

THE 'SOUND' OF MUSIC

TECHNOLOGICAL RATIONALIZATION AND THE PRODUCTION OF POPULAR MUSIC

One of the interesting things about pop music is that you can quite often identify a record from a fifth of a second of it. You hear the briefest snatch of sound and know, 'Oh, that's "Good Vibrations",' or whatever. A fact of almost any successful pop record is that its sound is more of a characteristic than its melody or its chord structure or anything else. The sound is the thing that you recognize.

(Brian Eno)¹

Ever since the rise of the recording and broadcasting industries, the search for the right 'sound' - the sound that would capture the ears and the imagination of the consumer - has been a matter of concern. Exactly what it is that constitutes the 'sound', however, is often difficult to pin down. In addition to a combination of instruments, vocal and musical styles, it contains something else - something that could be described as both a particular technology and a particular mode of production: multitrack recording. Multitrack technology, and the studio practices associated with it, were developed as an efficient way of meeting the aesthetic and technical demands of a new music - rock. At the same time, the technology has helped to define rock aesthetics and has been instrumental in the reorganization of rock as a form of musical practice.

It has been argued that popular music production since the 1950s has been less rationalized than during the previous era of so-called 'tin-pan alley' popular song. This view is based on an analysis of the organization of musical production within the industry as a whole. For example, Peterson and Berger have argued that Max Weber's model of capitalist organization (in terms of bureaucracy) assumes a stable market system and that since the 1950s the music business has been characterized by unstable, 'turbulent' market conditions. Such conditions work against bureaucratic, professional, or craft modes of production and give rise to independent entrepreneurs who take over many of the production requirements of the industry.²

While this argument is certainly valid, it privileges one form of rationality - bureaucratic organization - over other forms (such as abstract calculation and methodical experimentation) which were also considered essential to the development of capitalism by Weber.³ What I shall argue here is that what becomes rationalized in multitrack studio production is musical performance practice itself and that this rationalization is, at least initially, guided by goals



of economic efficiency and technical control. This derives from Weber's *The Rational and Social Foundations of Music*,⁴ in which he demonstrated the degree to which western musical materials - its instruments, scales, tuning system, notation, etc. - had become subject to rational modes of thought and action.

Jurgen Habermas has taken up Weber's concept of rationalization and refers to it as 'purposive rational action' (or simply 'work').⁵ He defines it as the realization of defined goals through a specific organization of means, strategies and rules. Against this he poses a second category, that of 'interaction' or 'communicative action', which is governed by consensual norms and reciprocal expectations about behaviour that are recognized by two or more acting subjects. It seems to me that Habermas's concepts of 'work' and 'interaction' create a useful framework for discussing certain aspects of multitrack production. For what is significant about this new technology is the way it substitutes a work discipline for interaction - the way it makes possible the *simulation* of interactive musical behaviour. Here, then, I am consciously extending Habermas's notion of interaction - which he limits to communication through language - to include various types of musical practice such as ensemble performance.

SEPARATION: A QUESTION OF SPACE

During the early days of electrical recording the microphone was used sparingly - just one or two microphones were the norm. The medium was still conceived of as the documentation of a musical performance. Beginning in the early 1950s, however, recording engineers, hoping to improve the technical quality of sound recordings, attempted to gain greater control over the recording process. John Eargle describes five techniques that developed during this period: (1) recording in acoustically dry studios; (2) the use of numerous, closely placed microphones to maximize separation; (3) the engineer's participation in the adjustment of musical balances; (4) the introduction of artificial reverberation which could be controlled by the engineer; and (5) careful selection, placement, and balancing of the individual microphones in the stereo array.⁶ Edward R. Kealy locates the development of these techniques, along with the emergence of rock 'n' roll, within the more general context of social, technical, economic, and aesthetic changes of the 1950s: the introduction of television and the decentralization of popular music tastes; the replacement of disc recording by the cheaper, more flexible tape recorder and the attendant rise of small, low-cost studios run by entrepreneurs; and changing aesthetic expectations on the part of the audience for rhythm & blues and rock 'n' roll records.⁷

There are three aspects of this development that I would like to address here. First, there is the way these techniques and contexts contribute to an increasing rationalization of the recording process. Kealy argues that the 'entrepreneurial mode' of production is less rationalized (with regards to the specialization of roles) than the earlier 'craft union mode' that was characteristic of the large recording companies at the beginning of the 1950s.

As I have mentioned, this interpretation takes into account only one aspect of Weber's notion of rationalization; in other respects the entrepreneurial mode of production is extremely rational.

For example, Kealy points out that the development of the idea of the 'hit sound' was 'a conscious, aesthetic and commercial goal'. I would argue that the organization of means - both technical and musical - was in keeping with this goal. In his essay on music, Weber describes how, despite the aesthetic nature of their goals, the activities of instrumental virtuosi ultimately lead to greater levels of rationalization: by experimenting with musical instruments the virtuoso develops expressive techniques and new melodic and harmonic resources which require new forms of codification and systematization. Similarly, the entrepreneurial producer and the engineer might be considered as the 'virtuosi' of the nascent art of sound recording for it is they who encourage technical experimentation (with novel microphone placements, complex mixing, artificial reverb, etc.). The technical nature of sound recording is such that studio experiments are quickly transformed into relatively standardized sets of practices and new technologies - electronic phasing systems were developed as an efficient means of producing an earlier experimental studio practice known as 'flanging', for example.

Secondly, this form of rationalization strives for a technical mastery over the musical materials - both the instrumental sounds themselves and the space in which they are recorded; the latter contributes greatly to the overall coloration of the recorded sound. Through close miking (within an inch in the case of some instruments) and signal processing (such as the manipulation of overtones through filtering, or 'equalization') the engineer can change the character of an instrumental sound. When special effects are employed, the musician merely supplies the 'raw material' for the engineer to manipulate; electronic instruments (like the synthesizer) are so fully integrated into the technical apparatus that no clear dividing line can be drawn between sound source and sound treatment.⁹ The studio itself is rationally designed (through the use of sound absorption materials) so as to minimize any ambient resonances that might interfere with the manipulation of the individual instrumental sounds; precise amounts of artificial reverberation can subsequently be added to the acoustically isolated sounds.

Thirdly, and partly as a result of technical rationality and the tendency towards control of the musical and spatial elements outlined above, one can discern the beginnings of a technical mastery over the organization of musical practice through modern recording techniques. Once the engineer and the producer take on the responsibility of musically balancing the recording they enter directly into musical practice. In effect, they take on the technical role of a conductor in forms of popular music (such as R & B, and rock) that never before had need of such a role.

In the studio, the acoustical separation of the performers is reinforced by the use of physical barriers. These may take the form of movable, acoustically insulated walls ('baffles'), or, as in what has developed as a common practice in isolating vocalists from instrumental sounds, the use of small, separate rooms ('isolation booths'). Under such conditions, the ability of the musicians to play

together as an ensemble can be subtly inhibited. Even advocates of separation recording like Everest have remarked on this problem:

As musicians are separated from each other physically and acoustically, something tends to be lost in the music in the effect the musicians have on each other. The intangible 'something' that makes a group successful is undermined to a certain extent . . . Physical separation, extremely dead studio acoustics, opaque baffles, and isolation booths achieve channel separation all right, even to the extent that the musicians often cannot hear one another.¹⁰

The technical solution to this problem is for each of the players to wear headphones in the studio. Because some musicians will need to hear certain members of the ensemble more than others, mixing consoles have been designed so that the 'mix' heard by the players can be individually tailored by the engineer and kept separate from the 'mix' destined to become the final recording. Thus, in order to play at all under the conditions of separation recording, the musical ensemble must become fully integrated into the technological apparatus - the apparatus is a mediating factor between all musical interactions in the studio.

This extreme form of separation is useful in making stereo recordings, not only because it allows the engineer to balance the dynamic level of the various sounds independently, but also because it allows the engineer freedom to create different spatial arrangements of the sounds in the stereo field. Any musical ensemble displays a certain spatial structure: the symphony orchestra is an obvious example with its relatively standardized left-to-right distribution of high and low strings, its grouping of wind and brass sections, and so forth. If, through separation recording, the ensemble is spatially divided, its 'sound' must be reconstituted through technical means by the engineer. The recording aesthetics of concert hall 'realism' dictate that the orchestra's spatial configuration be respected in the stereo mix - in large part, because the classical music consumer expects to hear it that way - even when the contingencies of the recording environment or an interest in creative experimentation have caused the players to adopt a different seating arrangement from the normal one.¹¹ By comparison, performing pop bands have been, as a rule, rather ad hoc groupings of musicians, varying in number and instrumentation; their spatial distribution is often dependent upon non-standardized club and concert venues. This fact, and the somewhat different expectations of the youth audience,¹² allowed the producers and engineers of the early rock period to experiment and to develop their own rational approach to spatial placement in recordings.

Certain aspects of this rationality as it developed during the 1960s can be noted. During the early part of this period as many as twenty-four microphones might be used in a pop recording session and, because no more than four tracks were available on most tape recorders of the time, a great deal of the essential mixing would have to be done at the time of the original recording;¹³ this severely limited the possibilities for further signal processing, balancing, and spatial placement in the final remix. Thus, certain calculations

regarding the size and nature of the ensemble to be recorded, and decisions concerning track assignment, were required before the session took place. Typically, the lead vocal would be assigned to one track, rhythm instruments (drums, bass, and rhythm guitar) to another, and all other backing instruments and vocals to the two remaining tracks. Most often, in the final stereo mix the vocal and rhythm tracks would be panned to the centre position and the other tracks to the left and right.¹⁴ There are musical and practical reasons for grouping rhythm instruments together so that the players can function more efficiently as an ensemble unit under the conditions of separation recording, for example, and for separating the vocalist from the other instrumentalists, but this approach to recording was also designed to meet certain aesthetic and commercial goals. For example, it is significant that the vocalist, who in popular music has always been one of the focal points of the star system and a privileged carrier of musical expression, was the only musician virtually guaranteed exclusive right to one of the four precious tracks and subsequently given 'stage centre', as it were, in the final mix. It has been stated that part of the appeal of rock music derives not from the meaning of song lyrics themselves but from the 'voluptuous presence of voices'.¹⁵ But while one may indeed respond to what Barthes called 'the grain of the voice' when listening to rock singers, the sense of 'presence' - the uncommon closeness with which the 'grain' of the voice is revealed through the microphone - is the result of a rational technological process: the isolation, selective emphasis (through equalization, compression, reverberation, and balancing), and the spatial placement of the recorded vocal sounds.

In a similar way, the more recent multitrack treatment of the rhythm section allows for a selective emphasis on the 'beat' of the music, which has also become characteristic of the 'sound' of rock recordings. Although the allocation of one of the four tracks to the rhythm section in early rock recordings allowed for a certain amount of general emphasis on rhythm, the overall effect was the creation of a dense, 'percussive cloud' of sound.¹⁶ With 8-, 16-, and 24-track recording capability during the late 1960s and early 1970s, it was possible to record not only the vocal soloist but virtually all instrumental sounds separately and, later, to process them individually and position them in the stereo field. In practice, this meant that in addition to separating the bass and rhythm guitars from the drum kit, each individual component of the kit (snare, bass drum, cymbals) could be recorded on separate tracks. The individual drum sounds could then be 'tightened' (through the use of compressors, expanders, and noise gates) and recorded at maximum intensity without interfering with the overall balance of the drum kit or the ensemble as a whole. The number of tracks assigned to the drum kit alone often exceeded that assigned to any other part of the group.¹⁷ Rhythm sections recorded in multitrack not only allow for a greater clarity and emphasis on the drum beat but also supply the engineer with an efficient means of tailoring the mix of rhythmic elements for specific commercial applications: this aspect of the multitrack recording process was, especially important in disco music where different mixes (and different engineers in many cases) were used in creating radio and dance club versions of every tune.¹⁸

Recording drums in this way is difficult and time-consuming. Not surprisingly, drum machines began to be used during the 1970s as a more efficient means of laying down dance tracks. Today, despite their more creative uses in music such as Rap, drum machines are still used most often in studios as technical and economic expedients: for most music recording they are simply easier and cheaper to make use of than live drummers.

Once recorded onto several different tracks, the drum kit must be 'reassembled' by the engineer into a spatial configuration in the final mix; this is usually done in a way that gives the aural impression of sitting directly in front of the kit (that is, from a 'listener's' perspective and not that of the drummer). This impression, however, is distorted in so far as the separation between the various components of the drum kit is much greater than that encountered under normal conditions. Not only are the cymbals and tom-toms spread over almost the entire breadth of the stereo field; they also become a spatial/structural framework within which the sound of the other instruments in the group can be freely distributed. In effect, the entire ensemble appears to play as if *inside* a drum set of almost mythic proportions - *inside* the spatialized rhythmic structure of the 'beat' itself. Control over the sound of the drums is an object of such considerable concern within the overall technical rationality of multitrack production because, as with the sound of the voice, the 'beat' is a major focal point in the commercial success of rock as dance music.

Generally speaking, the vocal and instrumental sounds recorded, processed, and spatially positioned in the manner described above do not fuse, but rather, remain on essentially separate acoustic planes; the result is what we have come to know as the 'pop sound':

current multi-track technique . . . creates the conditions for a sound separation, which makes for the characteristic 'sound' of this type of music, by facilitating . . . [an] analytic penetration. In this way instruments and parts with the most diverse sound volumes can be 'processed' together to create an artificial tonality that is impossible to accomplish by conventional 'natural' means.¹⁹

To a certain extent, the 'artificial tonality' that is characteristic of multitrack recordings can be regarded as a result, and a reflection, of the spatial separation and isolation of the musicians in the rationally planned, acoustically dead environment of the studio. It is also the result of a shift in recording aesthetics away from the 'realistic' documentation of a musical event to the *creation of one*. In this way, separation recording and multitrack mixing are an example of Walter Benjamin's dictum: *To an ever greater degree the work of art reproduced becomes the work of art designed for reproducibility*.²⁰

OVERDUBBING: A QUESTION OF TIME

The flow of time is perhaps music's most essential element, and rhythm its most powerful organizing principle - both musically and socially. The development of a relatively precise form of notation constitutes western music's first break with time. It provided for a spatialized representation of

time (and pitch) and a means for the rational planning of large-scale musical works outside of actual, real-time performance.²¹ The advent of sound recording was the second break, and a much more startling one. It made it possible to capture the ephemeral moment of musical performance itself and make it repeatable. With magnetic tape the temporal continuity of a work could be broken and then reassembled through editing, but each edited segment still had to be recorded as an integral performance by whatever number of musicians was demanded by the music. 'Overdubbing', however, opened up the possibility of assembling a recorded performance one part at a time - to layer and synchronize the contributions of individual musicians into a single musical/temporal experience. Used in this way, multitrack recording technology can, in effect, become a meeting-ground for composition and performance art or, as Chris Cutler puts it, 'a medium of *composition* for *performers*'.²² Cutler also insists that this new form of compositional/performance can (or should) be a *collective* form of activity. I would argue the opposite: by breaking the essentially time-bound character of group performance, overdubbing tends to emphasize the individual contribution over that of the collective. It creates a 'simulation' of collective activity and thus interrupts what Habermas might refer to as 'communicative action' by substituting in its place a 'work' discipline. Group performance itself undergoes a process of rationalization and this process is encouraged by the commercial context of production.

Some of the first experiments in overdubbing were carried out by the well-known guitarist Les Paul during the late 1940s. Paul began his experiments with two disc-cutting lathes, copying from one to the other and overdubbing new parts as each copy was made. During the late 1940s and early 1950s Paul released several hit songs (with the singer Mary Ford), some with as many as twenty-four instrumental and vocal parts built up in this way. Following this work, he created the specifications for the first 8-track tape recorder, which was built for him by the Ampex corporation in 1952.²³ Paul's early technique is more accurately referred to as 'sound-on-sound' than overdubbing (in the multitrack sense of the term) in that once recorded, the individual parts could not be erased, rebalanced, or otherwise altered. The technique required a high degree of rational planning; the whole song had to be completely arranged, in every detail, in order to avoid ruining the previously recorded 'tracks'. The move to multitrack tape was itself a rational decision based on the possibility of eliminating the element of risk that was an inherent part of the earlier disc recording technique.

Les Paul's approach to recording was, without doubt, a form of composition, a literal 'putting together' of the music. But the connection with traditional western composition goes deeper than this. In the introduction to *The Philosophy of Modern Music*, Theodor Adorno states that in the composition of music, especially polyphonic music, the composer posits a 'we' when, in reality, he expresses only himself as 'I'.²⁴ Through Les Paul's use of overdubbing the 'I' - the composer/performer - is technologically *transit rmed* into a 'we' in recorded form. The recorded performance that results from, this process thus partakes of both the creative and the contradictory elements of

composition. Les Paul's innovative use of recording technology is in keeping with Chris Cutler's **notion of the possibility of a fusion between composition and performance;** it points towards a new balance between rational and irrational forms of behaviour in popular music production. But, ironically, what appears to be among the most creative uses of the technology is also the least collective in nature.

These contradictions became much more evident when the technique of overdubbing was introduced into the dominant social and economic context of the popular music industry. Here, the technique became part of an overall technological rationalization in which time, and money, were of the essence:

In the early days of magnetic tape recording, recording engineers discovered that singers or instrumental soloists who worked slowly under studio conditions, or who were prone to frequent mistakes, could be recorded much more efficiently and economically through a process called **overdubbing.** In order to avoid keeping musicians on hand in the studio while the singer or soloist struggled to make the right takes, the wise producer learned to record the orchestral accompaniments separately. The artist, . . . could then be brought to the studio, where, with the aid of earphones, he could sing or perform along with the tape of the orchestral track. Next, both the prerecorded track and the newly recorded track were combined on a single tape.²⁵

For the recording industry, overdubbing was not so much a creative tool as a rational means: efficient and economic. It was also a means of propping up the star system (and this was as true for rock 'n' roll as it was for early 1950s pop). It ensured that the lead singer always sounded 'right', no matter how many takes might be required.

The development of 'selsync' (which allowed for the synchronization of separately recorded tracks) offered a greater level of flexibility in overdubbing than was possible during the early 1950s. The commercial successes of 1960s producers such as Phil Spector were, in part, based on the creative possibilities available through the use of 4-track recording equipment and overdubbing. With the expansion of multitrack during the mid-1960s, however, it could be argued that the recognition of the economic advantages inherent in overdubbing was an equally important factor leading to the adoption of the new technology. This attitude is evident in these comments by an engineer advocating multitrack in 1967:

Recording on the multi-track machines can be economical. One or more tracks can be recorded independently of each other. . . . In this way a few performers proficient on several different instruments can be used, eliminating the need for a large group, yet achieving the same results.²⁶

Thus, in a system where labour is always an object of rational calculation, the technical mastery of musical time becomes inextricably linked with the technical mastery of labour relations.²⁷

The mastery over musical materials achieved in this way thus requires the simultaneous subjection of the musicians to a rationalized work discipline,

which can be characterized in terms of Habermas's categories of 'work' and 'interaction'. In a sense, musical performance, especially group performance not based on strictly notated structures, can be conceived as a form of 'communicative action': a form of 'interaction' governed by consensual norms and reciprocal expectations that are understood and recognized by the members of the performing group. In multitrack overdubbing the fragmentation of temporal relations which are only later technologically synchronized (i.e. 'simulated') transforms interaction into 'purposive-rational' action, or 'work': the realization of defined goals through a specific organization of means and strategies. Simply, it is impossible for a musician to interact, to communicate, with a prerecorded track in that it is impossible to change the course of what is already there. Thus, musical performance in the multitrack studio takes on a new character: it is no longer 'interaction', but only reaction.

In a recent article, Mark Hunter identifies rhythmic invention as one of three significant aspects of performance practice in rock music that have been affected by multitrack recording.²⁸ The rhythm tracks are the first tracks to be laid down - either drums alone or with bass; sometimes electronic 'click tracks' are also used. This is necessary in order to set a constant beat, the temporal/structural frame that will be used to synchronize the other parts that will be recorded later. Hunter argues that rhythm, once a domain shared by most of, if not all, the members of the rock group, has now effectively become the province of one or at most two players who 'are obliged to play in a way that will not complicate the recording of the subsequent tracks. . . . Rhythm, once the backbone, has simply become the flat bottom.'

Thus, the rationalized work routine imposed by overdubbing creates, or reinforces, a hierarchy among the members of the rock band. Within this hierarchy, those who are recorded last (usually the vocalist or a featured soloist) have the greatest degree of expressive and improvisational freedom; those who are recorded first are generally the most constrained. It is ironic that while the 'sound' of the drum kit has been so enhanced through separation recording, the role of the 'beat' itself has lost much of its flexibility - it has lost its power to push and pull at the flow of time, to articulate rhythm in a musically expressive way. In multitrack recording practice, the drummer is often reduced to the role of time-keeper. With the appearance of Disco and increasing technological innovation during the early 1970s, the drummer was the first to disappear from the studio; the 'beat' - the *feel* of the music - was replaced by the 'sound' of the drum machine.

In his study of music Weber showed how increasing harmonic rationalization in western art music had tended to rigidify tonal intervals (by eliminating microtones, melodic inflection of pitches, etc.). The rationalization of temporal relations between musicians through technology and technological practices such as overdubbing can have a similar rigidifying effect: not so much on the musical materials themselves as on the dynamics of musical performance, that is, on music-making in its temporal domain.

The significance of the interactive aspects of group performance and their inhibition by multitrack recording lies not just in their intrinsic musical value, but also in their role as aural signs of a much larger shift in the nature of

popular music-making. As I hinted in my discussion of separation recording, this shift involves the full technical integration of popular music practice with sound recording as a commodity form.

'IMAGES OF COMMUNITY'

A certain 'myth of community' has often been at the heart of arguments about the cultural significance of rock music.²⁹ Quite apart from the sense of 'community' that is supposed to exist between the audience and the performer, there is a sense in which rock groups themselves have been taken to represent an idealized notion of communal identity and action:

A rock 'n' roll group is a banding together of individuals for the purpose of achieving something that none of them can get on their own. . . . But what begins as a marriage of convenience sometimes takes on its own value. An identity comes into being that transcends individual personalities, but does not obscure them - in fact, it is the group, sometimes only the group, that makes individuals visible. . . . Groups are images of community.³⁰

This 'image' may be little more than the projection of comradeship, and in the transient world of youth such a projection undoubtedly has its own value. But in the world of leisure commodities, of which rock is a part, it perhaps takes on a larger significance: 'the mass market depends on forms of collectivity, and leisure is crucially associated with the values of conviviality and comradeship.'³¹ Although the 'image' of rock 'n' roll musicians performing - their collective efforts 'subsumed in excitement and grace'³² - may be a focal point with which fans can identify, this image can also be used by the industry for its own promotional purposes. The more detached, rational contributions to the production process made by the producer and the engineer cannot be so easily incorporated into this dominant leisure image and they therefore tend to be excluded from it. The 'image of community' that is implicitly contained in most pop recordings is, for commercial and ideological reasons, only a partial one.

In the recorded product, there is little trace of the fragmented character of multitrack recording practices and, in this way, the technically seamless quality of the final, recorded 'image' itself can help to maintain the myth of collective activity and group solidarity. Not unlike the composer who must first posit a 'we' in order to create polyphonic music, the listener will tend to assume a 'we' in order to make sense of the multiple instrumental and vocal sounds of popular music recordings.

The fact that music as a whole, and polyphony in particular . . . have their source in the collective practices of cult and dance is not to be written off as a mere 'point of departure'. . . . Rather this historical source remains the unique sensory subjective impulse of music, even if it has long since broken with every collective practice.³³

With the appearance of Rap and musics that highlight the artificiality of studio production, the sonic 'image' of collective action is called into question. But

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any possible new perceptions are inhibited by the predominance of music videos in the market-place. These generally reinforce the myth of the group as model community: in some of his videos, Prince is reported to have led a band in lip-synch 'performances' of songs which he had recorded alone, through the use of overdubbing, in a multitrack studio.³⁴

The left has also constructed its own images and myths of community. In his vision of popular music and the multitrack studio, for example, Chris Cutler not only recreates the myth of community but also (more important for my argument) combines it with a myth of technology. Cutler wants to see the possibility of 'collective' work in the studio as a model of community - a model of the 'classless society'. He offers a curious mixture of Marxian class analysis and McLuhanesque technological determinism, with a strong emphasis on the more Utopian aspects of both:

the innate qualities of the new medium of production [multitrack recording], which are collectivist & democratic, can only be creatively developed by a democratic & collectivist class, a class whose historical role is to end class division altogether.³⁵

In an article restating his basic historical thesis, Cutler argues that jazz is perhaps overly concerned with improvisation, performance skills, and real-time collective composition and, as a result, it makes use of the recording studio only as a 'documentary' device: 'In these crucial respects it is time-locked, tied to real, linear time - and of course one of the prime attributes of the studio is that it liberates performance from this constraint.'³⁶

It is true that the musical character of improvisation, and musical practice in general, changes under studio conditions; it becomes, in effect, more rationalized. Just as chordal harmony creates a rational, structural framework for expressive, melodic elaboration, so the multitrack studio creates a meta-structure for a rationalized, test-and-evaluate form of musical practice. Even when it does not lose its expressive and affective character, performance becomes a kind of calculated risk-taking in a no-risk environment; the ability to erase an individual performer's 'mistakes' eliminates any possible secondary effects on the recorded music as a whole. And it is just this type of rationalization of performance practice that Cutler hopes to achieve through multitrack recording. It is the deferral of decision-making that transforms performance into composition: 'constructive decisions in the assembly of sound are concrete & empirical & can be reached through discussion'.³⁷ Thus, Cutler's 'liberation' of performance practice requires that it no longer be considered as an adequate form of 'collective' (or 'interactive') musical behaviour: performance must be transformed into 'work' so that 'collective' decision-making can be achieved, rationally, within the realm of language.

CONCLUSION

I have argued that the initial attempts at technical integration of popular music with the medium of sound recording followed a dual pattern of rationalisation. First, engineers and entrepreneurial producers interested in an aesthetic of

recorded musical 'sound' gained increasing control over the process through separation recording - a set of techniques derived from experimentation with architecture, tools, and techniques in the sound studio. Second, the aesthetics of the 'sound', in combination with commercial demands in the form of cost efficiency and the need to highlight star performers (usually singers), encouraged the increasing use of overdubbing, which allowed for the rational planning and control of the temporal aspects of music-making. Together, these two procedures led to fragmentation - in space and time - of ensemble performance and to the direct participation of the engineer and the producer in the creation of the recorded product. The ability of the more successful rock groups, from the late 1960s onward, to gain greater control over their recordings through participation in the final mixdown process does not alter the fundamentally rational character of multitrack recording as a musical practice.

The technical mastery of space and time contributes not only to the rationalization of musical production, but also to the creation of a myth of community. No matter how fragmented the production process, the conventional pop/rock product always appears to the listener as a spatially and temporally unified ensemble performance. The technical and musical process through which this sonic 'image' of communal effort is created has little in common with any spatial, temporal, or social concept of 'community'. It has much more in common with the general character of production and distribution within multinational capitalism. The 'simulation' of ensemble performance practice in the multitrack studio may perhaps have a significance that goes beyond the actual production process itself - a significance that touches upon questions of ideology in consumer society.

NOTES

- 1 B. Eno, 'Aurora musicalis', *Art Forum*, 24, 10 (1986), 76.
- 2 R. A. Peterson and D. G. Berger, 'Entrepreneurship in organizations: evidence from the popular music industry', *Administrative Quarterly*, 16 (March 1971), 97-106; see also E. R. Kealy, 'From craft to art: the case of sound mixers and popular music', *Sociology of Work and Occupations*, 6, 1 (1979), 3-29.
- 3 M. Weber, *The Protestant Ethic and the Spirit of Capitalism* (New York: Scribner, 1958), 18-25.
- 4 M. Weber, *The Rational and Social Foundations of Music* (Carbondale, Ill.: Southern Illinois University Press, 1958).
- 5 J. Habermas, *Toward a Rational Society* (Boston, Mass.: Beacon, 1970).
- 6 J. Eargle, *Sound Recording*, 2nd edn (New York: Van Nostrand, 1980), 64.
- 7 Kealy, 'From craft to art', 12-13.
- 8 Weber, *Foundations of Music*, 40-2, 46-8; see also editor's introduction, xxxv-xxxix.
- 9 W. Schlemm, 'On the position of the *Tonmeister* (sound recordist) in the musical communication process', in K. Blaukopf (ed.), *The Phonogram in Cultural Communication* (New York: Springer, 1982), 153.
- 10 F. Everest, *Handbook of Multichannel Recording* (Blue Ridge Summit, PA: Tab Books, 1975), 20.

- 11 See M. Ross-Trevor, 'The recording engineer', in P. Gammond and R. Horricks (eds), *The Music Goes Round And Round* (London: Quartet Books, 1980), 125-7.
- 12 Kealy, 'From craft to art', 13.
- 13 Eargle, *Sound Recording*, 173.
- 14 *ibid.*, 191.
- 15 S. Frith, *Sound Effects: Youth, leisure, and the politics of rock V roll* (New York: Pantheon, 1981), 164.
- 16 M. Hunter, 'The Beat Goes Off', *Harper's*, 274 (1987), 56.
- 17 A. Nisbett, *The Technique of the Sound Studio*, 4th edn (Boston, Mass.: Focal Press, 1979), 244.
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- 19 Schlemm, 'The Tonmeister', 153.
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