difficult to communicate, particularly to beings of very different biological make-up. Music, it seemed to me, was at least a creditable attempt to convey human emotions<sup>7</sup> (1978, p. 13).

Artist Jon Lomberg, who created the photo sequence for the record, wanted to include a musical tutorial similar to the photo series. Lomberg envisioned starting with the acoustic overtone series using pure sine tones, followed by simple melodies and a carefully scaled increase in harmonic and acoustical complexity. Lomberg ultimately felt that extraterrestrials might understand that we were beings who were very clever at manipulating frequency patterns, but might understand little else about the cultural and emotional meanings of the music.

## MUSIC AS CULTURAL CATEGORY AND TEXT

When Sagan came to me with this project, I felt it was a meeting of the minds of two scientists. He had his methods for analyzing the cosmos, and I had mine for analyzing world music. I told him I'd worked 30 years to develop a taxonomy of the world's

7. There were also other attempts to convey human emotions on the Voyager Record—notably, the sound of a kiss.

musical cultures. I had an incredible database—a cross-section of the world who could vote with their own music for a ride to the stars. ... But Sagan was real snooty about my science.<sup>8</sup>

Ethnomusicologist Alan Lomax, 1991

The more I think about it as time passes, the more I realize that there was just no way to develop a criteria for choosing [the Voyager music]. It became a matter of politics, with everyone arguing for his or her personal favorites.

Ethnomusicologist Robert Brown, 1991

There were three criteria for choosing the music, Timothy Ferris explained to Nelson during a phone interview (1991): geographical diversity, economic diversity, and "good music." To achieve geographical diversity, the team basically divided up the inhabited parts of the globe and looked for cultures that fell within each land segment. By economic diversity, Ferris was alluding to the fact that there are cultures within cultures—i.e., there exists a diversity of styles, worldviews, and life conditions within individual language and ethnic groups, and this diversity is reflected in music as well as in speech. To explain further, Ferris said that they could have chosen either a Gershwin piece or a blues piece by a poor black man as representative of a certain period in American musical culture. They chose to send to the stars the blues of Blind Willie Johnson, a disabled man who sang on the streets for handouts and died homeless and destitute. Ferris wrote:

Johnson's song concerns a situation he faced many times, nightfall with no place to sleep. Since humans appeared on Earth, the shroud of night has yet to fall without touching a man or woman in the same plight. (Sagan *et al.*, 1978, p. 178)<sup>9</sup>

The notion of "good music," the final criteria, is related to aesthetics and taste, and is a value-loaded term that has been traditionally taboo as a criterion of evaluation for musicologists and social science researchers (although we are reminded of the advice given by Delia and Grossberg to communication scholars that they "be smart and do good work;" 1977, p. 38). However, it raises an issue that became a central dilemma of the Voyager Record project. Once a decision had been made as to which geography, ethnic tradition, and economic group should be given a voice, how were they to select a particular song? The issue merits special exploration and will be discussed in more detail below.

There were other criteria that could have been chosen that were not, there were experts and cultural representatives who could have been consulted, and there

8. Lomax's controversial methodologies, called cantometrics and choreometrics, yield an "evolutionary" taxonomy of culture independent of language. Lomax believes that music and dance reinforce and are indicative of differentiated social adaptive patterns (see Lomax, 1972 and 1975).

9. We agree with Ferris's assessment of the Johnson tune, as do many others. It is interesting that the Voyager Record team's choice of Blind Willie Johnson's music predates a very recent "rediscovery" of that artist, who was for many years largely overlooked by blues fans in favor of some of his better known contemporaries (like Charlie Patton and Robert Johnson). Perhaps Blind Willie Johnson is more accurately described as a blues-influenced gospel artist than a blues singer. Nicely, "Dark was the Night" has been acclaimed in the last few years by many critics and blues fans (who are probably unaware of its place on Voyager) in much the same way that Ferris describes it.



were clear cases where “good music”—that elusive category—became conflated with hegemonic judgment and personal taste. The consideration of “Moscow Nights” is an example of a triumph of personal taste over the opinions of Russian musical experts and cultural representatives. The Voyager Record team approached the Russian government for guidance in selecting a piece that would be representative of “Russian” culture. This was obviously a difficult request, since Russian culture is as ethnically and musically diverse as, for example, “United States” or “African” culture. The song supplied through official channels was “Moscow Nights,” described by Ferris as “a hideous song—like Lawrence Welk—but it’s the most popular song in Russia” (1991), and by Sagan as “the blandest, least controversial, and least interesting music imaginable” (1978, p. 21).<sup>10</sup> Therefore, “Moscow Nights” did not make the Earth’s Greatest Hits record. But Soviet decision-makers had different criteria in mind, as Sagan later realized:

I later discovered that my request had been given very serious attention, floating toward the top of the scientific hierarchy of the U.S.S.R. Academy of Sciences, and possibly even higher than that. There were debates in which Lenin was quoted to the effect that even capitalist aspects of prerevolutionary Russian culture were important and worth preserving. But it is clear that this position did not carry the day. (1978, p. 21)

The Soviet decision-makers had either a radically different concept of “good music,” or it was not one of their criteria for selection. The compromise was a Georgian chant, selected by Lomax, that voiced a revolt against a tyrannical landlord (and an apologia by Sagan in *Murmurs of Earth* that time, budget, and bureaucratic constraints did not always permit extensive consultations with individual musical experts).

The assertion that “good music” is a valid criterion remains problematically untestable and unconsensual, raising the nagging question that, if we all know what good music is, how does “bad music” (“Moscow Nights,” perhaps) get made and popularized? For our part, we think “Moscow Nights” is a very catchy tune—definitely worthy of flight.

Music is a particularly difficult medium to describe, evaluate, and analyze. According to musicologists Susan McClary and Robert Walser, music is susceptible to either “poetic or technical mystification” (1990, p. 280). Evaluation of music, and use of terms like “good” or “bad,” has much to do with personal history, race, class, gender, and everything else that makes human beings different from one another. Of course that’s why there is so much disagreement, and so many different types of music! Ferris defined “good music” as “honest, heartfelt, efficient, relevant, and otherwise representative of the qualities we associate with good art more generally” (1993). When Nelson asked Alan Lomax to respond to Timothy Ferris’s comment that “good music” was one of the selection criteria, Lomax asserted, “I think ‘good

10. It’s hard to see, however, how the Brandenburg Concerti, which *were* picked (and which are, despite their musical merit, standard mid-morning public radio classical background music) are any more controversial!

music' is a perfectly acceptable category. I think Bob Brown and I—if we sat down together—would probably agree on what are good pieces of music" (1991).<sup>11</sup>

It is perhaps too easy to criticize the music selected for the Voyager Record. We have yet to show the list of selected pieces to a single music scholar who has not displayed a range of emotions from irritation to outrage by its omissions and inclusions. Yet criticism can also be an enlightening task, revealing one's own musical biases, passions, and assumptions. As Susanne Langer pointed out, "the oddest thing about this perfectly legitimate problem of musical meaning is that it seems impossible for people to discuss it with anything like detachment or candor" (1957, p. 236). Music is a tangled web of "information" and "meaning,"<sup>12</sup> and claims about musical propriety, like other knowledge claims, are "inseparable from the institutional structures and cultural formations that sponsor them" (see Browning and Hawes, 1991, pp. 37, 43). In his treatise on poetics, Aristotle remarked that music should be judged by whether it produces the sort of pleasure that is proper to its specific audiences and occasions (*Poetics*, 462b).<sup>13</sup> But Ferris asserted that "the deconstructionist opinion that all art is of equal merit, and that quality is produced not by the artist but by the audience, I reject entirely" (1993).

It appears that the Voyager Record team took pains to involve experts in selecting the non-Western music, but was more cavalier and proprietary in selecting the music they knew personally. Sagan's defense for the over-representation of European classical music was that it is the musical heritage of the culture that built the spacecraft (1978, p. 18). But this seems self-defeating of the goals of the project, as well as class-bound and ethnocentric, for United States residents with varying ethnic and socio-economic backgrounds and musical preferences took part in designing and constructing the spacecraft (and also paid the taxes that funded it). Where are Miles Davis, Merle Haggard, Santiago Jimenez, John Cage, Joni Mitchell, Elvis Presley, the Jackson Brothers, Woody Guthrie, Rafi, and Lawrence Welk?

Nonetheless, we appreciate the overwhelming difficulty of trying to capture the world musically on a 90-minute record. "Try it. Make your own list," urges science

11. It should be noted that the Voyager Music team never did sit down together as a group, but rather worked as independent consultants, with their inputs principally coordinated by Ferris.

12. It is worth recalling here Gregory Bateson's definition of information as "a difference that makes a difference" (1974) in the context of musical meaning arising out of its difference from, and ordering of, noise. See Jacques Attali's *Noise: The Political Economy of Music* (1985).

13. As musicologists, we believe that the record's weakest area is classical music. There is a predictable over-representation of individual European male composers, with 40% of the record's playing time devoted to historical high-culture European music, and three pieces by a single composer (Ferris argues that several pieces by the same composer were included in hopes of facilitating "decoding" by extraterrestrial listeners; Sagan *et al.*, 1978, p. 163). The rather unimaginative selection is a group of well-known pieces representing a very narrow historical period and a restricted range of tonal style. No contemporary classical music is represented, and none credited to women or non-Europeans. The most contemporary classical piece is the short excerpt from *Sacre de Printemps*, now almost a century old. Thus it appears that the Voyager Record team had little interest or understanding of European classical music of their own time, or even of recent history. (We are reminded of the popular book by Douglas Hofstadter, *Goedel, Escher, Bach*, and can't help but wonder why only the musical strand of the "eternal golden braid" is over two centuries old? Why isn't it titled *Goedel, Escher, Schoenberg?*)

writer Jonathan Eberhart at the end of his article "The World on a Record" (1977). Musical preference is individual as well as cultural. No one's list will be the same.

---

## MUSIC AS UNIVERSAL CATEGORY AND SOUND TEXT

Anthropological lore has it that when a Yanomama shaman was played an audiotape recording of a Mozart string quartet, he remarked, "what language are they speaking?" Although Yanomama men chant with melodic as well as rhythmic intonations as part of spiritual rituals, they have no cultural category of music, and they do not use instruments. They share our intelligence, environment, cognitive makeup, and speech capabilities, yet their cultural thought finds no musical information or meaning in the sonic reproduction of a string quartet performance. How likely will it be that beings who have even less in common with the makers of the Voyager Record will be able to map music onto its highly diverse human social contexts?

Ethnomusicologist Stephen Feld, in describing the song laments of the Kaluli in New Guinea, never once refers to their expressive forms as "music," for the word is alien to the Kaluli linguistic framework (1982). In many parts of the world, music and dance are often fused into one category. The conception of music as a sound text capturable by written notation or sonic device is a not a "universal" cultural idea, and the marking of music as a subject for scholarly analytic study apart from its performance is even less "universal."

What meanings do musics hold for human music-makers? Answers vary with individuals, cultures, performances, and historical settings. Feld, following anthropologist Dell Hymes, argues that musical forms comprise "logical patterns of symbolic material that exist not for themselves but in order to activate and bring forth meaningful social relations through structured expression" (Feld, 1982, p. 16). For many musical audiences, music is not a form in and of itself, but a vehicle that has been deliberately constructed to communicate. However, for many composers and musicians, the reverse is true—music and musical form has intrinsic, spiritual, philosophical, and quite independent significance that has little to do with any interest in social communication. There are as many musical nuances of structured expression as there are forms of human social relations in the world, and musical expression both reflects and reshapes these relations. It is one of music's great powers of naturalization that the feelings it evokes *seem* to arise unculturally mediated. After internalization at an early age, claim McClary and Walser, music appears to us to create its effects directly, and we believe that we are experiencing our own subjectivity or a collective subjectivity in music (1990, p. 279). What has been internalized and naturalized are our cultural (and biological) expectations about musical forms. As Kenneth Burke has stated, "a psychology of form is the creation of an appetite of mind in the auditor, and the adequate satisfying of that appetite. ... Music more than all the arts is most suited to the psychology of form" (1968, pp. 31–34). We hear motion and dynamics in music, maintains Victor Zuckerkandl, "we can hear what the tone strives for." We recognize the formal, narrational components of the music—their elaborations, reversals, contrasts, demands, strivings, postponements and climaxes. Sagan would undoubtedly agree

with Susanne Langer's assertion that music is a "logical expression of the morphology of feeling" with articulative powers beyond those of speech (Langer, 1957, pp. 218, 238, 233).

Musicologist Richard Goldman has argued that the acoustic overtone series (i.e., fourier waveform degradation patterns, which are indeed universal) "leaves unexplained the selection made by art from arithmetical or acoustical data,"<sup>14</sup> and also that our sense that the dominant requires resolution in the tonic is arbitrary, and "rests on no law of acoustics, but is an acquired meaning" (in Nattiez, 1990, pp. 208–209). Music semiotician Jean-Jacques Nattiez argues that "universals of music doubtless do exist, but they must be sought in the realm of poetic and aesthetic strategies more than at the level of immanent structures" (1990, p. 67). Yet others have argued strongly for physical, acoustic, psycho-acoustic, and cognitive bases for many of the "deep structures" of orchestration, harmony, melody, and rhythm found in the world's musics. Musical affect and innovation are complex, and arise both from music's culturally coded function as well as from its immanent form. Karl Weick's "principle of requisite variety," which states that social organizing is a set of complex phenomena requiring similarly complex methods of analysis (1979), is highly appropriate to the complex organization of sound and behavior known as music-making. In contrast to linguists, music scholars have not reached a consensus about what constitutes a "meme"—the most elemental unit of meaning in music.

Alan Merriam defined music as "concept, behavior, and sound" (1964, pp. 32–33). The Voyager Record contains only the last of these crucial categories, and while it might be argued that concept and behavior are implicit in musical form for our species, there is no way of knowing whether this implied information is translatable to extraterrestrials. Although the Voyager Record team may have believed otherwise, we contend that it is unlikely that much information is imparted about music's use and cultural meanings via its sonic structure alone. And while the Voyager Record includes photographs of a string quartet performing and a sheet of musical notation, these are probably two of the least indicative images possible about the ways humans tend to make music (wouldn't a drummer and flutist, or singer, be much more representative?). This visual data does little to explain that music is typically performed in special places and times set apart from routine activities, and that musical activity is carried out for the enjoyment and participation of those who listen and watch as well as those who perform.

---

## MUSIC AND PERCEPTION

The idea that musical forms are pleasurable because they come from nature does little to explain their sometimes startling biological and emotional power on human

---

14. There is not really any direct evidence that the harmonic overtone series is the "cause" of world tuning systems, and instead may be the result of simple mathematical ratios that are easy to reconstruct with strings and pipes and other acoustical instruments. Tuning systems and notions of harmonic consonance vary widely throughout the world.

beings. Music's power as a mood enhancer has been compared to that of a drug. As psychologist Anne Rosenfeld remarked:

In one sense, it's no surprise that music grabs us, it's supposed to. But once you look at the process, it seems quite miraculous that people can bowl one another over just by jiggling sound waves. It's a miracle akin to that of language ... But music is more than a language. (1985, p. 48).

Yet considering some of the probably innate biological and cognitive structures humans possess—pitch perception, timbral discrimination, spatial location, and higher level pattern recognition—this ability to “bowl ourselves over” with music is not surprising, for music is rich in these sorts of information.

Music may be more than a language in terms of its affective abilities, but music is also less than a language too, for its meanings are rarely (discursively) explicit. In questioning the root of music's deep psychological power, we can begin to wonder about music's effect on non-human beings. It has been fairly well established that many other animals are capable of hearing and responding to human speech sounds and musical frequency ranges (roughly 1 Hz to 20 kHz).<sup>15</sup> However, animals that clearly respond to and utilize musical form and idea (birds, whales, wolves, and many other species) respond in radically different ways (at least as far as we know!). While it is imaginable that any sentient being who is made from and shares our physical universe will perceive “sound” or “music” through some range of a frequency/amplitude sensing mechanism over some time scale, these ranges may be segmented in radically different ways. Extraterrestrials may “see” in our auditory range or feel pain on “hearing” enharmonic partials. Their “hearing” may not be essentially logarithmic like ours, and in fact, they may have no evolutionary need (as we do) for a great degree of pitch, loudness, and timbral discrimination. Frequency and amplitude are only two components of our sensing of sound. Psycho-acoustic perception is extremely complex, and has to do with a host of cross-referents, some relating to the sound itself (such as timbre), and others relating to our perception of it (either physiological or encultured).

Acoustical processing by the ear and brain is extremely complex. Musical processing in the human brain can be characterized as more often parallel than serial. Processing occurs simultaneously in the two hemispheres of the brain to varying degrees depending on what kinds of cognitive and audition tasks are being performed. Rhythmic, time-dependent, sequential aspects of music are processed by the left hemisphere, while pitch-based, melodic contourization is processed by the right (Levman, 1992, p. 162); EEG patterns from newborn infants show a tendency to respond to musical chords with the right cortex and speech sounds with the left (Rosenfeld, 1985, p. 54).<sup>16</sup> Our auditory dynamic range is quite acute,

15. Played at 16-2/3 rpm, frequency response over most of the Voyager Record is 20 to 15,000 hertz. Channel separation averages 40 decibels. Some of the recordings are in stereo while others are mono, leading Ferris to speculate whether extraterrestrial investigators might conclude that some of our species have only one ear! (Sagan *et al.*, 1978, p. 166)

16. Bryan Levman, who argues for the evolutionary primacy of music over language, points out that infants have a congenital ability to match pitch tones by 18 weeks, can also discern fine spectral differentiations we associate with timbral and phoneme detection, and expend a great amount of waking

able to respond to very faint sounds and yet capable of hearing sounds one million times greater. The ear does not have a "flat" frequency response; some frequencies are heard more loudly than others, and this frequency/loudness response varies with timbre, localization, aging, and other factors, including cultural ones. The conversion of sound stimuli by the human brain into sensations that we regard as pleasurable or otherwise is a complex synthesis of mechanical, chemical, electrical, cultural, and psychological events (Gould, 1981, p. 25). It is not highly likely that beings in an environment and gravity system different from Earth's will share our ear and brain structure, much less our cultural and psychological evolution.

Audition of musical tones is further complicated by the fact that every instrumental and vocal tone is composed of different time-varying spectra of partials (harmonic or not), which helps us to distinguish, to some extent, a particular vocalist or instrument. Some of the many acoustic features that facilitate differentiation of sounds include: transients like the "attack," or onset characteristics of a sound; complex steady-state and transient modulations of amplitude, frequency, and timbre (vibrato is a good example of the simplest form of steady-state frequency modulation); formant regions; "common fate" characteristics of dynamically changing spectra; and the general statistics of partial amplitudes, phases, and frequencies ("brightness" is a commonly used term to describe, for example, the general energy level of higher partials).

The gestalt of these various acoustic and psycho-acoustic sensations is often categorized in an oversimplified manner as timbre, which is often analogized as the shape or color of sound. We are still very uncertain as to exactly what we mean by timbre, and it is likely that the term itself will be viewed as archaic in the near future, since it includes far too many disparate concepts—timbre is often jokingly said to be that which is "everything else." We are even less informed about the specifics and complexities of human timbral processing, especially in musical contexts.<sup>17</sup> How might "timbre" be processed by Others? One small component of those things we collectively call "timbre," like common fate of higher partials, might conceivably be the most salient feature in the Other's music. Where we might say, "Catchy tune!" they might say "Pretty nice common amplitude trajectory for the prime numbered partials!"

If extraterrestrials are successful in decoding and translating our frequency signals into a range and time scale they can interpret, they may discover from the Voyager Record's music and visual images that our bodies do two things at fairly regular intervals: internalize oxygen through lung intake and circulate it by pumping it through our veins via our hearts. The structure and frequency of our breathing might be somewhat discernable from our vocal and woodwind patterns. Even our string and percussion phrasings are often tied to breathing patterns, since much instrumental music originated from or accompanies vocal texts. If an

---

time mastering the reproduction of the musical aspects of language. He notes that all musical elements with the exception of timbre are present in a child's first cry (1992).

17. It has been suggested that it is timbre that forms music itself (Williams, 1981, p. 237), for if music were recognizable merely as a conceptual event, then we would be content to learn to read musical notation (much like we read words without vocalizing them) and not care about its actual performance.

extraterrestrial audience does not breathe, our phrasing and musical patterning may seem quite unnatural to them.

Likewise, our sense of rhythm may not be meaningful to extraterrestrials. While it is difficult to substantiate clearly the connection between rhythmic sense and heartbeat, it has been pointed out that a great deal of the world's music tends to fall within the tempo of the normal heart rate (Rosenfeld, 1985, p. 51).<sup>18</sup> The body movement music often evokes is yet another example of our humanly embodied response to music. Some musicologists have argued that this proclivity to move and respond to rhythm stems from our familiarity with our mother's heartbeat in the womb and our own bodily awareness of our own heartbeat. Again, this may not compute for beings who don't have beating hearts (or mothers!). As Aristotle also understood about our species and its musical proclivity, we are beings who take pleasure in repetition and imitation (*Poetics*, 1448b); in this sense, as Victor Turner noted, musical performance is closely tied to ritual performance (1986). What sorts of pleasures might extraterrestrials seek and what sorts of behavioral contexts might these pleasures be enacted within? Susan McClary points out that "music is also very often concerned with the arousing and channeling of patterns of desires, mapping patterns through the medium of sound that resemble those of sexuality" (1990, p. 8). These are very human patterns of desire, and may well be unique in the universe.<sup>19</sup>

Finally, there are significant cultural constraints on sound cognition. It bears repeating that music is neither "universal" nor a language in the sense that it can communicate clear and consensual meanings. Susanne Langer has remarked that music's symbols are ambiguous—"not communication but insight is the gift of music" (1957, p. 244). The diversity of musical pleasures divides as often as it unites (witness the Voyager Record team's reaction to "Moscow Nights" and their axiomatic use of the term "good music"). "Of course music is not a universal language," remarked ethnomusicologist John Blacking, "and musical traditions are probably the most esoteric of all cultural products" (1987, p. 129). The capacity to respond to music appears to be innate in human beings, but music is also highly individual and cultural, and is often a complex ongoing conversation about itself—a text embedded within other texts. Our music arises from various arenas of human struggle over power and voice, as well as from social and individual strivings for understanding and beauty. Our musical texts will not likely be read in a cultural vacuum either (for if they were, we could not possibly have the same understanding of music). The beauty of music comes from its humanity, joy, and politics of desire, and its function is tied to its form for both sender and receiver.

---

18. There have been a great many theories about time, meter, pulse, and rhythm, but Polansky believes most of them to be problematically self-generative and tautological, similar to Goldman's criticism of physicalistic theories of musical harmonics (see Nattiez, 1990, pp. 208–209).

19. Indeed, in a review of the newly released "Murmurs of Earth" CD, writer Julian Dibbell provocatively asserts that the "hot commodity of the Communication Age isn't information, it's desire." Dibbell remarks that the Voyager Interstellar Record "resembles nothing so much as a cosmic personal ad" (*The Village Voice*, 1993).

## HOMO MUSICUS

Lawrence Grossberg has remarked that "the political functions of music cannot be totally explained by the representational content of the music itself" (1984, p. 97). This insight seems further validated by the possibility that Blind Willie Johnson's wordless, moaning lament may come to speak for all of us someday.

Or perhaps not. According to Ferris, the Voyager Record has only the slightest chance of being retrieved and played. "But that's the beauty of it. There's always a hope, like a child putting a message in a bottle... It's not a calculated act, it's an inspired one" (1991).

If questions loom large about the possibility of the record ever being found or understood, it is worth remembering Sagan's remark that the Voyager Record has two audiences—it was made for us as well as for them:

Perhaps the Voyagers would never be recovered by some extraterrestrial society. But making the record had provided us with a unique opportunity to view our planet, our species, and our civilization as a whole, and to imagine the moment of contact with some other planet, species, and civilization (Sagan *et al.*, 1978, p. 41).

John Blacking proposed that music "can bridge the gulf between the true state of human being, and the predicament of particular human beings in a given society, and especially the alienation that springs from the class struggle and human exploitation" (in Gourlay, 1982, p. 414). This is the message we hear in Blind Willie Johnson's blues. It is a powerful message—that music itself is often productive of empathy and change. Although there are many sounds of human technology on the Voyager Record (a train, tractor, saw, jet, etc.), Sagan and colleagues deliberately chose not to include messages about the darker side of humanity such as war, violence, famine, disease, racial prejudice, social injustice, and sexual inequality. But these darker messages are there (at least for us), encoded in Johnson's rich and moving performance.<sup>20</sup>

Musicologist Lucy Green suggests the importance of imagining an Other [she means a human Other, but let's expand her definition] listening to our music—music which personally affirms our larger feelings of humanity as well as our deepest sense of self. She says:

[I]n communication *through* music to the particular other ... the seeming unity of self with cosmos is destroyed as an appearance. In the posited listening other we can recognise ... the possibility of other universes, other world-views, other meanings (1988, p. 144).

Gregory Bateson remarked that only when we know an Other whose intelligence matches our own will we truly know ourselves (1979). It is interesting to reflect about whether the Voyager Interstellar Record project, a unique experiment in applied communication in search of a subject, can be judged worthwhile in terms of

20. Musicologist Susan McClary also described some of the classical Western pieces, especially Beethoven's Fifth, as "aggressive" (1992).



the theoretical and practical measures proposed recently by applied communication scholars (see special issue of the *Journal of Applied Communication Research*, "The Agenda for Applied Communication Research," June 1991).

Timothy Plax has argued that useful applied communication inquiry must be social-scientifically sound and empirical ("controlled" and "systematic"), must produce usable results, must be guided by theory, and ought to be conducted in the field (1991, p. 68). Certainly, as Plax argues, when neither the research subject nor the setting is known, there are tremendous threats to the "ecological or external validity" of an applied communication investigation. But Karl Weick, following Mitroff and Killman's topology of scientific inquiry (1979), proposes an alternative method of inquiry that is engaged, personal, imaginative, speculative, generalist, and holistic (see Browning and Hawes, 1991, p. 48). Rather than producing results and stasis, claim Browning and Hawes, this alternative form of inquiry leads to conversation and change (1991, p. 47). The practitioners of this alternate form of inquiry reframe the taken-for-granted; in the words of Weick and Browning, they "introduce novel variations on activities we thought we understood, and reconfigure an overdetermined world into unexpected patterns" (1991, p. 17).

Everything most intense and productive of change, Bakhtin wrote, takes place on the boundaries (1986, p. 2). As James March has similarly suggested, the margins are the place where new interpretations for experience take place. March further argues that "the delicacies of learning from events that didn't actually occur" can aid in "a more accurate assessment of a theory's contribution to truth, beauty, and justice" (1991, pp. 30, 31). We would agree with applied communication practitioners who call for exploration and imagination, and who value relational methods of inquiry and praxis, including vulnerability, risk, and play.

By taking our assumptions about communication to its boundaries, by imagining our relationship with other life in the universe, and by wondering what forms we might use to communicate with possible Others, we gain new perspectives into what we take for granted about our own communicative forms. Insights gained while creating the Voyager Record have already been applied by several team members to NASA's Search for Extraterrestrial Intelligence project, and to designing a "keep out" sign for a nuclear waste disposal site that requires a 10,000-year communicative lifespan (see Burdick, 1992).

What is remarkable about our species, in addition to our propensity to sometimes abandon speech and resort to song, is our imagination, our lifelong desire to play and explore, and our willingness to give to others. While he didn't know if Earth's music would have meaning to intelligences on other planets, Ferris believed that the *gesture* of sending the music might mean more than the music itself—"It says, whoever and whatever you are, we too once lived in this house of stars, and we thought of you" (Sagan *et al.*, 1978, p. 167).

Try it. Make your own list. "It changed my life—I'm still thinking about it," remarked Robert Brown about his role in selecting the music (1992). Perhaps our music is ultimately ours alone. Nonetheless, by imagining an Other listening, we reflect back upon ourselves, and open our selves and cultures to new musics and understandings, other possibilities, different worlds.

## REFERENCES

- Aristotle. (1951). *Poetics*. In S. H. Butcher, (Ed.), *Aristotle's theory of poetry and fine art*. NY: Dover Publications, Inc.
- Attali, J. (1985). *Noise: The political economy of music*, B. Massumi, trans. Minneapolis, MN: University of Minnesota Press.
- Bakhtin, M. (1986). *Speech genres*, C. Emerson and M. Holquist, (Eds.), V. McGee, trans. Austin, TX: University of Texas Press.
- Bateson, G. (1974). *Steps to an ecology of mind*. Northvale, NJ: Jason Aronson Inc.
- Bateson, G. (1972). *Mind and nature: A necessary unity*. San Francisco, CA: Chandler Publishing Co.
- Blacking, J. (1987). *A commonsense view of all music*. Cambridge, UK: Cambridge University Press.
- Brown, R. (1991, March). Personal interview, Southern California Chapter meeting of the Society for Ethnomusicology, University of California, Santa Barbara.
- Brown, R. (1992, October). Respondent remarks, Annual SEM Conference, Bellevue, Washington.
- Browning, L. D., and Hawes, L. C. (1991). Style, process, surface, context: consulting as postmodern art. *Journal of Applied Communication Research*, 19, 32-54.
- Burdick, A. (1992, August). The last cold-war monument: Designing the "keep out" sign for a nuclear-waste site. *Harpers Magazine*, 62-67.
- Burke, K. (1968). *Counterstatement*. Berkeley: University of California Press.
- Delia, J. G., and Grossberg, L. (1977). Interpretation and evidence. *Western Journal of Speech Communication*, 41, 32-42.
- Diamond, J. (1990, Summer). There is no they there. *Musicworks*, 47, 12-23.
- Dibbell, J. (1993, February 2). Only connect. *The Village Voice*, 47.
- Eberhart, J. (1977, August 20). The world on a record. *Science News*, 112, 124-125.
- Ehrenhaus, P. (1991). Co-opting the academy: On the urgency of reframing "applied." *Journal of Applied Communication Research*, 19, 123-128.
- Feld, S. (1982). *Sound and sentiment: Birds, weeping, poetics, and song in Kaluli expression*. Philadelphia: University of Pennsylvania Press.
- Ferris, T. (1991, April 25). Telephone interview.
- Ferris, T. (1993, January 18). Personal correspondence.
- Gould, R. (1981). Sound in nature. In K. Spence, (Ed.), *How music works* (pp. 23-34). New York: MacMillan Publishing Co., Inc.
- Gourlay, K. (1982). Towards a humanizing ethnomusicology. *Ethnomusicology*, 26, 411-420.
- Green, L. (1988). *Music on deaf ears*. Manchester, UK: Manchester University Press.
- Grossberg, L. (1984). "I'd rather feel bad than not feel anything at all": Rock and roll, pleasure and power. *Enclitic*, 8, 94-110.
- Langer, S. K. (1957). *Philosophy in a new key: A study in the symbolism of reason, rite, and art*. Cambridge, MA: Harvard University Press.
- Levman, B. G. (1992). The genesis of music and language. *Ethnomusicology*, 36, 147-170.
- Lomax, A. (1975). Audiovisual tools for the analysis of culture style. In P. Hockings, (Ed.), *Principles of visual anthropology* (pp. 303-322). The Hague: Mouton & Co.
- Lomax, A. (1972). The evolutionary taxonomy of culture. *Science*, 177, 228-239.
- Lomax, A. (1991, May 1). Telephone interview.
- Lomberg, J. (1991, May 8). Telephone interview.
- Lovejoy, C. O. (1982). Evolution of man and its implications for general principles of the evolution of intelligent life. In J. Billingham, (Ed.), *Life in the universe* (pp. 317-329). Cambridge, MA: MIT Press.
- March, J. G. (1991). Organizational consultants and organizational research. *Journal of Applied Communication Research*, 19, 20-31.
- McClary, S. (1992, March 17). Personal interview, Department of Musicology, University of California, Los Angeles.
- McClary, S. (1990). *Feminine endings: Music, gender, and sexuality*. Minneapolis, MN: University of Minnesota Press.
- McClary, S., and Walser, R. (1990). Start making sense! Musicology wrestles with rock. In S. Frith and A. Goodwin, (Eds.), *On record* (pp. 277-300). NY: Pantheon Books.