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THE POETICS OF ROCK COMPOSITION: MULTITRACK RECORDING AS
COMPOSITIONAL PRACTICE

by

ALBIN J. ZAK III

A dissertation submitted to the Graduate Faculty in Music in
partial fulfillment of the requirements for the degree of
Doctor of Philosophy, The City University of New York

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24 April 1997
Date

Andrew Tomasello
Andrew Tomasello
Chair of Examining Committee

23 April 1997
Date

Allan W. Atlas
Allan W. Atlas
Executive Officer

Professor Allan W. Atlas

Professor Stephen Blum

Professor John Graziano

Professor Peter Manuel

Professor Leo Treitler
Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

THE POETICS OF ROCK COMPOSITION: MULTITRACK RECORDING AS
COMPOSITIONAL PRACTICE

by

Albin J. Zak III

Adviser: Professor Leo Treitler

In the rock idiom, musical works are represented by recordings. From rock's earliest days, recordists have sought to use the recording medium to create artifacts that deliver unique sonic experiences, rather than faithful representations of live performances. The rock recording process, then, is a process of making, or composing. This dissertation is an account, based upon the testimony of recordists and their works, of the record making process. The study includes historical, technical, aesthetic, and musical stylistic components.

The dissertation is organized in a cumulative way. That is, each chapter builds upon the concepts, principles, terminology, and so forth presented in preceding chapters. Chapter 1 is an historical introduction to the idea and practice of using musical performance as a tool of inscription. Chapter 2 defines the compositional project as the creation of a sounding work of music. While the work contains a song and a musical arrangement, its essential identity lies in a specific sonic rendering of these, which

involves compositional concerns that are specific to the recorded work. Taking up the issue of content, Chapter 3 sets forth five categories of sound phenomena that account for what we hear on a record: musical performances, timbre, echo, ambience, and texture. Each of these elements contributes in some significant way to the identity of the work, and each is examined separately in terms of its part in the overall compositional concern. In Chapter 4, the roles of the various participants in the recording project--songwriters, arrangers, musicians, engineers, and producers--are outlined in terms of the collaborative dynamics that shape most recording projects. Chapter 5 examines the functions of recording places and technology in the compositional process and the nature of their presence in the finished work. Finally, Chapter 6 utilizes the ideas developed in discussion of the foregoing topics in a general account of the multitrack process as a multifaceted and collaborative compositional method.

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I must also thank my primary readers--Stephen Blum, Peter Manuel, and Allan Atlas--all of whom brought their unique experience and critical insights to the project, helping me to sharpen both my thinking and my writing skills. Stephen Blum brought his keen sense of the nuances of language and his wide-ranging critical depth; Peter Manuel brought his broad perspective of popular musics in various world cultures and a cheering enthusiasm for the idea of popular music studies in general; Allan Atlas brought his fine and musical sense of prose, and his refreshing, down-to-earth approach to scholarship.

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Finally, thanks, as always, go to my family. Pursuing a Ph.D. in musicology at the end of the twentieth century requires either independent means or a leap of faith. Only the latter was available to me. But it was never a lonely leap. I was always supported by the convictions and beliefs of all the members of my family, especially my mother and father. To them I owe my deepest gratitude. For through so many stages of living and working, it is they who have always been there to help, to cheer, and to wish me nothing but the best.

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1. INTRODUCTION

"Here is a new art. For a few decades it seemed like nothing more than a new technical device...a new way of preserving and retailing...performances. But today its development has already belied this assumption. ...it exhibits--quite beyond any doubt, I think--not only a new technique, but a new poetic mode."¹

In a series of scenes from Michael Radford's film, Il Postino, the postman Mario Ruopollo gathers aural images of his island home with a recording machine left behind by the poet Pablo Neruda. "Small waves...Big waves...The wind on the cliffs," he says to the microphone, pointing it at waves and cliffs in turn and smiling in wonder. As he takes hold of the power to record selectively the sounds that make up his world, Mario is overcome with excitement. Wherever he points the microphone, it seems not only to capture sound, but to register his own feelings about the world he perceives. Finally, he points the microphone at the night sky. "The stars," he says. He has become intoxicated with the magic of this machine, and in the process has forgotten that it can record only sound. To Mario, the machine seems capable of capturing and replaying anything that engages his emotions or leaves a trace on his imagination. In these touching scenes, Radford portrays the meeting between human beings and technology as one of poetic collaboration. This wonderful machine inscribes an image of whatever sound is set before

¹ Susanne Langer, "A Note on the Film," in Feeling and Form (New York: Scribner, 1953), p. 411.

it, but the choice of image is a matter of human agency; the talking machine can only repeat what it has been given to hear. Thus as it performs its mechanical task, it makes a record both of sound and of the recordist's intention.

Mario's childlike wonder is understandable, as is his sense of empowerment. Sound recording is a kind of magic, conferring on the recordist the power to capture selectively fleeting temporal phenomena. To a great extent, this power and the disembodied aural images that it produces remain as mysterious to us now as they were to Nipper, the bull terrier in Francis Barraud's painting that became well known as the RCA Victor logo. The mystery lies not so much in the technological process of recording, but rather in the art that has been its unimagined consequence. Although invented to record the spoken word, sound recording's greatest cultural impact has been through music; and music itself has changed as its production and reception processes have become permeated by technology.

Like musical notation before it, sound recording has had a profound influence on the way music is made, heard, and thought about. As it preserved the ephemeral act of musical performance and gave performances the solid form of lasting entities, it gradually brought about a conceptual change. For example, jazz improvisations, once recorded, were treated like musical works--collected, studied, learned, played over

and over again.² Musical composition, long a process of encryption of musical ideas in symbolic notation, was free to move to a process of direct inscription. That is, musical ideas could be embodied as aural images without having to pass through the encoding/decoding process of writing and reading musical notation. The compositional process could deal in actual sonic renderings. In short, real time performances took on a timeless aspect which opened up a world of possibilities that had never before existed. The consequences of these possibilities, however, would take some time to emerge.

"We only begin to really hear about sound as a cultural entity," writes Douglas Kahn, "with the introduction of Cros' paleophone and Edison's phonograph right into the midst of ascendant modernist and avant-garde culture. The timing of the two was perhaps no coincidence, for here was a machined fusion of orality and literacy...the totalizing cornu/copia of all and every sound..."³ From its invention, sound recording technology fed a desire among avant-garde artists to use sound as artistic material. If at first technological capability lagged behind conceptual implications, the ability

² For a brief, yet illuminating historical overview of the work concept, see Carl Dahlhaus, "Music as Text and Work of Art," in Esthetics of Music, trans. William W. Austin (Cambridge: Cambridge University Press, 1982, originally published 1967), pp. 9-15. For an extended treatment, see Lydia Goehr, The Imaginary Museum of Musical Works: An Essay in the Philosophy of Music (Oxford: Clarendon Press, 1992). Goehr discusses "extensions" of the work concept into musical idioms such as jazz in "Being True to the Work," The Journal of Aesthetics and Art Criticism (Winter 1989), pp. 55-67.

³ Douglas Kahn, "Introduction: Histories of Sound Once Removed," in Wireless Imagination: Sound, Radio, and the Avant-Garde (Cambridge, MA: MIT Press, 1992), p. 5.

to "phonograph sounds," as Edison put it, nevertheless fired many artistic imaginations. Before turning to film, for example, Dziga Vertov attempted to "transcend the limits of ordinary music," by making aural art works using any and all sounds in the "audible world."⁴ In the late 1920s, Laszlo Moholy-Nagy complained that "Contemporary 'musicians' [had] so far not even attempted to develop the potential resources of the gramophone record, not to mention the wireless,"⁵ and he urged the development of an "acoustic alphabet of sound writing"--an analog process whereby "visual signs can be translated into acoustic phenomena"--to create film sound tracks "without reproducing any existing music."⁶ In his experimental The Sound of ABC, he employed a technique of direct inscription similar to the one others had used on wax discs, scratching images and letters on to the sound track of optical sound film, producing sounds that "had the character of whistling and other noises."⁷

But in the realm of conventional performance-based music--e.g., jazz, Western classical music--the new technology took a much more conservative path. Rather than a "fusion of orality and literacy," the aim was to represent performance traditions as they existed. If the recording bore

⁴ Dziga Vertov, "Speech of 5 April 1935," cited in Seth Feldman, Evolution of Style in the Early Works of Dziga Vertov (New York: Arno Press, 1977), p. 13 and in Kahn p. 10.

⁵ Laszlo Moholy-Nagy, "Problems of the Modern Film" (1928-30), in Moholy-Nagy, Richard Kostelanetz, ed. (New York: Praeger, 1970), p. 135.

⁶ Moholy-Nagy, Vision in Motion (Chicago: Paul Theobald, 1969, originally published 1947), p. 277.

⁷ Ibid.

some conceptual resemblance to a literate artifact, its content--a musical performance--and production process did not. Though the musical styles that were recorded varied from Italian opera to rural American blues and included practices that fell on either side of the oral/literate divide, fusion was not a goal. For this would have meant that the machinery had to engage actively in the creative process, rather than simply record what was set before it, and there was no conventional basis for that in any performance tradition.⁸ Modernist visionaries and experimenters such as Edgard Varèse or Pierre Schaeffer could make music with tone generators or fragments of the natural sound world, but for those to whom music meant participation in a conventional poetic/aesthetic economy, using machinery to manipulate music was looked upon as inauthentic trickery or worse. Mezz Mezzrow characterized Sidney Bechet's 1941 one-man-band recording of "The Sheik of Araby" and "Blues of Bechet"--on which Bechet played soprano and tenor saxophones, clarinet, piano, bass, and drums--as an "engineering stunt." Although he praised the high quality of the music making, the nature of the project represented for Mezzrow the "neurotic and bestial" product of ruthless individualism, a sad lack of communal expression, "the final

⁸ The efforts of classical record producers such as John Culshaw or Goddard Lieberson to make their recordings sound distinctively different from live performances are differences of presentation or interpretation; they have affective significance but do not alter the identity of the work.

and most eloquent comment on the level to which our jazz had sunk."⁹

The exception to this view was in the area of popular singing. With the invention of the electrical sound transduction process and its basic tool, the microphone, in the 1920s, blues, country, jazz, and pop singers were able to project their vocal stylings as never before. Singers were no longer required to have operatic voices in order to fill a large hall or to be heard above an ensemble. Electrical amplification provided popular singers with a new set of possibilities, and they embraced the microphone both as an aspect of vocal technique and as an expressive tool. The singing style known as crooning--most famously exemplified by Bing Crosby--owed its very existence to the microphone, which dramatized the subtlest vocal inflections. Embracing it as an artistic accomplice, crooners developed a performance style that was inseparable from technology, and over the next several decades, American popular music would continue to integrate technology and musical performance.

One of the first to make records using the practice of overdubbing was the guitarist and inventor Les Paul. Overdubbing is an additive process whereby multiple sequential performances are combined or overlaid with one another within the unitary time frame represented by a disc or a piece of magnetic tape, creating the illusion of an

⁹ Mezz Mezzrow with Bernard Wolfe, Really the Blues (London: Flamingo, 1993, originally published 1946), pp. 326-7.

ensemble performance. Although Paul had no formal training as an engineer, he was a tireless experimenter who, working in his garage, managed to devise equipment modifications and recording techniques that allowed him to use the recording process in a new way, recording layer upon layer of performances to build a musical piece that had its unique existence as a sound recording. The technique of overdubbing onto disc--whereby a live performance is played with a previously recorded one while both are recorded to a second disc--had been in use since the early 1930s, primarily in film. The problem was that with each successive generation of disc to disc transfer, the sound quality diminished rapidly, which, in turn, limited the number of overdubs. Using his own disc-cutting lathe made from a Cadillac flywheel, Paul made records containing many more generations of disc transfers without serious degradation than had previously been thought possible. He accomplished this by recording the least important parts of the arrangement first and by minimizing his use of microphones, using them only toward the end of the layering process. Plugging his electric guitar directly into the recording console eliminated the accumulation of successive layers of room and microphone noise, while saving the most important musical elements for last meant that they would retain the greatest clarity.¹⁰ His breakthrough hit

¹⁰ This account is from a phone conversation with Les Paul's son, Gene (September 18, 1996).

came in 1947, a recording of Rodgers and Hart's "Lover" arranged for eight guitars, all of which he played himself.

When Paul acquired a tape recorder in 1948--a gift from Crosby, who, in 1947, and at Paul's urging, had begun taping his weekly radio show (and whose Crosby Enterprises had subsequently become the worldwide distributor of Ampex tape recorders)--he immediately saw in it an opportunity to record even more overdubs with greater fidelity. It was, however, a difficult proposition. The machine had only one track, and each new recording pass had to be laid over the existing material--rather than simply combining the two as in the disc method--so that a mistake meant starting the whole process over from the beginning. Paul and his wife and partner Mary Ford rose to the challenge--"It made us real pros,"¹¹ he boasted later--and in 1950 they made a recording that contained twelve overdubs. The recording was an intricate arrangement of "How High the Moon," with all parts recorded by Paul and Ford. They followed the same reverse order they had become accustomed to, Ford singing her least important harmony parts first and saving the lead for last. Released on March 26, 1951, it reached the No. 1 spot on The Hit Parade in less than a month.

Bruce Swedien, an engineer and producer who has worked for almost half a century with recording artists ranging from Fritz Reiner's Chicago Symphony to Michael Jackson, cites

¹¹ Mary Alice Schaugnessy, Les Paul: An American Original (New York: William Morrow, 1993), p. 181.

"How High the Moon" as the "one record [that] changed pop music forever....There wasn't a shred of reality in it--and it was wonderful."¹² For Swedien, the marvel of the track was that it successfully presented a new set of options for record making, proving that "it was no longer necessary to present popular music in concertlike form." In Paul's efforts, we see and hear the beginnings of the oral/literate fusion in the field of conventional music making. Indeed, Paul did not use any musical notation for his elaborate arrangements. He relied instead on oral modes of music making--a combination of memory and improvisation--to create a literate text represented by his inscriptions in the iron oxide particles of the magnetic tape. As recording moved away from the "reality" of "concertlike form," the process and its end result became very different from what they had been. The process became one of deliberate composition, and its product an original musical work.

From our vantage point it is easy to appreciate both the technical and the conceptual importance of Paul's innovations for rock recording. But, at the time, his work had little direct impact on rock. The musical style in which he and Ford worked was passing from popular favor as rock was ascending, and he neither liked nor understood the new music. For their part, rock musicians and producers had little interest in constructing recordings systematically. Nevertheless, Paul's approach would in time become the normative procedure for all

¹² Bruce Swedien, "Tear Down the Walls," *EQ* (June 1991), p. 40.

rock recording. I shall return to Les Paul, but first there is a second part to the story of the transformation of the recording from performance snapshot to musical work that needs to be put in place.

In postwar African-American urban communities, a new music that would come to be known as rhythm and blues (R&B) emerged with a powerful energy. With its roots in Mississippi Delta blues, Southwestern jump blues, and boogie woogie, R&B drew together elements that had long been popular staples of African-American musical culture. Unlike its precursors, however, R&B placed the element of electricity squarely at its center; it was an amplified, even over-amplified music, and the expressive fervor of its performers was heightened by the volume they were able to command. The live performance took on an unprecedented outsized sonic presence. In the hands of a player such as T-Bone Walker or Muddy Waters, for example, a solo electric guitar could dominate a noisy barroom. R&B brought together an intense, sometimes outrageous performance style and an unnaturally amplified sound that changed the terms of the listening experience.

Early rock and roll recordings took R&B's highly energized performance style and "larger than life" sonic presence as its aesthetic foundation. But rock and roll, unlike R&B, was first and foremost a recorded music; its rapid rise in popularity was a result not of live performances, but of mass radio exposure which was fed by records, primarily the new and affordable 45 rpm singles that

were the staples of teenagers' record collections. Recording was, from the beginning, rock and roll's principal activity. In such a scenario--where the recording precedes live performance in the experience of most listeners--there is a clear implication of musical workhood, and indeed rock and roll records early on were viewed as self-contained musical artifacts. But although the tools and techniques of the recording studio were enlisted in the poetic process, the aesthetic terms inherited from R&B--especially the expressive spontaneity of unedited performances--stood as guiding principles. Hence early rock recording was aimed not at the kind of construction process that Les Paul was using, but rather at creating a unique sonic setting for a real-time performance.

In his 1936 essay, "The Work of Art in the Age of Mechanical Reproduction,"¹³ Walter Benjamin put forward the idea that in their high degree of technological sophistication the mechanically reproducible arts of photography, sound recording, and, above all, film had "transformed the entire nature of art." The transformation involved a shift in the nature of authenticity, for which he gave the following definition: "The authenticity of a thing is the essence of all that is transmissible from its beginning, ranging from its substantive duration to its testimony to the history which it has experienced." The

¹³ Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," in *Illuminations*, trans. Harry Zohn (New York: Schocken Books, 1969), pp. 217-51.

authority of such testimony relies on the art work's "presence in time and space, its unique existence at the place where it happens to be." He called this unique presence the work's "aura," and argued that only the original work could claim it: "there can be no replica of it."

For the arts that were "founded in" and "designed for reproducibility," however, such a concept of authenticity had little meaning. As a result, what Benjamin called the "cult value" of art works yielded to their "exhibition value." That is, the value of an art work no longer lay in ritualistic functions--which required the authenticity of its unique presence--but in its "public presentability," for which refinements in reproduction techniques made it increasingly fit.

Throughout his essay, Benjamin insists that aura requires the physical presence of an original work or agent, that, for example, the "shriveling of the aura" is an inevitable consequence of film, where the actor is never present before the audience. The actor performs "not for the audience but for a mechanical contrivance," and "the audience's identification with the actor is really an identification with the camera." Implicit in all this is the possibility that the shift from cult value to its "polar opposite," exhibition value, involves the development of a new kind of presence, which in turn calls for new ways of conceiving and implementing the creative production process. Benjamin raises, but never adequately addresses, the issue of

the audience's aesthetic participation and the changing modes of perception that accompanied the rise of the new art forms. The camera with which the audience identifies is a metaphor for the film itself. If the aura of the performer is missing, the aura of the work--whose making has involved a transference and translation of the performer's aura--is quite apparent. But in this case, authenticity does not rely on the presence of a unique original. All instances of the work are equally original as far as the audience--from the amateur to the connoisseur--is concerned. The permeation of the art production process by machinery creates a new set of terms, "a new law." The presence of the art work "designed for reproducibility" is experienced by perhaps millions of people around the world, and the work's aura lies not in a unique existence, but in the space it makes for itself in the collective consciousness and the stylistic field it inhabits.

As Peter Wicke, among others, has pointed out, rock, from its inception, embraced technological mediation wholeheartedly. Its very existence was based upon a creative relationship with the tools and methods of the recording studio, and it "accepted this fact without compromise as a prerequisite for artistic creativity."¹⁴ In the area of performance-based music, then, the rock idiom represents the first sustained and stylistically pervasive effort to do what film had done decades before: to effect a transformation in

¹⁴ Peter Wicke, Rock Music: Culture, Aesthetics, and Sociology, trans. Rachel Fogg (Cambridge: Cambridge University Press, 1990), p.4.

the nature of the authenticity of the art work. The rock recording is not a reproduction of anything; from the beginning, it was looked upon as a thing in itself. Although at first the recording process was centered around real-time musical performance--rather than layered construction--its result was to be a musical artifact with a unique sonic presence, not simply a rendering of a performance. Hence the aesthetic criterion shifted from the sound of the performance to the sound of the recording. When Sam Phillips wanted to audition Elvis Presley, he did not simply want to hear him sing. He was interested in Presley's recorded presence. He instructed guitarist Scottie Moore to bring Presley to the studio so they could "see what he sound(ed) like coming back off of tape."¹⁵

In terms of poetic process, then, the earliest rock recordings represent a kind of conceptual middle ground between the recording as a reproduction of a musical performance and the recording as a composition. This distinction helps to explain why multitrack recording--the practice of storing sounds on discrete parallel bands of magnetic tape--was slow to catch on in rock. Paul had been interested in the possibility of putting eight discrete tracks on a single piece of tape since 1954. He commissioned Ampex--who had already come up with seven-track flight data recorders for airplanes--to build him an eight-track tape

¹⁵ Peter Guralnick, Last Train to Memphis: The Rise of Elvis Presley (Boston: Little, Brown & Co., 1994), p. 93.

recorder, and by 1957 he had the first fully operational Ampex Model 300-8 in his Mahwah, New Jersey, home. One of the chief obstacles the Ampex engineers had to overcome was the time delay between recording and playback that resulted from the gap between the machine's record and playback heads. The delay made synchronized recording with a previously recorded track impossible. They solved the problem by devising a method whereby a single head could provide both record and playback functions simultaneously, and with the machine that Paul dubbed "the Octopus," recording gained an unprecedented degree of discrete control over individual elements. Overdubbing no longer involved real-time mixing with pre-existing material; rather, each overdub could be stored separately on its own track, and the accumulated tracks mixed together at some later time when decisions could be reconsidered and further sound processing and balance refinements could take place.

Thus the technology of 1957 already permitted the possibility of eight-track recording, twice the number of tracks used to create the Beatles' four-track Sgt. Pepper's Lonely Hearts Club Band--a recording that marked a watershed in multitrack technique and consciousness--a decade later. But during its first decade of existence, the possibilities of the eight-track machine remained mostly unexplored. Clearly the concept of recording and subsequent assemblage were not at the forefront of rock's recording consciousness. Resistance to the new technology ranged from musicians' fears

of being put out of work, to the machine's \$11,000 price tag and added tape noise, to the view that such piecemeal recording diminished the vitality of the music making. The only record label to acquire and use the machine extensively in the 1950s as a tool for enhancing record production was the fledgling Atlantic Records. But the enhancements were in the realm of sonic clarity--i.e., separate tracks for each instrumental section--rather than compositional method. Overdubbing was considered a secondary issue. It was used mainly for production convenience--fixing an out of tune note, say. The focus at Atlantic, as at all other labels, remained on capturing the dynamic energy of complete performances. "It all had to do with capturing the spontaneity of the moment," recalled songwriter and producer Mike Leiber, for in this there "was an interaction that was irreplaceable."¹⁶

Although the aesthetic of live interaction that rock and roll inherited from R&B had little use for overdubbing, the concept of combining multiple sonic images into a single composite that was represented uniquely by the finished recording was an essential principle of rock recording from the beginning. If recordings from the fifties and early sixties are rarely multitrack, most of them are multi-channel. The multichannel mixing console provided several discrete inputs which could be fed by different sound

¹⁶ Ted Fox, In the Groove: The People Behind the Music (New York: St. Martin's Press, 1986), p. 175.

sources, including separate microphones, added ambience, and tape echo effects. These were combined at the console using its controls. Although the performance was live, the relationships that defined the configuration of the recording were controlled electronically at the console. There is little functional difference between building a mix while playing back a multitrack tape over and over and doing so while having musicians play their parts over and over, as Phil Spector did.

After Sgt. Pepper's, overdubbing became a matter of course and the demand grew for recorders and tape formulations with more and more tracks. Eight became sixteen, then twenty four and so on. But this development of the methodical multitrack recording techniques pioneered by Les Paul represented an increase in compositional complexity rather than a conceptual shift. Focusing the recording process on the making of musical artifacts, and locating the identity of the musical work uniquely in the sound recording had always set rock apart. Moreover, merging the concept of musical work with the phenomenal actuality of concrete sound represents an oral/literate fusion--both practical and conceptual--of which some recordists were quite conscious. "We didn't write songs, we wrote records," claimed Jerry Leiber and Mike Stoller.¹⁷ The statement is fraught with implication, but it makes the recordists' conception of the

¹⁷ John Pareles and Patricia Romanowski eds., The Rolling Stone Encyclopedia of Rock & Roll (New York: Rolling Stone Press/Summit Books), p. 322.

project unequivocally clear. Leiber and Stoller did in fact write songs, but more importantly in their own minds, they produced the records for which the songs were only starting points. The manifest sound of the recording represented for them the ultimate form of the art work.

Although most rock criticism leans heavily on interpretation of lyrics, recordings themselves invite us to think about them in a more holistic way. They invite us to experience "the luminousness of the thing in itself, of things being what they are."¹⁸ In her essay "Against Interpretation," Susan Sontag writes: "the cinema...possesses a vocabulary of forms--the explicit, complex, and discussible technology of camera movements, cutting, and composition of the frame that goes into the making of a film."¹⁹ Recordings, too, have such a vocabulary, though "form" is already such an ambiguous term in musical discussions that I will substitute "technique." The techniques by which rock recordings are made are different from techniques of melody writing, formal design, or instrumental arranging. Although these latter are also represented in the record making process, they account for only a portion of the overall compositional project. Techniques such as microphone choice and placement, compression, and equalization are important determinants both of a recording's identity and its affective impact. Like any other compositional technique, they generate content, and

¹⁸Susan Sontag, "Against Interpretation," in Against Interpretation and Other Essays (New York: Anchor Books, 1990), p. 13.

¹⁹ Ibid., p. 12.

hence mastery of these techniques and an understanding of their rhetorical significance is as essential to the recordist's compositional craft as the manipulation of pitches and rhythms is to a composer working with musical notation.

"Composition" is not a term usually associated with rock recording. The term has a particular set of implications in Western musical usage, and although the practice of rock recording involves creating rhetorical constructs using a conventional vocabulary and grammar, it has rarely been characterized as composition. "The production of sophisticated high-tech sound," writes Rose Rosengard Subotnik, "...has replaced composition as the primary musical activity in Western culture."²⁰ What constitutes "the primary musical activity in Western culture" is, I think, impossible to say, but Subotnik could have easily avoided the pitfall of the sweeping statement if she had simply substituted "compositional activity." However, although Subotnik seems generally to support popular music, she evidently views its making as something other than composition. Composition with a capital C is presumably still associated exclusively with the making of scores. As I shall argue throughout this study, "production of high-tech sound"--though this is only a very partial description of what rock recording is--has not replaced composition in any way; with rock it has become a

²⁰ Rose Rosengard Subotnik, Developing Variations: Style and Ideology in Western Music (Minneapolis: University of Minnesota Press, 1991), p. 288.

new mode of composition. Rock recording has given us a somewhat different set of compositional concerns and a different kind of musical work, but as a process it has much in common with written musical composition, especially as the term has been understood in other conventional musical styles whether 1930s big-band jazz or eighteenth-century classicism. Though some of the poetic techniques differ, the artistic concerns involved in making a rock recording are in many ways the same as those encountered in studying compositional process in any of these other styles and idioms.

Commenting on a cultural survey taken of college students, Milton Babbitt has characterized the results in the "favorite composer" category as "a confusion." The top two "composers" named by the respondents were Bob Dylan and John Lennon. Babbitt claimed that his concern was not with "their tastes," but with the respondents' confusion of "composer" with "songwriter."²¹ This would be a reasonable enough distinction to make except that it loses sight of the fact that these students did not know Dylan or Lennon by their songs alone; they knew them by their records. A popular song is indeed a different kind of work from a Babbitt string quartet. The important functional difference lies not so much in aesthetic or stylistic matters but in relative degrees of specification. The song has a built in fluidity; that is, it can be interpreted in many different ways--pitches, rhythms,

²¹ Milton Babbitt, Milton Babbitt: Words about Music, edited by Stephen Dembski and Joseph N. Straus (Madison: University of Wisconsin Press, 1987), p. 181.

tempo, even words can be altered--yet it will retain its identity. A performance of the string quartet, on the other hand, must hew to a highly prescriptive written score. The elements that constitute the piece's identity are specific and detailed. This higher degree of specification requires a different, more labor-intensive and detail-oriented poetic process by which the composer's decisions gradually narrow the possible choices, until finally a particular set of musical relationships stands to represent the work. As the view emerged, throughout the nineteenth and twentieth centuries, that scores themselves are primary sites of musical meaning and identity, classical compositions have generally tended toward increasingly detailed written specifications, which exert a tight control over expressive variables.

The songwriter/composer distinction can thus be made on purely functional grounds; the two simply do not share the same aims. Rock songs, however, enter the culture in the first instance as recordings. Songwriting is only part of the record making process, which can be just as labor intensive and detail oriented as writing a piece for full orchestra. Moreover, the end result is even more specific than the most detailed score. It is "recordings rather than scores which represent an extreme form of reified abstraction," as Richard Middleton puts it.²² Thus rock composition and score-based

²² Richard Middleton, Studying Popular Music (Milton Keynes: Open University Press, 1990), p. 83.

composition share a functional similarity that informs the present study: they both focus on poesis; both are committed to making musical works. Where they differ, both practically and conceptually, is in their respective means of materializing the work. For the composer of scores, script remains primary; recordists, on the other hand, compose with sound. But both share a literate aim, namely to give permanent objectified form to musical relationships. In the case of recording, however, the literate aim is accomplished by an oral act.

Sources

At the end of his book, Sounds and Signs: Aspects of Musical Notation, Hugo Coles writes: "The tape recorder is increasingly used as a composing tool by means of which the inspiration of the moment may be fixed, considered, worked over at leisure...".²³ Since 1973, when Coles was writing, the sophistication and widespread availability of this "composing tool" has increased beyond all expectations. Formerly, only artists with some kind of significant financial support--corporate, governmental, academic--could afford to use the tape recorder as a "compositional tool" in any but the most primitive kind of way. In industrialized countries over the last fifteen years, however, there has been a proliferation of inexpensive, high-quality recording

²³ Hugo Coles, Sounds and Signs: Aspects of Musical Notation (London: Oxford University Press, 1974), p. 153.

and music production technology that has made recording technology available to unprecedented numbers of musicians and composers, both professional and amateur. Almost anyone who is so inclined can "write a record" of some sort. As such, recording has become a pervasive musical activity; recorders of all kinds (including computer sequencers) have probably become more widespread as compositional slates than manuscript paper, and interest in production techniques among musicians of all sorts, and even among many laymen, has grown steadily.

This expanded interest in the techniques of record production has coincided with a rising historical awareness in rock that has led to an ever more palpable sense of a "rock tradition" among many rock fans, critics, and contemporary rock artists. Compact disc technology has helped to generate this historical interest as record companies have found it very lucrative to re-release older recordings--whose costs have long since been recouped--on CD, which, in turn, has yielded a bonanza of formerly out-of-print classic recordings for record collectors and historians. The advent of the CD box set and accompanying documentation--e.g., historical essays, performance credits, recording information--has often brought to light materials that were previously unavailable. These include demos, alternate takes, session notes, and the like. Some scholars have begun to

apply sketch-study techniques to this material in an effort to gain insights into recordists' creative processes.²⁴

The confluence of practical, historical, and economic interests has given rise to a number of publications that provide, among other things: interviews not only of performers and songwriters, but of recording engineers and producers; articles on recording techniques and studio design; equipment reviews, recording industry news and features on historical figures and recordings of the rock era. In addition, there is an ever growing body of biographical and autobiographical literature that contains at least some information about recording histories and techniques. Drawing freely from this large reservoir of raw data has afforded me the advantage of access to a wide range of recordists working at different times and in different rock styles.

As much as possible, I have used the words of the recordists themselves to offer evidence of their concerns. Clearly my selection of statements already constitutes interpretation as it guides the focus on a given issue. But I have attempted to frame the context for artists' words carefully, with the aim of allowing them full and accurate resonance. Interpretation of artists' rhetoric has in many cases required collecting groups of similar statements by a

²⁴ For example, Daniel Harrison, "Good Vibrations: A Case Study of Compositional Process in Rock Music," read at the Joint Meetings of the American Musicological Society and the Society for Music Theory, November 4, 1993.

range of recordists in order to form a context for understanding the meaning and implications of testimony that is often quite metaphorical. Recurring references to "painting," "canvas," and "sculpture," for example, constitute a language practice among recordists that gives such statements a more concrete conventional meaning than they would have as isolated personal expressions.

By some standards, the rhetoric is often imprecise--references to "vibe" and "magic" are commonly encountered in otherwise quite technical discussions, for example--yet telling and rich in the kind of meaning that attends artistic knowledge and awareness. On occasion, I have paraphrased an especially atmospheric comment that I think contains a subtext that is substantive and illuminating. For the most part, however, I have sought to set up the discussion of a given issue in such a way that recordists' testimony is self-explanatory and serves to illuminate, personalize, and ground what might otherwise be abstract concepts.

Scholarly studies of rock music fall into two basic categories: those dealing with professional musicians (e.g., Robert Walser, Running with the Devil: Power, Gender, and Madness in Heavy Metal Music, Allan Moore, Rock the Primary Text: Developing a Musicology of Rock, Eric Tamm, Brian Eno: His Music and the Vertical Color of Sound) and those that deal with non-professionals and their projects (e.g., H. Stith Bennett, On Becoming a Rock Musician, Sara Cohen, Rock

Culture in Liverpool).²⁵ My work falls into the former category. I have drawn examples from a body of works that will be familiar to most readers, at least by name. Many of these are commonly found in the average record collection and, in any case, all are available as of this writing.

While an account of recording as compositional practice could easily and interestingly take the path of investigating non-commercial recordists, I have chosen my approach for three principal reasons. First are the obvious advantages to readers of easily accessed recordings. Since notated musical examples will have little place in this project, listening to the examples cited will be the only way for a reader to assess the argument. My second reason is woven into the compositional issue itself. Record-making techniques have acquired stylistic value through their use in a system of conventional procedures, and compositional decisions are based on rhetorical intent relative to a compositional and a stylistic language evidenced in a large body of works that circulate among recordists. The language has developed through the accumulation of relationships that individual artists and their works have formed with the larger cultural field comprised of other works, artists, ideas, trends, and

²⁵ In rock, it is difficult to gauge without first-hand experience of a musician's performing, songwriting, or recording whether or not "non-professional" has any qualitative implication. The nature of the rock music business is such that it is rarely possible to be a professional--i.e., money-making--musician playing and recording original music without the support of a record company, which in itself is no assurance of quality. Conversely, a great number of musicians now make and distribute their own recordings outside the support network provided by record companies, and some of these are superior to many "professional" recordings.

so forth. In other words, recordists' consciousness partakes of a Zeitgeist, the existence and one's awareness of which requires that recordings circulate as only commercial ones are able to do.

Finally, in examining recording practices and their role in defining an art work or a musical style, it is necessary to take account of their historical development. The development of a conventional system is, after all, an ongoing process where significance--meaning--is relative, cumulative, and changeable; contemporary context is central to an understanding of compositional concerns and the use of specific recording techniques on a given project. For most of its history, rock recording has relied almost exclusively on the support of record companies, and thus commercially available recordings are the only works that give us a way of tracing its historical development.

The present study is organized in a cumulative way. That is, each chapter builds upon the concepts, principles, terminology, and so forth presented in preceding chapters. Chapter 2 begins by defining the compositional project as the creation of a sounding work of music. While the work contains a song and a musical arrangement, its essential identity lies in a specific sonic rendering of these, which involves compositional concerns that are specific to the recorded work. Taking up the issue of content, Chapter 3 sets forth five categories of sound phenomena that account for what we hear on a record: musical performances, timbre, echo,

ambience, and texture. Each of these elements contributes in some significant way to the identity of the work, and each is examined separately in terms of its part in the overall compositional concern. In Chapter 4, the roles of the various participants in the recording project--songwriters, arrangers, musicians, engineers, and producers--are outlined in terms of the collaborative dynamics that shape most recording projects. Chapter 5 examines the functions of recording places and machinery in the compositional process and the nature of their presence in the finished work. Finally, Chapter 6 utilizes the ideas developed in discussion of the foregoing topics in a general account of the multitrack process as a multifaceted and collaborative compositional method.

My overall aim is to give an account of rock record making as a musical practice, an artistic endeavor. Rock has too often been treated as an economic, a political, or a social phenomenon first of all. The present study examines the compositional issues involved with this "new poetic mode"--which has brought us new ways of thinking about such categorical distinctions as orality and literacy, work and performance, idea and manifestation--using art works and artists' testimony as evidence. In an idiom that includes styles as diverse as rockabilly, soul, punk, pop, metal, folk rock, funk, rap, and house among many others, the range of compositional methods and aesthetics is correspondingly broad. But there is a common thread running through rock's

styles and genres; it lies in the nature of the compositional medium itself. Artists from across rock's stylistic spectrum compose their works with performances and cast their musical ideas in the form of sensory phenomena; they "embed their dreams in fragile ribbons of plastic and rust," as Jim Santo puts it.²⁶ This study, then, is an attempt to articulate the poetics of their collective compositional process.

²⁶ This citation was taken from Jim Santo's Demo Universe (<http://www.popes.com/demou/>)--a World Wide Web site devoted to reviews of independent recordings--on March 23, 1996. "Fragile ribbons of plastic and rust" refers to the makeup of magnetic tape.

2. THE COMPOSITIONAL PROJECT

Compositional Layers

In order to define the scope of the compositional project and to develop an analytical framework differentiating various aspects and stages of production, it will be useful to think of a recording as containing three distinct compositional layers: the song, the arrangement, and the track. (The three do not necessarily constitute a temporal sequence of activities or any kind of hierarchy.) Each of these layers involves a different kind of compositional activity, and each is a distinct entity. The song is that which can be represented on a lead sheet; it usually includes words, melody, chord changes, and some degree of formal design. The arrangement is a particular musical setting of the song. It provides a more detailed prescriptive musical plan involving instrumental parts, textural configurations, rhythmic groove, formal layout, and so forth. The track is the recording itself, the sonic artifact. This is the layer that represents the finished musical work.

Ultimately, of course, the layers merge. The track subsumes the other two layers and is dependent upon them for its existence. Song and arrangement appear as aspects of the finished work, or stages in the compositional process, but they both retain an ontological independence. They have modes of representation--lead sheets, scores, performances--other

than the recording. Although songwriting and arranging may coincide with recording in a single, integrated creative process, the song and the arrangement have their own unique integrity apart from the recording.

The focus of the present study is the use of the multitrack recording environment as a compositional medium, the process of constructing the sonic artifact. Hence the aim is to address the compositional issues that arise at that stage in the creative process where musical ideas are concretized and assembled into what is recognized as the work. Sometimes this stage proceeds from songwriting and arranging, a consequent creative activity with its own distinct set of tools, applications, and criteria. But the wide range of approaches to record making requires allowance for all sorts of overlap; the nature of the compositional project is defined differently in different cases. The different types and stages of creative activity are not necessarily separate; rather, they exist in a continuum which may be very fluid indeed. Approaches to record making can be classified according to the degree to which the creation of the layers overlaps.

Songwriting

There is a great variety of working methods and aesthetic philosophies that account for the various ways in which the compositional layers develop and interact. In cases where the three layers develop separately, songwriting and

arranging precede recording and mixing in a stage commonly referred to as pre-production. Since the recording will ultimately be composed of performances, this stage also includes developing and refining those performances prior to formal recording through a process of rehearsal, making demo tapes, and perhaps performing before an audience.

Producer Rick Rubin is "a great fan of pre-production." He believes that "the most important thing a producer can do is spend time getting the songs into shape before recording," and that this "should be done at home or in a rehearsal studio."¹ The recording studio, he argues, is not a place for songwriting, but rather a place to enter only at that stage in the process where the music--song, arrangement, and performance--is thoroughly formed, and the focus is on capturing its elusiveness. In his view, the studio "is a place to make magic happen."²

Rubin's approach to producing the Red Hot Chili Peppers' Blood Sugar Sex Magik album (1991) was to spend seven months in pre-production, "working on the material." This approach allows the songs and arrangements to develop in terms of the live sound of the band, which the recording process then has as a constant point of reference. Rubin stresses that "the material is so much more important than the sounds...the process of getting the music onto tape is very simple, but getting the music to the point where it's even ready to be

¹ Iain Blair, "Rick Rubin: Forever Def," Mix (January, 1992), p. 148.

² Ibid.

recorded is very tough."³ Rubin's approach to record making is sequential and cumulative; it emphasizes songwriting, arranging, and rehearsal as prior necessities to getting the most out of the studio environment.

In contrast to Rubin's approach, there are innumerable examples of records emerging from a synergistic creative process where song, arrangement, and track-creation proceed simultaneously and are continuously interactive. The British producer Steve Lillywhite allows that "as much pre-production as you do, it all sort of goes out the window when you get into the studio."⁴ John Leckie, whose production credits include Simple Minds, Human League, XTC, and the Stone Roses, believes that shaping the ultimate content of the song and the arrangement is "an ongoing decision-making process all the way through to the final mix." Although "...your personal approach may vary slightly or radically from inception to finish ... You shouldn't decide that a song is going to be ... of a very specific nature before you begin piecing it together."⁵ For Leckie, then, the final form of the song is influenced by the course of the record making process. In this approach, the song/track relationship is somewhat like that of a screenplay to a film. The song, or screenplay, provides a genesis and a guide to the work's ultimate form, but it remains malleable throughout the production process.

³ Ibid.

⁴ Paula Parisi, "Steve Lillywhite: From Ultravox to the Stones," Mix (May 1986), p. 115.

⁵ Camran Afsari, "John Leckie: From Abbey Road to the Stone Roses," Mix (January 1993), p. 62.

Peter Gabriel's working method represents an even greater integration of compositional layers. For Gabriel, songwriting and arranging are often indistinguishable from the process of track creation; the song is conceived and developed as a recording. Working always with a tape recorder, he deals with recorded sound from the earliest sketch stages, and is guided throughout the compositional process by his responses to aural images. As he puts it, "if a sound is a great one it almost has a song within it."⁶ His approach to track creation is highly empirical, free-ranging, and holistically interactive. In his view, "... if you don't have some recording device on all the time you're playing, you're going to miss some of your best moments."⁷

On Gabriel's Us album (1992), "the 'writing process' continued right through until the end of the recording process."⁸ The project engineer, David Bottrill, states, "We run DATs all the time as we're recording just for a reference, so that if a great performance happened about 15 minutes ago, we'll just spin the DAT back."⁹ Thus the work Gabriel does even at the earliest demo stage is of sufficient technical quality to be used as part of the finished product.

Bottrill provides a glimpse of Gabriel's working methods in a discussion of "Digging in the Dirt," the first single

⁶ Dominic Milano, "Peter Gabriel: Identity," Keyboard (October 1989), p. 44.

⁷ Ibid.

⁸ Richard Buskin, "Digging Deep with Peter Gabriel," Mix (March 1993), p. 44.

⁹ Ibid.

released from the Us album. After deciding on a rhythmic groove (which is usually his departure point), Gabriel improvised chord changes and vocal melodies--using only nonsense vowel sounds--in a succession of experimental forays. Every attempt was recorded and had the potential to eventually turn up as part of the finished track. At the very least, each attempt led to the next one in a series of related steps, each informed by those that preceded it. Throughout the process, Bottrill recalls, "Peter would basically be building up sections until he'd have a tentative structure of a song."¹⁰ The song, however, remained in a formative state even as the recording/mixing process moved into later stages. "The structures were constantly changing... In effect, the song was constantly being molded and built up over the two-and-a-half-year period."¹¹

In this song, then, Gabriel adds the dimension of recorded sound to the musico-linguistic aspects of songwriting from the very beginning of the creative process. His compositional method involves a series of responses to recorded sound. Indeed sound precedes melody, lyrics, harmony, and form. It is not surprising that Gabriel characterizes his sketch ideas not as themes, motives, and the like, but as "little snatches of sound,"¹² for it is actual sound, specific aural images, that guide his compositional course.

¹⁰ Ibid., p. 45.

¹¹ Ibid., p. 47.

¹² Milano, p. 44.

Arranging

Whether a song is written prior to recording or is developed through the recording process is a matter of the personal working styles of those involved and the logistics of the particular project. But however it is created, the song is available as an independent entity; it is easily separated from the context in which it is presented on the recording. Its integrity is such that it will retain its identity through any number of alternate renderings. Arrangements, on the other hand, are often more dependent upon the particularities of the recording for their identity, even existence. In attempting to characterize the nature and scope of the compositional project, it is important to recognize that an analytical division between track and arrangement may sometimes be artificial and misleading. In many cases, the course of an arrangement's development is guided by criteria that are unique to recorded sound. As an arrangement evolves, some of its most characteristic features may emerge as a result of multitrack techniques of assemblage, sound processing, and frequency manipulation. Yet while the effect produced by the recording may be very difficult to reproduce in a live performance, some version of the arrangement is available independently of the recording. Examining the relationship between live and recorded versions of a song can provide useful clues to the nature of the process by which the recording was made.

The arrangements for the Blood Sugar Sex Magik sessions, for example, developed as live performances. Although their particular concretization as recorded tracks may have involved some further editing, they were essentially complete prior to beginning the recording process. Indeed, Rubin reckoned that if he had left the project at the end of pre-production, the album would have sounded substantially similar, since formal recording was focused on capturing a sound that had already been developed.

Many of the arrangements on Los Lobos' Kiko (1992), on the other hand, were developed as constructs of recorded sound, without regard for rendering an image of the band's live sound. As producer Mitchell Froom puts it, "...the songs didn't suffer under the tyranny of their being a live representation of what was going to happen (in concert). They wanted to get cool noises and make it a cool record; then they could reinvent it live later."¹³ Thus a broad range of instrumentations and unusual techniques of sound processing form the rich palette of sound images from which the album's arrangements are made. In the song "Angels with Dirty Faces," (ex. 2.1) for example, an Optigon--"a cheesy-sounding keyboard that was sold at Woolworth's and Penney's in the late '60s and early '70s"--provides a gritty scratching sound that permeates the center of the track, creating a grainy sonic texture that underscores the emotional texture of the

¹³ Blair Jackson, "Los Lobos Paint Their Masterpiece," Mix (October 1992), p. 202.

song's theme of homelessness. This sound is essential to the character of the track, but its effect would be very difficult to duplicate live.

The work of the Beatles offers a range of examples along the continuum from pre-production arrangements to arrangements that result from the track creation process, with various degrees of hybridization and overlap in between. In the Beatles' case, notation often plays a telling role. Paul McCartney's recording of "Yesterday" (1965--ex. 2.2), for example, features an arrangement for voice, acoustic guitar, and string quartet. The string parts are completely notated; the guitar part functions as a continuo. The entire arrangement can be represented by conventional musical notation. As such it can be easily reproduced in a concert setting; it is not dependent upon the particularities of the track for its identity since it was created independently of the track.

George Martin--the producer of "Yesterday" and responsible for the string arrangement--was classically trained at London's Guildhall School of Music, and his arrangements for the Beatles often rely heavily upon musical notation as a prior stage to recording. But as things developed--as technology advanced and as the band's enormous popularity persuaded EMI, their record company, to allow them unlimited studio time--the Beatles and Martin were eager to experiment, looking for new ways to use the resources of the recording studio as creative tools.

The making of "Strawberry Fields Forever" began a new phase of the Beatles' career. No longer touring, and with unlimited studio budgets, they began to work exclusively in the studio, creating works that were never intended for live performance. Although the first album to emerge from the new approach was the revolutionary Sergeant Pepper's Lonely Hearts Club Band, the project began with the recording of a song that did not appear on that album, "Strawberry Fields Forever." The recording began on November 24, 1966, and continued for a month, during which time the arrangement underwent numerous changes. Originally presented by John Lennon to the other Beatles and Martin in a gentle acoustic guitar and vocal rendition, the song was subsequently arranged by the entire band and recorded in a version that in Martin's estimation "started to get heavy."¹⁴ Aside from the mellotron, this arrangement is a straight-forward guitar/bass/drums texture (ex. 2.3).

Lennon later decided that the song wanted a different interpretation, and he asked Martin to write one of his scored arrangements. Martin came up with an arrangement for trumpets and cellos whose effect is very different from the first one. The texture of the verses is spare and dry: voice, trumpet, and cello, accompanied by the strange sucking timbre of backward cymbals.¹⁵ In the choruses, the band joins in

¹⁴ George Martin, All You Need Is Ears (New York: St. Martin's Press, 1979), pp. 199-200.

¹⁵ This effect is created by recording with the tape running backwards. When the tape is played back normally, the recorded sound's envelope is reversed.

with electric guitar and a thick percussion part, creating an enveloping sound of murky darkness that contrasts sharply with the crystalline texture of the verses (ex. 2.4).

In this version, there is a confluence of two compositional types: what Ruth Finnegan has characterized as "the rock mode of collective prior composition"--which is an "oral and active group learning mode"--and the "classical mode of prior written composition by an individual."¹⁶ But both "modes" take place at the stage of pre-production. Lennon's next idea brought the recording medium itself into the arranging process, and moved the arrangement into a third compositional mode. Lennon decided that both versions had merit, and that somehow they should both be used. According to Martin's account, Lennon told him, "I like the beginning of the first one, and I like the end of the second one. Why don't we just join them together?"¹⁷ The two versions were in different keys--a half-step apart--and tempos, but Lennon by now had complete faith in Martin's abilities. "You can fix it George," he said.

Martin's solution was to slow one version down and speed the other up--using the variable speed control on the tape machine--matching the pitches and tempos sufficiently to make a credible, if not altogether unobtrusive, edit. Martin then selected "precisely the right spot" to cut and splice the two tapes, which was determined to be one minute into the track

¹⁶ Ruth Finnegan, The Hidden Musicians: Music-making in an English Town (Cambridge: Cambridge University Press, 1989), pp. 160-79.

¹⁷ Martin, p. 200.

at the beginning of the second chorus. Geoff Emerick, who was working as the Beatles' engineer at the time, recalls gradually decreasing the pitch of the first version just before the edit point to make the splice as smooth as possible. This can be heard on the word "going" from the line "Let me take you down 'cause I'm going to" (ex. 2.5). The effect is slightly surreal and well in keeping with the overall atmosphere of the track. The creative use of available technology to build an arrangement--which on this track includes the use of the mellotron, backward tape effects, panning effects, the false fade in the coda--became a hallmark of the Beatles recording style for the remainder of their time together as a band.

Karl Wallinger's work is heavily influenced by the production techniques of the seminal 1960s recordings that used the recording process as a compositional medium. Echoes of the Beatles, the Beach Boys, Jimi Hendrix, Phil Spector, and many others are common on his World Party records. Wallinger, who does his own engineering and production work, as well as writing, arranging, and most of the playing, creates arrangements that are seamlessly integrated with the track, often drawing attention to the fact that the recording is not a live performance, but an imaginary sound world to be experienced on its own terms. At the very beginning of the Goodbye Jumbo album (1990), for example, he announces over a repeating drum machine pattern, "Okay, rolling" (ex. 2.6). It is at once a recognition of artifice and an invitation to

enter the sound world of the artificer.¹⁸ Similarly, the strange beginning of "Is It Like Today?" from Bang! (1993--ex. 2.7)--something like the sound of a tape recorder being turned on in the midst of some ongoing music making--announces that the machinery and techniques of the multitrack studio are central to what this music is about. The principle is illustrated again and again on Wallinger's records. With dense textural layerings that are so dependent upon the amplitudinal control of the mix for their balance and character; with complex and often subtle electronic effects that exploit the stereo panorama as a dramatic stage; with the liberal use of backward tape and other highly processed sounds, and in myriad other ways, Wallinger creates musical arrangements that are shaped in terms of recorded sound.

Track

Conventional musicological methods are often criticized for their inadequacy and wrong-headedness in dealing with rock music.¹⁹ But in my view, it is neither musicology nor rock's fault that they have proven ill-suited to one another; there is something of an ideological chasm between the two.

¹⁸ It is also a reference to the famous "Is it rolling Bob?" that Dylan addresses to producer Bob Johnston at the beginning of "To Be Alone with You" on his Nashville Skyline album (1969).

¹⁹ See, for example, Richard Middleton, Studying Popular Music (Milton Keynes: Open University Press, 1990), pp. 103-26; Susan McClary and Robert Walser, "Start Making Sense: Musicology Wrestles with Rock," in On Record: Rock Pop and the Written Word, Simon Frith and Andrew Goodwin, editors (New York: Pantheon Books, 1989), pp. 277-92; Philip Tagg, Kojak--50 Seconds of Television Music: Toward the Analysis of Affect in Popular Music (Göteborg, Sweden: Musikvetenskapliga Institutionen, 1979), pp. 28-32.

Simply put, musicology and music theory deal primarily with a written, rather than a sounding, text.²⁰ Every performance of a notated piece of music has a score--a non-sounding representation of music--as an underlying referent. Beginning in the early nineteenth century, an ideology took root that located the essential identity of the musical work in the score, rather than in the performance. And it is to the content of scores that most musicological study has been directed. As Carl Dahlhaus points out: "The new insight that Beethoven thrust upon the aesthetic consciousness of his age was that a musical text, like a literary or a philosophical text, harbors a meaning which is made manifest but not entirely subsumed in its acoustic presentation--that a musical creation can exist as an 'art work of ideas' transcending its various interpretations."²¹ Dahlhaus states further that, although this ideological viewpoint emerged within a particular historical context, it "is now taken for granted among the artistically well educated."²² Indeed, it is the basis of such famous aesthetic dualisms as Schoenberg's "style and idea" and Ives's "manner and substance," as well as musings on the nature of the

²⁰ Notable exceptions include: Pierre Schaeffer's Traité des objets musicaux (Paris: Editions du Seuil, 1968), Robert Erickson's Sound Structure in Music (Berkeley: University of California Press, 1975), Robert Cogan and Pozzi Escot's Sonic Design: The Nature of Sound and Music (Englewood Cliffs, NJ: Prentice-Hall, 1976), and Wayne Slawson's Sound Color (Berkeley: University of California Press, 1985).

²¹ Carl Dahlhaus, Nineteenth-Century Music (1980), trans. J. Bradford Robinson (Berkeley: University of California Press, 1989), p. 10.

²² Ibid.

work/performance relationship that have occupied philosophers such as Roman Ingarden, Nelson Goodman, and many others.²³ As Beethoven refused to have his musical ideas limited by the capabilities of Ignaz Schuppanzigh's "wretched fiddle," so Ives chafed at the confinement imposed by sound upon music: "Why can't music go out the same way it comes into a man, without having to crawl over a fence of sounds, thoraxes, catguts, wire, wood, and brass? . . . That music must be heard is not essential--what it sounds like may not be what it is."²⁴

If in fact one takes such a view for granted, it is inevitable that many of the principal elements of rock composition will simply be overlooked, or at least undervalued. A rock recording is not an "acoustic presentation" of a written text; "what it sounds like" is precisely "what it is." The rock text is a sounding thing whose impact is first of all physical; we only begin to know it as it reaches our ears. It has no satisfactory visual representation, and studying it involves a direct transference of temporal, physical experience into the atemporal, abstract realm of intellect.

²³ Arnold Schoenberg, "New Music, Outmoded Music, Style and Idea" (1946), in Style and Idea: Selected Writings of Arnold Schoenberg, trans. Leo Black, Leonard Stein, ed. (New York: St. Martin's Press, 1975), pp. 113-24; Charles E. Ives, Essays Before a Sonata (1920), in Essays Before a Sonata, The Majority, and other writings of Charles Ives, Howard Boatwright, ed. (New York: W.W. Norton, 1970); Nelson Goodman, Languages of Art 2nd ed. (New York: Hackett, 1976); Roman Ingarden, The Work of Music and the Problem of its Identity (1966), trans. A. Czerniawski (Berkeley: University of California Press, 1986).

²⁴ Ives, p. 84.

What accounts for the impact of records such as the Kingsmen's "Louie Louie" or Frankie Goes to Hollywood's "Relax?" Their linear design, harmonic motion, motivic integrity, and formal design--all of which can be represented and studied on paper (in a score, transcription, lead sheet, etc.)--shed little light on the question. Indeed, there are dozens of rock records that have had an enduring cultural impact, yet whose songs do not amount to very much when reduced to a lead sheet. Their significance lies rather in the composite sound-picture they present. The intersections and interactions of all its many particular constituent parts --and the discourse they create with one another and with the stylistic, historical, and social field of rock culture in general--are what give a rock record its sound, its resonance, its identity. The musical idea is contained in its sonic manifestation and is inseparable from it. Hence analysis, to remain true to the nature of its subject, must consider the constitutive elements and characteristic features of recorded sound with the same care and attention to detail that attends the study of melody, harmony, lyrics, rhythm, form, and the like.

Even in a case such as "Yesterday," it would be inaccurate to say that the recording simply documents a performance of the song as arranged by McCartney and George Martin. The track for "Yesterday" is a composition in its own right, and, as its recording history confirms, although the multitrack process did not come into play in the writing or

arranging of the song, it clearly shaped the track. According to Martin, who produced the session, the first step in the process was to capture a simultaneous guitar/vocal performance by McCartney. "Then we overdubbed the strings while Paul had another go at the vocal. But because we didn't use headphones there was leakage from the studio speaker into his microphone, giving the impression of two voices or double-tracking."²⁵ The doubled voice, the image of a person singing with himself, moves the song and the arrangement into a sound world that is unique to recording. Furthermore, the fact that the track consists of separate performances that have been brought together by an electronic process--defining much of the orientation of the performances' relationships to one another--makes it something quite distinct conceptually from a recording of a live performance.

The rock text, then, is the track. Its composition involves making, capturing, and shaping actual sound. Its poetic materials are such things as concrete timbres and textures, ambient images and musical performances; its procedures include such things as spatial arrangement, electronic timbral manipulation, assembly of diverse "ear points"²⁶--provided by multiple microphones, each presenting a separate acoustic point of view--into a composite acoustic image, and managing relationships among the various areas of

²⁵ Mark Lewisohn, The Beatles Recording Sessions (New York: Harmony Books, 1988), p. 59.

²⁶ H. Stith Bennett, On Becoming a Rock Musician (Amherst: University of Massachusetts Press, 1980), p. 119.

the frequency spectrum. Formal structure, dramatic strategy, associations across the stylistic field, manipulation of affect, and ultimately the range of meanings that resonate from a track are developed through the assembly of sound images to form a sounding composition. Hence grammatical issues include not only musical and lyric elements of the conventional stylistic system, but also sonic ones. The grammar of sound recording--no less than that of music or words--provides a guide to interpretation, a context for situating problematic expressions and a key to the significance of rhetorical gestures.

I should say what I mean by the terms grammar and rhetoric. They have often been applied to music in terms of language/music analogies that can be quite direct. Theorists since at least the sixteenth century have drawn correlations between rhetorical elements in language and specific musical phenomena. Thus, for example, in his Tractatus compositionis augmentatus (ca. 1655), Christoph Bernhard systematically equates various kinds of dissonance treatment with rhetorical figures. A changing note is characterized as a superjectio, an incomplete lower neighbor is labeled subsumtio, and so on. And Johann Mattheson, in Der vollkommene Capellmeister (1739), relates musical form to that of an oration.²⁷ I do

²⁷ Christoph Bernhard, Tractatus compositionis augmentatus, trans. Walter Hilse in The Music Forum 3, William J. Mitchell and Felix Salzer, editors (New York: Columbia University Press, 1973), pp. 1-196; Ernest Harriss, Johann Mattheson's 'Der vollkommene Capellmeister': A Translation and Commentary (Ann Arbor: UMI Research Press, 1981). See also Joachim Burmeister's analysis of Lassus's motet In me transierunt in his Musica Autoschediastike... (1601).

not mean, by my use of terms such as vocabulary, grammar, and rhetoric, to imply any such set of direct correspondences, but rather to draw upon the underlying principle of convention. Grammar provides normative procedures for ensuring correctness and coherence within a given conventional system at a particular time in that system's history. Rhetoric, on the other hand, is the artful manipulation of grammar, the play of the individual imagination within a conventional framework. As one writer has pointed out, rhetoric "is at least in part an aesthetic category."²⁸ It uses grammar as a tool and a frame of reference to make expressive flourishes that, while personal, are persuasive in terms of the conventional system they inhabit.

Rhetorical individuality often involves deviation from grammatical correctness. For example, at various times in the history of rock recording, grammatical correctness has included such things as (1) sonic clarity, (2) a solid, pitched foundation in the lower part of the frequency spectrum (usually provided by a bass guitar or synthesizer), and (3) avoidance of electronic overload causing distortion. Yet each of these three examples has striking exceptions, which in some cases not only stand out as dramatic individual rhetorical gestures, but can actually claim to have had some part in redefining the grammatical system.

²⁸ Mark Evan Bonds, Wordless Rhetoric: Musical Form and the Metaphor of the Oration (Cambridge, MA: Harvard University Press, 1991), p. 69.

Phil Spector achieved his signature sound precisely by obscuring sonic clarity. From his earliest recordings he sought to create a thick, impressionistic texture where discrete parts receded into the overall sonic tapestry (e.g. "Then He Kissed Me," 1963--ex. 2.8). He rejected eight-track recording, when it first became available to him in 1960, because it provided too much clarity;²⁹ and he routinely overloaded recording console and tape machine inputs, using the resulting distortion as sonic ingredients. Engineers and musicians alike complained about his unorthodox methods, but it was difficult to argue with his success. Spector's records were conventional enough to be hits, yet personal enough to be artistic statements. But it is not their songs or their performances that set them apart from contemporary recordings as bold and daring rhetorical displays. It is their sound.

A powerful bass sound is one of the defining elements of rock. But in his recording of "When Doves Cry" (1983--ex. 2.9), Prince used no bass at all. The only low end on the track is provided by the bass drum and some low tom-toms. The effect is stunning from the standpoint of conventional expectation. The spare sound of the track, with its airy low end, provides a very beautiful setting for the song and Prince's vocal performance, but its impact is magnified by the striking deviation from grammatical norms. The successful

²⁹ Since 1957, Atlantic recording engineer Tom Dowd had been using an eight-track machine to capture and assemble Jerry Leiber and Mike Stoller's arrangements with clarity and precision. Spector, who went to work for Leiber and Stoller in 1960, found the technique and its results alien to his ideas of how a record should be made and how it should sound.

manipulation of stylistic convention was noted by Jive Records president Clive Calder, who, in 1983, circulated copies of "When Doves Cry" among his staff engineers with a memo stating that he was sure this would be a huge hit, and to please note the lack of bass.

Finally, overloading electronic circuits of all sorts--once considered a taboo among recording engineers--has become one of the most basic techniques for creating uniquely electronic timbres that attach themselves to the musical gesture, extending its meaning, and becoming an integral part of its identity. The guitar riff that permeates the Rolling Stones' "(I Can't Get No) Satisfaction," (1964--ex. 2.10) for example, situates itself as a central characteristic element in the overall identity of the track not simply as a result of its pitch, rhythmic, and registral configurations. Of at least equal importance is its manifestation on the recording as an overtly challenging sound. Paul McCartney describes the creative use, or misuse, of technology to create distortion on the later Beatles sessions in terms of "defeating the machine." He cites "Ob La Di, Ob La Da" (1968--ex. 2.11) as an example of a technique they commonly used of "over-record(ing) an acoustic guitar." "(Y)ou'd swing the needle into the red and it'd be there, hard, every time you'd played it." The functional characteristics of the recording circuit are here being used "incorrectly," causing distortion, and resulting in the timbral transformation of an acoustic guitar (with all its conventional associations) into some kind of

hybrid sound that exists only on the recording. "(T)he acoustic would come back like an electric, it wouldn't distort too much, it would just mess around with that original sound. It'd make it hot. You'd defeated the machine, you'd actually screwed it up a bit."³⁰

Each of these examples makes a rhetorical gambit by manipulating, or deliberately subverting, grammatical convention. And in each case the rhetorical move is made in the context of recorded sound. Although these examples present pervasive--thus obvious--problematic gestures, the frame of reference also includes very small, often fleeting, sonic details. A guitar sound, a vocal inflection, a certain kind of echo--these are among the myriad elements that influence reception and interpretation. The effect of the rhetorical gesture acquires significance through the entire complex of the sonic character it presents in relation to the conventional system. Although the interpretive possibilities offered by the sounds manifested on the recording represent only part of the whole (along with lyrics, melody, rhythm, etc.), they are crucial. They demand that the recording be understood on its own terms, as a sounding artifact. This brings to mind Richard Middleton's discussion of "primary signification," which is best explained by his characterization of Claude Levi-Strauss's theory of myth: myth "does not signify, it is; it does not deal in

³⁰ Lewisohn, p.11. In this example, the guitar is somewhat obscured by the piano. The effect McCartney describes can be heard more clearly on "I'm Only Sleeping" (Revolver, 1966).

representation of the world but in reciprocal correspondences--between myths, between elements and codes in myths, and between these and other structures which can be thought of as analogous, and which therefore 'mean' each other."³¹

Throughout the poetic/aesthetic economy of rock--among artists, fans, and critics--artworks are commonly sited and interpreted in terms of other artworks. Hence their meaning accumulates in an ongoing centripetal process that continually connects the individual work to other works, past, present, and future. In a recent review of The Apartments' A Life Full of Farewells, for example, one reviewer writes, "The arrangements feature prominent acoustic guitars, piano, occasional pedal steel, and, most notably, trumpet; think Van Morrison circa Inarticulate Speech of the Heart and you've got it."³² And in a characteristically expressive description of Richard Manuel's vocal style, Greil Marcus has written: "There are times when Richard Manuel sounds like the ghost of Johnny Ace (that sweet-voiced fifties R&B singer who died in a game of Russian roulette)--Johnny Ace condemned to haunt a gloomy radio, from which 'Pledging My Love'...issues every time you spin the dial. There are times when the tone is desperate, close to the panicky feeling Marvin Gaye got on 'I Heard It Through the

³¹ Middleton, pp. 222-23.

³² Dave DiMartino, Review of The Apartments' A Life Full of Farewells, Musician (August 1995), p. 92.

Grapevine.' But more often than not, the music is simply ominous."³³

Such intertextual sitings are extremely common in discourse about rock music; and that is because the practice of intertextual reference is a fundamental element of the idiom. It is a contextualizing force that places the individual recording within a galaxy of other recordings--allowing it a greater expressive range than it could achieve on its own--and provides the listener with a broad interpretive field. Marcus's characterization has a suggestive resonance that is at once impressionistic and precise. The connection between Manuel, Ace, and Gaye is an interpretive act on Marcus's part, a general impression of the evocative qualities of a collection of voices emanating from a loudspeaker. But anyone who knows the three singers, their records, the historical context of their hits (in one's own life as well as in society at large), the stylistic framework within which they worked, and the emotional aura surrounding their work knows exactly what Marcus means.

³³ Greil Marcus, Mystery Train: Images of America in Rock 'n' Roll Music (New York: E.P. Dutton, 1976), p. 54.

3. COMPOSITIONAL ASPECTS OF THE TRACK

Piecing together grammatical constructions and rhetorical statements requires an available vocabulary. The track-creation process involves the polyphonic weaving together of a range of sonic elements which can be broadly grouped into five categories of sound phenomena: 1) musical performance, 2) timbre, 3) texture, 4) echo, and 5) ambience. All of the sounds heard on rock recordings fall into one or more of these categories, as do the issues addressed by the various kinds of compositional procedure involved in record production. This chapter examines compositional issues associated with each of these categories in some detail, exploring the nature of the compositional problems involved, including issues of conventional significance and rhetorical manipulation.

Musical Performance

Recording has brought a new kind of consciousness to musical performance in general. Removing the dynamic energy and spectacle of the performer's presence, and subjecting the performance to the scrutiny of unlimited repeated listenings places unique demands on the recording. To use Walter Benjamin's terms, having forgone the "aura" of "presence," the recording must touch the listener by purely sonic means. This has led to a quest for some sort of ideal recorded performance, one which succeeds in convincing the listener

that the recording is somehow a unique and independent aesthetic entity, not a mere reproduction or a substitute for the "real thing." From this pursuit has emerged a process whereby performances are built in a series of stages. Various aspects of the performance are compartmentalized and considered separately, thus providing an ever-finer editorial control extending far beyond the moment of performance. In this process musical performances are treated as material. After the playing is finished, the material is worked in the mixing and editing process, and ultimately fashioned into what is heard on the recording as a "performance."

In Andrew Kazdin's account of his working relationship with Glenn Gould, he makes it quite clear that the stages of making a classical recording--of building its "performance"--are distinct, often separated from one another by time and place, and influenced by intervening periods of analysis and rethinking.¹ Already, in the deliberate construction of any sort of "performance," there is an element of composition. But in classical music, especially on modern recordings, there is a limited range of parameters where creative variation is tolerated. In popular music, on the other hand, creativity in performance is a basic condition. From the skeletal outline depicted on the lead sheet, the singer creates a character that not only renders the song, but completes it. All the particularities of performance--the

¹ Andrew Kazdin, Glenn Gould at Work: Creative Lying (New York: E.P. Dutton, 1989).

melodic elaborations, paralinguistic vocal sounds, particularities of phrase, diction, and timbre--combine to create a unique version that fills in the song's outline with musical and expressive details. In most styles of popular music, instrumentalists also have some degree of creative latitude. From a personalized approach to sound production and phrasing, to rhythmic interpretation, to outright improvisation, their performances create a music that is only hinted at by musical notation. On a recording, these creative contributions combine to make the musical work; they are transformed from impermanent acts of musical expression to fixed aspects of the work's identity. In such a context, shaping the particular configuration of specific performances is central to the creative compositional process.

While rock recordings present images of apparent musical performances, most recording projects bear little resemblance to live music making. Performing in the recording studio is not an end in itself; rather, it is a means of acquiring materials for constructing the track. Paul Clarke has pointed out that "even those recorded songs which exhibit a marked reliance on improvisation and expressive elaboration need to be evaluated ultimately as considered compositions."² He goes on to cite Greil Marcus's assessment of Elvis Presley's earliest recording sessions for Sam Phillips (hereafter referred to as the Sun sessions), performances which were

² Paul Clarke, "'A magic science': rock music as a recording art," Popular Music 3 (1983), p. 201.

recorded as complete takes, without overdubbing or tape editing. Marcus notes that "nearly every record Elvis made with Sam Phillips was carefully and laboriously constructed out of hits and misses, riffs and bits of phrasing held through dozens of bad takes. The songs grew slowly, over hours and hours, into a music that paradoxically sounded much fresher than all the poor tries that had come before..."³

Marcus's use of the term "constructed" suggests that the recorded performance, though unedited, is still somehow the result of a building process. Simply documenting a performance--one of many equally-possible performances--does not make a record. In order to qualify as an artistic entity in its own right, the recorded performance must convince us that, as far as the recording is concerned, it is the only one possible. Building an aesthetic structure that can function in the absence of "aura" is the recordist's ultimate challenge and goal. There is no sure or certain way of doing this, but the recording process itself is a path of discovery. Sam Phillips speaks of going "into the studio to draw out a person's innate, possibly unknown talents,"⁴ and of performers "creat(ing) in a studio"⁵ (emphasis mine).

"Composing" performances takes many forms. In the case of the Sun sessions the process involved a series of steps--recorded attempts--each suggested by those that preceded it.

³ Marcus, p. 173.

⁴ Ibid., p. 168.

⁵ Ellis Amburn, Dark Star: The Roy Orbison Story (New York: Carol Publishing Group, 1990), p. 47.

As Marion Keisker--office manager of Phillips's Memphis Recording Service--puts it, "each record was sweated out with hours of do it again and hold onto that little thing there."⁶ The cumulative sequence of takes and analyses shaped the ultimate performances, but the "feel" that Phillips so prized was contained in complete gestures. Hence, there was a consistent separation between performance and analysis; analytic editing rarely entered within the boundaries of the complete performance. In other cases, however, performances are assembled by splicing together pieces of different takes. Although this may involve literal tape splicing, it also includes techniques such as recording many complete performances of a given part on separate tracks and then assembling a composite performance, or "punching in," that is, recording part of a performance (as little as a single note) within an existing one. Whatever form it takes, this practice represents the intrusion of analytic consideration into the midst of the musical performance. At some point in the process, the emphasis shifts from performance as activity to performance as structure, from doing to making. Peter Gabriel's vocal on "Love to be Loved," for example, was recorded some forty times, and David Bottrill recalls "probably" using "bits from each performance"⁷ to construct the one that appears on the recording (Us, 1992). In other

⁶ Jerry Hopkins, Elvis: A Biography (New York: Simon and Schuster, 1971), p. 117.

⁷ Richard Buskin, "Digging Deep with Peter Gabriel," Mix (March 1993), p. 48.

words, the vocal "performance" on the recording, seamless though it may appear, has literally been edited into existence.

Another practice that has become common since the advent of digital sampling is after-the-fact alteration of a performer's sound. This is especially widespread with drum parts, where the rhythm data is retained, but the sounds are replaced or supplemented. Sound quality is an essential aspect of any performer's technique and expressive style; the act of performing involves continual responses to the sound being produced. The dynamic shape of a phrase, the interpretation of a rhythm, or the improvisation of a fill, for instance, are always connected to what the performer hears. Indeed, all aspects of a performance are in some way interdependent. To keep some aspects and replace others is a further analytic atomization of the musical performance. When a performance shaped in terms of one set of sounds is adapted to a completely different set, the relationships among the various performance parameters are, again, brought under a compositional kind of control. Responsibility for reassembling and reordering the relationships may remain with the performer, or pass to the producer or engineer, but, in any case, the performance is transformed from an integrated, real-time process to a composed structure consisting of discrete elements.

This analytic breakdown of performances is a basic principle underlying computer-based sequencers. They record

no sound at all, only performance data. All performance parameters--pitch, attack, duration, dynamics, pedaling, pitch bend, and so forth--are automatically recorded separately and can therefore be edited individually. Furthermore, editing systems for hard-disk recorders allow a similar sort of compartmentalized control over recorded sound.

These practices are carried out within the individual performance; but the concept of performance-building extends to ensembles as well. In addition to preserving the integrity of individual performances, Presley's Sun sessions captured an image of the performing ensemble playing together at the same time and place. With the advent of overdubbing, however, different components of a track could be split up and recorded separately. In its extreme form, this leads to situations where a band can record an entire album, yet never see one another in the recording studio, and living performers can "perform" with dead ones.⁸ It also makes it possible to move master tapes around the world, recording different musicians in different place at different times, and creating collages of musical cultures and recording places (e.g., Paul Simon's Graceland, 1986, and The Rhythm of the Saints, 1991). Hence, unity of time and place, a given in live performances, is replaced by a new dynamic, one which

⁸ Paul McCartney, George Harrison, and Ringo Starr, for instance, have created new Beatles tracks using John Lennon demos as a foundation. E.g., "Free as a Bird," The Beatles Anthology, vol. 1 (1995).

inevitably affects the kinds of performances that appear on the recording.

Roy Halee, who has worked with Paul Simon off and on as engineer and producer since Simon & Garfunkel's Wednesday Morning 3 A.M. (1964), offers the following account of a track on The Rhythm of the Saints:

...there's one track called "Proof." It's like the U.N. We cut the track in Paris because the Cameroonian rhythm section live in Paris. That was two guitars, bass, keyboards and a drummer playing foot pedal and a high hat for time. Then we brought in "legit" horn players from Paris. We came back to New York and put a South African bass player on it (Bakhiti Kumahlo), an American drummer (Steve Gadd), and an accordionist from New Orleans (C. J. Chenier)...Then we took it down to Brazil...where we put on all kinds of added percussion. Then we brought it back to New York and added on female singers from Cameroon and a shaker player from New York, Ya Yo. And then after all that, Paul put his vocals on.⁹

Removing the unity of time and place by splitting up ensembles provides compositional control over the relationships among different performances that together constitute the track. In addition to providing maximum control over sound quality and technical execution, recording performances separately offers the opportunity for a single

⁹ Bill Milkowski, "Roy Halee: Capturing The Rhythm of the Saints," Mix (October 1990), p. 58.

performer to play multiple parts. The result is a virtual ensemble like the one Danny Kortchmar assembled on "If Dirt Were Dollars" (ex. 3.1) from Don Henley's The End of the Innocence album (1989). "With 'Dirt,'" says Kortchmar, "it was like a really funky band. What I was going for was a really rockin' band. And that's what it sounds like, but it was really all programmed."¹⁰ The ensemble never actually existed as a physical entity; it comes into being via the recording process, and has its existence only as recorded sound.

More importantly, from the standpoint of compositional process, recording parts of the ensemble separately makes the ordering of response patterns within the ensemble highly variable and subject to a structural process. By controlling the order of events in the recording process, performers' responses to one another can be guided according to a preconceived plan. A percussion performance, for example, might have a vocal--rather than, more typically, a bass and/or other rhythm part--as its primary reference point. Indeed, during recording, any kind of ensemble can be created--simply via the headphone mix--and used temporarily to influence the character of any given performance. These temporary combos serve a range of both pragmatic and expressive functions as they focus musicians' responses in specific directions.

¹⁰ Sue Gold, "Danny Kortchmar: No Longer Innocent," Mix (December 1990), p.91.

Discussing the making of his Mistrial (1986) album, Lou Reed describes the series of steps that led to the realization of what he called, at the time, his "perfect" record. Among the instrumental parts, he wanted the guitar to be the record's central character. Although his preference had been for recording basic tracks live--to capture something of the feeling of musicians interacting "naturally" in real time--he had always been dissatisfied with the results. As a matter of sheer studio logistics, Reed was never close enough to his guitar amplifier, resulting in what he felt was a loss of control over his sound. "The band is playing to that guitar,"¹¹ notes Reed. With an unsatisfactory performance as the band's central referent, a kind of domino effect set in and the overall performance suffered. His solution, suggested to him by Ric Ocasek, was to record the guitar parts accompanied only by a drum machine and a guide bass track. When the guitar performance was shaped to his satisfaction, the real bass and drum parts were recorded. At this stage in the process, the performers' responses were focused on the finished guitar part.

Reed's approach to recording Mistrial is not unusual. However, I cite the example not simply for its method, but for its intent. For Reed, "The heart of a rock and roll record is guitar and voice."¹² The multitrack process in this case is used to provide optimum logistical conditions for the

¹¹ Dan Daley, "Lou Reed Acquits Himself Well with Mistrial," Mix (October 1986), p. 113.

¹² Ibid.

creation of the instrumental track's central character--the guitar--and then to provide an environment that orients the subsequent performances toward that character. Mistrial, then, offers a clear example of how the practical advantages --from the standpoint of controlling the sound--of tracking instruments separately, and in a particular order, can also serve to shape the expressive character of the track.

Many performers, on the other hand, are reluctant to split up their performances. They may feel that it is a live performance in the studio that best captures their sound, or that the overdubbing process becomes too artificial, lacking authenticity and antithetical to spontaneous music making (this is especially prevalent among punk or alternative bands). Moreover, developing a recorded performance often involves a great deal of repetition which some performers find intolerable. Studio resources allow producers to get the most out of performers by acceding to their technical and aesthetic preferences and habits, yet reserving for the themselves the ability to shape an edited performance that "sounds like a record." The following is Butch Vig's account of recording Nirvana's Nevermind (1991): "The band is really into spontaneity and first takes, and they weren't very good at doing things over and over again. So every time they were warming up, I'd be recording. After I felt they had some good performances, I'd use an Akai sampler to take things and move

them around."¹³ Vig also notes that "alternative bands are more suspicious of technology than other bands." He respects their aesthetic point of view as a "purist thing." The bands do not want to "feel like it's (the music) been heavily manipulated." Nevertheless, it falls to him to make the performance work as a recording, and, although the raw expressive sound of a live punk performance serves as a referential frame, the process of making the record remains a very deliberate one where the producer uses the band's performances as construction materials.

Early Phil Spector recordings illustrate a quite different approach to ensemble recording, one that very few producers could get away with. Spector wanted to capture the feel and energy of live playing; he hired some of the best studio musicians in Los Angeles, including many fine jazz players. But his approach to building a track like "He's a Rebel," for instance, required them to submit to a long period of repetitive experimentation before any recording took place. Although performances were usually recorded in complete takes, the process of honing the image of the track prior to recording was a tedious one for the performers. Spector built his instrumental accompaniments by experimenting with mixes and balances of sonorities as the studio musicians played their parts over and over again in an hours-long process that was a combination of arranging,

¹³ Blair Jackson, "Digital Signal Processing at the Top of the Charts," *Mix* (March 1992), p. 37.

rehearsal, and mixing. He continually made adjustments--in microphone placement, balance, arrangement, ambient processing, and so forth--until he heard the sound he was after. He used performers to fuel his creative process, directing their skills to provide himself a living sound canvas upon which he could work out his musical ideas in the realm of actual sound. To the jazz guitarist Howard Roberts, Spector "was using repetition...to get his piece figured out."¹⁴ And the bassist Ray Pohlman recalls that he (Spector) "always seemed to have an idea of what he was after, but I don't know if he could always express it. He would let it happen with the band and let it evolve."¹⁵

Roberts contrasted a typical session for Nelson Riddle with one for Spector: "With other producers, there would be some little fine adjustments here and there, and you'd do four sides in three hours and leave. With Nelson Riddle, it sounds great. But with Spector, we'd sit there for hours on end on one tune, strumming these three chords."¹⁶ The difference is clear. A typical Riddle arrangement is a fully-notated piece of music; the recording session is dedicated simply to capturing a clear and transparent representation of the performance at hand. Spector, on the other hand, was seeking a musical image that could not be represented in musical notation. Its only existence prior to recording was in his imagination, and it required an empirical process to

¹⁴ Mark Ribowsky, He's a Rebel (New York: E.P. Dutton, 1989), p. 123.

¹⁵ Ibid., p. 93.

¹⁶ Ibid.

take on concrete form; it only came into being as sonic layers were mixed and processed. He used performers almost as human sequencers, playing their parts again and again as he searched for precisely the right balance of sonorities. Billy Preston, who worked on Spector's production of George Harrison's All Things Must Pass, recalls that the process "was monotonous as hell. But he was making it the Phil Spector sound."¹⁷

Removing musical performance from its traditional contexts and functions, and turning it into material, creates a variety of risks and problems. Although the recording is deliberately put together in a series of steps, it remains a real-time musical experience for the listener. It is perceived not as an analytic construct but as a musical performance and must, therefore, convey a believable expressive feel. In the artificial atmosphere of the recording studio, however, the human emotion embodied by musical expression is easily lost. The clinical scrutiny of every detail, the ever-present option to redo, the ability to edit every parameter individually--all of these are potentially stifling. As recording engineer Ed Cherney puts it, "If you have the time and money, you can play around with it forever and go past the moment where that 'Indefinable Thing' happens. Sometimes if you put just a little more

¹⁷ Ibid., p. 255.

tweaking in, you may start diminishing the emotional content."¹⁸

Cherney is speaking of mixing, itself a kind of performance, and his statement echoes a common theme among recordists. There is a recurring reference to some kind of "Indefinable Thing" that turns up in almost any discussion of record making. "One of the great things Dan Lanois introduced me to," says Peter Gabriel, "was this idea that when something special is happening, take two tracks and grab it. I mean whenever magic appears in the studio grab it, because it is your most valuable commodity."¹⁹ It is also a fragile one. As Russ Titelman reminds us, "you have to be careful about not taking the feeling out of a vocal performance by trying to get it too perfect. As far as vocals go, you're always looking for the thing that gets you in the heart."²⁰ In discussing studio performances recordists refer again and again to a search for, and the ability to recognize and capture, some ephemeral "magic" in a performance, even if it is only a moment that can be concatenated with other such moments; and the most often-cited criterion for correctness in any recording situation is "feel." In an environment where technological manipulation and analytical parsing might threaten to drain the expressive content from any project,

¹⁸ Steve La Cerra, "Bonnie Raitt's 'Sneakin' Up You'," *EQ* (May 1995), p. 36.

¹⁹ Milano, p. 36.

²⁰ Dan Daley, "Russ Titelman: Production as Destiny," *Mix* (June 1986), p. 38.

human and musicianly intuition provides both rudder and compass.

Timbre

"Of all musical parameters, timbre is least often analyzed," writes Robert Walser in Running with the Devil: Power, Gender, and Madness in Heavy Metal Music, "but its significance can hardly be overstated. Scan across radio stations and a fraction of a second will be sufficient time to identify the musical genre of each. Before any lyrics can be comprehended, before harmonic or rhythmic patterns are established, timbre instantly signals genre and affect."²¹ As Walser suggests, rock recordings are to a great extent known and understood by the particular colors of the sounds from which they are made. The colors themselves provide information about style, genre, historical period, and the identity of the individual artist and work. Frank Zappa puts it this way: "On a record, the overall timbre of the piece (determined by equalization of individual parts and their proportions in the mix) tells you, in a subtle way, WHAT the song is about. The orchestration provides important information about what the composition IS and, in some instances, assumes a greater importance than the composition itself."²²

²¹ Robert Walser, Running with the Devil: Power, Gender, and Madness in Heavy Metal Music (Hanover, NH: Wesleyan University Press, 1993), p. 41.

²² Frank Zappa with Peter Occhiogrosso, The Real Frank Zappa Book (New York: Poseidon Press, 1989), p.188.

Zappa's statement makes its impact by playing on the conventional meaning of the word "composition." Again, the most essential aspects of a musical composition have been considered to be those parameters that are most easily translated into notation. Zappa is simply telling us that the particular sounds on the recording--the recording's "orchestration"--are equally essential, or, to put it another way, that the composition exists as a manifestation. Its sounds form a matrix of relationships wherein resides the identity of the work. Basically, rock compositions can sound only one way (allowing for variations in reproduction equipment); their specific timbres are interwoven with parameters such as pitch and rhythm, creating a particular configuration of elements wherein each one is perceived in terms of the others. A melodic "idea," for example, is inseparable from the particularity of its manifestation--the instrument, the player, the technique, the room, etc.--and thus there can be no meaningful separation between the concept of "composition" and that of "orchestration," as Zappa uses the term. Furthermore, the singer as well as the song are elements of the work; that is, the singer's vocal timbre, diction, phrasing, and so forth participate equally with words and melody in conveying the sense of the artistic expression.

In composed music of Western cultures prior to the advent of sound recording, timbral particularity belonged to each individual instance of performance. Performers apply

their technique and musical sensibility--on a particular day, playing a particular instrument in a particular place--to the interpretation of a set of directions provided by the composer in musical notation. Although composers since Beethoven have specified ever greater refinements of orchestrational detail and performance instructions in their scores, the listener's actual sound experience is produced by the hands, lips, and voices of the performers who interpret them. Since the actual sounds produced in performance are beyond the composer's control, and are ephemeral and ever-changing, many conceptions of the musical work's essential identity locate the "musical idea"²³--that which represents the essence of the composer's expression--in a constellation of notated musical relationships rather than their sonic manifestations.²⁴ For Nelson Goodman, performances may

²³ In "New Music, Outmoded Music, Style and Idea" (1946), Schoenberg defines "idea" thus: "Every tone which is added to a beginning tone makes the meaning of that tone doubtful. If, for instance, G follows after C, the ear may not be sure whether this expresses C major or G major, or even F major or E minor; and the addition of other tones may or may not clarify this problem. In this manner there is produced a state of unrest, of imbalance which grows throughout most of the piece, and is enforced further by similar functions of the rhythm. The method by which balance is restored seems to me the real idea of the composition."

²⁴ Actually, the conceptual separation between idea and manifestation has become so deeply rooted in Western compositional thought that it extends beyond the notation issue. Charles Dodge has expressed the following view about electronic and tape compositions: "I've been in the position of having compositions appear on a recording before they were performed--pieces which were created in studios or on computers --yet I find that I still do, nonetheless, distinguish between the composition that I have wrought and the tape that I've made of it. Even when I have a hard time going back to create a different 'performance' of the piece, I think I have a notion of the composition as something outside of the tape realization. And I think it's more than just wishful thinking that I'd done a better job. I think it's that the relationships, in the things that I do, stand apart, in some way, from the computer programs and from the dials

represent, by "compliance" with the written score, "a genuine instance of a work."²⁵ The substance of the work, however, is contained in the written text. Benjamin Boretz, who has had some disagreement with Goodman, locates the work's identity in its structural relationships. For Boretz, "works of art may be regarded as analog models of closed formal-systematic structures"; and "The composition of works of art may be described as the definition and creation of relational 'universes' of elements in whose interrelations are embedded hypothetical properties of relational behavior..."²⁶ While this view may not seem incompatible with Zappa's statements, Boretz further insists that "Sounds...are not part of music, however essential they are to its transmission."²⁷

Whatever merit these views have with regard to compositions whose identity may be located elsewhere than the moment of performance, they are clearly inadequate for dealing with works that are wrought in concrete sound. By providing a more or less precise way of inscribing sounds, the technology of sound recording brought timbral considerations into the heart of the compositional process. Once specific timbres could be shaped, set down, and reproduced more or less exactly with every repeated playing,

that I twist. I think that when I go back and re-do one of my pieces it is that piece again" (response to Roger Reynolds's "Thoughts on What a Record Records," in The Phonograph and Our Musical Life, p. 35).

²⁵ Goodman, p. 186.

²⁶ Benjamin Boretz, "Nelson Goodman's Languages of Art From a Musical Point of View," in Benjamin Boretz and Edward T. Cone, eds., Perspectives on Contemporary Music Theory (New York: W. W. Norton, 1972), p. 41.

²⁷ Ibid., p. 34.

they became integral to the formal configuration of the work. Techniques of physical and rhetorical manipulation of sound became part of the composer's craft, process, and language. Sound could now join the musical elements represented by notation in a new formulation of musical substance. As Eric Tamm has observed of Brian Eno's "ambient music": "Much of the meaning of Eno's music hinges on very subtle factors having to do with the vertical spectrum of tone color; the exact hues of a sound, down to almost imperceptible shifts in overtone structure, are for Eno the substance of the music itself."²⁸

Here again, however, there is an ideological reluctance on the part of some classically-trained composers to fully embrace the aesthetic implications of sound recording and synthesis, even when these are their chosen media; and therein resides another fundamental difference between rock recordists and many electronic composers. In his "Thoughts on What a Record Records," given at a 1977 conference entitled The Phonograph and Our Musical Life, Roger Reynolds sounds "a note of caution" about the medium's "rigidity," its lack of "neutrality," its ability to "elevate the unreal at the expense of the real." In a response to an audience member after the paper, he passionately defends the principle of separation between the "visceral impact" and "the work itself." The "generality and power of a score...a class of

²⁸ Eric Tamm, Brian Eno: His Music and the Vertical Color of Sound, (Boston: Faber and Faber, 1989), p. 64.

musical experiences...is a Western richness" that is "challenged in profound ways by recording, particularly by singular recordings of works."²⁹

The aesthetic ideology of rock has no such misgivings. It is a fact usually considered too obvious to mention that manifest sound is rock's fundamental expressive medium, and there are innumerable examples of rock recordings whose sounds immediately engage and orient the listener as to their mood, style, and identity. The chiming electric twelve-string guitar sound that represents the central instrumental character in the Byrds' first hit single, "Mr. Tambourine Man" (1965--ex. 3.2), the out-of-tune acoustic twelve string guitar that begins the Rolling Stones "As Tears Go By" (1965 --ex. 3.3), and the sound of Garth Hudson's organ introduction on the Band's "Chest Fever" (1968--ex. 3.4) are all striking sonic gestures that function as affective signals, and add their own dimension of meaning beyond the pitch and rhythmic elements of the musical parts they manifest.³⁰ These examples all have in common a

²⁹ Roger Reynolds, "Thoughts on What a Record Records," in The Phonograph and Our Musical Life, H. Wiley Hitchcock, ed. (Brooklyn: Institute for Studies in American Music, 1977), pp. 28-36.

³⁰ Of "Mr. Tambourine Man," David Fricke has written: "There are few sounds in rock & roll as immediately recognizable, physically exhilarating and historically pivotal as the opening guitar riff on the Byrds' 1965 debut single, 'Mr. Tambourine Man.' The riff itself...was quite unusual... But the actual sound of it--the clarion churchbell ring of Roger McGuinn's electric 12-string Rickenbacker, glistening with harmonic overtones--was something else again, a bracing guitar reveille for a brand new rock & roll day." (An Historical Essay, in booklet accompanying the Byrds' CD box-set, p. 14.) Of "Chest Fever," Greil Marcus has written: "Garth Hudson's satanic organ playing...is the key to 'Chest Fever'--the words couldn't be, no one has ever deciphered them anyway." (Mystery Train, p. 55.)

distinctiveness that places them in a thematic role within the track. Yet there are differences of scope among them that suggest a range of timbral function, significance, and specificity. That is, a given timbre may be uniquely associated with a particular track, its color so specific to the work that it functions as a prominent sign of exclusive identity. Or, a timbre may be more generally representative--of an instrument, a genre, or a style. The guitar sound in "As Tears Go By"--a result of its particular tuning--is unique to that track. Out-of-tune guitars are not generally characteristic of the Rolling Stones' style; the sound simply occurred as it did, was captured on tape, and deemed upon playback to be acceptable.³¹ It is uniquely the product of a particular occasion. The electric twelve-string, on the other hand, has a far more general significance for the Byrds; it was one of the primary sound colors associated with the band, a central timbral element on most of their recordings.

Working with timbre involves three general areas of compositional consideration: 1) the physical characteristics of a sound by itself (solo), i.e., its overtone structure, frequency range, ambient context, etc.; 2) its physical relation to other sounds on the track, e.g., complementary, reinforcing, contrasting, etc.; 3) its rhetorical

³¹ John Leckie believes that some of the character of older records lies in their tuning and timing irregularities: "One thing I strongly believe is that two of the worst things invented in the last ten years are the electronic guitar tuner and the metronome click track. ... Since the guitar tuner was invented, I've found the timbral quality of the music to be different, sometimes blander to my ears." (Afsari, p. 62.)

significance in relation to both similar sounds on other tracks throughout the conventional field and the other sounds on the track at hand. Although these three areas of compositional consideration are parts of a unified compositional perspective (which, of course, also includes the music that the sound plays), one or another of them may be primary at different points in the compositional process, and the responsibility for each may fall to a different member of the recording team. For example, once a sound has been worked and shaped on its own--in solo mode--its stylistic and orchestrational suitability must be determined in the context of the overall sonic configuration of the track. Initially, the sound may be the creation of a guitarist working with an amplifier and a set of sound processing devices; whether and how it fits into the larger sonic tapestry, however, is usually a judgment made by the engineer and/or the producer, who may further tailor the sound using the battery of sound-shaping tools in the control room. Questions of style involve relationships that go beyond the individual track to the conventional field that provides the context for rhetorical display and interpretation. Is the general stylistic association appropriate? Is a direct reference being made, and, if so, does it cast the work in a desirable light? The meaning attached to timbre can be quite explicit, and such questions often become a matter of some debate among those involved in the recording project and those who listen to the records. When Dylan switched from

acoustic to electric guitar in 1965, there was an uproar from those who saw his move toward a rock sound as a move against an ideology of authenticity associated with the urban folk style of the early sixties. The rhetorical significance of the sound obscured for a great many listeners any other sense of the music.

Timbres can have fairly precise associations, resulting in much finer categorical distinctions than electric guitar versus acoustic guitar. And such conventional associations are not static; rhetorical intent and interpretation is contingent upon historical and stylistic contexts. Although the ur timbres of rock--guitar, bass, drums, and vocals--have continued to provide a set of primary colors and a foundation for expectation, they are subject to continual reinterpretation, taking on new significance as the sounds are modified and adapted to the expressive needs of differing aesthetic sensibilities. Electric guitar distortion, for example, is common to many rock styles, but this generalization does not begin to tell the story of the conflicting stances associated with different kinds of distortion. The distorted guitar sound on Def Leppard's Robert "Mutt" Lange-produced Pyromania (1983), for instance, means something quite different from that on Nirvana's Nevermind (1991). The former is highly refined, clean and smooth, like large slabs of polished marble; the latter is ragged, edgy, and searing. They each project a very different image and represent different musical styles, aesthetic

attitudes, and social stances. Lange is known for spending a great deal of time in the studio carefully crafting sounds, and the Def Leppard sound is intentionally controlled, made safe for mainstream "pop" consumption. Like cinematic special effects that thrill but are never mistaken for reality, it is prized mainly for its larger-than-life quality. For Rick Savage, the band's bassist, "the whole idea of Def Leppard is escapism." The lead vocalist, Joe Elliot concurs: "It's all wine, women, and song. Nothing annoys me more than records about politics this, Greenpeace that. ... All we are is total escapism."³²

Nirvana's Kurt Cobain, on the other hand, alludes to the type of distortion heard on punk rock recordings dating back to the Velvet Underground. Its rawness is meant as both a challenge and a sonic reflection of the lyrics' expression of an intensely personal sensibility, one that often treats themes of rebellion against any sort of status quo--social, political, or musical. The emphasis is on the integrity of the artist's personal identification with all aspects of the music's message as communicated through words, sounds, and the trappings of visual imagery. It is a fundamental of punk ideology that this "honesty" is diminished if spontaneity is curbed by over-refinement. In an attempt to preserve as much raw, spontaneous expression as possible in the recording process, for example, British punk bands of the mid-1970s

³² David P. Szatmary, Rockin' in Time: A Social History of Rock-and-Roll, 3rd ed. (Upper Saddle River, NJ: Prentice Hall, 1996), p. 256.

took a lo-fi, do-it-yourself attitude to recording. Conversely, so-called "progressive" or "art-rock" groups such as Pink Floyd and Yes, who spent a lot of time in recording studios crafting records, were dismissed as "dinosaurs" who had completely lost touch with the true spirit of rock. Thus Cobain's guitar sound ties Nirvana's work to an aesthetic ideology that presents a very different image from Def Leppard's. The guitar's timbral character is a determinant of musical style, song meaning, and audience identification.

Timbre is the parameter that allows for the greatest range of experimentation in rock music. Highly chromatic melodies and irregular meters are rare, but the range of sounds available to the rock recordist includes every instrument--indeed every sound-making thing--in the acoustic world (Pink Floyd, for example, used sound effects as integral elements of their musical structures); synthesizers provide a vast array of electronically produced sound configurations; likewise, innumerable images of simulated acoustic spaces can be designed simply by manipulating algorithms; even the sound of the most basic rock instrument, the acoustic guitar, can be layered and processed in myriad ways to create new sounds. As George Martin puts it, "In pop music...the sky's the limit...We have an infinite palette of musical colours."³³ Bruce Swedien, who began recording in the late 1940s and has participated in what he calls a "transformation" in the techniques and aesthetics of record

³³ Martin, p. 76.

production, writes, "In modern music production, the only limit to our sonic palette is our imagination...we are now free to create a sonic canvas with our creativity as the sole limiting factor."³⁴

How, then, faced with a virtually limitless sound palette, are timbres chosen, shaped, and combined? What criteria guide a recordist through the process of assembling a richly layered sound complex? Approaching an answer to these questions leads back, once again, to the conventional nature of the rock idiom. Just as Heinrich Christoph Koch stressed the importance of developing a "feeling"³⁵ for writing melodies in the highly conventional classical style, so the testimony of rock recordists prizes intuition informed by a feel for the style and language as the surest creative guide. Although record making is extremely complex, comments

³⁴ Bruce Swedien, "Foreword" to Music Producers: Conversations with Today's Top Record Makers, Terri Stone, editor (Winona, MN: Hal Leonard Publishing Corporation, 1992), p. v.

³⁵ "Sowohl die Stellen wo sich in der Melodie Ruhepunkte des Geistes äussern, als auch die Beschaffenheit dieser Ruhepunkte des Geistes, in so ferne sie mehr oder weniger merklich find, das heist, in so ferne sie entscheiden lassen, ob die damit geendigten Theile des Ganzen, als Theile betrachtet vollständig sind oder nicht kann (allgemein genommen) nur durch das Gefühl bestimmt werden..." "Generally speaking, only feeling can determine both the places in the melody where resting points of the spirit occur and also the character of these resting points, if they are more or less noticeable, that is, if they indicate whether the sections of the whole thus ended may be considered complete or not." (Versuch einer Anleitung zur Composition, II p. 349.) . . . "Wir müssen uns daher begnügen das Dasein oder den Mangel der Ruhepunkte des Geistes, und die Beschaffenheit der Theile in Absicht auf ihre Vollständigkeit, durch das Gefühl entscheiden zu lernen." "We must therefore content ourselves with learning to determine through feeling the presence or absence of resting points of the spirit and the character of sections with regard to their completeness" (p. 356). These translations are, for the most part, taken from Nancy Kovaleff Baker's translation of parts of the Versuch. I have, however, reinstated Koch's "Ruhepunkte des Geistes," which Baker translates simply as "resting point."

on the nature of its process and criteria--even by those responsible for its most technical aspects--are almost never about theoretical principles or justifications. "If I like something I keep it," says Karl Wallinger. "If something bothers me I get rid of it, and it's on to the next thing."³⁶ Thomas Dolby characterizes his work as "mainly intuitive and motivated by a puerile sense of mischief, and an incurable romance with this little planet and its occupants."³⁷ Tony Visconti, acknowledging that "the range of options is incredible," narrows the choices by "gut feeling." "If it sounds good, I record it and don't ask questions."³⁸ Nicky Ryan, who produces Enya's albums, states, "I don't have a preconceived picture. We work on it until it's right, and only your ears can tell you that."³⁹

The reason "your ears can tell you that" is that they are working with a firm conventional basis for intuiting the sense of a sound. The accumulated works and conventional practices of rock recording provide a context in which recordists can make semiotic use of timbre and enhance the sense of their work by connecting it with others. The ways in which particular sounds have been used on prior recordings informs how they are used on the one at hand. Sounds carry with them entire stylistic legacies, and as rock has

³⁶ Blair Jackson, "An Invitation to Karl Wallinger's World Party," Mix (June 1993), p. 114.

³⁷ Craig Anderton, "Interview: Thomas Dolby," Electronic Musician (June 1986), p. 60.

³⁸ Michael Molenda, "Production Values: Audio Visionary," Electronic Musician (October 1995), pp. 44-5.

³⁹ Blair Jackson, "In the Studio with Enya," Mix (May 1992), p. 135.

developed, the nuances of the stylistic language have become ever more refined. Timbral rhetoric is shaded by varying angles of intersection among parameters and degrees of reference among characters. No one would confuse the bright, ringing quality of the Byrds' guitar sound with the husky, distorted sound of Jimi Hendrix. The difference is obvious. But to rock aficionados, there is an equally-obvious difference in the quality of distortion produced by the single-coil pickups on Hendrix's Fender Stratocaster and that of the humbucking pickups on Jimmy Page's Gibson Les Paul. The difference in sound carries associations of difference in overall artistic style and persona: their guitar techniques, their individual relationships to the blues, their respective vocabularies of melodic material, their nationalities (American and English respectively), their repertoire, images, stage presence, and stylistic precursors and followers (some of whom are the same, some different), as well as whatever personal associations the listener has with either artist. The list could be extended much further. The point is that although the Page/Hendrix comparison exhibits a much subtler degree of timbral contrast than the Byrds/Hendrix one, it still carries a wealth of rhetorical significance.

The rock idiom is a stylistically inclusive one, open to eclectic collages of disparate stylistic associations. The associations that adhere to sounds allow them to stand as symbols in such collages, suggesting dialogues and resonances

that reach beyond the boundaries of the track. As Luciano Berio has put it, "When with electric guitars (or in place of them) instruments like the trumpet, the harpsichord, the string quartet, the recorder are used...they seem to assume the estranged character of quotations of themselves."⁴⁰ In what he terms an "obvious reference to surrealism," Berio finds that "(recorded) pieces by the Rolling Stones, the (Four) Tops, the Mothers of Invention, the Grateful Dead, and above all the Beatles" move beyond the "idea of song and develop into a sort of sound drama...in the form of a collage." In these dramatic collages, "...the extra instruments are adopted like polished objects from a far-off world..."⁴¹

Certainly, the Beatles were important figures in broadening the available palette of rock timbres. When George Martin suggested strings to Paul McCartney for the

⁴⁰ Luciano Berio, "Commenti al Rock," Rivista musicale italiana 1 (May/June 1967), p. 130. "Quando con le chitarre elettriche (o al loro posto) vengono usati strumenti come la tromba, il clavicembalo, il quartetto d'archi, il flauto dritto ecc. (quasi mai il pianoforte), essi sembrano assumere il carattere straniato di una citazione di se stessi."

⁴¹ Ibid., p. 132. "Alcuni pezzi, infine (soprattutto quelli registrati), propongono un superamento dell'idea stessa di song, sviluppando una sorta di drammaturgia sonora fatta di frammenti di dialogo, di montaggi, sovrapposizioni di registrazioni diverse e di qualche manipolazione elettro-acustica: in questi casi la forma è il collage. Quei pezzi dei Rolling Stones, dei Tops, dei Mothers of Invention, dei Grateful Dead e, soprattutto, dei Beatles, che sono particolarmente legati alle tecniche di studio, sono praticamente ineseguibili dal vivo. Queste manipolazioni, proposte per la prima volta dai Beatles, evitano gli effetti e le trovatine sonore: il richiamo surrealista è ovvio.

"Quando un gruppo rock usa altri strumenti oltre alle chitarre, la batteria e l'organo elettrico, lo fa senza troppi compromessi: gli strumenti 'extra' vengono adoperati come oggetti puliti, come se venissero da lontano, in un modo, tutto sommato, che suggerisce l'utopia del 'ritorno alle origini'."

"Yesterday" arrangement, McCartney was leery of the associations this called to mind. "He hated syrup," Martin recalls, "or anything that was even a suggestion of MOR."⁴² A ballad arranged for swelling strings seemed altogether too soft for the Beatles image at the time, and McCartney became interested in the idea only when Martin suggested a string quartet--no longer an association with "MOR," but rather the more exotic, ethereal "far-off world" of classical music. Still, it was unprecedented for the Beatles. The timbre represented an experimental, potentially problematic shift in their image, and they did not release "Yesterday" as a single until after it achieved widespread acclaim as a result of the album release (Help!). The success of "Yesterday," along with the Beatles' widespread influence throughout the culture of rock, assured that the string quartet quickly became an accepted element in the rock palette at large. Later that same year (1965), the Rolling Stones--with a much tougher rock and roll image than the Beatles--used a string quartet in "As Tears Go By." And, of course, Martin's fine arrangement for Revolver's "Eleanor Rigby" (1966) uses a double quartet as the sole accompaniment for the vocals, completely displacing the standard rock instrumental timbres of guitars, bass, and drums. Throughout their careers, the Beatles steadily expanded their timbral palette and in the process changed the nature of conventional expectation for the entire rock idiom. The track for "Love You To," also from

⁴² Lewisohn, p. 59.

Revolver, is built on a sonic foundation of sitar and tabla timbres. In a very short time, rock's stylistic possibilities had taken on a very different appearance from the one presented by its original instrumental lineup. And the willingness to incorporate sounds of all kinds, a consciousness that blossomed in the 1960s, became a lasting hallmark of rock aesthetics.

The three areas of compositional consideration outlined above suggest two basic types of function that timbre serves in the track: 1) physical entity with particular behavioral characteristics and 2) rhetorical sign. Again, these functions are often considered separately--and often by different members of the recording team--but they, too, are ultimately merged in an inclusive decision-making process. For example, the use of the glockenspiel adds high frequency information to the frequency structure of a track. In a setting such as Bruce Springsteen's "Born to Run" (1975--ex. 3.5), it provides an etched quality to the melodies it doubles, helping them to stand out amidst the thick sonic texture. However, it also makes a clear reference to Phil Spector who used it similarly in many of his "wall of sound" productions (e.g., "Puddin' and Tain'" [1962], "[Today I Met] The Boy I'm Gonna Marry" [1963], "Fine Fine Boy" [1963]). Thus, as the glockenspiel fulfills its orchestrational function, it also makes a specific connection to an artist, a style, a body of work, and an era, expanding the interpretive context of the track.

A more subtle example of such intertextual timbral dialogue is the beginning of R.E.M.'s "Tongue" (1994--ex. 3.6), which bears a remarkable affective affinity to the Band's recording of Dylan's "I Shall Be Released" (1968--ex. 3.7). Whether or not the reference is intended, it is quite specific. In the introductions to both tracks, a solo piano placed on the left side of the stereo soundstage, with a prominent ambient shadow cast to the right, sets up the entrance of a pleading falsetto vocal. This is not Michael Stipe's normal singing voice, and coming after this introduction it calls to mind Richard Manuel, who sang the lead on "I Shall Be Released." Manuel--"the ghost of Johnny Ace," as Marcus put it--is a tragic figure in rock history whose singing style, long before he took his own life, always expressed a yearning sadness. "Sometimes I thought you felt too much," sings Robbie Robertson in "Fallen Angel" (1986), his tribute to Manuel. Indeed, the vulnerability and rawness of a soul too open and knowing for its own good is a characteristic mark of Manuel's artistic persona, and he portrays the hope against hope of the character in "I Shall Be Released" with resigned clarity. As they enter into its sonic atmosphere, all of the accrued significance of this version of "I Shall Be Released" is available to Stipe and R.E.M., and "Tongue" is enriched by the association. Indeed, both tracks and the entire conventional system they inhabit are so enriched. There is an elegance and efficiency in offering such possibilities to artists who work within the

exemplified by a band such as Nine Inch Nails. The sonic allusion is to a futuristic, machine-ruled world, an image not heretofore associated with U2. Thus, before any words have been sung, the sounds alone alert the listener that the band has moved into new expressive territory.

If the first few seconds of the introduction set up an intellectually puzzling, problematic atmosphere, the bass entrance provides a visceral presence that goes straight to the body, enveloping the listener in pulsing, vibrating energy. It also brings in a contrasting rhetorical character, one that fulfills conventional expectation both in terms of rock recordings at large and U2's own catalog. Throughout the track the contrasting interplay between sounds that are highly-processed--disorienting expectations of genre and artist identity--and sounds that are more stylistically conventional creates a sound drama whose structure roughly mirrors that of the song. At the first entrance of the voice in the introduction--structurally analogous to the later "Zoo Station" chorus--the murky industrial sounds give way to the relative clarity of the soaring natural voice.

Simultaneously, the anchoring bass riff releases, providing a further sense of lift. As the song moves on to the first verse, the mechanized atmosphere returns, evoked now primarily by the strange robot-like vocal sound. The tension of the verses, followed by the release of the choruses is a consistent structural refrain throughout the song, and it is

signaled throughout by the changing vocal timbre as well as the harmonic release of the bass.

Turning again to Tamm's comments on Eno: "If in the classical work the timbre may be said to adorn the structure, then in the ambient work the structure adorns the timbre."⁴³ This is an interesting twist that seeks to rearrange some conventional theoretical priorities, and it is a useful move for shaking up some well-worn attitudes toward musical analysis. The example of "Zoo Station," however, presents yet another way of looking at (or hearing) the issue. Here, neither timbre nor structure are adornments; rather, each one underscores the other, intensifying the overall effect. The tension and release of the song structure is mirrored by the unfolding timbral drama.

Texture

I had just finished mixing Under the Red Sky and I was happy with it. But (Dylan) came in, listened to it, and said, "Eaahh, it's screwed up. The mix is screwed up. I can hear everything." That was the first time I had that complaint. But you know, he was right. I went back and made it murkier, which is what old-time blues and rock 'n' roll records were about. They were a little dark, maybe a little ambiguous in terms of who was playing what. The mix was much better that way. Bob knows.⁴⁴

Ed Cherney

⁴³ Tamm, p. 173.

⁴⁴ Alan di Perna, "Ed Cherney: Capturing Musical Dialogs," Mix (September 1991), p. 86.

The term "texture" is commonly modified by a descriptive adjective such as homophonic, polyphonic, rhythmic, instrumental, and so forth, thus delimiting its definition. My use of the term here, however, is multiple and varied. By texture, I mean the quality of sound that resides in the relationships created by the interaction of a track's constituent elements. As Robert Erickson has put it, "texture always denotes some overall quality, the feel of surfaces, the weave of fabrics, the look of things."⁴⁵ This "overall quality" is the general character of the musical gesture; it encompasses among other things timbre, dynamics, rhythm, ambience, pitch range, harmonic spacing, and spatial placement of constituent sounds. Creating and molding textures entails bringing all of these elements into a desired balance that involves a complex set of proportions and angles of intersection. Dylan's complaint was simply that although the constituent parts of the track were clearly audible, the feel of the textural balance was off. That is, the parts were right, but the relationships among them were not. The ensuing remix speaks to the importance placed upon textural feel in the record-making process. Although all aspects of the track certainly work together, texture--even more than song--is perhaps the most basic determinant of a record's character.

⁴⁵ Robert Erickson, Sound Structure in Music (Berkeley: University of California Press, 1975), p. 139.

On many records, much of the textural depth is provided by instruments that are barely heard, often not consciously heard at all. Like the invisible undercoats that build up the surfaces of some paintings, sounds and musical parts may lose their individual identities and even become inaudible as distinct characters. Yet their presence is felt in the overall sound and affective sense of the texture. On George Harrison's "Isn't It a Pity" (1970--ex. 3.9), for example, there is an under-layer of acoustic guitars upon which the rest of the track is built. Their deliberate, steady rhythm--reinforced by the piano--underscores the song's repetitive harmonic cycle and mood of emotional resignation. After the first verse the guitars recede behind the high hat and tambourine; they are "felt rather than perceived," as Richard Williams has observed.⁴⁶ Their function is not to be heard as strumming guitars, but rather to provide a mysterious depth to the track, a textural thickness that is also a manifestation of the track's affective character emanating from within. They amount to an almost subliminal expression of the rhythms, harmonies, and mood that are evident on the track's surface.

The effect created by these guitars relies on two of the most basic and time-honored techniques for creating textural substance: doubling and layering. Doubling provides a basic thickness, a sense of bigness. In the case of a string

⁴⁶ Richard Williams, Out of His Head: The Sound of Phil Spector (New York: Outerbridge and Lazard, 1972), p. 164.

section, or the five rhythm guitars Spector called for on John Lennon's "Happy Xmas (War Is Over)" (1971), all the instruments may play at the same time, creating--through mass as well as variations in tuning, timing, dynamics, articulation, etc.--a thick instrumental texture for a single musical part. Of course, in the multitrack environment the effect can also be built up one track at a time using overdubs. Layering, on the other hand, involves combining strata of different musical parts and managing the spatial and dynamic relationships among them. On "Isn't It a Pity," there are layers of doubled guitars, percussion, and piano all in different dynamic ranges and in different areas of the soundstage. Though each layer by itself is quite simple, in combination they create an enveloping sensation of multi-dimensional sonic architecture. The texture they create provides a depth and breadth to the track that gives it a sense of size and draws the listener into its unique sonic world.

The textures that animate rock recordings have little to do with acoustic reality; they are shaped electronically by combining layers of electronically processed sound (miked, recorded, filtered, compressed, synthesized, etc.), and they constitute a sound world unto themselves. The unreal situation of a person singing with herself is amplified several hundred fold on Enya's "Angeles" (1991) as she overdubs "about 500" vocal parts.⁴⁷ Radically multiple vocal

⁴⁷ Jackson, p. 135.

overdubs are a common stylistic feature of Enya's records, and this otherworldly textural design is an elemental aspect of the dreamlike atmospheres that her music conjures. The aim here is to create a sound environment unlike any in the real world, and the tools of the recording studio provide a wealth of possibilities for the creative imagination, offering compositional choices that could never work in the world of live music making. A single texture, for example, might combine the quality of attack achieved by a sharply-struck snare drum with the breathy quality of a soft, low flute sound that contains, apparently within itself, the shimmering harmonic and lightly percussive sound of a strumming acoustic steel string guitar with most of its low frequency identity removed. The process of creating this composite texture would require at least a precise proportioning of amplitudes, a careful complementary shaping of the overtone content in each sound (i.e., equalization), a determination of what sort of rhythm the guitar should play, and decisions about how much to separate the sounds in the stereo spectrum (the more they are separated, the more distinct their individual identities). These relationships could then be frozen and the texture used as a strand in a larger textural configuration where another set of such relationships would come into play.

Composing textures--what George Martin refers to as "building musical images"⁴⁸--is a central activity in the sound mixing process, and it underscores an important aspect

⁴⁸ Martin, p. 35.

of musical performance in the recording studio: the total effect of the performance is a collaborative matter. Even if all the instruments are playing at the same time in a more or less conventional performance situation, the process of balancing and processing the sound information coming through the microphones into the mixing console is an electronic rather than acoustic one; and it is in the hands of those in the control room (engineers and producers). Thus, developing the textures of a record involves an ongoing interplay between two different sets of skills and points of view, those of the performer and those of the recordist.

Again, a shift in compositional thinking is involved here; the recordist--provided with actual, rather than virtual, sound material--is now able to compose directly with concretized musical ideas. Like a visual artist, the recordist handles the actual material of which the piece is made. Materials accumulated during the recording process are combined, mixed, layered, processed, counterpoised, and fixed upon the canvas that is the final mix. One often encounters analogies to painting and the use of visual terms such as "image," "canvas," "sculpture," and "color" when recordists discuss their work. "It's all just paint, right?"⁴⁹ says Nile Rodgers of the elements that make up a recording. Brian Eno, who has often challenged conventional notions about the nature of music making, puts it this way: "If you start

⁴⁹ Ted Fox, In the Groove: The People Behind the Music (New York: St. Martin's Press, 1986), p. 334.

thinking of music as something you don't have to do in real time but something that can be built up, like a painting, that gives you a different way of working. You can think about it on, shall we say, the atomic level. The other level you can think at, through working with the kinds of processing equipment that studios have, is as a way of making atmospheres, landscapes, whatever you like."⁵⁰

Texture plays an exceptionally important role in rock recording because it can provide a track with a unique character, which in turn insures that the track is perceived as a cohesive entity in its own right, a composition rather than a document of a performance. To a large extent, it defines what a recording is. As it dictates the terms of perception, it draws the listener into the track's sonic sphere. As individual parts are woven into the larger fabric, the fabric itself becomes the focus of attention; one strand or another may momentarily arrest attention, but in general the parts are subordinated to the whole. And, again, the textural configuration of a track is highly particular. A track's timbres may be generic, but its texture exists as a unique composite image. That image is the sound of the record. Spector recordings offer one example after another of this principle; indeed, the "Wall of Sound" so characteristic of his style is one large textural mass, most of whose constituent parts are indistinct to the ear (e.g., "Zip-A-

⁵⁰ Robert L. Doerschuk, "Twelve Who Count: Brian Eno," Keyboard (March 1995), p. 51.

Dee-Doo-Dah," 1962). His love of the impressionistic effect created by the overall sonic tapestry was one of the reasons he insisted that monaural records were superior to stereo.⁵¹ With no physical separation between the sounds on the record, they all merged into one massive, opulent texture from which only the vocals and the most salient musical gestures stood out.

Brian Wilson had great admiration for Spector's work; he worked in the same studios in and around Los Angeles during the same period of time using many of the same musicians. When Spector released "Be My Baby" in 1963, Wilson "immediately bought ten copies...and played them incessantly," learning "every note, every sound, the pulse of every groove."⁵² From Spector's recordings, and occasionally by observing his sessions, he "learned...to think in terms of production, rather than songwriting."⁵³ In other words, to think like a composer of records. The influence of Spector and the Beatles, as well as his own competitive nature, drove Wilson to successive creative peaks in the recording studio, culminating in 1966 with Pet Sounds--itself one of the most influential albums in rock history--and the subsequent single, "Good Vibrations."⁵⁴ Among the many rich textural

⁵¹ In the late 1960s, when mono was being phased out on rock recordings, Spector began to sport a button that read "Back to MONO"; this is also the title of his retrospective collection released in 1991. Spector's first stereo recording was the Checkmates "Black Pearl" (1969).

⁵² Brian Wilson with Todd Gold, Wouldn't It Be Nice: My Own Story (New York: Harper Collins, 1991), p. 82.

⁵³ David Leaf, Pet Sounds CD booklet (1990), p.21.

⁵⁴ Pet Sounds repaid the Beatles influence on Wilson. Impressed by the consistent quality and variety of the tracks on the Beatles'

treatments--all mono--on Pet Sounds is the track for "God Only Knows" (ex. 3.10), an arrangement for twenty-three musicians playing together in a single studio, "the different sounds bleeding into one another, producing a rich, heavenly blanket of music."⁵⁵ The basic rhythmic feel for the track is provided by repeating staccato quarter-note chords whose texture at various points in the course of the track is made up of organ, harpsichord, piano with slapback echo, sleigh bells, and pizzicato strings. With the exception of the bells, none of these draws attention to itself individually; they are balanced in such a way that they create a single, richly textured instrumental character whose constituent elements are much less apparent than its overall quality. Complementing the rhythmic figure are whole-note chords played by a group of instruments whose blend, again, removes much of their distinctly individual character. After careful

Rubber Soul, he wanted to move beyond singles and surf music toward "a new type of sophisticated-feeling music" (Pet Sounds CD booklet, p.5) and an expressive statement that spanned an entire album. In a 1990 interview, McCartney testified to Wilson's success at both: "It was Pet Sounds that blew me out of the water. I love the album so much. I've just bought my kids a copy of it for their education in life...I figure no one is educated musically 'til they've heard that album...I love the orchestra, the arrangements...it may be going overboard to say it's the classic of this century...but to me, it is a total, classic record that is unbeatable in many ways...I've often played Pet Sounds and cried." (Good Vibrations CD booklet, p.36) Moreover, the timing of the release of Pet Sounds (May 1966) ties it to another extremely influential album whose recording sessions were to begin later that same year, Sgt. Pepper's Lonely Hearts Club Band. McCartney listened to Pet Sounds a great deal during the months leading up to the Sgt. Pepper's sessions, and has credited it as his "inspiration for making Sgt. Pepper's...the big influence." (Pet Sounds, p. 20-1) As far as the Beatles' other principal songwriter, John Lennon, is concerned, McCartney says, "I played it to John so much that it would be difficult for him to escape the influence ...It was the record of the time." (Good Vibrations, p.36)

⁵⁵ Wilson, p. 139.

listening to the finished track, as well as a working version without vocals (released in 1993 as part of the Good Vibrations: 30 Years of the Beach Boys retrospective collection), and reading the liner notes, one can say with some certainty that the whole-note texture in the introduction is composed of strings and accordion. With a great deal less certainty one might assume that the flute and bass clarinet which play the four-note lead-in to the first verse are also part of the mix, but there is no way to be sure. The point is that the constituent timbres are not functioning as primary rhetorical signifiers, but rather as material components. The doublings--along with all the variable particulars, such as ambience and dynamic balance, that are captured and fixed on tape--are meant to merge the identities of the various instruments into something altogether new, existing only on this track. In addition, they enrich and give concrete shape to the harmonic and rhythmic gestures, providing a unique sonic quality to accompany the one really clearly identifiable timbre in the introduction, the French horn, and the vocal in the verse.

Karl Wallinger's "Way Down Now" (1990--ex. 3.11)--a kind of trope on the Rolling Stones' "Sympathy for the Devil" (1968)--provides an example of a different type of textural treatment that nonetheless serves a similar aim to that in "God Only Knows," namely, enriching a simple basic gesture. In this case, however, rather than a densely-stacked mono texture playing in rhythmic unison, we have a chaotic parade

of varying interpretations of the basic musical gesture--a repeated rhythm () and a shifting chord sequence (V,IV,I in the verse; I,V,IV in the chorus)--spread out across the stereo soundstage. The chord sequence is played by two electric guitars--one panned to the left and heavily distorted, the other to the right--organ and bass in the center, and a piano playing with a hammered, percussive quality, yet held down in volume, placing it well "behind" the other instruments. Although it is difficult to make out clearly, the piano seems to be on both sides but not in the middle. All of these instruments interpret the chord sequence in their own way with different voicings, rhythms, and melodic figures. The rhythmic groove is carried by two bass drums--one panned left, one right--bass, and piano. Again, the specific rhythms played by each instrument are free variations on the basic pattern. The instrumental vamp in the introduction and between verses adds a melodic fragment (fig. 3.1) to the mix that is also interpreted variously by the two guitars and the organ.



Fig. 3.1

In this example, the placement of sounds in the stereo spectrum plays an important part in forming the textural image. Wallinger has made a quite atypical stereo mix here, placing most of the elements on one side or the other with only the bass, organ, and the coda guitar solo in the middle

of the soundstage. Besides the left/right guitars, each side has its own drum kit and voice, a very unusual arrangement. The balanced distribution of similar sounds on either side of the soundstage creates a sense of expanse that subsumes the different rhythmic and melodic interpretations in an overall gestalt.

The balanced distribution of sounds, however, is offset by variations in amplitudinal balance and sound quality that further enrich the texture, creating multiple textural levels within instrumental sections. That is, each section presents its own range of difference among its constituents which creates a more or less complex texture within a single timbral group. For example, with regard to dynamics there is a general side-to-side textural depth created by the uneven prominence of the right bass drum over the left, the left voice over the right, the right guitar over the left. Furthermore, the sonic characters of each of these pairs is quite different, hence the side-to-side image includes a multitimbral interplay as an aspect of the textural spread. Much of this track's textural complexity lies in such variations among instruments of specific timbral categories ("guitars," "vocals," "drums," etc.), and these variations take many forms. Differences in degree and type of variation within these categories constitute yet another aspect of textural substance. The percussion ensemble provides a good example. The two snare drum parts are almost identical in rhythm, sonority, and amplitude, though they are separated in

space. The rhythmic variations between them are slight enough that they can almost be taken as a single part that has been routed to different places in the stereo spectrum. The tambourine (left) and shaker (right) are likewise symmetrically balanced in amplitude, placement, and rhythm in a steady sixteenth-note pulsation, but they are different sounds. Thus they exhibit a difference in sonority that the snares do not. However, the substantially similar rhythms and amplitudes apparent in these two pairs of instruments create something of a mirror relationship between the two sides of the soundstage. Hence they inhabit a similar general textural level and function in a similar way.

On the other hand, the other prominent members of the percussion ensemble--the bass drums--though placed in a similar left-right counterpoise, have a very different kind of relationship. To begin with, their amplitudes are unbalanced. The greater prominence of the right bass drum casts the left one in shadow; indeed, the only section of the song where the relationship between the two drums can be heard clearly is the bridge, where the overall texture of the track thins out considerably. The bridge also clearly exposes the very different sonorities of the two drums. In addition, the rhythmic parts are different; although they obviously share the same groove, they do not synchronize with anything like the precision of the snare drums. The resulting plurality of attacks, sonorities, and dynamics creates a thick bed of kinetic activity in the track's low end that

unfolds through interaction among different textural levels, obscuring the unitary coherence of the percussion ensemble while at the same time creating a sense of depth.

In analyzing "Way Down Now," I have tried to illustrate how texture is developed through the interplay of various elements in the track, each contributing in its own way. Clearly in this case, one of the primary forces shaping the textural image is rhythm, the random multiplicity of attacks provided by the various interactive interpretations of the fundamental groove and the loose rhythmic spread between the left and right guitar and vocal parts. Rhythmic interplay also figures prominently in the beautiful textural configuration of John Hiatt's "Through Your Hands" (ex. 1992 --3.12), but it is used in a quite different way. A rhythm obliquely at odds with the prevailing groove is folded into the timbre of a single instrument by way of the rhythmic pulsations of the tremolo effect. The resulting rhythmic conflict animates the textural weave and gives the introduction, first verse, and first chorus a feeling of hovering suspension. Tremolo is produced by an oscillation in amplitude; its speed and intensity can be controlled to create the desired effect which is usually timbral in nature, a dreamy, atmospheric sound color. However, since the speed of the oscillation is controllable, it is possible to set up a specific rhythmic relationship between the timbre and the basic pulse of the track, and in "Through Your Hands" this is exactly what occurs.

Beginning with the introduction, the rhythm guitars, panned left and right, play variations on the same figure (fig. 3.2).



Fig. 3.2

The guitar on the left has the tremolo effect, which is set such that it creates a triplet rhythm in relation to the track's underlying pulse. This guitar part by itself contains a degree of rhythmic ambivalence. Its attacks break up the regular oscillations of the tremolo, creating a sort of rhythmic wash from the layering of duple and triple subdivisions. On the surface, this rhythmic conflict, together with the prominent presence of the tremolo guitar, appears to be the source of the suspended effect. But the guitar on the right participates in a subtle, yet crucial, way in transforming the purely rhythmic gesture into a textural one that deepens the aural image, increases the conflict, and anticipates the rhythmic direction that is to come. As with the two bass drums in "Way Down Now," the nature of the effect is veiled by the amplitudinal disposition of the two parts. That is, the degree of rhythmic tension between the two guitars is controlled by the balance of amplitudes between them; the guitar on the right is quieter, its subdivisions practically indistinguishable. Yet from its submerged place in the track, the guitar on the right, along with the small flourishes of the shaker and

finger cymbal, firmly articulates the rhythmic groove that will eventually take over.

After the first chorus, an acoustic guitar enters on the right side and clearly foregrounds sixteenth-note subdivisions in its strumming pattern. For the first time we hear rhythm as groove, but it still struggles to establish itself against the ambiguity of the tremolo. At the beginning of the second verse a second acoustic guitar playing a similar part appears on the left side as the drums enter to provide a stable rhythmic foundation. The tremolo guitar now recedes into a texture that has changed from the floating, ambiguous one with which the track began to one that, though still awash in pulsing oscillations, is firmly rooted to a solidly duple rhythmic foundation. The rhythm that was always present as a textural element has emerged as the central driving force; the shift in textural levels has changed the rhythm's function. Furthermore, the feeling of the song changes along with the textural shift; the singer's rhythmic orientation becomes clear and the floating quality of the first verse and chorus is replaced by a more forward-driving one in the second verse.

This example provides a good illustration of a common function that texture serves in rock composition. Rock songs are, for the most part, strophic. Their long-range musical form is therefore somewhat static. By contrast, textural composition can provide the track with a formal layer that is through-composed--or at least developing, changing shape as

it goes--in conception. Thus, a kind of dramatic progression can be introduced into the work while retaining the song's strophic character. Such a progression of textural events may somehow reflect a similar progression in the song's lyrics, or it may simply unfold independently as an impressionistic underscore. My final example will further examine this principle.

Richly sensuous and evocative textural treatments are characteristic of Daniel Lanois' production style. He often uses them to enhance the dramatic flow of his productions by fashioning them into narrative structures that function as the primary agents in the track's dramatic unfolding. The textures on his recording of "Amazing Grace" (1989--ex. 3.13), for example, are arranged in a developmental way that underlies the song's strophic form. The song's melody is sung in a highly ornamented version by Aaron Neville, mirrored in a rough kind of gestalt by a synthesized pan flute melody. These are underpinned by a synthesized bass riff--spelling out a minor-mode tonic--reinforced by a bass drum, both of which share a steady groove with sixteenth-note inflections. By contrast, the vocal and flute parts appear to float in a state of meterless suspension. In addition, other solitary timbres--pulseless sound-objects, with no sense of melodic or harmonic progression--gradually drift into the soundscape one by one, each distinct and separate from the others, yet coalescing into a haunting, otherworldly sound collage.

In the background, there is a very faint strumming guitar texture spread across the middle of the track, a hovering, shimmering backdrop on which the other sounds are placed. The guitars are strumming sixteenth notes and articulating chords, both of which prefigure the climactic gesture that will follow the second verse. But at this point they are perceived mainly as a distant textural haze. At the first harmonic movement--from i to III at the words "was blind"--a subtle harmonic change is felt (the character of the E in the flute sound is clearly transformed from that of a fifth to that of a major third) but its source is unclear. There is only a vague shift in the background texture of the strumming guitars as the tonic bass riff momentarily drops out. And if the harmonic impression of the background is subtle, the rhythm is practically inaudible. The relationship of these guitars to the foreground of the track is one of mysterious distance; their presence is perceptible, but any certainty of their features is unknowable.

The significance of what hovers hidden in the background of the track is revealed after the song's second chorus. Here, as if from nowhere, rhythm guitars strumming sixteenth-note chords emerge into the foreground. In a subtle touch, the meterless guitar on the left side of the mix that has aimlessly uttered two notes repeatedly throughout the second verse and chorus finally gives birth to the strumming guitar on the right. Up to this point it has repeatedly risen from B to C in a seemingly static gesture. Suddenly it proves to

have been working all along to deliver the most dynamic moment in the track to this point. It finally rises from D to E, and as it reaches the upper note the strumming guitar breaks into the foreground as though emerging from the E.

In quick succession, a second rhythm guitar enters on the left side of the soundstage. Now the harmonic and rhythmic elements of the background have moved right to the front in a textural shift that propels the piece into a new section where harmonic and rhythmic motion become the main focus. What had been a static soundscape of more or less suspended objects is transformed into an image of forward motion. Furthermore, the sense of distance is bridged; even the vocal is moved forward into a clearer light, emphasizing the sense of its final refrain: "I once was lost, but now I'm found/Was blind, but now I see." The seeds for this formal transformation are embedded in the track's texture from the beginning; and the narrative substance of the work lies in its textural composition. As in "Zoo Station," concrete sound plays an integral formal role in the track. In "Amazing Grace," however, rather than paralleling the song's structure, the sequence of textural events works independently to provide the track's dramatic progression.

Echo

Echo is one of the most versatile sonic phenomena used in record production, and its use as a constitutive element

dates from the earliest rock and roll recordings.⁵⁶ There is a range of physical configurations of echo with a corresponding range of uses. These may be grouped very generally according to: 1) their temporal disposition (delay time), 2) their amplitude, 3) their number, and 4) the means of their production (digital or tape delay). A low-amplitude single echo with a very short delay time (around 25 milliseconds), for instance, may function simply as a textural thickener, adding weight and presence to the original sound, but having no distinct identity of its own. Such short delays are very commonly used for subtle enhancements that, while practically inaudible as discrete sonic phenomena, provide an extra layer of sonic complexity and interest. Raising the amplitude of the echo to a level roughly equal to that of its source produces a distinctive timbral effect often referred to as automatic double tracking (ADT). As the name implies, the effect approximates the sound of overdubbed doubling of a part. In this configuration, although the delay time is still too short for the echo to be perceived as a repeated image, the timbral effect is marked.⁵⁷

As echo becomes more apparent, it takes on a considerable range of expressive and conceptual significance.

⁵⁶ Early examples where echo contributes significantly to the character of the track include Presley's "Blue Moon of Kentucky" (1954) and "Baby, Let's Play House" (1955).

⁵⁷ Ken Townsend, an Abbey Road Studios technician at the time, devised an ADT method for the Beatles around the time of the Revolver sessions (1966), and the effect is prominently featured throughout the album.

As a re-presentation of a prior event, a post-facto mirrored image, it is an affective device with many available associative configurations. Increasing the delay time to around 70 milliseconds, for example, creates a ghost image that mimics its source at close range. This is often referred to as slapback echo. The precise effect such an echo produces depends upon how much prominence it is allowed in relation to the original sound (i.e., its relative amplitude) and its orientation to the overall soundscape, but in any case it carries a strong stylistic association with 1950s rockabilly records, where it is often heard providing a nervous rhythmic propulsion to the vocal line. Bruce Springsteen, for one, uses the effect referentially in songs such as "She's the One" (1975--ex. 3.14) and "Working on the Highway" (1984--ex. 3.15) to fashion rhetorical stances that include a historical connection. The effect, however, functions differently in each of these examples. On "She's the One" it is incorporated into a larger vocal texture thickened by doubling and harmonization. The slapback is an allusive reference to an historical style, but the overall sonic effect combines several stylistic elements. In "Working on the Highway," on the other hand, the slapback is closer to a direct stylistic quotation, as a comparison with Presley's "Baby, Let's Play House" (1955--ex. 3.16) reveals.

As echo becomes still more prominent--perhaps with a longer delay time, or a separation from its source in the stereo field--it exerts an increasingly strong individual

presence. At this point it might be said to move into the associative realm of memory (recurrence) or shadow (projection).⁵⁸ In this application, the effect creates a sense of perspective, both in terms of spatial distance and in the nature of the relationship between the original sound and its echo. The perspective can be altered by changing delay time and/or amplitude, both of which are under the continuous control of the user. Hence the use of the effect can take on a narrative significance.

The vocal echo on Gabriel's "Love to be Loved," (1992--ex. 3.17) for example, follows and enriches the dramatic unfolding of the vocal line. In the introduction and first verse, the echo, panned to the left of the original, casts a prominent shadow with a clear directional orientation. As Gabriel's quietly searching vocal begins to feel its way into the song, the focus on the voice is diffused; the listener's attention is split uncertainly between the primary voice and its echo. At the line "In this moment," the tone of the primary voice intensifies and takes on a degree of urgency; simultaneously the echo suddenly changes. It is now balanced on both sides of the voice and lower in amplitude. As it recedes and changes its directional orientation, it is transformed from a distinct character to a constituent of the composite vocal texture, drawing the listener's attention fully to the primary voice. In the second half of the song--

⁵⁸ Listen, for example, to the piano echo on the introduction to "Tongue."

beginning with the line "This old familiar craving"--the echo is further diminished, bringing the vocal forward, increasing its presence and altering its affective character. The change underscores the pleading quality of the vocal at this point. In this case, the vocal echo is used dynamically to guide the focus of the listener's attention in ways that correspond to the affective sense of the vocal performance, and to intensify the sense of dramatic progression in the song.

Once a discrete echo has been created, it has its own existence separate from its source. It can therefore be manipulated independently, offering another array of sonic options. Thus the vocal echo on "Love to be Loved" is not simply a mirror image of the actual voice. It has its own ambient texture which gives it an entirely different character from its source. Repetition of echoes also presents a range of textural and expressive possibilities. Repeated echoes may be programmed to recur at varying delay times within a set range. These in turn can be processed in various ways to create such timbral effects as flanging, phase shifting, and chorusing.

Ambience

Multiple echoes produced by sound reflecting randomly off the surfaces in an architectural space accumulate to form an aural image known as reverberation, or ambience. Although often referred to as echo--e.g., echo chamber--ambience is quite a different phenomenon both physically and in its

functional role in the record-making process. It is the acoustic context of a sound; it reveals itself as the sound calls forth the immanent properties of the surrounding air and architectural space. Recording microphones hear source sound and resulting ambience as a composite sonic image. Hence, the character of a sound varies depending upon where it is produced; the ambience of the recording space is actually part of the sound's complete aural identity.

Moreover, ambience is a compositional element in itself. The ambient images that appear on the finished recording are not necessarily those of the actual spaces in which the various sounds were produced and recorded. Sound that is produced at a particular location can be effectively "placed" anywhere through various techniques of ambience generation. The image of a cathedral, a concert hall, or a cavern can be drawn by sound that is actually produced in a small room. Ambience is a mediating force that gives form and character to the sound world embodied in the recording. Like the mirror in Jean Cocteau's Orphée--which serves as a doorway between two dimensions--it is instrumental in effecting a perceptual transformation that draws the listener into a unique aural world whose shape, dimensions, lighting, and perspective it serves to define. Because we associate reverb with space, it provides the illusion that the recording exists in some unique place, suspending the listener's disbelief in the disembodied voice and drawing them into an autonomous sound world.

In constructing a recording, the effects of reverberation are a central consideration at every stage, from deciding how close to a sound source to place a microphone (the further away the microphone is placed, the more room sound it will capture) to deciding how to employ the rich palette of available ambient effects during mixdown. In the case of the latter, source sounds may be assigned practically any configuration of reverberation characteristics.⁵⁹ Since the effect is electronically programmable, it need not represent any actual acoustic space. Furthermore, like echo, ambience can be manipulated separately from the source sound; the composite image can be taken apart--by separating the constituents spatially and/or temporally to an "unnatural" degree--giving the ambience a more individual presence; or the source can be removed from the mix altogether, leaving only its shadowy ghost-like ambient image. In other words, there are various degrees of problematizing to which ambience can be subjected as a matter of expressive intent. But however the phenomenon is employed, it always involves a relationship between source sound and its consequent reverberation. The myriad ways of shaping and manipulating this relationship offer a broad range of affective and interpretive gestures, and form a central part of the record maker's art.

⁵⁹ Reverberant characteristics are usually broken down into the following parameters: pre-delay, decay time, diffusion, and density.

In the coda of the Beatles' "Hello, Goodbye" (1967--ex. 3.18) an exaggerated amount of reverberation on the drums creates a cavernous ambience that spreads over the track, providing a textural expansion that enhances the coda's affective character. Paul McCartney recalls that it was the ambient image that brought all the other components of the track together and made the coda work: "We had those words and we had this whole thing recorded but it didn't sound quite right, and I remember asking (engineer) Geoff Emerick if we could really whack up the echo on the tom-toms. And we put this echo full up on the tom-toms and it just came alive."⁶⁰ Acknowledging the inspiration for the move, and the clear reference thus invoked, McCartney adds, "We Phil Spector'd it."⁶¹

When Phil Spector set about revolutionizing the sound of rock recordings, his greatest tool was ambience. His much-celebrated "Wall of Sound"⁶² was the result of deliberately obscuring individual instruments in a haze of ambience. Individual parts were doubled and tripled--according to the arranger Jack Nitzsche, a typical rhythm section included "four keyboards...a grand piano, a Wurlitzer electric piano, a tack piano, and a harpsichord...three acoustic guitars, three basses (acoustic, electric, and a six-string Danelectro bass), electric guitar, three or four percussionists, a

⁶⁰ Lewisohn, p. 15.

⁶¹ Ibid.

⁶² This characterization was apparently coined by Rolling Stones producer Andrew Loog Oldham.

drummer..."⁶³--overwhelming the relatively small recording space with a wash of reverberant sound that spanned the frequency spectrum. What was a muddy cacophony in the studio, however, could be controlled by the use of faders in the control room; the effect of the room could be tailored and shaped by experimenting with different microphone placements and balances. After recording the basic track, overdubs were recorded with the sound of the first track coming through speakers (rather than headphones), back into the recording space and once again into the microphone. Further, the already ambience-laden sound was processed through echo chambers adding another layer of ambience with a different set of characteristics. Marshall Lieb, who, as a member of Spector's first band, the Teddy Bears, participated in the early recording projects, recalls that Spector's intent was to have "a lot of air moving around, notes being played in the air but not directly into the mikes. Then, when we sent it all into the chamber, this air effect is what was heard--all the notes jumbled and fuzzy. This is what we recorded--not the notes. The chamber."⁶⁴

Lieb recorded with Spector during 1958-59. Spector continued to develop and refine these techniques as he pursued his vision of what a recording should be. In 1964, the jazz guitarist Barney Kessel played his first recording date for Spector, who was producing the Righteous Brothers'

⁶³ Mr. Bonzai, "Lunching with Bonzai: Jack Nitzsche," *Mix* (January 1987), p. 38.

⁶⁴ Ribowsky, p. 44.

'You've Lost that Lovin' Feelin'." Kessel's impressions were not unlike Lieb's: "...there was a lot of weight on each part. The three pianos were different, one electric, one not, one harpsichord, and they would all play the same thing and it would all be swimming around like it was all down a well. Musically, it was terribly simple, but the way he recorded and miked it, they'd diffuse it so that you couldn't pick any one instrument out. Techniques like distortion and echo were not new, but Phil came along and took these to make sounds that had not been used in the past. I thought it was ingenious."⁶⁵

Spector was enormously successful and widely influential in his role as the first rock producer to be considered an auteur.⁶⁶ The use of highly-reverberant sound images--washes of sound--as substantive compositional material entered the vocabulary of record production and remains a much-used resource. On Spector's early recordings the raw material for generating ambience was provided by actual acoustic spaces.

⁶⁵ Ibid., pp. 185-86.

⁶⁶ In 1965 Oldham took out a congratulatory ad in Melody Maker touting the Righteous Brothers' recording of the Barry Mann/Cynthia Weil song "You've Lost that Lovin' Feelin'" as "the great new PHIL SPECTOR Record, THE RIGHTEOUS BROTHERS singing 'YOU'VE LOST THAT LOVIN' FEELING'." Radio deejays also referred to the release as the new Phil Spector record, as they customarily did with his productions. Beginning in 1963, Spector released album-length collections of his productions for "various artists," including the Crystals, Darlene Love, the Ronettes, and Bob B. Soxx and the Blue Jeans, but the featured artist was clearly Phil Spector (in fact, personnel in the groups was not consistent). In 1976 he began to reissue his work in collections with titles such as Rare Masters and Phil Spector's Greatest Hits. Furthermore, when his business position was strong enough to demand it, Spector insisted on sharing songwriting credit equally with songwriters. In his view, the songs were not really finished until he produced them.

Electronically-captured sound was fed to a loudspeaker in the "echo chamber" and the reverberant result was recaptured by another microphone which fed back to the control room where the ambience could be mixed with its source. However, various kinds of reverb simulation technologies have been developed which provide for precise tailoring of ambient images to create a desired effect, extending control and expanding the palette of options. When Presley first went to record for RCA in Nashville, the studio, owned and shared by the Methodist TV, Radio and Film Commission, used a "stairwell in the rear of the building...as an echo chamber and whenever anyone pulled a Coke from the soft drink machine at the foot of the stairs, that sound was included on the recording."⁶⁷ The ambient character of a particular stairwell--or barn, bathroom, castle, etc.--may still figure prominently on a given recording (as I shall discuss in the section on acoustic spaces), but today a computer is more likely to be the tool of choice for creating ambient images, and shaping those images, using an array of techniques, has become an essential expressive aspect of the compositional process.

The famous and extraordinarily influential drum sound on "The Intruder" (1980--ex. 3.19), from Peter Gabriel's eponymous third album, is laden with a highly processed ambient image. The drums announce aggressively at the very outset of the album that we have left the acoustic world as we know it, and moved into a strange soundscape of unknown

⁶⁷ Hopkins, p. 120.

dimensions. The operative conceptual principle--manifested in ambience--is the same as Spector's: the recording is a sound world unto itself, and bears no responsibility to accurately render sound events in the natural world. But the technique used, and the sound that results, are quite different from Spector's.

The sound was constructed by first recording the drums in a large reverberant barn. The focus was fully on the heavy repeating rhythmic loop played by drummer Phil Collins on the snare and kick drums. Since no cymbals or high hat were recorded--minimizing spillage of one instrument's sound into another's microphone--it was possible to place the microphones further away from the drums than usual and capture a great deal of the room sound. Once the ambience was recorded, it was subjected to a then-radical processing technique involving gating and compression. The dynamic range of the ambience was highly compressed, in effect squeezing its energy into a tighter space, increasing its intensity and elongating its decay, which was then gated, creating an artificial cutoff.

In contrast to Spector's hazy wash of ambient texture, the effect in this case is one of stark textural clarity. Within the dense sonic complex of the track as a whole, all the constituents hold a tightly prescribed place. The gated ambience on the drums resolves a physical contradiction: it evokes the sense of awe and power associated with large, open ambient spaces, while at the same time confining the sound to

a clearly delineated place in the track. Limiting each eruption of sonic intensity to a short burst solves the problem of preserving textural clarity without diminishing the drums' visceral power. But conceptually it is richly problematic. Where is this place that the ambience evokes? It is completely unfamiliar. The strange behavior of sound in this atmosphere emphasizes the separateness of the sound world represented by the recording from our own and demands interpretive engagement. To put it another way, the disorientation created by the unfamiliar requires a re-orientation on terms set by the recording.

The space-evoking quality of ambience is used not only to develop the material being of the recorded sound world, but to create different places that exist synchronically within it. For example, on the recording of Springsteen's "Atlantic City" (1982--ex. 3.20), from the Nebraska album, there is a persistent vocal image that apparently inhabits a different place than the lead vocal. Through the verse it is a distant moan; in the choruses it joins in harmony, but it remains in its own distant place. Hence, rather than a simple reinforcement of the lead vocal, the second voice sets up a complementary relationship with it, increasing both the spatial and conceptual depth of the track

Such polyphonic assemblages of multiple simultaneous ambient images have become common. Indeed, every musical part in the mix may have its own unique ambient image. The introduction to "The Intruder," for example, has four levels

of ambience that create a set of planes whose arrangement defines the perspective and depth of the sound stage. Besides the drums, there is a spiky sound effect which is quite dry, with very little air around it. Its lack of ambience brings it to the front of the sound stage and heightens its eerie effect. The guitars have an ambience that gathers itself inside the actual guitar sound, but hardly extends beyond the sound's cutoff (i.e., configured of a short pre-delay and then gated). Its effect is mainly textural, filling the guitar sound with air but providing little spatial information. The artificial cutoff places the guitars in some sort of conceptual proximity to the drums; that is, we can not be quite sure what the ambient information is conveying with respect to "place." Finally, the piano is "down a well." As in the Springsteen example, it seems to be in a completely different place from the rest of the instruments.

Most recordings feature ambience so prominently that drastically limiting its use makes a rhetorical statement in much the same way as Prince's omission of a bass part in "When Doves Cry." The dryness that results from putting sounds on tape with very little air around them produces an aggressively intimate presence. As reverberation creates a distancing effect between the natural sound world and that of the recording, so its absence moves the recording "closer" to the listener. The effect can be unsettling. On the Red Hot Chili Peppers' "Under the Bridge" (1991--ex. 3.21), for example, singer Anthony Kiedis appears to be standing in the

same room as the listener. Is he demanding attention? Sharing an intimate secret? The point is that, again, through a subversion of a grammatical norm, we are engaged in an interpretive response by the sonic configuration of the track and its relation to conventional expectation. The guitar introduction that begins the song is also extremely present. Besides sowing an ambiguity of place, it conjures an image of low-budget recording. As previously noted, such a lack of artifice is often viewed as a statement of street-credibility, or authenticity. Drummer Chad Smith puts it this way: "there's no shit on the tracks, not a lot of modern technology, tweaks and reverbs. It's straight in your face, loud, raw--just like we played it."⁶⁸ Producer Rick Rubin states simply, "I don't like reverb, and on the Chili Peppers record we didn't use any."⁶⁹

⁶⁸ Mr. Bonzai, "Lunching with Bonzai: Red Hot Chili Peppers," Mix (October 1991), p.114.

⁶⁹ Blair (1992), p. 150.

4. THE "COMPOSITION TEAM"

"Nobody does an album by themselves. I work with great people, I have a lot of help."¹

Tom Waits

Edward Kealy has argued that with the introduction of magnetic tape--the use of which brought an unprecedented ease and flexibility to the editing of recorded sound--into the popular music production process in 1949, "the recording medium gained a whole new range of aesthetic decision points and the sound mixer was directly involved in them."² Leopold Stokowski had grasped the importance of the "sound mixer" much earlier, in 1929, when he began making radio broadcasts. "Then you're paying the wrong man," he insisted when he found out what the stranger sitting at the side of the stage was doing. "He's the conductor and I'm not. I don't want this to be broadcast under my name if I'm not controlling the pianissimo, the mezzo forte, and the fortissimo."³ Finding it impractical to manipulate the controls and conduct at the same time, Stokowski settled for making the engineer a member of the orchestra "to be cued as he would cue the first bassoon." Later, when tape provided the possibility of post-

¹ Bill Flanagan, Written in My Soul: Conversations with Rock's Great Songwriters (Chicago: Contemporary Books, 1987), p. 389.

² Edward Kealy, "The Real Rock Revolution: Sound Mixers, Social Inequality, and the Aesthetics of Popular Music Production" (Ph.D. dissertation: Northwestern University, 1974), p. 44.

³ Evan Eisenberg, The Recording Angel: Explorations in Phonography (New York: McGraw-Hill Book Company, 1987), p. 151.

performance mixing, Stokowski would direct the mix by moving his hands above the engineer's to get the balance he wanted while complying with union rules, which forbade the conductor from doing the engineer's job.

Stokowski was a pioneer who did not hesitate to experiment with any technique that he thought might improve the effect of recorded performances. Like Carlos Chavez, Rudolph Arnheim, Kurt Weill,⁴ and others, he believed that the new technology had brought forth a new kind of aesthetic object which had to be shaped according to a new set of criteria. Musicians who sought to use the technology to document existing performance practices as faithfully as possible often found that his recordings contained "too much Stokowski,"⁵ as Rachmaninoff once complained. But Stokowski was simply extending the control he enjoyed as a member of an autocratic conducting tradition (e.g., Mahler, Toscanini, Koussevitsky) into the realms of aesthetic decision making and problem solving that the new medium demanded. He understood that the control he had hitherto exerted through the force of his personality and physical gestures was no longer enough to ensure the aesthetic effect he intended. In order to achieve a desired result, the recording artist must creatively engage the machine.

⁴ Carlos Chavez, Toward a New Music: Music and Electricity, trans. Herbert Weinstock (New York: Da Capo Press, 1975, originally published 1937); Rudolph Arnheim, Rundfunk als Hörkunst (Munich: C. Hanser, 1979, originally published 1936); Kurt Weill, "Radio and the Restructuring of Musical Life," in Writings of German Composers, Jost Hermand and James Steakly, eds. (New York: Continuum, 1984, originally published 1926).

⁵ Eisenberg, p. 152.

While Stokowski sought to interpret scores in ways that took advantage of the new medium's sonic possibilities, the texts he interpreted remain ontologically separate from their manifestations on the recordings. Their composition and their recording represent two different kinds of process separated by time and place. In the case of rock record making, however, the machine is enlisted in the creative process from the outset. As it enters into the composition of the work, a different sort of compositional process results involving many kinds and levels of creative input and control, any of which may exert an influence that affects the other elements, the course of the project, and the ultimate configuration of the work. Roughly, the creative tasks involved can be identified as: songwriting, arranging, performing, engineering (recording and mixing are often performed by different engineers), and producing. These are the categories of contributors that usually appear in an album's credits, and they reflect the coordinated creative effort involved. The tasks, however, often overlap or merge, muddying the categories that the credits purport to identify. Yet this fact in itself illuminates the complex collaborative nature of the project. As Jerry Wexler has put it, "...it's like who does what to whom in bed. Nobody knows. ...Nobody knows what goes on at a record session unless you're sitting there. ...In the long run, what emerges is that the credit accrues to the whole team."⁶

⁶ Ted Fox, In the Groove: The People Behind the Music (New York: St.

As a matter of form, the "artist" on a recording is the person or group that receives top billing on the record cover. But all of the tasks involved in making the record require some measure of artistic imagination and aesthetic sense, and ultimately they all affect one another. A mixing engineer can have a profound impact on a track's arrangement simply by manipulating the timbral and amplitudinal controls provided by the mixing console. A vocalist may drastically re-configure the "written" melody of a song, in effect re-writing it. And an instrumentalist may improvise a part that becomes an important characteristic feature of the track. In short, the many constitutive elements of a track develop as a result of many different people's contributions. The composition comes into being as a result of the efforts of a "composition team,"⁷ which interacts in many ways. Thus in addition to the contributions of individual talents, relationships among the team's members play an important role in the outcome of a recording project. This social element is basic to the nature of the compositional process in rock, and one function of pre-production work is to establish the working relationships that will influence the course of events as the process unfolds.

Martin's Press, 1986), p. 136.

⁷ See George Martin's characterization of his working relationship with the Beatles in All You Need Is Ears (London: MacMillan, 1979), p. 35.

Songwriters

Songwriters' work may precede recording; or it may take place during the recording process; or it may await a nearly finished track that provides the chord changes, form, and sonic context, but no melody or lyrics. Songwriters who are not producing a project or performing on it are rarely part of the recording process. Having placed their completed song with a publisher, producer, or recording artist, their work is finished. However, since the 1960s a sense has developed that generally the most authentic rock recording artists are those who write their own songs. Thus, a great many records feature at least some songs written by the "artist"; these often come about as the track is taking shape and may be influenced by it in various ways. Songs that are finished prior to recording may have a quite different structural character from those that emerge during the track creation process. The former are usually completely represented by their chord/melody/lyrics/groove matrix, and are thus easily adaptable to different interpretations. The latter, on the other hand, may be difficult to extract successfully from their particular setting on the recording to which their genesis is intimately linked.

Because a song need not be completely finished until the final mix, songwriters who perform on, and perhaps even produce, their own records have a fluid situation in which to work. Those with the budget to do so have often used the resources of the recording studio to integrate the

songwriting and track creation processes. (Of course, now that recording equipment has become quite affordable, more and more songwriters use the recording process interactively with songwriting.) According to producer Tony Visconti, David Bowie seldom came to a recording session for his 1970s albums with a "finished lyric or melody... Bowie is the only artist I've worked with who actually writes on mic." For example, "'Fashion' (1980) was conceived as nothing more than a riff... All the little musical 'tastes' were recorded simply because they sounded good; they weren't embellishing the vocal melody because there wasn't one."⁸ The song was only finished months later when the vocal was being recorded, some of the lines written on the spot.

Lindsay Buckingham says that, on his solo projects, his "writing process is very intertwined with the process of making a record. Sometimes I have a whole track and don't have a melody yet."⁹ In such an "intertwined" process, the concrete aural shape of the track may affect the song in any number of ways. "You've got a canvas, and you start off with a certain intent. But because it's a quiet and intuitive process, you put strokes on the canvas, and the work starts to speak to you, taking you off in a direction you didn't expect."¹⁰ The influence of specific sonic textures can open new doorways to the songwriter, expanding the context within

⁸ Michael Molenda, "Production Values: Audio Visionary," Electronic Musician (October 1995), p. 42.

⁹ Mr. Bonzai, "Lindsey Buckingham: Endlessly Rocking," Mix (September 1992), p. 48.

¹⁰ Ibid., p. 47.

which the song develops. Lyrics and melodies are evaluated from the beginning for their impact as recorded sound and their suitability to the track as a whole.

Tony Asher, who collaborated with Brian Wilson on the songs for Pet Sounds, recalls how the songs developed on that project: Wilson "used to go in and record (instrumental) tracks. We didn't know what they were going to be. They didn't even have melodies. They would just be a series of chord changes that Brian liked... Then, we would bring these back (to the house) and play them and kind of write a melody to them and then write some lyrics."¹¹ Once the basic "feel," as Wilson called his sketches, was in some kind of concrete form, the aural impression it made informed and furthered the songwriting process. "Once they (the "feels") are out of my head and into the open air, I can see them and touch them firmly," says Wilson. "Then the song starts to blossom and become a real thing."¹²

In his account of U2's working methods on the Zooropa project, Bill Flanagan describes a songwriting process where the group jams freely with tape recorder rolling. "Eno or Edge then go through the tapes, finding sections they like and editing them into proper song form. Then the band listens, suggests alterations, and tries coming up with words and melodies to go on top of the edited

¹¹ David Leaf, The Beach Boys (Philadelphia: Courage Books, 1985), p. 78.

¹² David Leaf, Pet Sounds CD booklet (1990), p. 8.

tracks."¹³ As the album progressed, tracks were assigned to one of three categories: "Songs," "Vibes," or "Soundtrack," each indicating the track's state of completeness. In this kind of process, lyrics--which in any case are as much about their sound as they are about their linguistic meanings--melody, and vocal character are to a greater or lesser extent responses to the sound of the track. Feel, sound, and groove all precede what Flanagan calls "proper song form." The song elements are fitted to the affective character that the track presents. They, in turn, may shift existing elements of the track in a new direction. In short, the formation of track and song constitutes a continual interaction, and thus anyone involved in creating the sound of the track--engineer, musician, producer--has a potential influence on the songwriter.

Musicians

As previously noted, musical performances in the record making context provide the concrete material from which the work is made. And inevitably the musicians who provide this material leave something of their own personal mark on the work. Obviously, degrees of significance vary; a lead vocal accounts for more of a work's identity than a tambourine part. Nevertheless, the finished recording captures and combines the individual techniques and styles of every

¹³ Bill Flanagan, U2 at the End of the World, (New York: Delacorte Press, 1995), p. 183.

musician who puts in an appearance. It is common for specific musicians to be invited to participate in a project in order to incorporate their unique musical sensibility and perspective into the work. Drummers such as Manu Katché, Kenny Aronoff, and Larry Mullen Jr., for example, make a great many guest appearances on a variety of different artists' records, always appearing "as themselves." That is, they are not called upon to alter their style in a chameleonic way--as professional studio musicians often are--but rather to bring their own distinctive character to the project. The set of qualities that define a musician's personal style is immediately evoked by the lexicon of musician references that is used in recording studios: the "Duane Eddy guitar sound," the "Phil Collins drum sound" (known as the "Hugh Padgham drum sound" among engineers), "Everly-style harmonies," "Dylan-esque phrasing," and so forth. Musicians' styles thus take on a symbolic quality, signifying a particular set of associations and providing another element in the rhetoric of record making. The presence of an Eddie Van Halen guitar solo on Michael Jackson's "Beat It" (1982), for example, makes a statement that resonates beyond the track. Van Halen here represents not only himself but pop metal in general, an overwhelmingly white rock style quite different from Jackson's background in Motown pop soul. The two styles are not blended in any way; one is simply superimposed on the other. They are meant to be

intersecting entities whose meeting creates a set of interpretive problems that further enriches the track.

There are also collective styles such as the "Motown sound," the "Muscle Shoals sound," the "Stax sound," and the Wrecking Crew that feature a regular group of session musicians who contribute a characteristic group sound to the work of different songwriters, vocalists, and producers. In a refutation of the common criticism of the Motown style as "an assembly line of interchangeable parts" under the tight control of producers Brian and Eddie Holland and Lamont Dozier, Jon Fitzgerald argues that the recording process at Motown was "interactive." It was "likely to be a very dynamic and communal process," in which the players were given minimal direction--"about five chords and a feel" as pianist Earl Van Dyke has put it--and were expected to provide their own parts. "Yes, they'd give you a chord sheet and say, 'You're on your own'," recalls the bassist James Jamerson, one of the Funk Brothers without whom Dozier acknowledges "a lot of the ideas wouldn't have been possible."¹⁴

Of course, in the multitrack environment it is not necessary for musicians to play together and many tracks are built one performance at a time. But the interactive nature of ensemble playing can add another dimension to the recording. The quality of the energy passing among the players becomes a part of the work, adding depth and

¹⁴ Jon Fitzgerald, "Motown Crossover Hits 1963-1966 and the Creative Process," Popular Music (January 1995), pp. 2-3.

resonance to the texture. During recording for Emmylou Harris's Wrecking Ball (1995), for example, a premium was placed on interactions between musicians playing together in the studio. Overdubs were used sparingly in an attempt to capture a particular kind of musical atmosphere. "We would sit really close together with no separation," Harris recalls, "and work up the arrangements and go for a performance, with a live vocal and minimal amount of overdubs. Bleeding into the microphones¹⁵ was kind of encouraged on this record. With that, I think you get another participant on the track, which is the room and the energy and the performance. It's an ambience that you can only get going with that live situation."(emphasis added)¹⁶

On the other hand, studio performances can consist of fragmentary musical statements of limited technical scope--perhaps just a few notes to add a particular color or affective flavor to the track. Hence technical proficiency, an assumed prerequisite for live performance, is not always necessary in the multitrack environment. Musicians can bring their musical sensibilities to instruments other than their primary one, which can lead to some fresh and interesting approaches as they are forced to abandon long-established habits and patterns and focus primarily upon using their powers of sheer musical expression to create a musical

¹⁵ This refers to the leakage of sound from one instrument into another instrument's microphone.

¹⁶ Rick Clark, "Emmylou Harris: The Making of Wrecking Ball," Mix (February 1996), p. 184.

statement that, while technically simple, is imbued with expressive depth. "If things start sounding too commonplace on people's normal instruments, then I just ask them to play another instrument, just to come up with things from a more unusual or stranger angle," says Daniel Lanois. "In my experience, artists will create with almost any tool you present them with. It can be fascinating if you have your hands on something that you normally don't play, the idea being that the artist in you...should be able to make something out of anything. Musicians of that caliber can usually come up with something interesting with any instrument."¹⁷ Mitchell Froom, among others, also finds this approach to be useful: "By having a lot of unusual instruments laying around in the studio, you can create an atmosphere where someone who barely knows how to play can find an unconventional, often naive approach to an instrument that really works."¹⁸

Arrangers

Oftentimes rock recordings do not use any scored arrangements, and usually when such arrangements are used they constitute only one part of the overall track arrangement. Thus, "arranger" credits are often qualified in some way--"string arrangements," "orchestral arrangements," and the like--or left off the album altogether. Many track

¹⁷ Ibid.

¹⁸ Paul Tingen, "Mitchell Froom," Keyboard (April 1993), p. 44.

arrangements emerge from a combination of head arrangements and pre-composed blueprints. Again, the process is a fluid and collaborative one (think of the case of "Strawberry Fields Forever"); everyone involved in making a record is a potential contributor to the arrangement. For example, a band may work out basic arrangements together in rehearsals and performances; the producer will ideally have some kind of mental image of the ultimate shape of the work, and may contribute ideas that help to transform the live arrangement into one that works as a record; the engineer keeps an ear on the sonic logic of instrumental combinations as they make their way to tape, perhaps cautioning when an otherwise interesting musical part detracts from the overall sonic weave; a studio musician may come up with an idea during a session that casts the track in a new light and moves the arrangement in a new direction. All of these possibilities and many more supplement, and sometimes replace altogether, the traditional role of the arranger.

There was, however, a notable period during which pre-composed arrangements flourished in rock recording. Charlie Gillett has pointed out that it was Atlantic Records in the 1950s--under the leadership of Ahmet Ertegun and Herb Abramson, and later Ertegun, his brother, Nesuhi, and Jerry Wexler--that pioneered the use of formal arranging techniques in music that had previously relied on head arrangements. "You just couldn't find blues singers in Harlem or Washington," recalls Ertegun. "They were all in Chicago,

Texas, New Orleans."¹⁹ So, beginning in 1950 Ertegun and Abramson made trips to the South in search of performers, songs, and a stylistic direction for their young company. Accompanying them was Jesse Stone, a music business veteran whose songwriting and arranging credits reached back to the 1920s. In Ertegun's view, Stone "did more to develop the basic rock 'n' roll sound than anybody else..."²⁰ Stone was certainly responsible for setting in motion the development of the Atlantic "rock 'n' roll sound." After the first Southern trip--"about eight thousand miles" of "zig-zagging" on the way from New York to Fort Worth, Texas--he began working on arrangements that captured the flavor of the music he had heard. Stone had worked with jazz big bands through the twenties, thirties, and forties, and this music presented him with new challenges. "I had to learn rock 'n' roll--we didn't call it rock 'n' roll then--and it wasn't something that I could do easily at first."²¹ The difficulty, of course, lay in preserving the sense of spontaneous, direct expression that provided so much of the resonant atmosphere of blues and R&B performances while transferring the music into a written format with more elaborate instrumentation and tight vocal arrangements, a style Wexler termed "immaculate funk." During recording, the instruments were miked separately, decreasing leakage and room ambience, and further

¹⁹ Charlie Gillett, Making Tracks: Atlantic Records and the Growth of a Multi-Billion-Dollar Industry (New York: E. P. Dutton, 1974), p. 49.

²⁰ Ibid., p. 51.

²¹ Ibid., p. 53.

enhancing the tight clarity of the arrangements. According to Ertegun, all of this was "a major departure for R&B recordings. Some writers have described the Atlantic sound as R&B with strings or arranged R&B and there's merit in that."²² Also, in 1958 Tom Dowd, Atlantic's chief engineer, began using one of three Ampex eight-track tape recorders then in existence. Although the format was not used to build tracks layer by layer, as would later become common, it allowed the signals from different microphones (i.e., different instruments) to be stored separately, providing greater control over the remix. Stone's and subsequent Atlantic arrangers' success, along with the recording techniques pioneered by Dowd, resulted in a "New York sound" associated with the label, a sound later exemplified by Jerry Leiber and Mike Stoller productions, most notably their string of hits with The Drifters.

The use of written charts also resulted in greater control over events at the recording session, an economic necessity for a small company working with New York studio rates and union rules. Recording sessions were three hours long and musicians were paid by the three-hour unit, or any part thereof, whether they were playing or not. If the arrangement or its execution had problems, the units could add up quickly, which led to a demand for arrangements that were pre-composed and musicians who were fluent readers. At

²² Jerry Wexler and David Ritz, Rhythm and the Blues: A Life in American Music (New York: Alfred A. Knopf, 1993), p. 171.

the end of a three-hour session "a producer would be inclined to settle for the best take he had,"²³ and thus a certain degree of professional craftsmanship aimed at efficiency was required of both arrangers and musicians. Clearly, the types of arrangements and musicians such a production method demanded had a decisive impact on the character of the recordings. The tight arrangements and time constraints left little room for creative interplay among musicians, and the interactive spontaneity that had always been such an important element in rock and roll and rhythm and blues was displaced by a more formal pre-composed approach.

Gillett also points out that the decisive moves away from such a system came from two directions: Britain and the American South. In both cases groups of musicians wrote songs and worked out arrangements collaboratively, each contributing their own creative input as well as their instrumental technique. In 1965, Wexler himself began to move his sessions from New York to the studios of Memphis, Tennessee and Muscle Shoals, Alabama where groups of studio musicians who played together regularly were accustomed to working on arrangements in the studio until the feel was right, "accepting that one session was a song rather than a three-hour unit of time."²⁴ Arrangements grew out of jam sessions, and the interactive habits of the musicians became an influential element in the character of the arrangement. I

²³ Gillett, p. 213.

²⁴ Ibid.

shall return to Wexler's work with these southern musicians in my discussion of collaborative interactions.

Engineers

From the quality of the sound colors captured on tape to the refinement of the smallest details in the mix, engineers are responsible for much of what we hear on a recording. It is common among recordists to credit good songs as the central poetic element on a successful recording, but, as previously noted, there are many exceptions. And even in the case of a "great song," a well-made track takes it to another level of affective impact. Indeed, songs have become so thoroughly associated with the concrete sonic elements of their setting that professional songwriters no longer shop their songs with simple demo tapes of a singer with piano accompaniment. Rather, they provide what publishers, record companies, and the like have come to expect: high-quality recordings that help to explicitly define the song's affective character.

The tone of Kealy's dissertation is set from the outset by his quotation of the following passage from the liner notes to Dylan's Bringing It All Back Home (1965):

...am standing there writing WHAAAT? on my favorite wall when who should pass by in a jet plane but my recording engineer "i'm here t pick up you and your latest works of art. do you need any help with anything?"

. . .

an so i answer my recording engineer "yes, well i could use some help in getting this wall in the plane"

Indeed, how would Dylan--by his own admission uninterested in the technological side of the production process ("I don't think I knew you could do an overdub until 1978."²⁵)--get the wall into the plane without the help of his engineer? From their first decisions about microphone selection and placement, engineers participate in the process of shaping the musical work; and their involvement deepens as the project progresses. They are both craftsmen and shamans, harnessing the power of the machine and deftly manipulating its magical secrets to effect the transformation of the musical moment into a musical text. They are the participants in the process who best understand the technological tools in terms of their potential for realizing musical aims, and throughout the recording project songwriters, performers, and producers are reliant upon them to shepherd intuitive musical visions that are often only partly formed, perhaps technically naïve yet artistically sensible, through a daunting technical and analytical process.

The engineer is, in a sense, a translator for the other members of the recording team. Musical ideas, human presence, artistic personalities, the sounds of instruments, voices, and rooms must all be translated from their original state to

²⁵ Flanagan (1987), p. 108.

the recording medium. Communication and empathy are critical. Working on Kiko, Latin Playboys (1994), and Colossal Head (1996), the members of Los Lobos developed a quick, intuitive communication with the engineer Tchad Blake. By the time they reached the Colossal Head sessions, Blake was co-producing (along with Mitchell Froom) and David Hidalgo recalls, "We'd say something that sounded off the wall, they would say, 'Oh, OK, cool, let's do it.'" "In three seconds," adds Cesar Rosas, "Tchad would go [he mimes Blake punching something up on a board] 'tchk, tchk, tchk, tchk.' 'Like that?' 'Yeah, like that.'" Steve Berlin continues, "Tchad's artistry is that he starts in a place that's very, very colorful, and he frees you to think abstractly. It's not like you have to get from A to B to C to D. If you want to start at Y with him, you can see a whole range of possibilities..."²⁶ In other words, the instinctive musical understanding between the engineer and the writer/musicians allowed the project--which was begun without any finished songs, yet completed in a month--to proceed in sometimes unorthodox ways, transcending technical issues and keeping the proceedings focused on creative ones; logistical methodology was simply absorbed into the overall creative gestalt of the process. The series of steps that often becomes the procedural habit of a recording project could be rearranged at will to present new perspectives without fear of becoming lost in the recording process.

²⁶ Chris Morris, "We're an American Band," Pulse (April 1996), p. 45.

The engineer plays a central role in preserving the inspiration of the intuitive moment as it goes through the often tedious process of becoming a finished artwork. George Massenburg, who as an engineer, producer, and electronics designer spends his life grappling with the musical/mechanical interface, offers the following view of what makes a great engineer: "What I listen for is transparency, where the idea moves from its inception to the listener with the least amount of forces impeding it."²⁷ As understated as this sounds, the criterion of "transparency" is a very demanding one. It requires musical, organizational, and interpersonal skills as well as technological expertise. Moreover, inasmuch as the work of the various participants in the recording process is interdependent, it demands an aesthetic sensibility and a sensitivity to the artistic aims of the project. "Certain producers...choose their engineers very carefully, because the producers know that those engineers are going to bring certain aspects to the record," says Kevin Killen, who has played roles as both engineer (U2, Patti Smith, Roy Orbison, Kate Bush) and producer (Peter Gabriel, Elvis Costello). "And whether you call that person an engineer, a co-producer or a producer, it's all nomenclature at that point. The industry likes to put things into nice little boxes, but most engineers do feel that they

²⁷ Mr. Bonzai, "George Massenburg: In Search of the Lost Nanoweber," Mix (November 1985), p. 204.

play a large part in the artistic end of a record."²⁸

Mitchell Froom has no doubt on this point. He characterizes his relationship with Blake, as a "creative partnership."²⁹

The engineer/producer partnership constitutes an expanded set of musical sensibilities incorporating all the aspects of compositional decision making that goes on in the studio. The depth to which the partnership can affect the work is further illustrated in a comment by Jack Douglas, the producer of such artists as John Lennon, Patti Smith, and Aerosmith: "I'll take the tracks to where I think they should be, and then when I'm out in the studio running it down with the band that super class of engineer has taken it to twice what I heard while I was in (the control room). I'll come back in and get a great big surprise. Engineering is really an art, and there are some real good artists out there."³⁰ Such partnerships often last for many years. Examples include George Martin and Geoff Emerick, Phil Spector and Stan Levine, Quincy Jones and Bruce Swedien, Leiber/Stoller and Tom Dowd, Brian Eno and Daniel Lanois.

Engineers are charged first of all with capturing the sounds of the musical performances at the recording session, and doing so in a way that allows musicians to be at their best. This means that they must work quickly and efficiently

²⁸ Dan Daley, "Kevin Killen: The Engineer becomes Producer," in Music Producers: Conversations with Today's Top Record Makers, Terri Stone, ed. (Hal Leonard Publishing Corporation, 1992), p. 35.

²⁹ Michael Molenda, "Production Values: Listen to the Music," Electronic Musician (April 1996), p. 69.

³⁰ Bobby Owsinski, "You Don't Know Jack," EQ (May 1996), p. 52.

to get the session into tracking mode as soon as possible. A drummer who has just spent two hours hitting a snare drum while the engineer adjusts microphone placement, sets recording levels, decides on equalization, and so forth, will be hard-pressed to then begin producing inspired performances. Besides the time-equals-money equation that rules the professional recording environment, there is a concern for "capturing the moment," that is, capturing the musicians' excitement and inspiration before the adrenaline slows to a trickle and boredom sets in. "John (Lennon) was a one or two take man," recalls EMI engineer Peter Vince. "If you didn't get him then, or if you didn't put the right amount of echo in his cans, you just wouldn't get the performance from him."³¹ Even studio musicians who are professional craftsmen, proud of their ability to produce on demand, perform best early on in the recording process. "There is a natural progression," says Neil Stubenhaus, bassist on projects for Anita Baker and Bonnie Raitt among many others, "especially if you're tracking and have musicians together. Everyone has a peak and a peak performance. That peak is closer to the beginning than to the end."³²

The engineer must also provide a suitable sonic environment for the performers via their headphone mix, which may require an alternate mix to the one being monitored in

³¹ Mark Lewisohn, The Beatles Recording Sessions, p. 70.

³² Robyn Flans, "Studio Session Players Sound Off About Producers and Engineers," Mix (October 1992), p. 40.

the control room. The musician might, for example, have a particular EQ and reverb added to the headphone mix, creating a sound environment that stimulates the musical performance but is not printed to tape. Meanwhile, the producer in the control room may require a very different mix, a harsher light in which to make critical judgments. The engineer must meet these varying needs simultaneously, alternating between two different sonic environments and sets of criteria.

There are many things that affect sound between its point of production and its appearance in the monitors and headphones. When engineers "get sounds," they are not simply setting up microphones and monitoring record levels. They are balancing a complex network of interactive mediating elements that color the sound and may affect a musician's performance as well as the decision making of the recording team. Engineers must choose among microphones, preamps, compressors, equalizers, effects, and recording media, deciding whether and how to use them according to the general aesthetic stance of the project. Hence, they must know generally what kind of coloration is acceptable, even desirable, to the producer and the musicians, and what will ultimately suit the finished track.

The tools of record production are often judged according to their "musicality." "A Composer Lies In You!" begins a recent advertisement for a compressor called the "Composer" by its manufacturer. "Creative genius. The province of songwriters, arrangers, producers, and musicians.

And sound engineers. With control over the audio signal at the final stage, you can make all the difference to the final result--but your creativity won't shine through unless you have the right tools for the job."³³ Similarly, the sonic coloration effected by certain preferred equalizers, mixing consoles, microphones, and so forth is characterized as "musical." The effective--that is, "musical"--use of these tools is the engineer's responsibility, and the best engineers direct their reservoir of knowledge and experience toward managing the interface between music and machine, art and technology. "I'm not really a musician in my own right," says Killen. "What I play is the console, and I interpret the ideas and get them to tape."³⁴ Likewise, Tom Lord-Alge refers to the Solid State Logic console as his "instrument."³⁵ What constitutes "musical" sounds is, of course, a matter of style and personal taste. Part of an engineer's role is to bring to the project an experienced awareness of timbral and textural conventions from the point of view of sound recording practice. That is, in addition to the physical aspects of individual sounds and composite textures, the engineer must be attuned to their suitability to the intended musical expression, as well as any stylistic associations they may have with other artists, eras, and recordings that might influence the rhetorical stance of the record.

³³ Keyboard (April 1995), p. 39.

³⁴ Daley, p. 36.

³⁵ Blair Jackson, "Tom Lord-Alge: The Grammy-Winning Engineer/Producer Is on a Roll," Mix (May 1989), p. 59.

These considerations are not sequential, but simultaneous. Lord-Alge records "with the mix in mind."³⁶ Hugh Padgham elaborates: "When we're putting parts down in the studio, I have a quick realization whether the parts are going to work against each other musically and from an audio point of view. When I produce or mix a record, I hear the music in a sort of sonic spectrum."³⁷ This combination of musical and audio considerations is not really separable in a meaningful way. It amounts to an integrated kind of arranging where musical parts and actual sounds are interdependent. From calls this the "overall noise." It is a mistake, he believes, "to separate sonics from the musical arrangement."³⁸ Indeed, as with the composition team itself, successful recordings involve integration of such categorical distinctions on both the conceptual and the practical levels.

Engineers should also have an understanding of musical structure--the form of a song, the shape and nuances of a phrase, the progression of events in an arrangement or a performance. An understanding of musical structure is invaluable when editing, whether splicing tape, bouncing tracks, or assembling composite performances. Furthermore, since engineers are in charge of running the tape recorder at tracking sessions, they must be able to find the exact place where an overdub is required, and to get there as quickly as

³⁶ Ibid., p. 62.

³⁷ Mr. Bonzai, "Hugh Padgham: Studio Synchronicity," *Mix* (October 1990), p. 84.

³⁸ Molenda (1996), p. 69.

possible to minimize any disruption in the session's flow. If drop-ins are required, it is the engineer's responsibility to punch the machine in and out of "record" at precisely the right spots. These may be in the middle of phrases, where a mistake will erase something that was intended to be kept. The engineer must keep track of which takes have been determined to be acceptable, which may be questionable, and which need to be re-done. In the compartmentalized environment of the multitrack medium, all the various musical parts inhabit their own separate places, and engineers need to know at all times the location and status of all the elements of the track.

Perhaps the clearest indication of the engineer's place in the record making process is the responsibility they assume for the track's final mix. The mix brings together all of the track's parts into a coherent whole that aims to exemplify the various concepts and expressive intentions that have been articulated by the project's participants. Until there is a mix, there is no piece. Yet setting up the basic dimensions of the mix is usually left to the engineer alone. The producer, and any others who are still involved at this stage, usually avoids the studio while the engineer sets up a mix, thus preserving a fresh perspective. "As most producers do," says Bob Clearmountain of Bruce Springsteen, "he gives me a few hours to get my mix together and listens to my concept. If he doesn't like it, he'll just tell me it isn't what he had in mind. He'll point me in a new direction. But

usually he likes what I come up with and he'll just go through a bunch of different options."³⁹ In order to "come up with" a mix--from the huge range of possibilities--that is close to the artist's mental image of the finished piece, Clearmountain must have an artistic connection to the project, an almost alter-ego relationship with artist and producer and an aesthetic understanding of the piece. His musicality and overall sensitivity to a project's intended aims make Clearmountain a popular choice to serve as mix engineer on many artists' albums. Daryl Hall, for instance, claims that "...Bob Clearmountain is one person...that you can give something to and let him fly blind with it, and he'll come out with the right thing. He's supernatural when it comes to that. He's the only person I know who can do that, and I guess that's why I use him all the time. He's so much better than any mixer I've ever worked with that it's really astonishing."⁴⁰ Clearly, the "right thing" is a realization of what Hall envisioned his work to be. His comments illustrate once again the importance of artistic empathy between engineer and artist or producer.

Much of an engineer's work is done "after hours." Once the formal recording session is over and the musicians have left the studio, the engineer often stays to work on edits, sounds, mix ideas, and so forth. According to Flanagan,

³⁹ Mr. Bonzai, "Bob Clearmountain: Sound Ideas," Mix (October 1989), p. 92.

⁴⁰ Bruce C. Pilato, "Daryl Hall: Standing Solo," Mix (November 1986), p. 283.

during the sometimes lengthy and intense negotiations that took place in the studio during the making of U2's Zooropa, "Flood listens to it all and says nothing. When everyone else is talked out, exhausted, and home in bed, he will still be here, making it sound the way he wants."⁴¹ Night after night, after the others had gone, he remained behind to continue work on the tracks. The point where he leaves off is the point at which the others will begin when they arrive the following day. Thus the engineer quietly, yet tellingly, nudges the project along. "A lot of the time I'm like this junior partner," says Flood. "It's almost like you go around with the broom afterwards."⁴²

Producers

For "Watching the Wheels," which he played like a Bob Dylan song with just him on acoustic guitar, his instructions were: "This is angular, make it circular."⁴³

Jack Douglas on John Lennon

The question has often been asked, "What is a record producer? What exactly do they do?" Although it seems a simple enough question, it is impossible to answer simply. The range of roles played by producers is limited only by the number of tasks on a given project. Furthermore,

⁴¹ Flanagan, p. 190.

⁴² Ibid.

⁴³ Owsinski, p. 55.

conceptions of the producer's function vary greatly among producers themselves and from one era to another. From the standpoint of the record company, the producer is the person who is responsible for delivering a given project on time and on budget, and there have been producers who do little more than hire musicians, pay bills, and keep the project on schedule, leaving creative tasks to writers, arrangers, musicians, and engineers. But the role of final arbiter in the studio--on issues ranging from which songs to record to which musicians and studios to use to which take is best, as well as a host of more mundane matters--necessarily involves at least a passive artistic sensibility, and producers often bring an active artistic element to their roles as well. This might manifest itself in actual songwriting, arranging, performing, or engineering.

Certain historical factors have wrought changes in producers' roles and functions. These include: 1) technological developments, 2) growing economic power and artistic autonomy of recording artists who write their own material, 3) changes in the structure of the music business, and 4) more recently, the dramatically lowered costs of producing professional-quality recordings resulting in a "de-centralization" of the production process. However, good instincts, both artistic and commercial, have remained the common element among most producers throughout the rock era. Producers are matched

with particular projects according to their ability to take a particular set of elements and shape them into a cohesive whole, overseeing and managing the dynamics of collaborative creativity among the project's participants.

While the nature of the producer's role varies, it almost always leaves its mark on the artwork. The influence might be immediately apparent in the sound of the record; some producers have a distinctive style that they bring to whatever project they are working on. Or the producer's impact might be completely behind the scenes. Putting together the right chemistry among musicians, for instance, or finding an appropriate song for a given artist can be keys to a successful project. Some producers are associated with a particular style of music and might be sought for their sense of stylistic nuance. Others are especially sympathetic to the needs and vision of certain recording artists, providing them with creative direction and guidance, and coaxing from them performances that will stand the test of time. In short, the task requires a range of skills, and no two producers have quite the same combination of abilities. But in any case, most important is the ability to draw together the diverse strands of creativity and focus the energies of the recording team.

Probably because of Spector's status as one of the few producers recognized as an auteur, Jack Nitzsche, the arranger on many classic Spector sessions has said, "I think Phil is the best record producer--no, I mean he is the only

artist/record producer. He was firstly an artist."⁴⁴ "Artist" here does not simply mean someone who contributes artistry to the project, but rather "recording artist," that is, the person who claims top billing. But the idea that a producer should be an auteur--imposing his own sound and vision on diverse projects--is controversial, as is the "artist/record producer" conflation. "The main part of the job is to stay absolutely out of the way when you're not needed," says Fromm. "If you can't make the decision to leave a good thing alone, you've no business being a producer."⁴⁵ In Bob Dylan's view, "Producers usually get in the way. They're fine for picking you up at the airport and making sure all the bills are paid at your hotel. ...but I haven't run into any that know any more about what I'm doing than I do."⁴⁶ On the other hand, some producers view recording artists as vehicles. "I loved them," Spector said of the Righteous Brothers. "I thought they were a tremendous expression for myself. I think they resented being an expression."⁴⁷ Rick Hall--founder of the Fame studios in Florence, Alabama and central figure in the development of the "Muscle Shoals sound"--has an equally imperious view of musicians. Comparing his approach to that of Jerry Wexler, whose inspired combinations of musicians often contributed a creative element to the project, Hall

⁴⁴ Mr. Bonzai, "Lunching with Bonzai: Jack Nitzsche," Mix (January 1987), p. 38.

⁴⁵ Molenda (1996), p. 72.

⁴⁶ Flanagan (1987), p. 110.

⁴⁷ Jan Wenner, "Phil Spector," in The Rolling Stone Interviews (New York: Straight Arrow, 1971), p. 258.

says, "Jerry thinks that musicians are the answer to hit records. I say musicians are like basketball players, they need a manager to tell them when to drop a play. My engineering ability and advice on licks and beats contributes more than the individual musicians."⁴⁸

Comparing the roles of record producer and film director--from which the auteur concept is borrowed--Don Was characterizes the former as "a little more of a nebulous thing. A film director is the artist and it's really his vision, and the actors and the entire crew are there to serve him. Whereas if you are producing a record, you make the same types of decisions, but, theoretically, they are towards furthering the artist's vision."⁴⁹ Was is credited as a creative collaborator by the "artists" he works with, but there is clearly some line which delimits the scope of his creative contributions and distinguishes his role as a "producer" from the role he inhabits as an "artist" when making his own records. As he puts it, "If I'm going to lapse into being the artist, I might as well really do it."⁵⁰

These conflicting views of producers' roles are drawn from different historical periods and circumstances. Although Spector's approach persists among some producers, or may be appropriate for a given project, there has been a general historical trend favoring producers who can empathize with

⁴⁸ Gillett, p. 207.

⁴⁹ Erik Philbrook, "The Wizard of Was," ASCAP Playback (November-December 1994), p. 5.

⁵⁰ Ibid.

the artist. Indeed, Spector, who retained his mastery of the studio process through his final recording project (the Ramones' End of the Century, 1980), was nevertheless left behind by changes to which he refused to adapt. As recording artists gained ever-greater autonomy from the mid-1960s, they sought producers who could work from within the artist's creative sphere, helping to draw out and focus the most characteristic aspects of their artistic personae, rather than imposing a perhaps conflicting musical vision from the outside. "The main criterion is that the producer provides a camaraderie, more than a technical expertise," says Rickie Lee Jones. "I want them to relate to the work, to dig it and help to bring an atmosphere of confidence."⁵¹ This trend toward greater autonomy for recording artists has led to a common situation where projects are co-produced, the production credit shared between the producer and the artist.

Far from receding in importance, however, producers enjoy unprecedented visibility. There has been "a marked transition in the role of record producer"⁵² from the record company A&R men who matched songs with artists, hired musicians and arrangers, and supervised recording sessions (e.g., John Hammond) to the independent contractors of today. The trend has accelerated in the last fifteen years.

"Producers seem to be getting known by the public nowadays

⁵¹ Mr. Bonzai, "Rickie Lee Jones: Sweet and Spicy," Mix (April 1992), p. 74.

⁵² Bruce Swedien, "Foreword" to Music Producers: Conversations with Today's Top Record Makers, p. v.

and I don't think that's a good thing. It's the band that's all important, all the time," protested Steve Lillywhite in 1982. At the time, however, Lillywhite was in the forefront of young British producers who were responsible for the growing trend towards ever more experimental sonic treatments--especially in the realm of ambience--that took records further and further from acoustic reality and asserted their own identities as autonomous worlds of sound. As variations on the immense and strange drum sound on Gabriel's "The Intruder" turned up on Lillywhite's productions for bands such as U2 and Big Country, it was inevitable that the producer responsible for these sounds would be widely credited with the striking effect these records had. Unique sounds became artistic entities in themselves, and producers increasingly directed their technique to framing songs and performances in complex and sophisticated sonic architecture. British recordings of the early 1980s ushered in a new era in record making, one in which sound quality--to some, "ear candy"--rose in aesthetic significance and became generally accepted among not only recording professionals but the record-buying public as an essential aspect, along with songs and performances, of a recording's identity and value. The origins of the concept, however, are much older and are to be found not in Britain but the United States.

George Martin recalls that "before and even after the Beatles arrived--the record producer was basically an

organiser."⁵³ This was true in Martin's case because he worked for a large corporation. But in America, where small independent record companies dotted the landscape, there were producers breaking the A&R mold from the beginning of rock recording, making records on which the producer's hand was apparent.⁵⁴ Clearly Sam Phillips was far more than an "organiser." Besides drawing from Presley and others a "possibly unknown talent," he contributed the sound of the tape delay, a fundamental stylistic element and an obvious move away from acoustic reality. And there were many other independent engineer/producers around the country--Norman Petty in Clovis, New Mexico (Buddy Holly), Lee Hazelwood in Phoenix, Arizona (Duane Eddy), Cosimo Matassa in New Orleans (Fats Domino and a host of other New Orleans musicians)--all working at making distinctive, unique-sounding records.

The work of these pioneers, and others, set the stage for Spector. Comparing himself to George Martin, Spector has said "I don't consider myself in the same situation or league...I don't consider him with me. He's somewhere else. He's an arranger, that's all."⁵⁵ Again, Spector considered

⁵³ Martin, p. 104.

⁵⁴ It should be noted that there was at least one very independent engineer/producer working in a small apartment/studio in 1950s London. Joe Meek pioneered a range of unorthodox recording techniques--forbidden in "official" British studios--"distinguished by his trademark use of echo, compression, distortion, and overdubbing," often with equipment he designed and built himself. His memory is preserved by the Joe Meek Appreciation Society. See: John Repsch, The Legendary Joe Meek: The Telstar Man (London: Woodford House, 1989). Hear: It's Hard to Believe It: The Amazing World of Joe Meek (Razor and Tie RE 2080-2, 1995).

⁵⁵ Richard Williams, Out of His Head: The Sound of Phil Spector (New York: Outerbridge & Lazard, 1972), pp. 156-8.

himself to be the record's main artist. "...I don't have a sound, a Phil Spector sound--I have a style, and my style is just a particular way of making records--as opposed to Lou Adler or any of the other record producers who follow the artist's style."⁵⁶ The "artist's style," like everything else (the song, the arrangement, the performances), was to be fitted to the needs of the recording, the producer's oeuvre, which must become larger as a whole than any of its parts. In Jerry Wexler's three categories of producers, he cites Spector as "the prime example of the third category: producer as star, as artist, as unifying force."⁵⁷ In many ways, producers of the past fifteen years embody these three things. And yet the general attitude they take toward their work falls into Wexler's second category: "servant of the project." But although they may prefer to remain behind the scenes, their effect on the outcome of the project can be profound.

The nature of the producer's role in the modern studio is summed up well by Paul Fox, a producer who has worked with many very different artists (e.g., XTC, Victoria Williams, Boy George, They Might Be Giants). "(A)s a producer, you have so many different bags that you have to dip into...You have to be somebody who is aware of all the different levels that go into being an artist. There's a little bit of being a psychologist, a teacher, the musician and arranger. Then

⁵⁶ Wenner, pp. 255-6.

⁵⁷ Wexler, p. 143.

there's being the engineer and the sound sculptor. ... I'm the guy who flies the helicopter above the trees to look down and get the overview."⁵⁸

Collaboration

On a small portable recorder I did 20 takes of this guitar instrumental--my friend Pierre Marchand listened to them all and picked out the best. In England, Brian (Eno) played many beautiful keyboard parts--a sort of sound sculpture behind a lonely guitar. James May, a New Orleans trumpet player, was playing outside my window. I invited him to do an overdub. Much later Malcolm (Burn) did the mix.⁵⁹

In this brief account of the making of "White Mustang II" (1989), Daniel Lanois captures the flavor of the collaborative nature of the recording process. Recordings usually involve the input of several musical sensibilities, each affecting the other in some way, and there are myriad varieties of potential interactions among participants. Again, precise distinctions among roles are not possible, nor are they necessary; in fact they can be misleading. Record production is an ongoing collaboration where participants often play very fluid roles, fueling a catalytic responsive process that can take many, often quite subtle, forms.

⁵⁸ Maureen Drone, "Paul Fox: The Band's the Thing," Mix (February 1996), pp. 115-6.

⁵⁹ Daniel Lanois, liner notes to Acadie (Warner Brothers Records, 1989), p. 6.

Decisive influences that account for some salient aspect of the work can come from many sources as a result of any number of working methods. Ideas circulate among a project's participants, developing and changing shape as the project moves through its various stages.

For example, on Daryl Hall's Three Hearts in the Happy Ending Machine, Dave Stewart (formerly Annie Lennox's collaborator in the band, Eurythmics) is credited as one of the album's producers, although he left the project mid-way through. As far as Hall was concerned, however, Stewart's work was already done by that point. "I was looking for someone who could take me out of myself," says Hall, "out of my normal pattern, and he was really good at that." Although producers are usually responsible for delivering a finished product, Stewart's role was simply to help open new creative avenues at the project's inception. Interfacing Hall's normal creative process with a different set of sensibilities and procedures provided the impetus for the album. "He really got things started," says Hall. "His role was really that of a catalyst."⁶⁰

Percussionist Michel De la Porte played another kind of collaborative role on this project. Although studio musicians are usually brought in for a specific, limited purpose--for supplying a particular instrumental color, say, or standing in for a band member whose technique is inadequate for a given part--Hall credits De la Porte with influencing the

⁶⁰ Pilato, p. 228.

overall character of the album. "(T)he rhythms on this album are very different from what I normally use. They're very liquid. And they really did influence the tracks," he says. Moreover, since Hall writes songs as the track develops, De la Porte's contributions influenced the course of songwriting as well. Having recorded the percussion parts very early on in the project and then built the tracks from there, Hall credits De la Porte as having had "a lot to do with the shaping of the album."⁶¹

Producers are often the overseers of a recording project's complex collaborative dynamics. Whether they take a more or less active role depends upon personalities and situations, but in any case their job is to foster the process in whatever way seems appropriate at the moment. As Jim Dickinson--the producer of albums such as Big Star Third and the Replacements' Pleased to Meet Me--puts it: "Music has a spirit beyond notes and rhythm. To foster that spirit and to cause it to flourish--to capture it at its peak--is the producer's task." Furthermore, "As a producer, I try to remain aware and attuned to the peculiar harmonic properties of the events as they unfold. This is not just musical. I'm talking about how the balance is gonna change in the room constantly during the process, just because of the process itself. It's in the life of the event where you find the soul, and that's what you're trying to capture."⁶² This is

⁶¹ Ibid., p. 230.

⁶² Rick Clark, "Jim Dickinson: Memphis Maverick," Mix (October 1992), p. 186-7.

beautifully expressed; it captures the essence of a production process whose nature is organic, chaotic, empirical, and infinitely variable.

Dickinson's production philosophy provides us with a way of understanding the importance of a producer such as Jerry Wexler. Wexler found his most distinctive voice as a producer when he began to make records in the South, first in Memphis and then in and around Muscle Shoals. While he was drawn to the feel with which the Southerners played, as well the lower fees they charged, one of the main reasons he returned again and again was that his production style was suited to the loose, collaborative environment in which these musicians worked. There was an element of spontaneity in the recording process itself that reflected the feel of the music and allowed the inspiration of the intuitive moment to flourish. The energy of ideas in dynamic interaction was powerful and unpredictable, and defining moments in recording sessions might emerge from unexpected directions. The famous story of "In the Midnight Hour" (1965) is a good example. The members of the Stax studios rhythm section in Memphis, Tennessee, who wrote and played on Wilson Pickett's hit recording all agree that it was Wexler who was responsible for the feel of the track. The composer and guitarist, Steve Cropper says, "When I wrote the tune I had it going a completely different way. Basically the changes were the same, basic feel was the same,

but there was a different color about it."⁶³ The bassist, Duck Dunn, recalls "...we had it going another way. Jerry came out and did the jerk dance."⁶⁴ Wexler, in his first session at Stax as anything other than an observer, left the control room to demonstrate a popular dance, "what the kids were doing." The point of his demonstration was that the accent should be shifted from the downbeat to the second beat and the fourth beat should be slightly delayed. "Why don't you pick up on this thing here?" he urged the band, making the rhythm with his body. As Wexler puts it, "The idea was to push the second beat while holding back the fourth--something easier demonstrated than explained."⁶⁵ Evidently, the difference was profound. "To tell you really," says drummer Al Jackson, "you wouldn't believe the way it was played on the floor and the way it is now."⁶⁶ The resulting groove became something of a formula for many subsequent Stax productions (e.g., Eddie Floyd's "Knock On Wood," Sam and Dave's "Hold On, I'm A-Coming") in which Wexler had no involvement.

Wexler, who places himself in the second of his producer categories--"servant of the project"--produced some of the most memorable rhythm and blues records of the 1960s. But his contributions in the recording studio can seem slight in comparison to more active producers such as George Martin,

⁶³ Jan Wenner, "Booker T and the MGs," in The Rolling Stone Interviews, p. 134.

⁶⁴ Ibid.

⁶⁵ Wexler, p. 176.

⁶⁶ Wenner, p. 135.

who contributed so many arrangements to Beatles' tracks. Wexler's success lay in his feel for R&B style, the interactive working environment he fostered, and his understanding of the artists he produced. He brought elements together and set collaborations in motion, the resulting musical and personal interactions of which defined the character of the work. Aretha Franklin's "I Never Loved a Man (The Way I Love You)" is a striking example of the kind of result his approach could produce. Franklin had been recognized as a fine singer and pianist while still in her teens, and John Hammond was instrumental in bringing her to Columbia Records where she remained for six years, recording eight albums. Her Columbia recordings, however--of "restrictive pop songs, stylized jazz, or petrified show tunes,"⁶⁷ as one writer has characterized them--met with little success. Despite the repeated attempts, no producer succeeded in finding the right combination of elements--the right collaborative mix of songwriters, arrangers, musicians, and engineers--that would complement Franklin's own gift and produce a successful recording.

In 1967 Wexler signed Franklin to Atlantic and became her producer. Once again, he headed south, this time to Rick Hall's Fame Studio in Florence, Alabama where he had begun recording with Pickett the previous year using the regular studio rhythm section of Chips Moman (guitar), Tommy Cogbill

⁶⁷ Gerri Hirshey, Nowhere to Run: The Story of Soul Music (New York: Random House, 1984), p. 238.

(bass), Spooner Oldham (keyboards), Roger Hawkins (drums), and Jimmy Johnson (rhythm guitar). In February, 1967, they all went into the studio to record "I Never Loved a Man," Franklin's first Atlantic single. "I had no lofty notions of correcting Columbia's mistakes," recalls Wexler. "My idea was to make good tracks, use the best players, put Aretha back on piano, and let the lady wail."⁶⁸ According to Wexler's account, the session began with Franklin playing the song for the rhythm section. Then, as the band learned the song and worked out the rhythm arrangement, "(saxophonist) Charlie Chalmers went into Rick (Hall's) office to write out the horn parts, and when he came out with the arrangement, we played the whole band together."⁶⁹ As an afterthought, he recalls that Franklin's sensuous overdubbed vocal harmony in the chorus--an important element in the track's "hook"--was Chips Moman's idea. It all sounds quite simple and straightforward, but success in such a process is elusive. The particular combination of musical sensibilities that Wexler brought together, and the free flow of ideas among them, created the atmosphere in which Franklin's talent as a performer could finally be transformed into a successful recording, her first top ten record and the first of many hits she would have on Atlantic.

Moreover, Wexler's intuitive understanding of Franklin's talent and the dynamics of the collaborative relationship set

⁶⁸ Wexler, p. 207.

⁶⁹ Gillett, p. 209.

the session on the right track. For one thing, he knew enough to "let the lady wail." At Atlantic, Franklin "remained the central orchestrator of her own sound, the essential contributor and final arbiter of what fit or did not fit her musical persona."⁷⁰ He also knew that the group of musicians he introduced her to at Fame would understand that persona. "The minute Aretha touched the piano and sang one note, the musicians were captivated. They caught the fever and raced for their instruments." Songwriter Dan Penn, who was present at the session, recalls, "When she hit that first chord we knew everything was gonna be all right."⁷¹ Thus the tone of the collaboration was set, and the process of track creation put in motion, by the reactions of the musicians to one another. Wexler's greatest talent as a producer lay in putting together such successful chemical combinations of musical personalities, and in his intuitive understanding of the importance of interpersonal dynamics in the record making process, the correspondence between human interaction and resulting musical expression.

On the other hand, collaborative interactions in the multitrack environment need not be direct; that is, the developing work, rather than a shared instance of performance, can function as a central point where participants' ideas and responses come into contact. As Dickinson says, the "process itself" often accounts for the

⁷⁰ Wexler, p. 206.

⁷¹ Ibid., p. 210.

contributions participants make. To this we can add that the project itself exerts an influence as well; and the influence grows stronger as the work proceeds toward its finished state. As it becomes increasingly autonomous, the project takes on a life of its own and participants' responses are made increasingly to the work itself, or to one another through the work. Brian Eno's production methods make use of this concept to open up unexpected avenues of collaborative creativity. He allows projects to find their own way of proceeding based upon the cumulative efforts of those involved, allowing space for individual creative input throughout the process guided by the general terms of the project itself. He offers the following characterization of his recent work with David Bowie on the latter's Outside (1995):

Well, I think the way of working is to start by describing the universe that this thing falls into. The normal way of working on songs is from the inside: People say, I've got a Bb followed by a C and a D and we'll have a kind of a gap here and the thing builds up like that. I think what we've been doing...is to say, which world is this that we're making? We start with some sense of that, and then the music grows quite easily within. But we don't really work together exactly. I do something, he does something, then I do something, and he does something.⁷²

⁷² Mark Rowland, "The Outside Story," Musician (November 1995), p. 32.

In other words, the project has a general aesthetic tone. It might be set by a song, a texture, a riff, a rhythm, an image, whatever; but the project, "the world that we're making," to some extent defines its own terms and serves as the meeting ground for the various personalities involved in making it. Thus, collaboration need not take place directly among artists, but may occur as they encounter one another's ideas manifested in the work.

5. PLACES AND TOOLS

The title of George Martin's memoir, All You Need Is Ears, at once makes reference to his long association with the Beatles and calls attention to a basic principle of record production. Records are sensory things, and making them is an empirical process guided by physical experience. Compositional decisions are based upon responses to specific aural images, and ears are the windows through which all evaluations are made. What needs to be considered here is how things are heard in the recording studio. There are many factors that affect the sound image and the impression it makes on the recordist. In this chapter, I will examine issues concerning the mediating influences of recording environments and the ways in which they affect the poetic process.

Recorded sound per se is--even prior to its use as compositional material in the track--a composed thing. It is shaped by manipulating the relationships among source sound, room acoustics, the various elements of the signal path, and the recording medium. Because sound and aural perception in the studio are always influenced by some kind of electronic process and architectural design, there are many apparently "non-musical" issues that fall within the framework of compositional practice. Recordists must take these issues into account in both the planning and execution stages of recording projects. And while there is a reservoir of shared

conventional record making techniques, recordists also develop their own personal approaches to integrating these various mediating influences into an overall musical style. To put it another way, there is often little separating the utilitarian and the creative applications to which tools and rooms are put; there is a continual interchange that moves in both directions. Mindful of this, Lou Reed spent two and a half years "gearing up" for his Set the Twilight Reeling album (1996). This involved seeking advice from various technical specialists and experimenting with a range of equipment to find the pieces that best suited his conception of the project; all of this was undertaken and completed before the songs for the album were written.¹

Throughout the history of sound recording, the technical aspects of such factors as room acoustics, equalization, and loudspeakers have been much written about, usually in books and articles aimed at recording engineers and, increasingly, home recordists.² My focus will be on the interaction between the elements of the multitrack environment and artists' creative needs--the ways in which such things as architecture, electronic signal processing, recording media,

¹ For an account of technical pre-production for Set the Twilight Reeling, see: Bob Ludwig, "True Lou," EQ (April 1996), pp. 66-78, 123. This is an interview with Reed and engineer Steve Rosenthal conducted by one of the world's foremost mastering engineers, Bob Ludwig.

² See for example: Glen Ballou, ed., Handbook for Sound Engineers: The New Audio Cyclopedia 2nd ed. (Carmel, MN: SAMS, 1991); John Woram, Sound Recording Handbook (Indianapolis, IN: Howard W. Sams, 1989); Robert Runstein and David Huber, Modern Recording Techniques 2nd ed. (Indianapolis: Howard W. Sams, 1986); F. Alton Everest, Handbook of Multichannel Recording (Blue Ridge Summit, PA: Tab Books, 1975).

and so forth are put to musical uses. For in addition to the elements of music, language, and performance, recordists use rooms and machines to create the world of the musical work. And in many instances, remarkable aspects of a record are associated with a particular piece of equipment, place, or recording technique.

There is a huge number of possible choices among tools and recording places. Decisions on how to proceed are made according to a varying set of criteria which include such concerns as availability, cost, musical style, personal preference, and rhetorical intent. Although the technical quality of recording tools can be measured according to a set of abstract standards that can be tabulated in a list of numerical specifications, their value as artistic implements is judged far more idiosyncratically. Rooms and tools have their own "personalities" that impart varying degrees and types of coloration to recorded sound. Although one might imagine that recordists would prefer to have the most current top of the line equipment at all times, budget permitting, this is not the case. The character of a piece of equipment contributes to a record's unique sonic patination, and equipment is often chosen more for what are perceived to be its immanent aesthetic properties than its technical specifications. The use of tube-based sound processing, for example, an old and for some time practically discontinued technology has had a great resurgence in recent years. As Paul McCartney puts it, "valve (tube) equipment...gives you a

record-y type sound."³ The "record-y" coloration consists of an apparent sonic "warmth" and has become a widely used method of masking the stark clarity of digital recording. Such "vintage" technology is also used to evoke associations with recording styles of the past.

One hears time and again from recordists involved in all styles of rock from every historical period that in record making "there are no rules." The statement underlines the empirical nature of the recording process in rock, as well as a willingness to pursue untested paths and to resist the potential overshadowing of artistic aims by technological theory. Of course, if there were really no rules at all, there would be no conventional system, and in fact there is one important rule that recordists go by which owes its very existence to the stability of the system: Whatever combination of tool, technique, and recording space is employed, the result must "sound good." That is, it must serve the rhetorical ends of the recording. Most recordists have a wealth of anecdotes about how they have broken the rules of physics and thereby achieved a successful artistic result.⁴ But as with the "unlimited palette" of timbres, there is a collectively known conventional grammar--i.e., rules--of recorded sound and musical style that serves as the anchoring backdrop against which intuitive decisions are measured.

³ Mark Lewisohn, The Beatles Recording Sessions, p. 11.

⁴ See, for example, Rick Clark, "Production Sickness Secrets Revealed," Mix (September 1995), pp. 30-44.

The homemade demos that Los Lobos members David Hidalgo and Louie Perez made in pre-production for Kiko, for example, were technically very primitive. Yet precisely because of their technical limitations, they provided "quite a few clues" as to the direction the project should take. According to the producer Mitchell Froom, they were "the best demos you would ever hear in terms of character." They had been recorded on a four-track tape machine that "had so much distortion and compression on things that it gave us the idea of how the percussion should sound."⁵ Because the atmosphere of the demos seemed so right to all the members of the composition team, Froom and engineer Tchad Blake improbably sought to emulate the effect of their technical limitations once formal recording began. In search of "grungy, dirty, squashed sounds," as Blake puts it, the drums were "mainly recorded...in a little vocal booth, sometimes just using a Calrec (stereo microphone) through some really rotten compressors."⁶

These unconventional recording techniques are complemented by unusual instrumentations and arrangements to give Kiko some strikingly original textures. The overall result of the aesthetic "clues" indicated by the demos is an album that stands out not for its "grungy" or "rotten" sound--in point of fact, it sounds beautifully crafted--but for its difference. Listener expectations are met with surprising

⁵ Blair Jackson, "Los Lobos Paint Their Masterpiece," Mix (October 1992), p. 202.

⁶ Ibid., p. 203.

alternatives to both Los Lobos' previously established characteristic style (though their previous album, The Neighborhood, had signaled their attraction to a broader sonic palette) and to that associated with the "roots rock" category to which they had been generally consigned.⁷ The normative "rules" that one should use good quality compressors and record drums with multiple microphones in a large room have been violated. But in the process, the ultimate rule, that of rhetorical effectiveness, has been enthusiastically obeyed.

I. PLACES

The acoustical properties and behavior exhibited by architectural spaces and construction materials have various coloring effects on sound, and hence an initial concern in the first stage of track production--capturing sounds--is the physical environment in which sounds are produced (unless, of course, a sound source--a synthesizer, say--is routed directly to the recording device via "direct injection"). As Bob Norberg, a veteran Capitol Records producer, puts it, "Listening...in the (recording) room is very important. I wouldn't try recording anything without first understanding what the whole package was saying."⁸ In other words, the

⁷ For example, in a review from June 25, 1992, Rolling Stone reviewer David Okamoto wrote that Kiko "sets tales of hope and despair against rhythmic backdrops spiked with feedback, distortion, sound bites, and other studio shenanigans that defy roots rock tradition." (p. 41)

⁸ John La Grou, "Recording the Acoustic Guitar: Tips from Top Engineers," Mix (June 1993), p. 56.

relationship between the room and the sound source must be understood in order to begin "composing" the recorded sound, which involves striking a desired proportional balance between the sound itself and the particular coloration imparted by the room's ambience. The nature of this relationship will suggest to the recordist ideas about microphone choice and placement as well as possibilities for further sound processing such as equalization or compression.

On the other side of the glass, in the control room, the quality of the sound image presented to the recordist by the monitor loudspeakers is also affected by the acoustical character of the room. The acoustical requirements and functions here, however, are quite different. While the recording space affects the sound of a musical performance, and perhaps the performance itself, the control room's acoustical character influences the perceptions upon which compositional decisions are based. All sorts of spaces are used for recording. As with equipment, recording spaces are often selected for their unique personalities. Control rooms, on the other hand, because they are required to represent the recorded material as accurately as possible, are subject to a different, more objective, acoustic standard. Ideally, they impart as little of their own coloration as possible to the sounds heard in them, functioning as a sort of "every room" in which recordists can make decisions that will hold up in myriad listening environments.

Many recording spaces are designed to be acoustically anonymous (hence versatile) rooms whose main features are size and soundproofing; and in many cases, recording methods are used that minimize the studio's own ambience. Recordists may prefer to mold ambient images using one or another ambience simulator. On the other hand, there are many studios whose distinctive sound and influence is forever linked with the recordings made in them. By influence I mean all the ways other than ambience that a studio leaves its mark on a recording. These can range from the metaphysical--the feel of a studio's historical legacy, for example, and the influence that that can have upon the members of the composition team--to the concrete. The Stax studio in Memphis, for example, was very large and the musicians recorded all together without headphones. They were widely separated and though the band used visual cues to keep a tight sense of ensemble, their pulse was just slightly behind that of the singers. "It became a very delayed thing by the time Al (Jackson, drummer) heard the singers singing,"⁹ recalled Steve Cropper. The resulting delay became a stylistic rhythmic element.¹⁰

⁹ Rob Bowman, "The Stax Sound: A Musicological Analysis," Popular Music (Fall 1995), p. 309.

¹⁰ Comparing Wilson Pickett recordings made at Stax in 1965 (e.g., "In the Midnight Hour," "That's a Man's Way") with those made the following year at Fame (e.g., "Land of 1000 Dances," "Mustang Sally"), the effect of this room delay as an element of musical style is quite apparent. On the Stax recordings Pickett is consistently slightly ahead of the band. This creates a certain rhythmic conflict that further intensifies the urgency of Pickett's vocals. On the Fame recordings, on the other hand, Pickett's vocals are laid right in the pocket of the groove resulting in a solidly unified rhythmic flow.

When recordists use them to make associative references, a studio's sound and influence take on a rhetorical function. For example, in 1979 George Clinton was working at United Sound in Detroit, where many of the early Motown hits were recorded. He said in an interview at the time, "All we got to do is lay the rhythm tracks here at United Sound, and I can record the other tracks anywhere in the world. Because this particular room has that sound that hits you right on your primal button. And people be thinking, 'What does that remind me of?' and they don't connect that subliminally they're hearing that old Motown sound on the bottom in this room."¹¹ Similarly, Phil Spector returned to Gold Star Studios in Hollywood again and again to capture the sound of its spaces and incorporate them into his tracks, each time tapping into a sonic resource with which the public had become familiar through its appearance on past Spector hits. According to Larry Levine, who engineered many of Spector's sessions, "the Wall of Sound was indigenous to Gold Star, to the studio, the chambers, the walls."¹² Most of Spector's hits were produced there, and Levine maintains that when Spector finally moved on, in 1966, he "was out of that old thing. Once he left Gold Star it was over."¹³

¹¹ Chip Stern, "The Serious Metafoolishness of Father Funkadelic, George Clinton" (1979), in The Rock Musician, Tony Scherman, ed. (New York: St. Martin's Press, 1994), p. 9.

¹² Mark Ribowsky, He's a Rebel (New York: E.P. Dutton, 1989), p. 246.

¹³ Ibid.

Before the various types of ambience synthesis were developed, all reverb was produced either by the room in which the recording was made or by some other architectural space where sound was reproduced by a loudspeaker and the resulting ambience captured by a microphone. The ambient sound was then combined with the original sound either during recording or mixing. Thus in addition to the recording space, the "echo chamber" of a given studio added a particular sonic atmosphere to the recording. The chambers at Gold Star--in the men's room--were a major attraction for Spector. Similarly, the sound of Buddy Holly's 1956-58 recordings made at Norman Petty's studio in Clovis, New Mexico is in part a result of the acoustic characteristics of the room above Petty's father's gas station, which served as the studio's ambient chamber. Beginning in 1947, Bill Putnam, one of the first to use added ambience extensively, used "the ladies washroom" adjacent to the penthouse space in the Chicago Civic Opera building that served as the studio for Universal Recording.¹⁴

In the web of particularity that is the track, studios and ambient chambers can contribute a particularity of place. "Create a unique environment for each record wherever possible,"¹⁵ says Daniel Lanois, who has often recorded in unusual locations--an Irish castle for U2's Unforgettable

¹⁴ Robert Pruter, Doowop: The Chicago Scene (Urbana, IL: University of Illinois Press, 1996), pp. 16-17.

¹⁵ Iain Blair, "Daniel Lanois: Sonic Atmospheres," Mix (February 1990), p. 77.

Fire, an old New Orleans apartment house in the Neville Brothers' neighborhood for their Yellow Moon. His personal studio is a thirty-room house built soon after the Civil War on the edge of the French Quarter in New Orleans. "I Like the strange rooms that you find in old houses and buildings," he says. "You get a sound that's unique to that record, a sonic signature, if you like."¹⁶ Producer Brian Ahern avoids conventional studios--which he calls "sterile and generic"--almost altogether. For the past twenty-five years he has worked out of a mobile studio--his own Enactron Truck--moving from place to place, using whatever recording space he feels is most appropriate for a given project.¹⁷

The criteria for effective recording spaces--unlike mixing rooms--vary enormously. Creative recordists take advantage of room peculiarities and work around acoustic deficiencies. At one time or another, tracks have been recorded in all sorts of spaces exhibiting all sorts of acoustic behavior. Important aspects of a track may come about as a contingency of the acoustic circumstances. At the Record Plant studios in New York, for example, engineer David Thoener "used to stick drums in this first-floor back area behind Studio A, where they used to put the garbage." Although it was "a real drag for the drummers, because they'd have to stay out there eight hours a day drumming with garbage around them...everyone agreed it was a killer sound

¹⁶ Ibid., p. 82.

¹⁷ Rick Clark, "Brian Ahearn," Mix (July 1996), p. 114.

because there was a lot of marble around and cement walls,"¹⁸ which provided a bright and highly reverberant sound. While not designed for recording, the space proved an effective acoustic environment for drums and contributed to the "sonic signature" of recordings made there. Conversely, rooms that are designed for recording may have characteristics that present problems in certain situations whose solution itself contributes to the uniqueness of the track. The small size of Norman Petty's studio, for example, made it impossible to record drums on Buddy Holly's "Not Fade Away" (1957--ex. 5.1) without drowning out the rest of the band. The cardboard box percussion part--a surprisingly light sound for the driving "Bo Diddley"-type groove--was substituted simply because of logistical necessity.

Certain ambient signatures have become part of the conventional musical system. For example, on Public Image Limited's Album (1986), the producer Bill Laswell wanted to emulate John Bonham's (Led Zeppelin's late drummer) recorded drum sound on Led Zeppelin III, a sound that bore the signature of Headley Grange, the large English country house where the album was recorded. In an effort to capture a similar sense of ambience, drummers Ginger Baker and Tony Williams played inside an elevator shaft at the Power Station studios in New York with microphones suspended inside the shaft. "Basically, we were trying to replicate the length and

¹⁸ Rick Clark, "Getting that Great Drum Sound: Advice from Both Sides of the Glass," Mix (June 1996), p. 55.

depth of a stone hall to get that great bass drum sound that John Bonham got," says engineer Jason Cosaro, adding, "Of course, the Bonham sound is pretty much just Bonham."¹⁹ Indeed, Williams, Baker, and Bonham are three quite different stylists. But the drummers were not being asked to emulate John Bonham. Rather, the intent was to allude to the ambient texture with which the recordists associated Bonham's sound.

While a room's unique "sonic signature" may add a distinctive personality to the performances recorded in it, mixing requires an acoustic environment whose character is as neutral as possible. "Acoustically, a control room should do nothing at all."²⁰ It should act as "a very accurate acoustic microscope,"²¹ providing "a laboratory environment for the monitor speakers and the mixer."²² If the configuration of a control room is such that it adds further coloration to the sound that is being monitored through the loudspeakers, it is impossible to make informed decisions that will hold up when played in other environments. It is like painting in poor light; the artist never really knows what is before him. For example, equalization that is applied to compensate for an overly-resonant frequency will prove to be inappropriate if the resonance is simply the result of control room coloration. When the recording is played in a different

¹⁹ Bill Milkowsky, "Understanding Bill Laswell," Mix (August 1986), p. 117.

²⁰ Malcolm Chisholm, "How to Design and Construct a Modern Control Room," Mix (August 1992), p. 52.

²¹ Larry Todd, "Reflecting on Studio Acoustics: Peter D'Antonio," Mix (October 1991), p. 75.

²² Chisholm, p. 52.

environment, the frequency in question will simply be diminished, affecting the overall timbral balance of the mix. In order to create a track that can be more or less faithfully reproduced in a variety of listening environments recordists need to have as accurate a representation as possible of the elements that go into it. Thus, the complex and ever evolving craft of control room design is ideally aimed at providing the clearest possible sonic image.

Location Recording

Choices of recording places concern not only acoustics and available equipment, but atmosphere. Since so much of the record making process relies on interactions among participants, a project's success is partly determined by environmental factors that affect those interactions. Jerry Wexler likened his projects to retreats "in the Catholic sense,"²³ quasi-monastic experiences of highly concentrated activity. His trips to Muscle Shoals perfectly suited his desire to be away from the daily concerns of business and home while working on a record.

Another option that can increase the participants' concentration is to take the project to a non-studio location for recording. While location recordings can be needlessly expensive indulgences, they can also provide a comfortable, relaxed setting--both physically and psychologically--that may be more conducive to music making and creative

²³ Ted Fox, In the Groove: The People Behind the Music, p. 137.

experimentation, and overall, to lend the project "a sense of focus," as Lanois puts it. The Red Hot Chili Peppers' Blood Sugar Sex Magik was recorded in an old mansion in Laurel Canyon outside of Los Angeles. Most of the band lived together in the house during recording, literally living with the project. The band had never done a location recording before, and all the members agreed it was the best recording experience they had ever had. Drummer Chad Smith, the only band member who did not sleep at the house, summarizes the general feeling of the band, producer Rick Rubin, and engineer Brendan O'Brien: "It was so relaxed, as opposed to the atmosphere of most recording studios. It gave the music real character. And we could record anywhere in the house. You don't need an exactomundo environment. A room and mics, and you make the noise."²⁴ The Chili Peppers are a band that excels in live performance; they rely on spontaneous energy, which a conventional recording studio can inhibit. By abandoning the recording studio--and what vocalist Anthony Kiedis calls "the impersonal, anal-retentive, tight-ass quality that studios have"--they were able to focus on their strengths and maximize their creative process.

One of the most famous rock recordings, The Band's eponymously titled second album, is an early and extremely successful example of location recording. It was recorded in a pool house at a Los Angeles estate formerly belonging to

²⁴ Mr. Bonzai, "Red Hot Chili Peppers: Some Like It Hotter," Mix (October 1991), p. 114.

Sammy Davis Jr. In 1967, the members of the Band had established a creative headquarters in a house in West Saugerties, New York known as Big Pink where they lived, wrote, and recorded for two years.²⁵ Within a year, the atmosphere of communal creativity that surrounded Big Pink produced The Band's first album, Music from Big Pink. But the album was not recorded there. Conditions were simply too primitive, and so formal recording sessions were held at A & R Studios in New York as well as Capitol and Gold Star in Los Angeles. As artistically successful as Music from Big Pink was, the group felt that the sound they were after was somehow compromised by a state-of-the-art studio environment and the attendant high-tech aesthetic of polished refinement. In contrast to the prevailing contemporary trends in rock recording, they were looking for an unvarnished "woody, thuddy sound"²⁶--as guitarist and songwriter Robbie Robertson put it--that would better resonate with their music and lyrics, an earthy and eclectic stylistic mixture that included allusions to many older non-rock musical styles. Of their work with some of the more commercially successful

²⁵ Early on in this period, several months were spent playing with Dylan, whom The Band had backed up on his last world tour before his motorcycle accident and subsequent seclusion in Woodstock. The recordings of a small portion of these informal jam sessions were eventually released in 1975 on The Basement Tapes. Of these sessions Dylan told Rolling Stone interviewer Jan Wenner, "You know, that's really the way to do a recording--in a peaceful, relaxed setting, in somebody's basement, with the windows open and a dog lying on the floor." Jan Wenner, "Bob Dylan," (1969) in The Rolling Stone Interviews, vol. 1 (New York: Warner Paperback Library, 1971), p. 302.

²⁶ Barney Hoskyns, Across the Great Divide: The Band and America (New York: Hyperion, 1993), p. 180.

engineers of the time, bassist Rick Danko has said, "We'd be thinking Harveyburgers and they'd be thinking caviar."²⁷ The Band were thus determined to create a different kind of working environment for their second album, something more like Big Pink.

The Los Angeles house was large enough to accommodate all band and crew members, and once the pool house had been given a bit of acoustic treatment and a rented console had been installed, recording began in March of 1969. Most of the songs had been written previously, but it was left to all the members of The Band, as well as producer John Simon, to now "discover" how they should sound. First the instrumentation for a particular song was decided. Then they rehearsed and worked out the arrangement. Finally, when the arrangement and performance had settled, the track was recorded--usually in the morning--all members of The Band playing together in the pool house, which doubled as both studio and control room (plate 1). Overdubbing was limited to adding extra instruments to the basic track. Living and working together in relative seclusion, the group re-captured the spirit of their highly creative Woodstock period. "It was very cozy on our own with nobody there looking over your shoulder and making you stick to schedules,"²⁸ recalled Robertson. The sound that emerged was not so much the result of the pool house acoustics, but rather the atmosphere of communal give-

²⁷ Ibid., p. 176.

²⁸ Ibid., p. 178.

and-take music making and improvisatory creativity to which the group had become accustomed. The Band's years together on the road and the members' complementary roles made them unusually democratic collaborators. The setting they chose for the album fostered the working methods they were most comfortable with, and helped them to reach what many have felt was their creative peak.

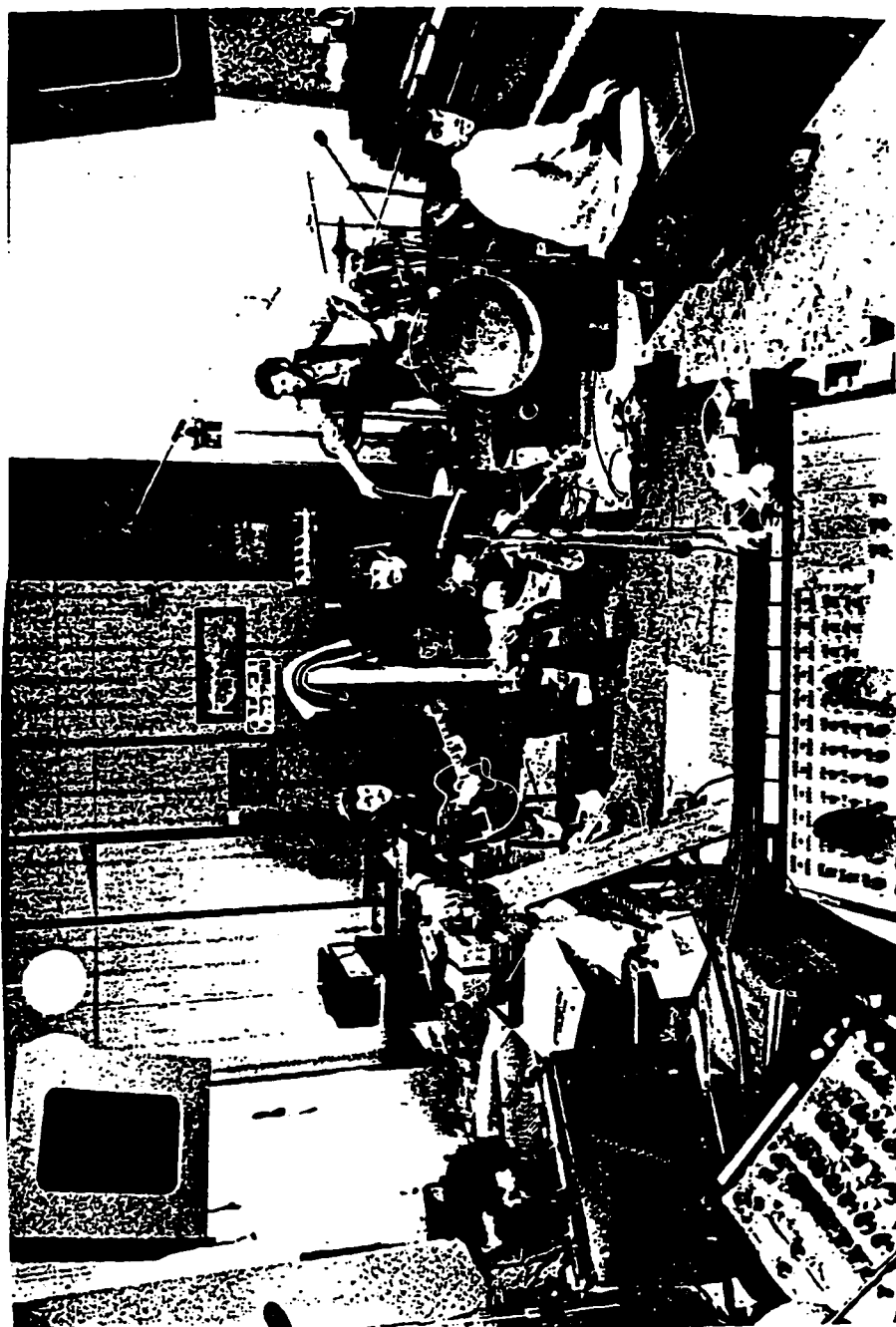


Plate 1. (photograph by Elliott Landy)

II. TOOLS

On its way from production to storage, sound--acoustical energy--is converted to electrical energy, and travels through various electronic devices along what is commonly known as the signal path. A microphone transforms sound waves into electrical impulses; a cable carries the electrical signal to a microphone preamplifier and on to the recorder; the signal may also pass through a compressor, an equalizer, a console, each of which adds its own coloration to the sound. Mixing involves an even more complex signal path that includes the console, amplifier, and monitor loudspeakers, as well as any number of sound processing tools accessed at a central patch bay. In a complex mix, electrical signals move through a dense web of wiring before finally emerging from the loudspeakers as sound once again.

Guided by logistical concerns, personal preferences, and the aesthetic stance of the project at hand, recordists employ a wide range of tools and techniques to capture, shape, and combine the compositional elements of the track. An equalizer, for example, manipulates timbre; a digital delay produces echo and provides the means for producing echo-based timbral effects such as chorusing and flanging; reverb simulators provide ambience; textural composites are assembled at the mixing console; and of course, musical performances are captured by microphones. Although there is a common array of tools used to make records, aesthetic differences abound among recordists regarding specific

choices and techniques. Some prefer as much transparency as possible. In this view, proper microphone selection and placement, together with a good performance on a good sounding instrument, should obviate, or at least minimize the need for EQ, compression, or other processing. On the other hand, some recordists subject virtually every sound to more or less elaborate treatments. Tom Lord-Alge, for example, has called himself "one of a new breed of engineers" who are "not afraid to use EQ...not afraid to use compression," who will "do whatever it takes to make it sound different, less predictable."²⁹ In any case, the recordist incorporates the various tools into their own creative process according to personal taste, the dictates of musical style, and considerations of rhetorical intent.

1. Microphones

The initial stage in the signal path is the microphone. In many ways microphones are the technological soul of any recording project, and the effectiveness of all other tools and techniques depends upon the quality of the image that the microphone is able to deliver. It is often noted that what Roland Barthes calls the "grain of the voice"³⁰ is at least as essential to a rock song's meaning as the words or melody, and this view can be extended to all of the performances on a

²⁹ Blair Jackson, "Tom Lord-Alge: The Grammy-Winning Engineer/Producer Is on a Roll," Mix (May 1989), p. 56.

³⁰ Roland Barthes, "The Grain of the Voice" (1972), in Image, Music, Text, trans. Stephen Heath (New York: Hill and Wang, 1977), pp. 179-89.

track. That is, the sound of a particular voice or instrument in a particular performance represents a sort of phenomenal meaning that completes the sense of the song and, in turn, the track. To a great extent, microphones not only capture this "grain," they participate in creating it. The microphone serves as an alchemic doorway between performance and text. Sound enters the doorway as fleeting variations in air pressure, and through a process known as transduction is instantly transformed into a corresponding electrical signal that can be printed on some form of recording medium (disc, tape, computer memory). But the process does not yield an exact correspondence; depending upon the nature of its behavioral characteristics, the microphone changes the original sound in some way. Thus it actively participates in the rendering of the sound, and its coloring effects, along with those of microphone placement, must be appropriately matched with both the source material and the stylistic and expressive intentions of the project, a task which requires aesthetic judgment in addition to technical expertise.

Decisions of microphone choice and orientation in relation to the room and the sound source depend on a feel for the affective character of the sound in question and a sense of its rhetorical role in the track. Aesthetically speaking, as one writer puts it, "there is no 'correct' microphone for any application."³¹ To be sure, the basic

³¹ John Woram, Sound Recording Handbook (Indianapolis, IN: Howard W. Sams & Co., 1989), p. 61.

characteristics of microphone design offer some guidelines as to applications, and there are conventional procedures that are considered normative. But correctness is relative to a network of context-specific issues that vary from one situation to another. The intuition and creativity involved in microphone techniques moves the issue from craftsmanship into the realm of subjective artistic judgment.

The process of "hearing" sound and then converting it to an electrical signal is subject to a number of variables that account for the coloring characteristics of particular microphones. The two basic microphone types--condenser and dynamic (which has two sub-types: moving coil and ribbon)--have differences in their design and operating principles that make for generic behavioral characteristics that recommend one or another in certain situations. Condensers, for example, respond very quickly to transients (rapid changes in sound pressure) and have a very wide frequency response, producing a detailed sonic image. Condenser microphones are commonly used for recording the rapid transients of certain percussion instruments (e.g., cymbals, acoustic guitars) and for capturing the fine details of vocal performances. Moving coil dynamic microphones, on the other hand, have slower response times but are capable of handling very high sound pressure levels. They are often used in live performance and for recording electric guitars--especially heavily distorted ones--and snare drums. Also, their slower

response times can effectively smooth out sharp attacks such as might be encountered with brass instruments.

There are many variations within these design categories that account for the sonic personalities of particular models and even individual microphones. Microphone restorer and builder Stephen Paul refers to the particular configuration of elements that can give a microphone a completely unique quality as "alchemical formulas." "There was a feeling that in this thing was magic," he says of the Neumann and AKG mics of the 1940s. "There was something that transcended its technology...the whole microphone has the aura of a Stradivarius. It's like a musical instrument, and it has a sound of its own."³² In his modifications of both new and vintage microphones, Paul balances experience and technical expertise with an appreciation for the chaotic unpredictability of our "vibratory universe." Believing that "the phenomenon of acoustics is so complex that no math can truly do it justice," he says that magic is "an essential part of the formula" in his work. "Sometimes I sit for hours staring at a piece of my work--a wiring harness, or a circuit board I've built by hand, and I realize after a while that what I'm doing is spending a lot of time imbuing it with energy, putting a spell on it."³³

In addition to a microphone's design, the complex and subtle art of microphone placement is an important factor in

³² Mr. Bonzai, "Stephen Paul: Microphone Doctor," *Mix* (April 1987), p. 47.

³³ *Ibid.*, p. 53.

the rendering of the sonic image, and recordists continually refine and expand their technique through experimentation. Different placements result in different degrees and types of coloration and define the relationship between source sound and room sound. Considerations include not only the microphone's orientation to the sound source--possibilities include directly in front, to one side (off axis), above, below, close, at varying distances, and so forth--and the acoustic characteristics of the room, but also the microphone's sound gathering properties. Microphones hear sound in different ways according to their directional, or polar pattern, which determines the way in which a microphone responds to sound reaching it from different directions. There are three basic polar patterns: 1) unidirectional (subdivided into cardioid, supercardioid, and hypercardioid), 2) omnidirectional, and 3) bidirectional (plate 2). A microphone configured in a unidirectional cardioid pattern picks up sound that is directly in front of its diaphragm and slightly to either side, and attenuates sound that arrives from any angle outside of its field of response, thus minimizing room reflections and leakage from other instruments. An omnidirectional pattern, on the other hand, picks up sound equally from all sides, while a bidirectional pattern responds to sound at its front and back, but not at its sides.

A microphone's polar pattern, frequency response characteristics, and placement are all factors in its timbral

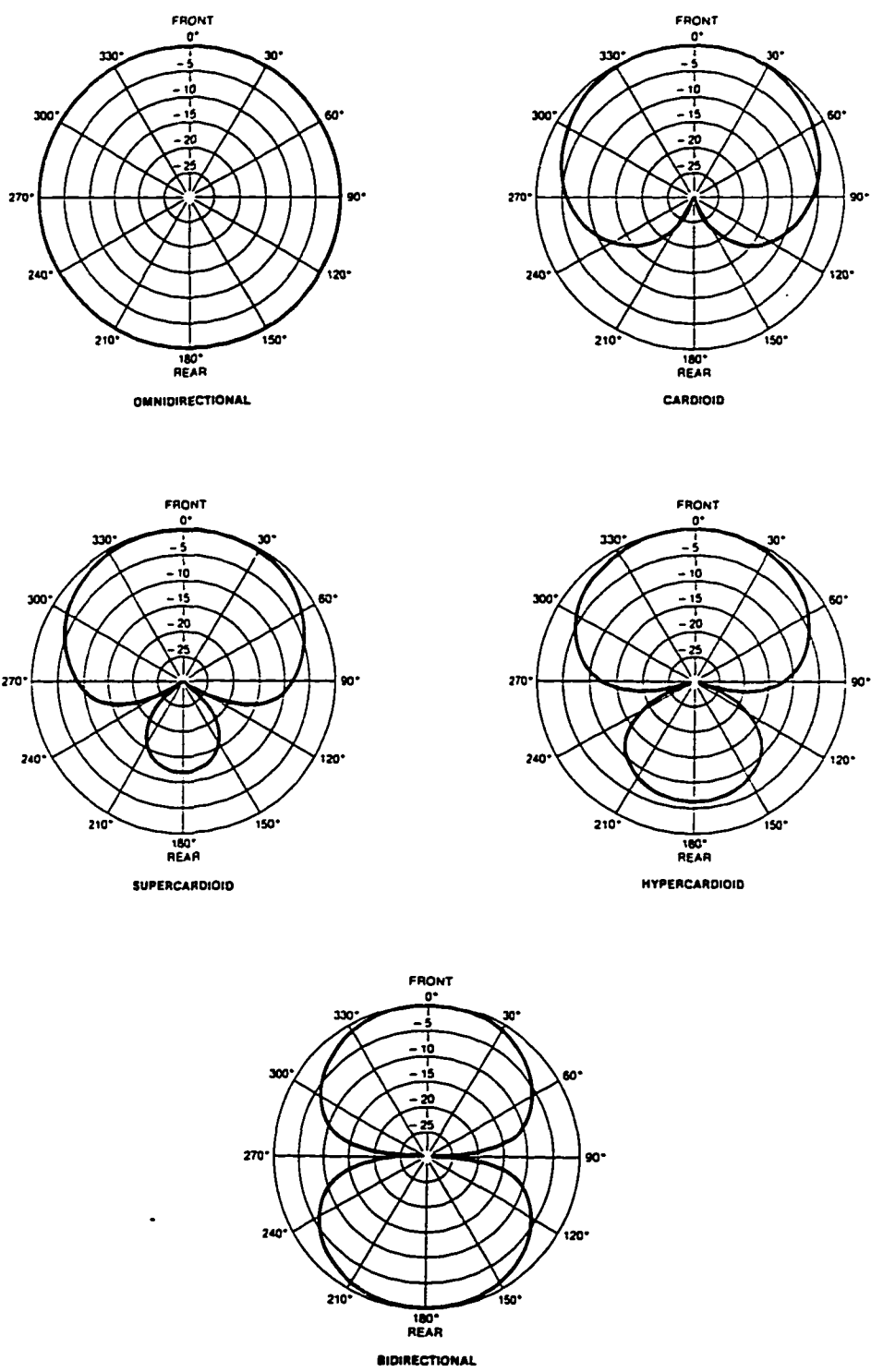


Plate 2. "Various polar patterns. Sensitivity is plotted vs. angle of sound incidence." (Bruce Bartlett, Introduction to Professional Recording Techniques, p. 86)

effect. For example, one of the characteristics of a unidirectional or bidirectional configuration is a marked boost in bass frequencies when the microphone is placed very near the sound source. This is known as the proximity effect. It is a kind of distortion, and it can create a muffled boominess that requires filtering. On the other hand, with controlled use it can be an expressive device, adding, for example, a warm intimacy to a vocal performance. Steve Albini has used the effect to create some very large recorded guitar sounds, notably for Kurt Cobain of Nirvana. He notes that the low frequency information emanating from an electric guitar amplifier cabinet is in the nature of "cabinet resonance, rhythmic transients, and physical pumping of air."³⁴ This is not the pitch content of the guitar part, but rather, its supporting resonance. "Capturing it on tape can make the recording seem more physical," writes Albini, "and the careful use of proximity effect allows you to completely tailor the low-end by moving the microphone, sometimes by fractions of an inch."³⁵ Albini's comment illustrates the degree of subtlety involved in microphone technique, and brings up another interesting point: the master recordist uses microphones not only to capture sonic and musical elements, but also the weight of apparent physical presence.

Issues of musical style, genre, and affect also enter into considerations of microphone choice. Bruce Swedien

³⁴ Steve Albini, "The Secret to Miking Guitar Amps," *EQ* (August 1994), p.36.

³⁵ *Ibid.*

speaks of using different microphones for Michael Jackson depending upon a song's tempo, groove, the theme of its lyrics, and so forth. Again, the choice is a matter of rhetorical intent, which may well guide the recordist in unconventional directions. Although condenser microphones are the most common choice for recording vocals, Phil Collins's distinctive vocal presence on his Hugh Padgham-produced records (e.g., Face Value [1980] Hello, I Must Be Going [1982]) is the result of the unusual choice of a dynamic moving-coil microphone. Padgham, who is also an engineer, reveals that the setup he uses to record Collins's vocals "is basically a cheap mic and a cheap compressor." The microphone he uses is a Beyer M88--the same one Collins uses in live performances--which "gives a nice rough edge to (Collins's) voice." The signal is then passed through an Allen & Heath minilimiter. "It's a vicious limiter," says Padgham, "but...it works well with Phil... It gives that guttural sound to his voice."³⁶ Moreover, Collins "actually sings to the sound of his voice going through this setup." That is, the processed voice is present in his headphones as he sings, influencing his performance.

The unlikely success of this unconventional configuration is singly suited to the particular timbral character of Collins's voice. "What sounds good on Phil doesn't necessarily sound good on other people," says

³⁶ Mr. Bonzai, "Hugh Padgham: Studio Synchronicity," Mix (October 1990), p. 84.

Padgham. "I've tried this particular setup on Sting, and it doesn't sound good." Note also that Padgham does not discuss the microphone choice alone. The microphone's interactive partner in the signal path, the compressor, is an integral factor as well, and although each tool contributes its own individual effect, it is their complementary relationship that ultimately shapes the vocal sound.

On Bob Dylan's Oh Mercy (1989), Daniel Lanois captured some of the most richly detailed vocals that Dylan has ever recorded. Again, processing tools were selected to complement a particular microphone, and the overall signal path was configured for a specific intent. "I went for the old sound in his voice and got a great, big, warm sound that also has a lot of presence," says Lanois. "[W]e used a Sony C-27 A, a valve (tube) mic, through an LA-2A tube compressor, with a Neve 4-band preamp, a 1976 model, I think."³⁷ Wishing to make a specific timbral association with a "vintage" type of sound, Lanois proceeded to choose his tools accordingly: tube technology for microphone and compressor and a classic preamplifier/equalizer. Many modern recordings confine the voice to a tightly defined space in the track (i.e., defined by equalization, compression, amplitude, positioning, and ambience), producing a sharply focused image. This gives the vocal an incisiveness that allows it to project from the mix. A vocal such as that for "Man in the Long Black Coat" (ex. 5.2), on the other hand, has a breadth and thickness to it

³⁷ Blair, p. 80.

that gives it an altogether different kind of affective sense. This is what Lanois refers to as "the old sound." The tools affect the dimensions of the vocal--its physical size, its relative "naturalness" (i.e., its relation to the natural sound world), its relative distance from the listener. In other words, the tools are actively participating in the development of a dramatic character.

2. Recording Formats

Once sounds are converted to electrical signals, they are sent to the recorder for encoding and storage. There are two types of recording technology in use at the present time: analog and digital. Analog recording uses magnetic tape to store the electrical signals from microphones or electronic instruments in the form of magnetic patterns that are analogous to the audio waveform. Upon replay, the patterns are re-converted into electrical signals and at the loudspeaker stage into a representation of the original waveform. Digital recording, on the other hand, converts the electrical signals into streams of binary code that are then stored on tape or in computer memory.

As anyone who has ever made an analog cassette can attest, the recording machine and the choice of tape have a readily apparent effect on the sound being recorded. Even among very high-end professional equipment, the characteristic qualities of particular recorders, alignment levels, types of noise reduction, tape stocks, and tape sizes

and speeds differ; choices are made according to subjective sonic preferences as well pragmatic concerns such as reliability and cost. Daniel Lanois, for example, finds two-inch twenty-four track Ampex tape running at 15 ips (inches per second) with Dolby A noise reduction to be a "very musical" format.³⁸ Many of his contemporaries, on the other hand, would insist on 30 ips and Dolby SR if they used analog at all. Still others find two-inch sixteen track machines to be the best analog has to offer. As with most aspects of recording technology, "there are no rules"; the choice is made intuitively rather than by comparing technical specifications.

The most striking sonic difference among professional quality equipment, however, lies in the differing conceptual bases of analog and digital technologies. Analog is more "active" than digital in terms of adding its own set of characteristic features to the recorded sound. The most obviously apparent coloration is the addition of tape hiss, which has generally been viewed as something to be minimized through a series of developments in the technology of noise reduction. The other most often cited coloring characteristic of analog recording is a boost in low end and high end frequencies and a presence enhancing effect known as tape compression when recording at high levels. "I get better bass on analog," says Daniel Lanois. "I suppose that when you

³⁸ Rick Clark, "Emmylou Harris: The Making of Wrecking Ball," Mix (February 1996), p. 184.

saturate tape, you get a musical result. When you hit it hard, you get a 'loudness' effect....I think when you hit analog tape hard, the midrange collapses, therefore there is the impression of more top and bottom so you get the 'loudness' curve effect, which is a musical curve."³⁹

Bob Clearmountain, on the other hand, is "frustrated" by the fact that "the analog machine is changing the sound."⁴⁰ To his ears, digital sound is "just better"⁴¹ because he regards it as a more transparent format than analog. However, digital sound is often criticized for sounding "harsh," "brittle," or "cold." That is, its relative lack of the coloration to which recordists are accustomed is regarded as a kind of distortion in itself. "There's a certain kind of compression that you get from analog recording," says Don Dixon. "It takes away a lot of the transient peaks. For some kinds of pop recordings, softening up those transients just gives you a better sound--it's a sound we're used to anyway."⁴² In other words, the general characteristic sound quality of analog recording sets the conventional frame. It is the "sound we're used to," a sound that permeates rock

³⁹ Rick Clark, "Mixing It Up With Analog and Digital," *Mix* (June 1995), p. 32.

⁴⁰ Bob Clearmountain and Robbie Robertson, "A Conversation About Destroying the Myths of Digital Recording," *Mix* (July 1992), p. 83.

⁴¹ "National Academy of Recording Arts and Sciences Roundtable: Modern Recording and Production Techniques," from the September, 1990 Audio Engineering Society Convention, excerpted in *Mix* (February 1991), p. 64.

⁴² Godfrey Cheshire, "Don Dixon: Southern Indie Roots," *Mix* (June 1991), p. 55.

history, and for many recordists it is an essential aspect of any rock recording, especially for bass, drums, and guitars.

Although it offers extreme flexibility in editing, very accurate sound reproduction, no tape hiss, no degradation of high frequencies with repeated playing, and a greater number of tracks available on a single machine, there is a persistent resistance to digital recording among many recordists. "For years now," says Robertson, "I've had recording engineers, producers, musicians, people off the street say, 'Stay away from this digital stuff. It's not musical. It does weird things to your ears. It's like standing in front of a radar oven too long.' I've heard all these myths."⁴³ With the digital/analog debates, we are confronted once again with an issue of aesthetics regarding sound recording and reproduction. Both formats have their own particular strengths, and many recordists use both of them in the course of a project, depending upon what is being recorded. Following a common practice, veteran engineer and producer Al Schmitt uses the 16-track analog format for rhythm tracks--to "get the warmth and punch"⁴⁴--while vocals are recorded digitally, thereby allowing composite vocal tracks to be constructed easily and with no loss of sound quality. Bruce Swedien mixes some tracks to analog and others to digital simply, as he puts it, "because they affect me differently."⁴⁵

⁴³ Clearmountain and Robertson, p. 81.

⁴⁴ "NARAS Roundtable," p. 65.

⁴⁵ Ibid., p. 66.

As Robbie Robertson points out, the analog machine is a kind of sound processor as well as a recording device, and "If you want this effect that it gives you, you can go through this machine."⁴⁶ However, in deciding to use the digital format for his Storyville (1991) album, he and engineer Steve Nye--previously a "die-hard analog fan"⁴⁷--determined that the analog effect could be duplicated by adding "just a little bottom EQ and a little compression. It was virtually the same thing, but (we) had better control over it."⁴⁸ Tony Visconti, who has extensive engineering and production credits from well before the invention of digital recording, praises the digital format for delivering, finally, the sounds as originally crafted by the recordist: "I came to accept that the public would never hear what we chosen few heard in the studio--until digital came along."⁴⁹ Like Clearmountain he prefers a format that functions as a faithful replicator rather than an effect. In his view, "Tape compression, although it is a reality that has become a romantic notion, is not an accurate means of equalization and is unpredictable. If I am compressing and equalizing a kick and a snare and I take a considerable amount of time doing that, I don't want the 'storage system' to change that hard work."⁵⁰ As for digital recording's lack of conventional coloration, Visconti believes that engineering technique and

⁴⁶ Clearmountain and Robertson, p. 86.

⁴⁷ Ibid., p. 84.

⁴⁸ Ibid., p. 86.

⁴⁹ Clark (1995), p. 34.

⁵⁰ Ibid., pp. 34, 37.

high quality outboard tools can create the same aesthetic effect with digital technology. "I can still make a recording with that 'classic' sound using modern equipment and modern digital tape--it doesn't depend on analog tape or equipment more than 30 years old."⁵¹

The ongoing analog/digital controversy calls to mind similar debates that have surfaced periodically throughout the history of recorded sound concerning the nature and value of "realism" in recording. In 1936, Cedric Wallis wrote the following in an article for The Gramophone entitled "The Future of Recorded Romanticism": "In those days (of acoustic recording) battle raged between two schools of opinion, who called themselves, respectively, Realists and Romantics. The Realists stood out strongly for as accurate a reproduction as possible of the actual sounds recorded, but the Romantics held that a certain sacrifice of accuracy was permissible, nay, even desirable, if it induced a quality more pleasing to the ear. To a Romantic, realistic records were always 'shrill' or 'thin,' or both. To a Realist, a romantic record would appear 'wooly' or 'foggy.'"⁵² The similarity--even in the choice of adjectives--to the analog/digital debate is striking. Not only is the basic issue the same, but in both cases the terms of competition between two technologies are

⁵¹ Ibid., p. 37.

⁵² Cited in Oliver Read and Walter L. Welch, From Tin Foil to Stereo: Evolution of the Phonograph (Indianapolis: Howard W. Sams, 1959), pp. 385-6.

not, finally, technical specifications but aesthetic judgment.

3. Monitors

Stored sound images remain in the silent world of magnetic particles and digital data until they are reconfigured and delivered to the listener by the loudspeaker. Monitor speakers and the amplifiers that power them are the final link in the sound reproduction chain, and all sonic decision making is based upon the information they provide. It is therefore crucial that the information be as accurate as possible. However, the large number of different monitors preferred by different recordists is a telling sign of the problematic nature of such a standard. How is accuracy to be measured? Aside from the fact that a loudspeaker's sound varies with different amplifiers and room acoustics, the speaker, even under the best conditions, can tell only one story. Although a particular speaker may exhibit a wide and flat frequency response, its very precision may prove misleading as a representation of how the record will ultimately be heard. For in the "real world" of rock reception, sound reproduction is subject to a vast range of technical and acoustical circumstances most of which are rarely optimal. And in many cases, recordists have abandoned

a personal favorite monitor because it was misleading as a reference; it "just sounded too good."⁵³

Nowhere are the unrealistic conditions of control room listening more apparent than in the permanently installed, wall-sized "main" monitors. Although they are among the most striking visual elements in any control room, they are rarely used by recordists except to check the extreme low end frequencies. "Usually, the only time they get used is when the band comes in and wants to listen," says engineer Terry Date. "They always want to turn up on the big speakers loud, and then I leave the room."⁵⁴ The essence of Date's comment is repeated again and again by recordists across the spectrum of rock styles, who prefer to use smaller "near field" monitors to better approximate real-world listening conditions, as well as to minimize the influence of room acoustics. And these are usually of quite average quality, producing a sound that fairly represents a middle way in sound reproduction. The aim is to approximate as nearly as possible the widest range of listeners' reproduction systems. "Most of my records don't sound good in optimum conditions," says Brian Eno, "where there are very large speakers which are extremely well balanced and have lots of high and low frequencies. I mix, really, for what I imagine most people

⁵³ Sarah Jones, "The Dream Machine: Grammy Nominees Speak out on Reference Monitors," *Mix* (April 1996), p. 36.

⁵⁴ *Ibid.*, p. 30.

have--medium-priced hi-fi--and for the radio a bit as well."⁵⁵

While recording technology has improved markedly, and many problems that in the past constantly threatened to diminish a recording's intended effect have been eliminated, the problem of monitoring remains pervasive. The experience of creating a perfect studio mix that sounds terrible on all other systems is a common one for inexperienced recordists. A successful mix is one that travels well, rather than one that is perfectly tailored to a particular listening environment. Given that sonic particularity is one of the fundamental concepts of record production, this presents something of a paradox. But it also removes the idea of particularity from the realm of abstract theory and illustrates the practical limits of the concept. The task of making a very specifically configured work with the criterion that it have a general effectiveness in myriad circumstances presents a very real problem that recordists must continually deal with.

As recordists strive to cultivate a sense of relative perspective among possible reproduction scenarios, they reference their work on several monitors of differing size and quality and in different environments in order to arrive at a reasonable average. The renowned remixer, John "Jellybean" Benitez, for example, mixes "on the Yamaha NS-10s and the E-V Sentry 100s (both average quality near fields)--

⁵⁵ Brian Eno, "The Studio as Compositional Tool-Part II," excerpted by Howard Mandel, Down Beat (August 1983), p. 52.

going back and forth between those two and whatever (main) monitors that are in the studio," listening for "different things on each speaker." When he finishes a mix, he also listens to it on the small built-in speaker on a Studer two-track tape recorder, believing that if the integrity of the mix holds up in such an unflattering circumstance, then listeners will be able to "hear it on anything."⁵⁶ Through such comparative listening, recordists seek to bridge the gap between the idealized listening environment of a world-class control room and the many less than ideal circumstances in which the work will be heard. Perhaps the intended sonic image exists only in the mind of the mixer, but as a practical matter, recordists come to rely on some combination of place and loudspeaker for a familiar general reference that allows them to hear their own mix in relation to others they have studied over a long period of time. Fittingly, for many rock recordists this most trusted listening environment is their car.

Although many engineers and producers take their own favorite near field monitors with them as they travel from one studio to another, there has been something of a standard speaker in use for over a decade in studios throughout the world. Though it is not especially accurate--as evidenced by the once ubiquitous "tissue paper mod," whereby the tweeters were covered with tissue paper to tone down the overly bright

⁵⁶ George Petersen, "Point of Reference: Engineers and Producers Speak out on Small Monitors," Mix (February 1987), p. 24.

high end--the Yamaha NS-10 was accepted as a good average representation of real-world circumstances. As engineer Elliot Scheiner puts it, NS-10s are "more realistic. It's not a great-sounding speaker...so you know that when you get a mix, or if you get anything sounding good on those, it's going to relate to the outside world."⁵⁷ Moreover, by using them as a common reference, recordists gain a normative standard with which to compare their work with that of others.

4. The Console

The console is the nerve center of the control room. With a set of separate channel strips that on a full-featured modern console such as those manufactured by Solid State Logic, Neve, Euphonix, and others, provide computer-automated control over amplitude, equalization, compression, gating, and panning for every sound that appears on the finished recording, the console provides the means with which to develop amplitudinal, spatial, and frequency relationships among the track's many individual musical parts and sonic treatments. It also serves as the central organizational point in the control room, controlling the routing of all signals to and from the tape recorder and the studio's various sound processors, providing the ability to instantly isolate any signal or to group a subset of signals, and offering the flexibility to create different simultaneous

⁵⁷ Jones, p. 36.

mixes--a headphone mix (for recording musicians) and a control room mix (for the engineer and producer).

In contrast to other recording tools, consoles are usually permanent installations, custom configured for a given studio's needs. Indeed until the early 1970s, consoles were individually designed and built, often by the studio's own engineers and technicians. Although there are now many manufacturers of mass-produced consoles, there are various different designs and configurations available, and new control rooms are designed with a particular console in mind. As a matter of studio economics, consoles are designed to meet the needs of a wide range of potential clients; flexibility, sonic transparency, and clarity are among their most valued features.

Consoles too, however, have their own personalities. These are manifested both in their sound and in the way their designs influence working methods. In addition to their characteristic overall sound, consoles have built-in equalization (EQ) on each channel strip that is unique in character, and the quality of the EQ is often cited as a reason for preferring a particular console. Another important consideration is a console's design features. How well matched are they to the recordist's preferred working methods? How extensive are the console's capabilities and how flexible are its functions? Does it have computer automation? How many inputs does it have? How straightforward is its

operation? In short, can the console facilitate both the recording and mixing processes of the project at hand?

Because the choice of studio inevitably includes its console, recording and mixing often take place in different studios. The two stages of track production require different things from a console. In the case of the former, the console may be bypassed altogether by signals being recorded in order to maintain the shortest possible signal path. Once recorded, signals are routed through the console to create temporary working mixes--for the headphones of overdubbing musicians, for example--but prior to a project's final mixing stage, a console's ultimate sonic and functional capabilities are generally outweighed by considerations of studio acoustics and atmosphere. During mixdown, however, the console actively participates in creating the sound of the finished work. Its EQ and automation functions are especially important to the project's outcome. Also, a greater number of inputs may be required during mixdown to accommodate all the musical parts and sound processing schemes. Hence a project is often moved to a different studio for mixing, one whose console is better suited to the requirements of the mix or is simply the preferred "instrument" of the mix engineer.

5. Signal Processing

"Nearly all the processing equipment you find in a studio gives you a way of changing the sense of space that the music is happening in."⁵⁸

Brian Eno

The compositional development of elements such as timbre, echo, and ambience makes use of an array of sound processing devices that provide control over these elements' defining parameters. Such processors fall into three basic categories: 1) timbral processors (equalizers, pitch modulators, psychoacoustic processors); 2) dynamics processors (compressors, gates); and 3) time-domain processors (reverb, delay). Equalizers, and often compressors and gates, are available on the console. Time-domain processors are available only as dedicated "outboard" units. Also, many times an outboard timbral or dynamics processor is preferred even if these are available on the console. As with microphones, all of these tools have a range of types and applications, and choices are made according to the demands of the situation and the preferences and habits of the artists who use them. There are general methodologies to be sure. But there are also innumerable applications that are arrived at through intuitive experimentation. Some processors have pronounced personalities, while others are more transparent in their operation. Some recordists, seeking the

⁵⁸ Robert L. Doerschuk, "Twelve Who Count: Brian Eno," Keyboard (March 1995), p. 51.

greatest possible control in tailoring the effect, insist on the latter. Others prefer a processor that adds its own distinctive flavor no matter how it is used (e.g., "British EQ," tube compression). In any case, these sound shaping tools are used, as Eno says, to "change the sense of space" in which the music is happening. In other words, they provide the recordist with the means to place the music in an entirely unique sound world.

Timbral Processing

As noted in Chapter 3, timbre functions in two primary ways: as physical entity and as rhetorical sign. The use of equalizers (which are available on most electronic instruments, guitar amplifiers, and so forth in addition to the console) can influence either or both of these, but their most common use is aimed at the former, shaping the timbre from the "outside," as it were, but leaving its essential character unaffected. Equalization involves the manipulation of particular areas of the frequency spectrum whereby the user may select bands of frequencies and then incrementally boost or cut them in order to precisely tailor a sound's color and, in turn, its place in the overall frequency structure of the track. In addition to the frequency range, the width of the affected frequency band can be defined by the user. For individual sounds, EQ can help to overcome a variety of sonic problems: e.g., a "dull" vocal sound, an "overly bright" guitar sound, a "thin" snare drum sound, and

so forth. Such problems can be corrected by identifying the problematic frequency range and shaping it to achieve the desired result. Sounds can also be enhanced, taking on a "polish" or "presence" that may have been lost in the process of recording, or that they may never have had in the first place.

EQ is also used to combine sounds in a complex texture, tailoring each of them to serve its appropriate complementary role in the overall fabric. While the timbral configuration of a sound heard by itself may be satisfactory, it may prove problematic when combined with other sounds. Hence EQ decisions involve not only timbral but also textural considerations; specific, detailed manipulation of EQ controls is ultimately guided by an understanding of how relationships among timbres account for the overall sonic image.

While many master recordists counsel conservative use of EQ in general, it is not uncommon to use it in more extreme applications that can influence a sound's affective character. When used in this way, EQ works from the "inside" of a sound as an essential shaping force. At a certain point, the equalized sound is no longer in the same rhetorical category as its original form. It may still be recognizable as a guitar, say, but when played through a wah-wah pedal--a variable bandpass filter--its timbre takes on a different set of associations. Thus EQ can be used to create new sonic characters out of existing ones. The new character extends

interpretive possibilities by playing upon listeners' expectations and associations. The murky electric guitar sound on Neil Young's "Change Your Mind" (1994--ex. 5.3), for example, is a staple of Young's style that dates back to his first album, Everybody Knows This Is Nowhere (1969). The dark sound is simply the result of overly prominent low mid-range frequencies that skew the tonal balance, but this particular choice of EQ defines the sound's identity and its place in the conventional field. It is immediately recognizable as Neil Young's guitar, which in turn evokes Young's entire stylistic history.

Whereas EQ can be used to shape sound in subtle ways that have no overt rhetorical effect, pitch modulating processes such as chorusing, flanging and pitch shifting have a marked effect on timbre that is immediately identifiable and carries the same kinds of stylistic associations that instruments do. These processes alter a timbre's surface in such a way that the effect becomes the timbre's most salient characteristic. For example, a chorused guitar (e.g., Andy Summers of the Police, James Honeyman Scott of the Pretenders) has a distinct sound all its own. Similarly, the flanging effect on George Harrison's vocal in the verses of "Blue Jay Way" (1967--ex. 5.4) objectifies the voice and, again, changes its rhetorical significance. And in the chorus, an effect that sounds like the voice being fed through the Doppler-like rotating Leslie speaker originally used in Hammond organs extends the timbral mutation of the

vocal even further. In a dialogic arrangement, the organ--which has the Leslie effect throughout--and the voice are placed opposite one another in the stereo field. As the vocal moves closer in timbre to the organ, the distinction between the dialogists begins to blur as the two become extensions of one another; the voice enters the swirling timbral dreamscape and the organ begins to sing. The range of expressive and interpretive possibilities opened up by such marked timbral mutations has made the group of pitch modulating effects a standard part of the recordist's timbral palette. Most of these effects fall into the category of time-domain processing, the functional nature of which will be discussed below.

Dynamics Processing

Recordists often use a process known as gain reduction to control the dynamic range of musical parts. Electronically limiting the degree of variation in the dynamics of a given part--reducing the loudest dynamics and thus allowing the overall average signal to be raised without distortion--effectively increases its density, or "presence." The user selects a threshold of volume above which a signal's intensity is reduced by a definable ratio. If a 4:1 ratio is selected, for example, a rise of 8-decibels (db) above threshold will result in only a 2-db increase in actual loudness. Prior to the invention of compression, fluctuations in volume presented a problem to recording engineers who had

to manually "ride" faders, turning the gain up or down as the performance went along. The compressor does this automatically and also provides control over attack and release times (of the compressor itself), in addition to threshold (the level at which it begins to work) and ratio (how much gain reduction it applies to the signal). These controls make it possible to set the compressor such that its operation ranges from the practically inaudible to the dramatically obvious, depending upon the requirements of the particular situation.

The two most common types of gain reduction used in record production are compression and limiting, which represent different degrees of the same basic phenomenon. Though there are units dedicated to one or another function, a gain reduction device with controls for "threshold," "ratio," "attack time," and "release time" can produce both types depending upon the configuration of the controls; at a certain ratio (10:1 and higher) coupled with fast attack and release times, compression becomes limiting. Perhaps because the two terms denote such similar functions, they are often used imprecisely by recordists. Again, however, when using sound tools, recordists follow their ears first of all; specific control settings and the accompanying terminology are often ignored or regarded as loose basic guidelines. When engineer Shelley Yakus was asked how much compression he used, for example, he replied simply, "'Til it sounds right." According to Jack Douglas, who worked for a time as his

assistant, Yakus "would tape cards across the VU meters so he couldn't see them. He'd say, 'You'll know when its wrong.'"⁵⁹ I will refer to the overall phenomenon of gain reduction simply as compression, following common usage.

While limiting dynamic range might be viewed as a constriction of musical expression, the net effect of compression is somewhat different from how it appears. Actual dynamics on a rock recording are controlled not by the musician, but by the channel faders on the console. The dynamic structure of the track is achieved through a choreographed series of fader movements that take place as the multitrack tape is being mixed to stereo (these movements can be quite extensive and complex, and today they are usually programmed into a computer which controls the faders). The effect of compression, then, is not to limit the musical effect of dynamics, but to provide a focusing mechanism--much like the one on a camera lens--to sharpen the sonic image. Compression allows the recordist to fashion for the sound image a desired degree of resolution which in turn affects the image's impact. For example, Douglas has an interesting application that he calls "bussed limiting," where drum tracks are grouped together on a single bus of the console to which compression is applied. The resulting sharply focused mono image of the drums and drum ambience is then combined with the unprocessed stereo mix of the drums. Though the compressed mono image may itself be almost

⁵⁹ Bobby Owsinski, "You Don't Know Jack," *EQ* (May 1996), p. 55.

indistinguishable, it serves to tighten the overall drum sound and provides it with added projective power.

Even in the most transparent applications, compression provides an enhanced clarity, and this is perhaps its most valued function in rock recording. It allows each musical part to retain a focused presence wherever it is placed in the mix and however its actual dynamics are manipulated at the console. Hence even the most subtle and intimate sonic moments tend to project from the loudspeaker; even a barely audible sub-layer will hold its place in the mix, providing a stable consistency to a composite texture. On the other hand, the dramatic sound of oversize drums and guitars, and the physical presence of the bass are also direct results of compression. This is perhaps why Tony Visconti refers to compression as "the sound of rock."⁶⁰ Squeezing the sonic information into a tighter dynamic space can provide a fullness and a concentration of energy in transient attacks, in effect lengthening the transient. The bass sound on Janet Jackson's "Control" (1986--ex. 5.5), for example, is a digital sample of car horns to which engineer Steve Hodge added "a bunch of low end (EQ) and compressed the living daylights out of."⁶¹ Hodge has emphasized the hard growl of the sound and highlighted its percussive aspect, which in combination with the compressed bass drum gives the track an irresistible sonic momentum in its low end, a stylistic

⁶⁰ Clark (1995), p. 37.

⁶¹ Bob Doerschuk, "In Control with Jam & Lewis Engineer Steve Hodge," Keyboard (May 1987), p. 76.

essential of successful dance tracks. The rhythmic momentum in the bass line is thus complemented by its sonic character.

When compressors are pushed to extremes, they can participate quite actively in a timbre's affective character. The drum sounds on Gabriel's "The Intruder" are an obvious example. Another example--this one not at all obvious--is the background texture for the track, "Goodbye" (ex. 5.6), from Emmylou Harris's Wrecking Ball (1995). It is impossible to identify the constituent timbres of the haunting canopy of sound that surrounds the vocal and finger-picked acoustic guitar. But Daniel Lanois reveals that the texture was created by radically compressing two instruments--a piano and an electric Vox mandoguitar--effectively fusing them into a single sonic entity. "We put a huge amount of compression on the piano and the mandoguitar, and it turned into this fantastic, chimey harmonic instrument," says Lanois. The compression merged both the sounds and the musical material into a unique composite texture. "We almost got the old Spector '60s sound, not by layering, but by really compressing what was already there between the melodic events happening between these two instruments."⁶²

Like compression and limiting, downward expansion and gating are related techniques whose applications can range from simple problem-solving to creative sonic shaping. The most common use of expanders is to control unwanted low-level noise by expanding the dynamic range downward. Controls are

⁶² Clark (February 1996), p. 184.

set so that as the volume of program material falls below threshold the expander engages at a definable rate to reduce the signal further. Thus, for example, noise between vocal phrases can be eliminated unobtrusively; when the singer begins to sing again, the level returns to normal. Another common application is the tailoring of sounds to remove unwanted artifacts (e.g., room reflections, ringing, buzzes, rattles, etc.) that become apparent only after the major portion of the signal is over. Like compressors, expanders provide control over threshold, ratio, attack, hold, and release times. The configuration of these controls determines whether the unit functions as an expander or a gate, a distinction between gradual attenuation and something closer to an on/off switch. In practice, the term "gate" is used to denote any use of the device, and its function mode is simply a matter of how the controls are set. In addition to the aforementioned controls, many gates include frequency, bandwidth, and range controls. The first two provide for the gate to be "tuned" so that it is triggered only by sounds falling within a specified frequency range. The "range" control allows the user to set the lower limit of expansion.

The use of gates can add significantly to the clarity of a recording by eliminating extraneous sounds on a track and by controlling microphone leakage. Such clarity is not a universally desired quality, but rather a stylistic option. Recall, for example, Emmylou Harris's comment about leakage being "encouraged" on the Wrecking Ball sessions. The random

mixing of sound that occurs in such a scenario can add an impressionistic textural depth to a track, as it does in this case. The tight, clean sound of many modern pop records, on the other hand, owes a great deal to the use of gates. The difference lies in the degree of analytic precision with which sounds are separated. If the aim is tight control over every individual sound, gates are used extensively. A separate gate on every drum microphone, for instance, helps to isolate each drum on its own track, effectively providing the recordist with the same kind of discrete control as a drum machine with separate outputs for each drum sound. The recordist can thus deliberately fashion the drum image during the mix. If a more natural randomness is desired--as on most punk recordings for example--microphones are gated more loosely, or left ungated to pick up whatever they hear. In this case, the impression is of a complex interactive sonic play among the members of the drum kit and the ambient images they evoke. The two techniques can also be used together, gating each drum while leaving a stereo pair of overhead microphones open to capture the overall sense of the drum kit/room ambience interaction.

With their ability to shape the envelopes of sounds--to reshape a sound's temporal character--gates can be used to create a variety of effects. Once again, Gabriel's "The Intruder" provides a dramatic example. Not only are the drums and the room ambience extremely compressed, the decay of the ambience is abruptly cut off by a gate. The principle can be

extended to the attack portion of the envelope as well, which can be masked by removing a sound's transients in the manner of a volume pedal, effectively turning it into an altogether different timbral character.

Time-domain Processing

Time-domain processes are those that create echo, ambience, and certain related timbral effects. They include analog and digital delay and the various types of ambience simulation. Unlike EQ or dynamics processing, time-domain processing involves a recurrence of an initial signal. The time between the original sound and the effect it initiates may be so short that the effect is perceived as a timbral alteration--a chorus or flange effect, for example--rather than echo or ambience. But the effect is in fact always a separate sound in its own right, and thus may be treated as an independent entity. While it is possible to remove the original sound from the mix altogether--using it only to trigger the effect--usually the original sound (commonly referred to as "dry") and the processed sound ("wet") are combined and balanced to create the desired effect. In the range of balance options and recombination techniques lies a wealth of opportunity for complex textural treatments.

Sounds are usually sent to processors via the "effect send" outputs on the mixing console. The resulting wet sound is returned to a separate input (a dedicated effect return or simply another channel input). Now it has its own place on the

mixing console and can be further processed--equalized, say--independently of the original. Additionally it has its own independent amplitude control; thus the balance between wet and dry sounds can be tailored precisely, and it can be varied during the course of the track. (An early example of such variation is Buddy Holly's "Peggy Sue," [1957--ex. 5.7] where the ambience of the tom-toms is switched on--diffusing the drums--during vocal passages, and switched off--bringing the drums forward--between the vocal phrases.) Moreover, the processed sound can be placed in its own area of the stereo soundstage--and so take on a quite distinct identity--via its pan control. Most of the lead vocals sung by John Lennon or George Harrison on Revolver (e.g., "I'm Only Sleeping," 1966--ex. 5.8), for instance, use this technique. Original sounds and their processed versions are commonly separated in the stereo field in order to fashion a range of textural configurations.

As previously noted, echo effects involve discrete repetition. Depending upon the delay time, the number of repeats, and whether or not a pitch modulation process is involved, the result can range from distinct echoes to timbral effects such as chorusing, flanging, and automatic double tracking (ADT). Delay effects were initially produced with tape recorders. The echo on Elvis Presley's Sun recordings, for example, was produced by tape delay, a technique that takes advantage of the fact that on a tape recorder with separate record and playback heads, there is a

gap between them, which causes a recorded signal to play back a fraction of a second after it has been recorded. Feeding a signal to two tape recorders simultaneously, while on one of them combining the original signal with its recorded-and-played-back version from the second machine, produces the distinctive "slapback" echo.

The Beatles made extensive use of very short delay times (between fifteen and thirty-five milliseconds) on vocals (especially Lennon's) to produce the ADT effect. The flanging effect on "Blue Jay Way" is a related technique whereby the delay time is continuously varied within the zero to twenty millisecond range, which, in turn, continuously changes the relationship between the original and the delayed sounds and introduces a pitch modulating process. To achieve this effect, the capstan motor of the recorder providing the delay is controlled by an amplifier whose voltage is controlled by a variable frequency oscillator. As the oscillator frequency changes, so does the tape speed, and thus the delay time and the relative pitch. Geoff Emerick recalls, "John (Lennon)--or George (Harrison) if it was his song--used to sit in the control room on mixes and actually play the oscillator."⁶³

Tape delay techniques were largely superseded by the advent of digital sampling technology, though they retain a distinctive sound that is still used by some recordists in certain situations. The digital delay unit produces the same effects and more, and is far more flexible and easier to use.

⁶³ Lewisohn, p. 74.

There is a much greater range of available delay times, numbers of repeats, and timbral effects utilizing secondary processing such as pitch modulation. The increased ease of use has helped to make digital delay one of the most extensively used processes on modern recordings. Like EQ and dynamics processors, its presence can be quite subtle, shaping the work without calling undue attention to itself. It is perhaps most commonly used as a sound thickener, enhancing textures by adding weight and smoothness much like orchestral doubling. On the other hand, delay times can be quite long, creating a rhythmic relationship between the original sound and its echo. All in all, the precision and ease with which digital delay devices can be programmed has brought about an increased and more varied use of echo-based effects.

The other essential time domain process is ambience simulation. While ambience has become a central compositional element on modern recordings, dedicated "echo chambers" are now rare. Often, extra microphones are used to capture the ambience of the recording space itself during tracking sessions, but the most commonly used method for adding ambience to a track is electronic ambience simulation. Ambience simulators provide the recordist with an abundance of virtual ambient spaces ranging from a closet to a cathedral, all of which can be edited with great precision to suit the needs of a particular situation. While nothing can replace the character of actual ambience, by their great

versatility, ease of use, and, in their digital incarnations, refined sound quality, ambience simulators have made themselves indispensable studio tools.

Various ambience simulating techniques have been invented over the past thirty-odd years. Analog devices that induce wave motion in a thin sheet of steel, gold foil, or springs produce ambient effects that have acquired their own sets of stylistic associations. But it was the advent of digital reverb that brought the use of simulated ambience into an unprecedented position of importance. Though ambience was always an important element on rock records--giving the record its sense of unique physical space--digital ambience simulators brought greater control and a vastly expanded range of programmability that allowed for the creation of elaborate ambient effects. As with digital devices in general, digital reverb units convert signals to digital data, in which form they are easily manipulated. The various parameters of ambient images--pre-delay, reverberation time, decay, and so forth--can be edited individually to create unique combinations of ambient elements (e.g., the onset of reverb might simulate a large hall, its subsequent decay a small room). Reverse reverb--as the term indicates, a reversal of the reverb's envelope, in effect a crescendo of ambience--and gated ambience are two examples of effects that can be easily created with a digital reverb device. In fact, because of the popularity of these effects, they come pre-programmed into most units.

The myriad possibilities offered by digital reverb techniques allow recordists to design virtual spaces whose implied size, shape, and construction materials are optimized for a given sound, musical part, or affective intention. Furthermore, it is common to combine a number of ambiences on a track, each with its own character. Thus the multitrack work is made not only of the diverse assembled "ear points" provided by multiple microphones, but also multiple spaces, both actual and virtual, which create a sort of ambient polyphony that infuses the work with a complex sensory richness.

There are many kinds of interactions among processing tools. Various units can be linked in series, setting up more or less elaborate chains of interdependent processing. There are also devices that offer several functions in a single unit: a compressor/limiter/expander/gate, for example; a multi-effects processor that supplies reverb, delay, EQ, and compression; or a so called psychoacoustic processor that automatically processes a signal using a concoction of EQ, time delay, and phasing. Additionally, many compressors and gates have a "side chain" function whereby they are controlled not by the signal they are processing, but by a signal from another processor. For example, a gate on a snare drum microphone can be controlled by an equalizer tuned to the snare's most prominent frequency band. Thus for the gate to open, it must be fed a signal that is not only above its volume threshold, but within the selected frequency range,

effectively precluding the gate opening in response to the attacks of other drums. This technique yields a clean snare track with minimal leakage. Similarly, compressed room ambience can add explosive power to a track's low end by keying the compressor to the bass drum, in which case the compressor will only pass the ambience when the bass drum strikes. Using sound processors interactively extends the range of sound sculpting techniques by adding further layers to the relationships between a track's sounds and the forces that shape them, and in turn increases the possibilities for developing and refining sonic motives, themes, and formal design.

Effects on Performance

"It's really recording it. That's the art. It's not just mixing it that is the production, it's recording it as well. I'd much rather spend three hours messing around with a guitar sound when it's getting recorded, than just sticking something down and then trying to tackle it (in the mix). 'Cause the sound that we make, that's the sound that sort of inspires the notes that we play."⁶⁴

Robin Guthrie

As they play, musicians react instinctively to the sounds they hear, and hence in the recording studio, sound is

⁶⁴ Stephen Dark, "That Which Cannot Be Spoken: Divining the Heavenly Sound of Cocteau Twins," Option (May/June 1987), p. 32, cited in Steve Jones, Rock Formation: Music, Technology, and Mass Communication (Newbury Park, CA: Sage Publications, 1992).

shaped not only to fit the work but to influence musical performance. Sometimes the sound a performer hears is printed to tape and has a direct presence on the track. In other instances, however, the sonic environment is created simply to motivate the performer. In such cases, the sound processing plays an indirect, though perhaps no less important, role in the outcome of the work. In any event, what musicians hear from their instruments or in their headphones can be manipulated to optimize recording conditions and to create a kind of responsive dialog between the musician and the sonic environment they inhabit while they are performing. Although in many cases a good headphone mix is simply a matter of clarity and balance, examples of interaction between performer and sound processor are also common. This is what Padgham refers to when he points out that Collins "actually sings to the sound of his voice" after it has been processed and routed to his headphones. Similarly for Enya, developing her lush vocal textures involves singing to a particular ambient configuration. Her producer/engineer Nicky Ryan designs digital reverb settings to fit the feel of the developing track. "Enya always has (the reverb) in her headphones," says Ryan, "so she floats with it, and it affects how she sings."⁶⁵

A good example of the interface between performer and sound processor, and its resulting effect on the track is the extraordinary snare drum sound on David Bowie's Low (e.g.,

⁶⁵ Blair Jackson, "In the Studio with Enya," Mix (May 1992), p. 135.

"Speed of Life," 1977--ex. 5.9). According to Tony Visconti, it was created by processing the snare drum through a harmonizer, decreasing its pitch and adding feedback, an unusual drum treatment to say the least. But the effect was not the result of the processor alone. When the drummer, Dennis Davis, heard the effect in the control room, "he begged to have it routed into his headphones."⁶⁶ The precise way in which the harmonizer reacted to the incoming signal was dependent upon the intensity of the signal at its input. When Davis "could hear the effect as he played, he was able to control the sound by how hard he hit his snare."⁶⁷ Thus the drummer controls both the degree and the timing of the textural modulation his part introduces into the track. Although the effect could have simply been added during mixdown, it would have lost the quality of interactive performance and taken on the quality of automatic correlation. Linking the processed snare sound to a particular interactive performance gives it a unique, organic quality as drummer and machine react to one another in the moment of performance.

Such examples are literally innumerable. But they all illustrate the same point: as the musical and the mechanical are interwoven in the overall artistic effort, the track creation process represents an interdependence of poetic practices. The sonic configuration of a track develops

⁶⁶ Michael Molenda, "Audio Visionary," Electronic Musician (October 1995), p. 45.

⁶⁷ Ibid.

through the interface between musical expression and the sound processing characteristics of electronic devices. The resulting interaction and interdependence forms an integrated compositional method. As the composition team integrates the skills of many different participants, so the composition process brings songwriting, arranging, and performing together with the tools and techniques of sonic artistry.

6. THE MULTITRACK PROCESS

In the preceding chapters, I have sought to develop, in a systematic and analytical way, the topics that would inform a discussion of the multitrack recording and assemblage process. The present chapter should, therefore, have a sense of familiarity about it because, in examining the aims of recording and the techniques of mixing, it uses concepts and terms that have at least been touched upon already. It is, therefore, something of a summation of rock's compositional principles, but, more importantly, it seeks to use these ideas to shape a general discussion of rock composition from the perspective of the overall artistic process.

Broadly speaking, there are two phases to a recording project: recording and mixing. The former involves musical performance in combination with engineering technique and is concerned with bringing the ephemeral into a state of concrete materiality. The latter involves processing and assemblage of the recorded material, defining and fixing relationships among the parts to form a single coherent image. Each phase has its own set of problems and concerns, but the two are not entirely separate; they are interdependent stages in a single process. Final compositional decisions are arrived at through a series of evolutionary steps that flow from recording, which brings the piece to a certain stage of completion, to mixing, which finishes the process. Thus the specificity that characterizes

the recorded work is developed by degrees. For example, because multiple recorded performances can be edited into a single composite, deciding upon the ultimate take of a given part is not necessarily a pressing issue during recording. Also, timbre, echo, and ambience can be altered or added at any time subsequent to recording, thus changing the sound, and perhaps the rhetorical sense, of what was originally committed to tape.

Recordists have the "mix in mind" during recording, assessing ideas and performances in terms of a work that is in the process of developing, but whose ultimate form is, for the moment, only imaginary, "nothing more than an auditory concept that floats in the mind."¹ Decisions about whether to "print" a timbral or ambient effect while recording a performance, for instance, or to leave it until the mix, when more of the track is in place and the precise quality of the effect can perhaps be better determined, are based upon an idea of the final mix's configuration. Perhaps the unit that produces the effect will be required for another part in the mix and will not be available. In this case, the effect must be printed with the performance. If, as the track develops, the effect turns out to be inappropriate, the performance will be unusable. On the other hand, the recordist may be so certain of the general correctness of the effect in the intended mix that there is no real risk in committing it to

¹ Aaron Copland "The Sonorous Image," in Music and Imagination (Cambridge, MA: Harvard University Press, 1952), p. 21.

tape. Such certainty would require a fairly clear sense of a given sound's eventual place in the mix's ultimate sonic design. But ideas that may change the initial mix concept accumulate throughout the recording stage. Rough mixes are made along the way which develop, refine, or perhaps alter the original plan. As such, they can function as a series of developmental sketches. The two stages of the overall recording/mixing process, then, are dynamically interactive. An idea of the mix shapes decisions during recording, but the idea is subject to change as it moves toward realization in the recording process.

I. Recording

"The word 'record' is misleading," writes Evan Eisenberg in his illuminating and entertaining book, The Recording Angel: Explorations in Phonography. "Only live recordings record an event; studio recordings...record nothing. Pieced together from bits of actual events, they construct an ideal event."² Insofar as recordings of classical music are meant to be apparent renderings of "events"--i.e., performances--perhaps the various editing techniques to which they are subjected are at odds with a narrow definition of "recording." Eisenberg, however, does not limit his discussion to classical recordings. Therefore, in

² Evan Eisenberg, The Recording Angel: Explorations in Phonography, p. 109.

substituting the term "phonography" for "recording," he presumably means it to apply to "studio recordings" at large.

But for rock recording--especially multitrack--this view is problematic because it approaches the issue from the wrong end of the compositional process. The often fragmentary instances of music making that are collected throughout the recording phase of a project are not "bits of actual events"; that is, they are not disassembled pieces of a virtual whole. Though they are not meant to stand alone, they are complete events in themselves, and recording them is part of a generative process. Their status as events, however, is only the beginning of their ontological journey, for such performances serve a larger purpose than either the moment of their performance or its remaining record. Once recorded, they become ingredients of a work in progress. Each overdub is a step in the making--even the discovery--of a work that does not yet exist and that, therefore, at the moment of recording it cannot claim to represent. Because the recording is not a deliberately constructed representation of an event, but a poetic work in itself, its making casts musical performance in a new light and in some ways changes its very nature and function.

Whereas a recorded performance of a written composition represents one possible interpretation of the work, the specific musical interpretations and expressions that make up a recorded composition are essential to the work's permanent identity. The finely shaded nuances of a particular

performance take on a heightened significance as they become fixed in a timeless text. Because they cannot be notated adequately, nor repeated exactly, such nuances constitute the unpredictable variables that distinguish different performances of the same music and give the live performance its sense of unique moment. Recording, however, transforms performance nuances from ephemera that characterize the moment to fixed elements of the work; they are repeated precisely each time the work is heard. Since there can be only one version of the work (re-mixes constitute works in themselves), the particularities of its specific performances, and the affective influence they impart, are inextricably woven into its identity.

Thus, although recording is aimed at accumulating a work's constituent material, it is not simply a collection process. Rather, it is the setting down of ideas--some rough, others fully formed--so that they may be experienced and evaluated as manifestations. As ideas take on the material form of recorded performances, they further the creative process, giving rise to other ideas and shedding new light on the formative art work. In recording, then, there is an element of organic compositional development. To borrow from Paul Berliner, we might call it "thinking in sound."³ Indeed, thinking without sound is sheer speculation as far as rock is concerned. To be evaluated for significance or quality, ideas

³ Paul F. Berliner, Thinking in Jazz: The Infinite Art of Improvisation (Chicago: University of Chicago Press, 1994).

must be manifested and heard. "You listen to the music," says engineer/producer Chuck Plotkin. "That's the whole thing. That's what you do: You put some music down and you listen to it. ... Listen hard."⁴

While the recording phase of a project includes the invention of musical parts, the shaping of timbres and textures, and improvisation ("spontaneous composition")--all compositional types common to many kinds of music--its primary compositional concern is the track. Even pre-composed arrangements are ultimately assessed in terms of their effectiveness as recorded sound. As sound images are inscribed on the tape, layer upon layer, each step leads in some way to the next and even the blind alleys contribute to the generative process. Each new layer is evaluated according to its fit in the track as a musical part, a timbre, a performance; and each further defines and illuminates the character of the work as relationships among the constituent parts become clearer. While in many cases, a more or less detailed arrangement--either in some kind of written form or in the form of a demo recording--serves as a procedural plan, it is rarely considered an authoritative blueprint. Rather, compositional authority lies with the track and develops gradually as the track's identity takes shape in the form of particular concrete aural relationships that increasingly affect criteria and creative direction.

⁴ Dave Marsh, Glory Days: Bruce Springsteen in the 1980s (New York: Pantheon Books, 1987), p. 121.

However detailed the initial script for a project may be, the sequential and empirical nature of the recording process itself influences the course of the track's development. Hence recording is often viewed as an ongoing process of discovery. For Karl Wallinger, it is "a learning process where we see what the songs become."⁵ Recording for Goodbye Jumbo (1990) resulted in sixty hours of material, which was edited down to 58 minutes. Clearly, much of Wallinger's recording process is made up of creative steps that lead to an ultimate end, but are not themselves represented materially in the finished work. They may simply serve to initiate the creative flow, offer a change of pace, or explore various options. The sessions for Bang! (1993) began by recording with the Dufay Collective because "it was nice to start with something acoustical and aurally taxing."⁶ None of the recorded material ended up on the record, however; it was simply a point of departure, an exercise to set the process in motion.

Approaches differ as to the nature and state of completion of the material that serves as the starting point for the recording process. Commonly, songwriting precedes recording, in which case a more or less finished song provides the initial direction for the track. But popular songs in general are quite variable musical entities, subject to interpretive treatment in most of their aspects; rock

⁵ Blair Jackson, "An Invitation to Karl Wallinger's World Party," Mix (June 1993), p.113.

⁶ Ibid.

songs in particular, apart from their recorded manifestations, can be very sketchy indeed. Are melody, chords, words, tempo, arrangement, and groove set before recording begins? Have they been carefully worked out in pre-production rehearsals? Are they at least generally indicated by a demo tape? Or is the "song" just a sketch, or perhaps merely a title that provides some guidelines as to mood and atmosphere?⁷ Moreover, some artists begin recording without songs, fully integrating the task of capturing sounds with that of musical invention. A groove, a sound, or a concept may serve as the point of departure. Brian Eno describes his recording method as "in-studio composition, where you no longer come to the studio with a conception of the finished piece. Instead, you come with actually rather a bare skeleton of the piece, or perhaps with nothing at all."⁸ Pink Floyd's "Echoes" (1971)--originally entitled "Return of the Son of Nothing"--began as nothing but reserved time at EMI's Abbey Road Studios. "Anytime that anyone had any sort of rough

⁷ Thomas Dolby describes his process of developing tracks starting with nothing more than a song title: "My songs usually start with a title, often a title that is memorable and suggestive enough that the music and the rest of the words follow on... 'Airwaves,' 'One of Our Submarines,' 'Mulu the Rain Forest,' 'Screen Kiss.' Then there follows this strange exploration of the mystery that the title conjures up. For example on 'Mulu' I started with a rhythm made up of tsikada insects and trees falling down in a jungle, then blew over the top of a milk bottle to make a Fairlight (digital sampler) pan pipe sound and found a melody. As I hummed along, words started to form which often tied in with the subject--'dreamtime/faultline,' 'warming/morning dew/Mulu,' etc. It's all about atmosphere, really. I just try to climb inside my subject and squeeze out every drop of detail that adds to it, until one night I can sit back and listen and know it's all there, and then I mix it...which I suppose is not much more than the art of making all those impressions onto a piece of half-inch tape."

⁸ Brian Eno, "The Studio as Compositional Tool--Part I," Down Beat (July 1983), p. 57.

idea, we'd put it down,"⁹ recalled drummer Nick Mason. Eventually thirty-six different "bits and pieces" (working titles: "Nothing, Parts 1-36") were brought together in a single 25-minute piece.

Such exploratory recording methods can be risky. They require a firm intuitive and technical grasp of studio process and either an artist-owned recording studio or a large recording budget. Aside from potentially using up the budget before recording is completed, the project may simply become lost in a maze of endless, unfocused possibility. Making a record can take a long time, and efficiency in the production process must be maintained not only for cost control, but also in order to preserve the concentration of creative energies. The Beatles recorded their first album in a day (Please Please Me, 1963), but by the time they recorded Sgt. Pepper's four years later, it took them six months of studio time. Early Beach Boys singles were recorded in hours, but Brian Wilson spent six weeks recording "Good Vibrations" (1966). Trevor Horn spent three months on the Buggles single, "Video Killed the Radio Star" (1979). And Rick Rubin characterized the sessions for Tom Petty's Wildflowers (1994) as "just a casual process of getting together every afternoon for two years."¹⁰ The longer and more involved the process becomes, the more problems are liable to arise, and many

⁹ Nicholas Schaffner, Saucerful of Secrets: The Pink Floyd Odyssey (New York: Harmony Books, 1991), p. 164.

¹⁰ Fred Schruers, "Tom Petty: On the Road," Rolling Stone (May 4, 1995), p. 52.

artists prefer to work quickly in order to avoid the potential pitfalls of the drawn out project. An overabundance of time and choice can lead to a diffusion of focus and a tendency to defer decisions. "De La Soul made an album in a week!...We need some of that,"¹¹ lamented U2's Bono as the sessions for Zooropa (1993) dragged on. Of course, part of Zooropa's fascinating character derives from the nature of its creative evolution. But the many experiments, which yielded so many possible options for the album's ultimate makeup, might easily have consigned it to the heap of eclectic oddities--interesting, but incoherent--that dot the history of rock recording (e.g., Fleetwood Mack's Tusk [1979]).¹²

Consistency of expression and atmosphere--i.e., "vibe"--can be difficult to maintain in a musical environment where performances for a single piece are gathered over a period of time. Some artists minimize the problem by treating recording as much like live playing as possible. Believing that the quality drains away quickly after the first few attempts, and that the result becomes increasingly forced and artificial sounding, they will simply move on to another song if the initial takes of one are unacceptable. On the other hand, many artists use the recording process as a means for exploring interpretive possibilities by recording a song or passage again and again. In this case, committing

¹¹ Bill Flanagan, U2 at the End of the World, pp. 195-6.

¹² Of course, such rambling agglomerations, usually double albums, can have their own charm (e.g., The Beatles [1968]).

performances to tape functions similarly to writing and rehearsing; it is a process by which one arrives at a desired musical expression.

Other problems and challenges faced by musicians in the recording studio include the lack of dynamic interaction between artist and audience, and the intensity of the scrutiny to which their efforts are subjected. In order to deal with the circumstances of studio recording, musicians must develop a kind of recording consciousness. This involves a combination of attitude, technical ability, awareness, and experience that turns the recording situation--completely artificial by live performance standards--into its own kind of performing reality. For recording is not a means of concocting ersatz performances. It is a set of techniques for effecting an ontological transformation, transferring the essence of the musical idea from its manifestation as a performance to its membership in a work. The special set of skills required is aimed at transferring the artistry of the performer into the medium of the poet, the maker. There are many excellent performers whose records have only sporadically measured up to their live performances (e.g., the Grateful Dead, Phish). For any number of reasons, these artists and their recording teams fail to make the transferal of expression from performance to work.¹³ Oftentimes, the

¹³ See Geoffrey Stokes, Starmaking Machinery (New York: Bobbs-Merrill Co., 1976) for a good account of the difficulties a live band--in this case, Commander Cody and His Lost Planet Airmen--can have in transforming their performance into a work.

failure is one of attitude toward, or understanding of, the nature of the recorded work. While it forces performers to develop an ability to perform expressively and with artistic conviction in varying musical contexts--from full ensemble performance to minute solo overdubs--having only a microphone for an audience, recording consciousness requires above all an ability to hear and evaluate recorded material as a record, something quite apart and different from a live performance.

The captured moments of musical performance are assessed for their suitability in a textural scheme that will involve various kinds of manipulation, such as concatenation and layering. And, of course, they must stand the test of repeated listening. Long before they reach an audience, the various elements of the track are subjected to this test as the track production process unfolds. Thus recording requires two kinds of consciousness: spontaneous, intuitive expression and deliberate critical analysis. The makeup of the recording team provides a model for the designation of tasks and roles--for example, the musician records a take (expression) and the producer decides whether or not to keep it (criticism)--but in practice these overlap to a great extent, and musicians may find themselves switching back and forth between performance and analysis. Peter Gabriel characterizes the recording process as a "two-levels-of-energy system," reflecting that "there are two ways a musician can operate in a studio." One level, "energy 2,...is a sort of performance-

inspired, red-light-on, pumping energy." It involves "feel based" musical interpretation, improvisation, and spontaneous interactions, both among musicians playing together and between musicians and the track. The results of "energy Z" are then examined in minute detail using "energy A, which is analytical energy...where you are able to zoom into decisions...and really get involved in the microcosm."

Gabriel describes a hypothetical breakdown of performance parameters to illustrate how the two-levels-of-energy system can work in each step of track production: "So let's say layer one is defining a melody. You're not worrying about the kind of sound you're using. You just turn the red light on and you're off. People are dancing around the studio. Then switch over to energy A and look at what you've done in order to figure out ways to improve it...Layer two is when you choose your palette of sounds with some tool you've created, maybe a joystick or something. When the red light goes on you perform the tone color changes. When that's done, you switch to the analytical stuff and do the small detail work. Level three, say, is adding the nuance to your performance, using breath or a keyboard or whatever. This is the process. You go layer upon layer, each time you try to force yourself into this high-energy performance mode before you get lost in the forest of analysis."¹⁴ Although Gabriel is describing a process of building a synthesizer

¹⁴ Dominic Milano, "Peter Gabriel: Identity," Keyboard (October 1989).

performance--where melody, tone color, and nuance can be edited separately--his account can be taken as a symbol for the recording process in general. As each layer of performance is recorded, the two levels alternate. The continual shifting from one kind of consciousness to another keeps the process balanced between technical craft and artistic intuition.

The two-levels-of-energy system applies to the entire composition team. Musical magic may come in momentary flashes of inspiration, improvised musings, or happy accidents. Hence the control exerted by producers and engineers must be balanced by a willingness to allow the dynamics of the process itself to take over. Producers must strike a balance between unpredictability, which may yield something extraordinary, and control which keeps the project focused creatively and on budget. Sensitive engineers roll tape whenever they sense something beginning to happen in the studio, even if the musicians are warming up or experimenting with a still unformed idea. Some simply roll tape at all times. "Always have the machine in 'record,'" says Tom Lord-Alge. "Any time there are musicians in (the studio) screwing around, or singers warming up, or whatever, you should be recording."¹⁵

Multitrack recording procedure can follow one of two general paths: the recording can be built layer by layer

¹⁵ Blair Jackson, "Tom Lord-Alge: The Grammy-Winning Engineer/Producer Is on a Roll," *Mix* (May 1989), p. 60.

right from the start, or it can begin with a more or less full musical performance that is subsequently enhanced with overdubs and sound processing. Of course, there can be many degrees of overlap between these two approaches. The choice of which route to take is a matter of preference, the artist's capabilities, and the style of the music. In styles that make extensive use of synthesized and sampled sounds--such as rap or techno--records are usually built gradually beginning with nothing more than a click track. Recordists, often working alone, record layer upon layer with a computer sequencer, tape, hard disk, or some combination thereof.

In band-oriented styles, on the other hand, a full band performance may be the only way to get an idiomatic sound. "I've always believed in recording a live backing track that holds some magical interaction between musicians," says producer John Leckie. He feels that such interaction "is almost impossible to obtain when doing singular overdubs." Hence he begins recording with "the bass, drums, a rhythm instrument and the vocal all happening together" and chooses "the take that has this magical interaction or uplift or some spirited feeling that makes the song happen." For Leckie, methodically building a track one layer at a time renders the track somewhat soulless. "When using a click track and starting with the drums, then bass and so on, you may never have more than one band member in the studio at the same time, and it's quite hard to keep a human essence or organic

musical dialog."¹⁶ In addition to the interaction among musicians, many recordists prefer this approach for the separation it affords between A and Z energies. Musicians must focus on playing together, while engineers and producers handle critical decision making.

Both of these approaches share the common aim of capturing initially a foundation, which in rock is usually the rhythm, or "basic," tracks. The drums provide the referential pulse to which everything else must be synchronized, as well as the groove character that is central to the track's style and feel. The other most foundational musical element is the song's chord sequence. Hence the bass and instruments with a mainly harmonic/rhythmic role such as rhythm guitar and some keyboard parts are also considered to be basic tracks. Even if they are to be redone later, these usually play along with the drums--assuming the project is using live rather than sampled drums--in order to give the drummer a fuller musical context than a simple click track. Once basic tracks are down, the recording team works on overdubbing, a kind of music making that is unique to recording. Overdubs are often isolated gestures, requiring the performer to conjure an expressive intensity from a musical atmosphere that is often a mere sketch, keeping in mind that their part in the ultimate work may have an altogether different significance from what it has in the

¹⁶ Camran Afsari, "John Leckie: From Abbey Road to the Stone Roses," Mix (January 1993), p. 58.

moment of performance. Furthermore, overdubbing requires the performer to engage with the track rather than other live musicians. What is an interactive musical interchange among players in a live situation--with fluctuations of dynamics, tempo, energy, and so forth--becomes a one-way responsive relationship between the musician and a fixed, unchanging musical partner.

From basic tracks to final overdub, the energy and concentration of the participants are focused on capturing moments of musical expression that are somehow extraordinary. What constitutes such "great performances" is entirely subjective and depends upon the sensibilities of the recording team. Recordists stress that one must simply feel when a performance, or part of a performance is right. But the basis of any set of criteria used to assess musical performance as compositional material is sound. As I have stressed repeatedly, evaluation is based on the specific sonic rendering. If it sounds right, then it is right. Linguistic and musical sense, as defined by systems of written language and composition are subordinate to the sense of the immediate sound, which is grounded in its own conventional system. Because the essential currency of the system is sound, sonic phenomena can take on an expressive importance that is at least equal to the affective importance of lyrics or melody. Simon Frith has pointed out that "song words are always spoken out--we always hear them in

somebody's voice."¹⁷ In other words, the sense of the musical idea involves its utterance as well as its pitch and rhythmic configuration or timbral character. It also involves the choice of recording tools, the space in which the recording takes place, and the dynamics of the interaction among the members of the recording team. And, of course, this idea applies not only to the voice. All the elements of the track are "spoken out"; their meaning is gathered from their sound. Thus recording brings about a fusion of idea, expression, and rendering.

The degree to which particular sounds and performances--in all their details and nuances--define the identity of a recorded work is well illustrated by the problem of the demo tape. Oftentimes, prior to the start of formal recording, a song is recorded in a rough, preliminary version. The demo can range from a bare songwriter's sketch with a vocal and single instrument accompaniment, to more elaborate recordings that specify details of the groove and the arrangement. While demos can give a project a sense of direction prior to entering the studio, and sometimes they are incorporated into the final recording, they constitute recorded works in themselves and they may be quite resistant to attempts at translation. In the case of the demos for Los Lobos' Kiko (1992), the sound offered enough specificity to indicate the direction that the record's sound should take--far beyond

¹⁷ Simon Frith, "Try to Dig What We All Say," The Listener (June 26, 1980), p. 882; cited in Paul Clarke, "'A Magic Science': Rock Music as a Recording Art," Popular Music 3 (1983), p. 205.

anything that a simple rendition of the song could have done-- yet remained general enough to allow the recordists the freedom to pursue the effect in other ways. On the other hand, so much of the atmosphere in a recorded performance is a matter of its particularity. There is often a quality in the initial setting down of an idea that is simply non-transferable, and complaints that the demo is in some way superior to the record are common. Many artists simply refuse to make demos. "I never make demos, and I've never understood how to do them," says Tom Petty. "What happens to me is that I do a demo and then I get frustrated because the record doesn't sound as good. I always put songs down on 24-track so if I want to make a record later, I can."¹⁸

One of the most famous cases of problematic demos is Bruce Springsteen's Nebraska (1983). The eventual solution to the problem yielded one of the most unique rock albums of the 1980s, and brought home to all those involved in the project how unique and inimitable the affective sense of a particular performance recorded at a particular time and place can be. The songs on Nebraska were recorded at Springsteen's home on a four-track cassette recorder. The tracks were intended as demos to provide his band and manager/producer Jon Landau with an idea of the direction he had in mind for the upcoming album project. According to Springsteen, the motivation to record the songs was simply to

¹⁸ Iain Blair, "Tom Petty's Solo Fever," Mix (October 1989), pp. 185-6.

bring greater efficiency to the recording process (his three previous albums had each required many months of studio time). Those who heard them, however, found the stark atmosphere of the demos captivating. Engineer Chuck Plotkin recalls being "transfixed" when he first heard them; Landau worried that the tone and atmosphere of the tracks might be impossible to emulate with full band arrangements; band member Steve Van Zandt's reaction was simply, "This is an album."¹⁹

Nevertheless, the band learned the songs and began recording them. Although the E Street Band was in top form, everyone agreed that the band's recordings had far less character than the demos. "The stuff on the demo tape was astounding," recalled Plotkin. "It was an incredibly evocative piece of work. And we were losing more than we were picking up."²⁰ Landau summed up the futility of the effort: "If we were missing by a little, we could figure that out. But we're not in the ballpark. We're not even close."²¹ It was clear to everyone involved that the expanded studio tracks succeeded only in diminishing the intimate immediacy of the demos, and after two weeks, the Nebraska material was set aside and the studio time, which had already been reserved, was used to record the material that would be released on Born in the U.S.A. two years later.

¹⁹ Marsh, p. 113.

²⁰ Ibid., p. 115.

²¹ Ibid., p. 120.

Springsteen, however, insisted that his next album release would consist of the Nebraska songs, and eventually the radical notion that the demos themselves should be released as a record emerged and was agreed upon by the creative team. But this decision did not end the problems. When the four-track cassette master was transferred to a professional quality multitrack for re-mixing, it was discovered that even the technical quality of the demos themselves had an affective integrity that the "better" technology could not match. "The better it sounded, the worse it sounded," recalled Plotkin. He explained that the "wonderful mixes" that were done in the studio "were also depriving the stuff of some important element of its particularness."²²

Springsteen then tried to re-record the songs with the same stripped down arrangements and intimate mood, but under studio conditions. This, too, failed to capture the atmosphere of his home-produced recordings. Finally, the two-track mixes that Springsteen had done on a "completely screwed up, old battered blaster" were accepted as the master mixes. For all their limited frequency range, tape hiss, chair creaks, and other presumed shortcomings, these tracks captured the unique essence of Nebraska; the "particularness" of the confluence of songs, performances, and recording conditions represented an unrepeatable set of circumstances in which the work was born and to which it owed both its

²² Ibid., p. 123.

surface particularities and its essential character. Nebraska is a very unusual case, but it well illustrates how intimately linked the art work and the process of its creation can be. Although the songs, the performer, and the arrangements were the same, changes in recording tools, place, and personnel (originally, Springsteen had recorded and mixed the songs himself) altered the work's essence to such a degree that it became obvious to everyone involved.

II. Mixing

Mixing is the stage in the record making process where all the separate elements--musical parts, performances, sounds--that have been accumulated during the recording stage are brought together to create a composite image of an apparently unitary musical performance. In addition, the mix defines the nature of the sound world in which the music is taking place and links the two in a unique and permanent relationship. The process involves placing the track's elements into an overall scheme of perspective and proportion, and in refining the form, arrangement, and dramatic progression of the musical narrative. With the sounding work before them, like a canvas before a painter, recordists combine elements and shape their interactions to arrive at a desired result. In the modern studio, every musical part and sonic process can be kept discrete; thus each can be manipulated separately from the others. Still, all aspects of the mix are interdependent; nothing functions

in isolation. The guiding principles of sound mixing are based upon the effects that elements have upon one another in combination.

Mixing is often compared to montage technique in film making, but this accounts for only part of the mixing process. Montage is an additive technique whereby scenes are concatenated, unfolding in a particular sequence to create a desired effect. Sergei Eisenstein explained the principle of montage in terms of Japanese ideograms. "For example: the picture for water and the picture of an eye signifies 'to weep'... But this is--montage! Yes. It is exactly what we do in the cinema, combining shots that are depictive, single in meaning, neutral in content--into intellectual contexts and series."²³ In concatenating musical moments to create the time line of an apparent performance, sound mixes also have such a narrative aspect. The effect of montage is especially apparent in the dub mix techniques pioneered by Jamaican reggae disc jockeys. Dub mixes suddenly reorient the listener by, for example, dropping instruments out of the mix unexpectedly, abruptly changing the musical "scene." The principle--which was widely adopted, especially in mixes produced specifically for dance clubs--can be applied in a real time performance or in a spliced-together construct.

²³ Sergei Eisenstein, "The Cinematographic Principle and the Ideogram," in Film Form: Essays in Film Theory, edited and translated by Jay Leyda (San Diego: Harcourt Brace Jovanovich, 1949). This essay was originally published in 1929.

On the other hand, the musical scenes of which the narrative mix is made have to be fashioned before any montage can take place. Sound mixing in the multitrack environment involves a vertical type of assemblage as well as a horizontal one; simultaneously occurring elements are combined to create sonic images that can be characterized with terms such as color, density, atmosphere, lighting, distance, and focus. Even if much of the track is made up of live material (i.e., little overdubbing), the parts are still more or less compartmentalized on separate tape tracks or console channels, and combining them requires an electronic balancing process by which the sonic image may be altered and the perspective changed from moment to moment.

George Massenburg has given us an economical, yet eloquent description of what a mix means to do: "I mix like I'm decorating a four-dimensional 'space.' Starting with some essential structural elements, I craft artifact and gesture, all of which say something about themselves and often refer to other elements in the 'space': shaking hands with (or, perhaps, conflicting with) other elements and usually supporting, flattering, or teasing the focal point--the center, the vocal."²⁴ Of the four dimensions, three are to do with simultaneously occurring elements that shape texture, what I am calling vertical assemblage. Width is represented by stereo separation, height by frequency range, and depth by

²⁴ Glen Ballou, ed., Handbook for Sound Engineers: The New Audio Encyclopedia, 2nd Ed., p. 1158.

the combination of elements that account for relations of prominence, which I shall discuss below. The fourth dimension is the progression of events, the narrative.

"Artifact and gesture" refer to the individual and the whole respectively. In the vertical assemblage, artifact is the individual sound, gesture is the texture of which the sound is a component. In the horizontal assemblage, artifact is the moment, gesture the temporal sequence, the formal design. The rest of Massenburg's statement concerns the interaction of artifacts and gestures, and defines a central focus around which the interactive relationships cluster.

Both horizontal and vertical assemblage involve the interactions of such elements as amplitudinal balance, the timbral configuration of the frequency spectrum (represented by both the musical arrangement and various techniques of sound processing such as EQ and compression), positioning on the stereo soundstage, ambient imagery, and depth of field. Synchronically, these shape the track's texture at any given moment; diachronically, their interaction can serve a formal function, as, for example, in Garbage's "Supervixen," (1995--ex. 6.1), which juxtaposes two completely different textures in a narrative scheme that sonically delineates the song's dramatic structure. In the fourth dimension, then, the two textural configurations represent artifacts, their juxtaposition, gesture.

Mixing has become increasingly complex over the years. The number of tracks increased dramatically with the advent

of synchronization (whereby multiple tape machines could be harnessed together), digital recording (which provides as many as forty-eight tracks on a single machine), and the potentially hundreds of available virtual tracks recorded into computer sequencers. Larger consoles have given recordists more flexibility and control over all of the track's elements, including increasingly sophisticated and numerous techniques of sound processing. Moreover, computer automation of consoles has allowed for increased complexity in the choreography of the mix. Mixes were once real-time performances themselves, sometimes with many hands on the console to cover all of the needed moves of faders, panning knobs, mutes, and so forth. However, like so much else in the multitrack process, this final stage of the creative production process can now be deliberately composed and inscribed in a permanent form.

1. Stereo

Stereo is a system of sound recording and reproduction that takes advantage of the psychoacoustics of sound localization. Using two loudspeakers separated in space, a sound can be assigned to one or the other, or any proportional combination of the two, and thus appear to emanate from any place along a horizontal spectrum. For the recordist, the stereo space is a panoramic soundstage across which elements can be positioned and moved about. The left-to-right orientation of each element is controlled by the

panning knob on the console, the position of which can be changed in real time during mixdown. Stereo placement is one of the principal techniques--along with ambience and the development of textural depth--for shaping a track's sense of space and, in turn, defining the terms--the degree and nature--of the track's sonic autonomy. The more unique the space is, the less it represents experiences of sound in the natural world and the more the listener must engage the track on its own terms. Furthermore, sounds may be placed in discrete positions along the stereo spectrum, or their presence can be enlarged by separating the sound and its echo or ambient image in stereo space.

Stereo is also a versatile rhetorical tool. Recall, for example, my analysis of Karl Wallinger's "Way Down Now" (1990) in Chapter 3 (pp. 98-101). A conventional stereo mix of a rock band aims for a clear aural representation of the visual image presented to the listener facing the bandstand. In this model, the vocalist is at center stage with the drummer just behind; the kick and snare drums are dead center, the high hat to one side, toms and cymbals spread from left to right. Because of its powerful sonic presence and its function as anchor of both groove and chord changes, the bass is also usually placed in the center. Other instruments in the arrangement are spread across the stereo spectrum as they would be on stage, balanced in such a way that all can be clearly distinguished. Wallinger's mix deviates from most of these norms. The mix is nothing like a

bandstand. The space is set up in an oppositional counterpoise of left and right drums, guitars, and voices, something like two different bands playing the same song simultaneously, each in their own way. The configuration is unique and wholly unfamiliar, demanding from the listener an interpretive engagement of some sort.

Stereo placement may either remain fixed for the duration of a track--as an aural representation of a stage--or it may change as the track proceeds, calling attention to the autonomous nature of the track's own space. Animating the soundstage can produce a range of effects, which may be purely auditory, or which may be linked in some way to a song's lyrics or the track's narrative flow. The panning guitar in the introduction to Shawn Colvin's "Diamond in the Rough" (1989--ex. 6.2) serves simply as an announcement, calling attention to the stereo space. The whimsical right to left bounce of the snare sound on Prince's "Starfish and Coffee" (1990--ex. 6.3) reflects the general tone of the lyrics. Crowded House's "Kill Eye" (1988--ex. 6.4), uses stereo placement as a thematic element in the track's dramatic structure. The vocal part is the only presence in the center of the soundstage during the song's verses. The entire drum kit and the bass are placed on the left side of the soundstage; all other instruments are on the right. There is a sonically dispassionate quality to the isolation of the vocal--a starkness of atmosphere--that highlights the urgency of the vocal character of the song's narrator. At the

refrain, the stereo image abruptly shifts to a more conventional configuration; the center is now shared by the voice and several instruments. Filling out the timbral space in the track's center brings a fullness and warmth to the refrain that is absent in the verse. As this shift occurs, the singer slips into a different character and the lyrics change from narration to plea. The technique is analogous to the timbral/structural correspondence in U2's "Zoo Station" (pp. 86-8), but in the case of "Kill Eye" it is the stereo image that mirrors the song's structure.

Thus the stereo spectrum can be employed quite literally as a dramatic stage on which a character's movements are choreographed and woven into the dramatic scheme. In the case of Led Zeppelin's "Whole Lotta Love" (1969--ex. 6.5), the track begins with a left to right movement on the soundstage that casts a shadow to the back right of the stage. This is accomplished by placing the guitar on the left and its delayed ambient image on the right. The two are separated not only along the left/right stereo plane, but also in terms of the depth created by the distancing effect of the ambience. The persistence of this configuration and the lack of another presence on the right of the stage marks it as a place of distance and shadow. The left-to-right motif is taken up by the panning guitar glissando in the choruses. But although the glissando moves to the right, it does not alight there. It simply disappears, and then reappears on the left again.

At the beginning of the break after the second chorus, the right side is opened up somewhat tentatively by the percussion, while the overall stereo spectrum is put in play with random back-and-forth panning of various sounds. Still, the residue of mysterious emptiness at the right of the stage remains. Finally, as the freely panning sound collage section comes to an end, a solo guitar boldly steps forth at the right side of the soundstage, emerging as it were from the shadow that has hovered there since the beginning. It is the only time in the piece that there is an electric guitar on the right of the soundstage, and the effect is quite dramatic. The spatial orientation of the musical part in relation to what has come before increases the impact of the guitar solo.²⁵

In Jimi Hendrix's version of "All Along the Watchtower" (1967--ex. 6.6), a single long-range melodic gesture unfolds across the length of the piece, beginning with the introduction and climaxing on the final note. In each instrumental refrain, including the introduction, the electric guitar reaches a new melodic peak that is only surpassed in a later refrain (fig. 6.1). The path traced by this over-arching linear progression of melodic peaks provides a teleologic pull that contributes to the unmistakable sense of arrival on the final tonic note. For the final melodic gesture the guitar, which has occupied

²⁵ This characterization is based on the 1994 compact disc version, for which producer Jimmy Page remastered the original tapes. The general effect is the same on the original LP version, but there are differences in some of the details.

center stage throughout the piece, starts at the left of the stage and pans across to the right. Then, as the final tonic pitch is repeated, it sweeps back and forth across the stereo spectrum. The gesture makes use of the physical stereo space to enhance the sense of arrival apparent in the musical space.



intro refrain #1 refrain #2 refrain #3 refrain #4
Center-----L-----> R, L<--> R

Fig. 6.1

Stereo was not a factor in early rock recording. Although techniques for recording and reproducing binaural sound had been in existence since the late 1920s, it was only with the advent of magnetic tape that stereo began to make inroads into the home listening environment. In the late 1940s, tape recorders became popular consumer items, and stereo tapes offered a sound experience closer than ever to the acoustic conditions of the concert hall. But it was not until 1957 that record companies finally agreed among themselves on a standard system for producing stereo records. Even then, however, the format was intended not for the mass market but for audiophiles, who were, for the most part, collectors of classical recordings. Furthermore, rock's primary means of dissemination was AM radio, which did not broadcast in stereo. Aside from such practical issues, musicians and producers who had grown up with mono recordings

had that general sonic image as their primary aesthetic reference. Phil Spector never really took to stereo. Brian Wilson, too, felt that mono was the preferable format: "I look at sound like a painting, you have a balance and the balance is conceived in your mind. You finish the sound, dub it down, and you've stamped out a picture of your balance with the mono dubdown. But in stereo, you leave that dubdown to the listener--to his speaker placement and speaker balance. It just doesn't seem complete to me."²⁶ Like Spector, Wilson believed that mono gave the recordist more precise control over the sound image. Although he cited the Beatles Rubber Soul (1965) as the inspiration for Pet Sounds (1966), he did not exploit the stereo techniques that had become common for the Beatles.

Another factor in the continued prominence of mono recording was the preeminence of the mono 45 rpm single as "the prime artifact of rock'n'roll."²⁷ Mixes were always aimed first of all at the release of the single, which would be the source of initial radio and retail exposure. Hence, early stereo album releases were not even meant to be listened to in stereo. "The reason I used the stereo machine in twin-track form was simply to make the mono better," says George Martin of the early Beatles albums, "to delay the vital decision of submerging the voices in the background. I

²⁶ David Leaf, Good Vibrations: Thirty Years of the Beach Boys, CD booklet, p. 30.

²⁷ Andre Millard, America on Record: A History of Recorded Sound (Cambridge: Cambridge University Press, 1995), p. 224.

certainly didn't separate them for people to hear them separate!"²⁸ Indeed, the strange left/right orientation of the early Beatles albums--rhythm tracks on the left, vocals on the right--is disorienting, and CD reissues have restored the first four albums (Please Please Me [1963], With the Beatles [1963], A Hard Day's Night [1964], Beatles for Sale [1964]) to mono mixes.

With Rubber Soul, a new consciousness began to emerge regarding the nature of the rock work. Rubber Soul "was the first album to present a new, growing Beatles to the world," recalled George Martin. "For the first time we began to think of albums as art on their own, as complete entities."²⁹ Due to a Capitol Records marketing decision, no singles were released from the album in the United States, hence record buyers were forced to take all the tracks together as a group. Over the next few years, albums, rather than singles, became rock's most representative format. The increasing importance of albums coincided with the rise of FM radio, which gave stereo a mass outlet and audience. Unlike AM, the FM format broadcast in stereo, and disc jockeys tended to play album tracks and even entire album sides.

The Beatles' next album following Rubber Soul was Revolver, which uses stereo extensively as a rhetorical device. As noted earlier, vocal delays were placed opposite the primary voice on most tracks. The voice is not only

²⁸ Lewisohn, The Beatles Recording Sessions, p. 28.

²⁹ Ibid., p. 69.

decentralized, it is not localized at all. The two halves of its presence delineate a space and create a vocal character unlike any in the natural world. Furthermore, "Eleanor Rigby" (1966--ex. 6.7) uses stereo in a structural way that the Beatles would later exploit with increasing sophistication. Here, the solo voice is placed off to the right side during all of the verses, while the chorus voices are balanced on either side of the strings. It is a simple mirroring of the song structure by the stereo configuration that brings stereo placement into the realm of the track's narrative. By the time they mixed "A Day in the Life" (1967--ex. 6.8), from Sgt. Pepper's Lonely Hearts Club Band, the Beatles and the rest of their "composition team" had refined the principle and made the stereo space an expressive thematic element.

At the beginning of "A Day in the Life," Lennon's vocal is alone on the right side of the stage. The bass and drums are in the middle, and the piano, guitar, and maracas are on the left. At the line "He blew his mind out in a car," the voice begins to move toward the center, continuing in discrete steps--rather than a continuous pan--and finally arriving at center stage with the bass and drums on the word "Lords." In the third section of this first part of the song, the voice continues its leftward motion, leaving the center and finishing with "I'd love to turn you on" at the extreme left of the stage among the piano/guitar/maracas accompaniment. As the vocal finishes, on the mostly vacant

right side of the stage the ominous orchestral glissando/crescendo begins to emerge.

After the orchestral glissando, the song breaks into its middle section. Written and sung by McCartney, the tone in this part of the song is altogether different--dry and matter of fact in lyrics, vocal character, and sound, in contrast to Lennon's dreamy psychedelic vocal and imagery--but the stereo motif continues. McCartney enters alone, like Lennon, at the right of the stage, where he remains. When the section ends and McCartney's character goes "into a dream," ethereal vocal "aah"s sweep back and forth across the stereo spectrum, serving as a bridge back to the atmosphere of the song's first part. Lennon re-enters where he left off, at the left of the stage. Now the piano, guitar, and maraca accompaniment is on the right side, leaving the voice alone once again. Finally, when Lennon sings "...Albert Hall./I'd love to turn you on," the voice appears on both left and right sides of the stage simultaneously. The track has a sense of journey about it that is reflected in the stereo moves. We move between the two different affective dimensions of Lennon and McCartney's sections as between dream and waking, though which is which is left to the listener. Is McCartney's interruption the dream or the waking reality? Though more matter of fact in tone, it is introduced by a surreal orchestral intrusion and is left via a sweeping cloud of swooning voices. Lennon's sections have dreamlike lyrics and vocal style, but the images are all taken literally from

daily news events. The song by itself only hints at the underlying significance of its binary structure and the questions it raises. The track brings the song to a higher level of dramatic focus. The animated stereo space adds to the interpretive problem as it heightens the differentiation between the characters and what they have to say, giving them each a distinct role in the overall choreography.

2. Frequency range

In the initial stages of mixing, it is common to work on individual sounds using a range of processing tools to create and/or refine the desired timbre. The ultimate timbral character, or color, of individual sounds is arrived at gradually through a process that moves from the sound itself, to the sound in relation to some subset of sounds, to the sound in relation to the overall track. With the touch of the console's "solo" button, a sound may be isolated or placed into a number of various larger contexts. Sound mixers, however, must guard against an overly analytical approach. With regard to texture, a sound on its own has little meaning, and shaping it to an abstract standard of individual refinement may yield a poor result when it is placed back into the mix. Hence there is a continual shifting of perspective between solo and ensemble mode. While the texture may need to be thinned in order to shape some particular sonic detail, the result of the shaping must ultimately be evaluated within the overall texture.

After the initial choice of timbre and recording configuration--microphone choice, preamplifier, recording media--the most versatile tool for tailoring the frequency spectrum is EQ. EQ can be used either directly or obliquely to bring a sound into a desired shape and/or relationship with other sounds. That is, it can be applied to the sound itself, or to some aspect of its processing--such as its ambient image or some timbral time-based process--or to a doubled version of the sound. The latter involves doubling the sound--either with echo or simply by bringing it into two or more console channels simultaneously ("multing")--treating the double, and combining the two in some desired proportion. Digital effects processors usually include an equalizer that allows the user to "tweak" the processed version of the sound. The most detailed control, however, is offered by the recording console, where the doubled sound can be equalized, panned, and sent to other processors.

Multing allows the mixer a great array of textural possibilities working in the textural background to affect foreground elements. In the area of EQ it can work to subtly affect the perception of a sound without altering the sound's primary timbral character. Engineer/producer Joe Chiccarelli illustrates:

"I'll typically bring up the snare drum on two faders. The main snare track will be EQ'd just the way I like it, but the additional snare track will have 1 kHz boosted like crazy to produce a real honking tone. When I creep the 'honking' fader into the mix a little, the snare seems to pop out of the track a bit more and add a real aggressive snap.

"This trick also works great if I have some guitar tracks that sound nice but that could use a little more meat. In that case, I'll take all the guitars and assign them to a stereo subgroup that, in turn, is routed to a stereo compressor. Then, I'll really squish the subgrouped guitars and fade them underneath the main guitars to fill out the low-mid frequencies. (This is similar to Jack Douglas's "bussed limiting" on drum tracks [pp. 214-5].)

"On vocals, I usually use two compressors. My main lead-vocal channel will have pretty conservative EQ and compression so that it just sits nicely into the track. But these settings may not help the vocal jump through the mix when all the other tracks are brought in around it. So I'll send the vocal to another fader and route the signal to something ugly, such as an old Urei 1176 compressor, and boost 4 kHz or 5 kHz to add bite. When this channel is tucked way underneath the main vocal track, it really adds personality to the voice and helps it cut through the mix."³⁰

Techniques such as these are audible only in their effect on foreground sounds. Although the multiplied version of the foreground sound is materially present in the mix, its amplitude is so low that it has no apparent presence of its own. Rather, it is an agent by which the foreground can be manipulated "silently." In that the listener can be sure only of the effect, and not the means of its creation, such techniques contribute to what might be called the suspension of aural disbelief, the impression that the recording represents some kind of sonic reality.

In a conventional rock mix, there is a rough balance of frequencies across the audible frequency range. Certain instruments serve specific functions. In the voice/guitar/bass/drums ensemble, for example, the low

³⁰ Brian Knave and Michael Molenda, "The Sophisticated Mix," Electronic Musician (April 1996), p. 64.

frequency range is anchored by the bass guitar and the bass drum; the low to middle mid-range is shared by snare drum and the fundamental pitches of the guitar and voice; the upper mid-range and high end are represented by the high hat and cymbals, guitar and voice overtones and ambient "air." In addition, the high and low ranges among the percussion have general rhythmic roles. The bass and snare drums anchor the meter and groove while instruments such as the high hat, shaker, and tambourine play the rhythmic subdivisions. This basic model can be configured in many ways using any number of timbral characters in the instrumentation, but it remains the basic point of reference, and a number of stylistic differences can be accounted for simply by the proportions among these constituents of the frequency space.

As individual timbres are shaped and combined, the overall track takes on a general sonic quality. In many cases, the desired result is simply a smooth balance throughout the frequency spectrum, but, again, this norm can be subverted for rhetorical effect. For example, a mix such as Stevie Winwood's "Higher Love" (1985--ex. 6.9) has an overall brightness to it, the result of boosting high frequencies and/or cutting some lower mid-range ones (the effect is similar). In addition to the high pitched percussion instruments--high hat, shaker, agogo, timbale--the verses feature a glockenspiel type of synthesizer timbre and a snare sound with its high frequencies exaggerated by EQ and compression. Furthermore, Winwood's voice, already a high

tenor, is thinned in its mid-range (by some combination of microphone choice, compression, and/or EQ), as is the guitar in the second half of the verse. Even the bass synthesizer has a percussive click to it that lies far above its fundamental frequencies. The overall result is a mix that sharply emphasizes the brittle sheen of the upper frequency range, balanced by a low end comprised of the bass synthesizer and a very fat bass drum.

Oftentimes styles, or individual works, are immediately identifiable by the way in which the frequency spectrum is arranged. Dance mixes, for example, emphasize the high and low ends. This gives the track a powerful physical presence, especially at high volume, and a sizzling, electric quality in the high percussion. "Higher Love" is influenced by the dance mix style of its time, though it is not as exaggerated as a mix made specifically for a dance club. On the other hand, an acoustic folk-like track such as Van Morrison's "Astral Weeks" (1968--ex. 6.10) is characterized by the warmth of a full mid-range. The presence of both the extreme high and low ends of the frequency spectrum--represented here by the shaker and the acoustic bass respectively--is comparatively subtle. The smaller spectrum of frequency content imparts a particular affective and stylistic sense to the track.

While certain general configurations of the frequency spectrum carry conventional stylistic associations, the phenomenon can also be specific to a given piece. Different

tracks on a single album, for instance, may be set up quite differently, depending upon the mood or theme of the song. The available timbral choices for the musical arrangement together with the technological options for shaping the frequency space provide opportunities for a great variety of configurations over the course of an album. One such album is TLC's CrazySexyCool (1994), on which nearly every track has its own color scheme designed to suit the sense of the song. With the juxtaposition of "Red Light Special" (ex. 6.11) and "Waterfalls" (ex. 6.12) for instance, the shift of color immediately signals a shift of mood. The two tracks--produced by Babyface (Kenneth Edmonds) and Organized Noize respectively--have very different atmospheres in the low end of the frequency spectrum. "Red Light Special" has a full, blooming low end--filled by synthesizer textures, as well as the bass and bass drum--in which the various constituents meld together to set the mood of sexual desire the song is concerned with. "Waterfalls," on the other hand, a song about drugs, HIV, and murder, begins with a sparse low end represented by only a bass drum. The overall texture--horns, guitar, snare drum, and so forth--is made up of sounds that are both on the thin side and quite discrete from one another. The effect is altogether more crisp. From one track to the next, the listener moves from an enveloping low-light atmosphere into one that is far starker and more clear eyed. Before any lyrics are heard, it is apparent that the story has changed.

As with all aspects of the mix, its frequency space is configured of interactive relationships. Frequency characteristics of different elements can work together in various complementary ways. Matthew Sweet's "Sick of Myself" (1995--ex. 6.13), for example, uses heavily distorted guitar timbres that emphasize low mid-range presence, but have very little high end content. The effect is somewhat muffled. In the choruses, the cymbals play continuously, providing a canopy of high frequency sheen, but their amplitude is quite a bit lower than that of the guitars. In this particular balance, the cymbals' individual presence is less apparent than the timbral effect it creates, effectively extending the timbral range of the guitars as the cymbals dovetail with the frequency content of the guitars' distortion noise. The proportions of the mix thus help to define the roles that the parts of the musical arrangement play with respect to one another. In this case, the frequency characteristics of different instruments combine to form a composite configuration of the frequency space. However, this space is itself engaged in interaction. For the effect is not simply a matter of complementary frequency ranges, but of their particular amplitudinal balance as well. Because the cymbals are softer, they are "behind" the guitars in textural space. The relationship between the two is thus not simply one of frequency, but also of relative prominence.

3. Prominence

One of the great delights of listening to rock records is venturing deeply into a track's texture, aurally exploring the complex sensory experience provided by a sonic mixture whose precise composition is often unknowable. Once the basic proportions of frequency, amplitude, and position among foreground elements are in place, the compositional focus moves to the track's textural middleground and background whose development will provide the track with its sense of depth. The complex of inter-related elements that accounts for a track's depth does so by defining relations of prominence among the sounds in the mix, creating through techniques that are analogous to lighting and focus a sense that the track has the dimension of distance or density. Recall the arrival of the rhythmic and textural shift in Daniel Lanois' recording of "Amazing Grace" (1989--ex. 6.14). The primary agents of the shift are the guitars, which have hovered quietly in the background since the beginning of the track. As they become more prominent, they give the sense of a coming forward from a distant place to one much nearer to the listener.

Clearly, amplitude is a component of prominence, but there are many other operative factors as well that contribute to its perception and which, therefore, must be considered simultaneously. In the area of timbre, for instance, the frequency spectrum can be configured in such a way (both through the orchestration of the musical

arrangement and the use of EQ and compression) that certain sounds take on prominence simply by inhabiting a space where there is little competition from other sounds. The focusing effect of compression is also especially important. Simply increasing a sound's amplitude may have little effect on its prominence if it remains too diffuse in the mix. In addition, ambience can affect the sharpness of a sound's image, while echo can increase its weight. Finally, sounds at or near the center of the stereo field have greater psychoacoustic impact, and thus a sound's placement can affect the perception of its prominence.

The inter-relatedness of elements that determines the prominence of the artifact also affects the gesture. Changes in EQ or amplitude, for example, among middleground sounds can account for significant differences in the perception of those in the foreground. A sound that at one amplitude adds a certain quality of shadow to the texture may, when increased too much, begin to mask a foreground element which inhabits a similar area of the frequency spectrum or the stereo space. The conflict may be quite subtle; it may appear that the foreground element is diminished in some way, but the culprit may be difficult to identify. The recordist must have a keen sense for how the perception of loudness functions, and must keep track of each strand's effect on the overall texture. The problem in this example might be corrected by a change of EQ or placement rather than a change of amplitude.

While relations of prominence among the elements of the track can have general stylistic or generic significance--e.g., the central role of guitars in heavy metal or the bass drum in rap--they also define the specific identity of a track. The affective sense created by the particular prominence configuration of the mix combines with that of the song to create the overall atmosphere. Thus, although in many rock styles a general mix configuration may remain fairly constant among most of the tracks on an album, it is not uncommon for tracks on the same album to be mixed quite differently, depending upon the sense of the song. The last three tracks on Sinéad O'Connor's The Lion and the Cobra (1987), for instance, have very different prominence configurations. On "I Want Your (Hands on Me)" (ex. 6.15) an aggressive drum track is the primary foil to the voice; on "Drink Before the War," (ex. 6.16) the drums recede to a thin middleground presence, while the organ commands attention; "Just Call Me Joe" (ex. 6.17) again de-emphasizes the drums (though in a different way) and gives the electric guitar the place of prominence, even displacing the voice from the center of the stereo field.

Because most rock records are recordings of songs, the voice is usually the single most important element in the track. Ordinarily, it is placed in the center of the stereo field and given enough compression and dynamic level, as well as any needed EQ, to project it into the central position of prominence in the mix. The importance of the voice, both as a

timbral element and as the conveyor of verbal meaning, makes it an attractive site for rhetorical expression. Listeners instinctively focus on the words of a song. If the presence of the words recedes into the track as a whole--or is placed to one side, i.e., if it loses its centrality--the listener's attention is engaged in active, though perhaps involuntary, interpretation. Reducing the prominence of the vocal has two primary effects that can serve a range of affective and rhetorical purposes: (1) the meaning of the words moves by degrees from the linguistic to the sensory; (2) the overall track becomes larger; sonically, the various parts function less as an accompaniment to a single focal element and more as equal members--either complementary or competing--of a polyphonic tapestry.

Both of these effects are apparent, for instance, in the Rolling Stones' "Tumbling Dice" (1972--ex. 6.18). The Stones characteristically place the vocal well back in the mix, which, together with Mick Jagger's diction style, de-emphasizes the words' linguistic function and heightens their sensory effect as vocal sounds. In addition, the composite sound is a representation not so much of voice and supporting instruments, but of an aggregate whose various constituents continually play off of one another. On the Velvet Underground's "Sister Ray" (1968--ex. 6.19), the rhetorical effect of the vocal balance is somewhat different. Rather than the integrated texture of "Tumbling Dice," we are presented with the image of the singer isolated and

surrounded by a powerful sonic force. The vocal is quite clear; it is in its own discrete space. But the roar that surrounds it feels as if it might drown out the voice at any moment. The balance suits the tough, declamatory style of the vocal and the lyrics.

The vocal balance on Emmylou Harris's "Goodbye" (1995--ex. 6.20) evokes yet another affective sense. The character of the track is extremely personal, as though one were listening to someone speaking to themselves. Harris's singing is itself introspective; many words are only half-enunciated or thrown away. But compression, EQ, and delay could be reconfigured to increase the physical weight of the voice. Moreover, the engineer (or the computer) could ride the fader to bring up the barely audible word endings. The vocal has been placed into the mix in such a way as to intensify the overall dramatic effect of the track. The track communicates through its atmosphere the sense of the sometimes unintelligible swallowed words and throaty whispers. The listener is drawn deeply into the sonic texture, whose character thus becomes an important factor in the affective nature of the piece.

Relations of prominence among the elements that make up textural layers help to account for the character of the texture, its weight, its density, the atmosphere it calls forth. The acoustic guitar texture that opens Tom Petty's "Wildflowers" (1994--ex. 21), for instance, is augmented by the high hat. The parameters of the relationship between the

two are rhythm, amplitude, frequency, and placement, all of which are set in such a way that the two instruments merge into a single textural gesture. They attack in unison on each beat, the high hat amplitude set lower than (behind) the guitar's; the two are superimposed in the center of the stereo field and the high hat frequency range meshes with and effectively extends the high overtone content and percussive plectrum noise of the guitar.

This example is quite simple, but the principles it illustrates are the same by which very complex textures are developed. As frequency, amplitudinal, and spatial relationships among its various elements are developed, the track's overall textural presence begins to gel and individual components--artifacts--are subsumed by the larger gesture. At this point, the mix can be worked as an overall image, and its depth of field manipulated with great precision. With the composite image more or less formed, recordists can make extremely subtle adjustments to middleground and background elements that refine the quality of light, the depth of shadow, the relative density or transparency of texture. Sarah McLachlan's "Fear" (1993--ex. 22) is made up of a complex series of dimensional levels. A rich collection of sounds come and go on a series of parallel stereo planes set at varying depths in three-dimensional aural space reaching from the textural surface to near inaudibility. The techniques by which each of these sounds is set in place--ambience, EQ, stereo placement, amplitudinal

balance, and so forth--are akin to those in the "Wildflowers" guitar texture. Though the two examples are on completely different levels of complexity, they have in common a set of compositional concerns and techniques that cluster around the development of the track's depth.

Ultimately, all of a mix's timbral and textural artifacts are encompassed in its temporal gesture. Reversing Friedrich von Schelling's formulation of architecture as frozen music, a mix can be thought of as architecture in motion. For like architecture, it involves designing and building a concrete structure made up of many interdependent elements. Unlike architecture, however, these take their places in a narrative scheme that unfolds in time, the mix's fourth dimension. Stereo placement, the configuration of the frequency range, textural depth, and narrative structure come together to give the song and its musical arrangement a particular sonic identity, expanding the musical parts and performances, as well as the lyrics, into fully formed affective gestures. Once again, the textural shift in "Amazing Grace" provides a good example of the interaction. As the guitars become more prominent, they give the sense of bridging a distance. But the distance from which they come forward is, in part, a result of the time it has taken for them to arrive. In Led Zeppelin's "Whole Lotta Love," too, the use of the stereo space to highlight a moment in the musical structure--the guitar solo--derives much of its

significance in the dramatic scheme from the length of time it has taken to prepare for that moment, setting a place apart and saving it until the moment arrives.

The art of mixing is the through-composed area of rock composition. As the track unfolds in time, the configurations of its other three dimensions modulate through various states of textural being. In the process, the track takes on a unique formal design that, in turn, imparts to it a fullness of sense and character that marks it as an independent work made up of a particular sequence of textural events. Both song and musical arrangement are elements of this work, but its fullest expression lies in its sonic gestures, whose proportional relationships in both the horizontal and the vertical dimensions define the work's identity.

When the mix has been fashioned to the recordist's satisfaction, it is recorded on either digital or analog two-track tape. This is the end of the recording/mixing process; the composition is now complete. The tape must still pass through the mastering process, where another engineer will perform any final adjustments of EQ or compression that may be required before transferring the work to LP or compact disc. But these adjustments are performed on the overall mix, not its components. The aim is simply to make any needed refinements that will present the recordist's rhetorical intent in the most convincing way and to compensate for any changes that may occur when transferring the recorded work to another medium.

The poetic process of building the recorded composition moves through many stages of production involving various kinds of activities usually performed by a host of participants. The final aim is to fashion a work whose interdependent phenomenal elements create a sonic experience that, though nothing like reality, has a convincing aura of authenticity. When successful, the recorded work draws the listener into its sonic world, defining the terms of perception by presenting the listener with a unique sonic image whose components have been set in place through a process of deliberate composition. In keeping with the nature of their medium, rock recordists trust their ears most of all. Artistic intuition, compositional craft, and stylistic sensibility are all based upon responses to sound, which in rock composition is essential to and inseparable from style, expression, and the musical idea.

APPENDIX

GLOSSARY

ADT--Artificial double tracking. An electronic process that simulates the doubling of a vocal or instrumental part.

ambience--Acoustical character of a room. In record production, it usually refers to the effect produced by reverberation.

amplifier--A device that increases the power, hence amplitude, of an audio signal.

analog recording--An electrical replica of sound pressure.

attack--The initial onset of a sound.

bandwidth--A particular frequency span.

basic tracks--Recordings of the foundational musical parts of an arrangement, usually drums, bass, and any parts that are primarily harmonic, such as rhythm guitars.

bus--A point in a circuit where several signals merge. The stereo mix bus on a console, for example, groups all of the signals present in the console down to two channels.

channel--On a console, a channel is a module to which a signal can be routed and then controlled and mixed with other signals. Controls include level, panning, EQ, and, on high-end consoles, gating and compression.

chorus--A timbral effect created by continuously varying the delay time of a repeated sound by 15 to 35 milliseconds and combining it with the original sound.

click track--A referential pulse to which overdubs are synchronized.

compressor--A device that reduces the dynamic range of an audio signal.

condenser microphone--A microphone that translates sound into electrical signals by registering variations--caused by sound pressure--in the distance between two plates, one fixed, the other movable. Condensers respond very quickly to transients (rapid changes in sound pressure) and have a very wide frequency response, making them well-suited for recording vocals and certain percussion instruments.

console--A device that allows for individual control of many separate signals and provides the means for combining them into a composite audio image.

decay--The dying-away phase of a sound event.

decibel (db)--A standard unit of attenuation and amplification measurement.

delay--Echo, a repeated sound.

demo--A sketch-like recording usually made at home or in a rehearsal studio prior to beginning formal studio recording.

digital recording--The translation of sound pressure into binary code.

distortion--Technically, any alteration of a signal. In recording, the term usually denotes the rough, grainy sound quality produced by overloading an electronic system (e.g., microphone preamp, speaker, tape, etc.).

dynamic microphone--A microphone that registers sound pressure magnetically using either a vibrating wire coil or a ribbon as the dynamic element. Dynamic microphones are very rugged, but lack the frequency and transient response of condenser microphones.

envelope--The overall shape of a sound as it occurs over time.

equalizer--A device capable of boosting or cutting selected frequency bands.

expander--A device that increases the dynamic range of an audio signal.

fader--The sliders on a console that control signal level.

flanging--A timbral effect that results from combining a sound with its delayed replica using a varying delay time of 0 to 20 milliseconds.

frequency--A particular rate of sound vibration. The frequency content of a sound affects the apprehension of pitch and timbre.

gain--The amount of power increase produced by an amplifier; the power difference between the amplifier's input and its output.

gate--A device that eliminates sounds that fall below a selectable threshold of volume.

groove--A piece's general rhythmic character.

headphone mix--The particular orchestrational balance that is fed to a recording musician's headphones.

ips--Inches per second; an expression denoting the speed at which magnetic tape moves across a tape recorder's heads.

level--Volume.

limiter--A device that reduces the upward dynamic range of a signal.

mix--The process of assembling discrete parts into a composite whole representing the finished recorded work.

monitor--A loudspeaker.

multing--Routing a single audio signal into more than one console channel.

multiprocessor--A device that can perform several sonic processes at once, e.g., reverb/chorus/delay.

multitrack--A tape or tape recorder that has several discrete parallel bands, each of which can store its own recorded sounds.

noise reduction--A process by which tape hiss is reduced.

overdub--A recording that is added to existing recorded material.

panning--The position of a sound along the stereo spectrum.

polar pattern--The directional response pattern of a microphone, e.g., omni-directional, cardioid, figure 8.

pre-delay--The delay between an initial sound and the onset of its reverberation.

pre-production--The stage of a recording project that precedes formal recording. It may include any or all of the following: songwriting, arranging, rehearsal, demo recording.

punch in/out--The act of putting a tape recorder into or taking it out of record mode on the fly.

ride gain--To manually control amplitude level as the program signal changes.

sample--A digitally recorded sound.

sequencer--A computer-based performance data recorder that records all parameters of musical performance except sound (e.g., rhythm, pitch, dynamics, pedaling, etc.).

side chain--The input on a compressor or gate that allows for an external device, such as an equalizer, to control its operation. For example, a gate on a snare drum can be "tuned," using an equalizer, to open only when the frequency range of

the snare is present, eliminating other sounds whose volume might otherwise trigger the gate.

signal path--The route along which an electrical signal travels.

slapback-- A short, single echo usually used on vocals and characteristic of rockabilly style.

stereo--The horizontal spectrum produced by two-channel audio recording and playback.

tape echo--A delayed repeat of a sound resulting from the time difference between recording and play back on a tape recorder with multiple heads.

tape head--An electromagnet in a tape recorder that translates electrical signals into patterns on the magnetic oxide coating of magnetic tape to record, erase, or play back audio signals.

track--An individual band of magnetic tape, or the overall recorded composition.

transducer--A device that converts mechanical, magnetic, or acoustic energy into electrical energy, or vice versa, e.g., microphone, loudspeaker, tape heads.

transient--A high amplitude sound of very short duration, such as the attack of a percussion instrument.

DISCOGRAPHY OF MUSICAL EXAMPLES

Key: Track/Songwriter/Album/Artist/Producer (p)/Engineer (e)/Mix engineer (me)/Label and original catalog number (when there are two numbers, the second is that of the compact disc reissue)/Year of original release.

Chapter 2

2.1. "Angels with Dirty Faces" (David Hidalgo, Louie Perez). Kiko. Los Lobos. Mitchell Froom & Los Lobos (p). Tchad Blake (e). Slash/Warner Bros. 9 26786-2, 1992.

2.2. "Yesterday" (John Lennon, Paul McCartney). Help!. The Beatles. George Martin (p). Norman Smith (e). Parlophone PCS 3071, CDP7 46439 2, 1965.

2.3-2.5. "Strawberry Fields Forever" (John Lennon, Paul McCartney). Magical Mystery Tour. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone R5570 (single), CDP7 48062 2 (album), 1967.

2.6. "Is It too Late" (Karl Wallinger). Goodbye Jumbo. World Party. Karl Wallinger (p) (e). Ensign/Chrysalis F2 21654, 1990.

2.7. "Is It Like Today?" (Karl Wallinger). Bang!. World Party. Karl Wallinger (p) (e), Steve Lillywhite (me). Ensign/Chrysalis 3 21991 2, 1993.

2.8. "Then He Kissed Me" (Phil Spector, Ellie Greenwich, Jeff Barry). Single. The Crystals. Phil Spector (p). Larry Levine (e). Jack Nitzsche (arranger). Philles #115, reissued in the Back to Mono collection, Abkco 7118-2, 1963.

2.9. "When Doves Cry" (Prince). Purple Rain. Prince and the Revolution. Prince (p). Peggy Mac & David Leonard (e). Warner Bros. 925 110-4, 1984.

2.10. "(I Can't Get No) Satisfaction" (Mick Jagger, Keith Richards). Out of Our Heads. Andrew Loog Oldham (p). Dave Hassinger (e). London 429, 1965.

2.11. "Ob La Di, Ob La Da" (John Lennon, Paul McCartney). The Beatles. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone PCS 7067-7068, CDP7 46443 2, 1968.

Chapter 3

3.1. "If Dirt Were Dollars" (Don Henley, Danny Kortchmar, J. D. Souther). The End of the Innocence. Don Henley. Don Henley & Danny Kortchmar (p). Greg Ladanyi & Shelley Yakus (e), Yakus & Rob Jacobs (me). Geffen 9 24217-2, 1989.

3.2. "Mr. Tambourine Man" (Bob Dylan). Mr. Tambourine Man. The Byrds. Terry Melcher (p). Columbia CS 9172, 1965.

3.3. "As Tears Go By" (Mick Jagger, Keith Richards). December's Children (and Everybody's). The Rolling Stones. Andrew Loog Oldham (p). London 451, 1965.

3.4. "Chest Fever" (Jaime Robbie Robertson). Music from Big Pink. The Band. John Simon (p). Don Hahn, Tony May, Rex Updegraff, Sheely Yakus (e). These are the engineers for the entire album; individual track credits are not given. Capitol SKA0 2955, 1968.

3.5. "Born to Run" (Bruce Springsteen). Born to Run. Bruce Springsteen. Mike Appel & Bruce Springsteen (p). Jimmy Iovine (e). Columbia JC 33795, 1975.

3.6. "Tongue" (Bill Berry, Peter Buck, Mike Mills, Michael Stipe). Monster. R.E.M. Scott Litt & R.E.M. (p). Pat McCarthy (e). Warner Bros. 9 45740-2, 1994.

3.7. "I Shall Be Released" (Bob Dylan). Music from Big Pink. The Band. See above.

3.8. "Zoo Station." Achtung Baby. U2. Daniel Lanois and Brian Eno (p). Flood (e). Island 314-510 347-2, 1991.

3.9. "Isn't It a Pity." All Things Must Pass. George Harrison. Phil Spector & George Harrison (p). Ken Scott and Philip McDonald (e). Apple STCH 639, 1970.

3.10. "God Only Knows" (Brian Wilson, Tony Asher). Pet Sounds. The Beach Boys. Brian Wilson (p). Chuck Britz (e). Capitol 2458, 1966.

3.11. "Way Down Now" (Karl Wallinger). Goodbye Jumbo. World Party. Karl Wallinger (p). Wallinger and Joe Blaney (e). Ensign/Chrysalis F2 21654, 1990.

3.12. "Through Your Hands" (John Hiatt). Stolen Moments. John Hiatt. Glyn Johns (p). Glyn Johns & Jack Joseph Puig (e). A & M 75021 5310 2, 1990.

- 3.13. "Amazing Grace" (traditional). Acadie. Daniel Lanois. Lanois (p), (e). Lanois & Mark Howard (me). Opal/Warner Bros. 9 25969-2, 1989.
- 3.14. "She's the One" (Bruce Springsteen). Born to Run. As above, add Jon Landau (p).
- 3.15. "Working on the Highway" (Bruce Springsteen). Born in the U.S.A. Bruce Springsteen. Jon Landau, Chuck Plotkin, Bruce Springsteen (p). Chuck Plotkin (e). Columbia, 1984.
- 3.16. "Baby, Let's Play House" (Arthur Gunter). Single. Elvis Presley. Sam Phillips (p), (e). Sun 217, 1955.
- 3.17. "Love to Be Loved" (Peter Gabriel). Us. Peter Gabriel. Daniel Lanois & Peter Gabriel (p). David Bottrill (e). Geffen GEFD 24473, 1992.
- 3.18. "Hello, Goodbye" (John Lennon, Paul McCartney). Single. The Beatles. George Martin (p). Ken Scott (e), Geoff Emerick (me). Parlophone R 5655, 1967.
- 3.19. "The Intruder" (Peter Gabriel). Peter Gabriel. Peter Gabriel. Steve Lillywhite (p). Hugh Padgham (e). Geffen 2035-2, 1980.
- 3.20. "Atlantic City" (Bruce Springsteen). Nebraska. Bruce Springsteen. Springsteen (p). Mike Batlin (e). Columbia TC 38358, 1982.
- 3.21. "Under the Bridge" (Anthony Kiedis, Flea, John Frusciante, Chad Smith). Blood, Sugar, Sex, Magik. Red Hot Chili Peppers. Rick Rubin (p). Brendan O'Brien (e). Warner Bros. 9 26681-2, 1991.

Chapter 5

- 5.1. "Not Fade Away" (Charles Hardin, Norman Petty). The "Chirping" Crickets. Buddy Holly and the Crickets. Norman Petty (p), (e). Brunswick BL 54038, 1957.
- 5.2. "Man in the Long Black Coat" (Bob Dylan). Oh Mercy. Bob Dylan. Daniel Lanois (p). Malcolm Burn (e). Columbia CK 45281, 1989.
- 5.3. "Change Your Mind" (Neil Young). Sleeps with Angels. Neil Young and Crazy Horse. David Briggs & Neil Young (p). John Hanlon (e). Reprise 9 45749-2, 1994.
- 5.4. "Blue Jay Way" (George Harrison). Magical Mystery Tour. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone SMMT-1, CDP7 48062 2, 1967.

5.5. "Control" (James Harris III, Terry Lewis, Janet Jackson). Control. Janet Jackson. Jimmy Jam, Terry Lewis, Janet Jackson (p). Steve Wiese, Terry Lewis (e), Steve Hodge (me). A&M CD 3905/DX 923, 1986.

5.6. "Goodbye" (Steve Earle). Wrecking Ball. Emmylou Harris. Daniel Lanois (p). Malcolm Burn (e). Elektra/Asylum 61854-2, 1995.

5.7. "Peggy Sue" (Jerry Allison, Buddy Holly, Norman Petty). Buddy Holly. Buddy Holly. Norman Petty (p), (e). Coral 57210, 1958.

5.8. "I'm Only Sleeping" (John Lennon, Paul McCartney). Revolver. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone PCS 7009, CDP7 46441 2, 1966.

5.9. "Speed of Life" (David Bowie). Low. David Bowie. Tony Visconti & David Bowie (p). Tony Visconti (e). RCA APL.1.2030, Rykodisc RCD 10142, 1977.

Chapter 6

6.1. "Supervixen" (Garbage). Garbage. Garbage. Garbage (p), (e). Almo Sounds AMSD-80004, 1995.

6.2. "Diamond in the Rough" (Shawn Colvin, John Leventhal). Steady On. Shawn Colvin. John Leventhal & Steve Addabbo (p). Steve Addabbo (e), Kevin Killen (me). Columbia CK 45209, 1989.

6.3. "Starfish and Coffee" (Prince, Susannah Hoffs). Sign "O" the Times. Prince. Prince (p). Prince, Susan Rogers, Coke Johnson (e). Paisley Park Records 9 W1-25577, 1987.

6.4. "Kill Eye" (Neil Finn). Temple of Low Men. Crowded House. Mitchell Froom (p). Tchad Blake (e), Bob Clearmountain (me). Capitol CDP-548763, 1988.

6.5. "Whole Lotta Love" (Jimmy Page, Robert Plant, John Paul Jones, John Bonham). Led Zeppelin II. Led Zeppelin. Jimmy Page (p). George Chkiantz (e), Eddie Kramer (me). Atlantic 8236, 82633-2, 1969.

6.6. "All Along the Watchtower" (Bob Dylan). Electric Ladyland. The Jimi Hendrix Experience. Jimi Hendrix (p). Eddie Kramer (e). Reprise 2RS 6307, MCA MCAD-10895, 1968.

6.7. "Eleanor Rigby" (John Lennon, Paul McCartney). Revolver. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone PCS 7009, CDP7 46441 2, 1966.

- 6.8. "A Day in the Life" (John Lennon, Paul McCartney). Sgt Pepper's Lonely Hearts Club Band. The Beatles. George Martin (p). Geoff Emerick (e). Parlophone PCS 7027, CDP7 46442 2, 1967.
- 6.9. "Higher Love" (Stevie Winwood, W. Jennings). Back in the High Life. Stevie Winwood. Russ Titelman & Stevie Winwood (p). Tom Lord-Alge (e). Island 422-830148, 1986.
- 6.10. "Astral Weeks" (Van Morrison). Astral Weeks. Van Morrison. Lewis Mernstein (p). Warner Bros. 1768-2, 1968.
- 6.11. "Red Light Special" (Babyface). CrazySexyCool. TLC. Babyface (p). Brad Gilderman (e), Dave Way (me). LaFace 26009-2, 1994.
- 6.12. "Waterfalls" (Marqueze Etheridge, Lisa "Left Eye" Lopes, Organized Noize). CrazySexyCool. TLC. Organized Noize (p). Nealepogue (e). LaFace 26009-2, 1994.
- 6.13. "Sick of Myself" Matthew Sweet. 100% Fun. Matthew Sweet. Brendan O'Brien (p). Nick DiDia (e), Brendan O'Brien (me). Zoo 72445-11081-2, 1995.
- 6.14. "Amazing Grace," see 3.13.
- 6.15. "I Want Your (Hands on Me)" (Sinéad O'Connor, Mike Clowes, Rob Dean, "Spike" Hollifield, John Reynolds). The Lion and the Cobra. Sinéad O'Connor. Sinéad O'Connor & Kevin Moloney (p). Kevin Moloney (e). Ensign/Chrysalis VK 41612 DIDY 2352, 1987.
- 6.16. "Drink Before the War" (Sinéad O'Connor). The Lion and the Cobra.
- 6.17. "Just Call Me Joe" (Black. Moon E). The Lion and the Cobra.
- 6.18. "Tumbling Dice" (Mick Jagger, Keith Richards). Exile on Main St. The Rolling Stones. Jimmy Miller (p). Andy Johns, Glyn Johns, Joe Zaganno, Jeremy Gee (e); no individual credits given. Rolling Stones 2900, Virgin 39524, 1972.
- 6.19. "Sister Ray" (Lou Reed, John Cale, Sterling Morrison, Maureen Tucker). White Light/White Heat. The Velvet Underground. Tom Wilson (p). Gary Kellgren (e). Verve V/V6-5046, 1968.
- 6.20. "Goodbye" (Steve Earle). Wrecking Ball. Emmylou Harris. Daniel Lanois (p). Malcolm Burn (e). Elektra/Asylum 61854-2, 1995.

6.21. "Wildflowers" (Tom Petty). Wildflowers. Tom Petty. Rick Rubin, Tom Petty, Mike Campbell (p). Jim Scott, David Bianco, Richard Dodd (e)--no individual credits given--Richard Dodd (me). Warner Bros. 9 45759-2, 1994.

6.22. "Fear" (Sarah McLachlan). Fumbling Towards Ecstasy. Sarah McLachlan. Pierre Marchand (p), (e). Arista 18725-2, 1993.

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