The Relation of Language to Materials

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Mimetic and aural musical discourse

It is not the purpose of this chapter to delve yet again into the meaning of the term ‘expression’ used with respect to music. We will be concerned with one aspect of music perception brought to the fore once more by the development of electroacoustic music on tape: namely the possible relation of the sounds to associated or evoked images in the mind of the listener. The term ‘image’ may be interpreted as lying somewhere between true synaesthesia with visual image and a more ambiguous complex of auditory, visual and emotional stimuli. We are concerned here not with how specific sources may evoke particular images but with how the imagery evoked interacts with more abstract aspects of musical composition.

In my discussion of music, I would like to use the term ‘mimesis’ to denote the imitation not only of nature but also of aspects of human culture not usually associated directly with musical material. Some aspects of mimesis are unconsciously passed on by a culture while others are consciously appropriated and used by the artist. Conscious and unconscious aspects are not sealed off from one another, of course, and a two-way exchange is evident over a period of time. We may have become much less conscious of the religious symbolism in Baroque music while being very conscious of the use of ‘birdsong’ in the music of Messiaen. There are two types of mimesis: ‘timbral’
mimesis is a direct imitation of the timbre ('colour') of the natural sound, while 'syntactic' mimesis may imitate the relationships between natural events; for example, the rhythms of speech may be 'orchestrated' in a variety of ways. In practice, from Janequin's *La Guerre* to Debussy's *La Mer*, the two types have been variously combined in what is known as 'programme music', as well as in the programmatic elements of much other music.

We must also be careful not to assume that the mimesis which might assist or motivate the composer is necessarily that which the listener will immediately apprehend. Trevor Wishart has argued that the greater the degree to which the composer has investigated the accepted mythic and symbolic structures of the culture of his potential audience, the greater this match will be—and arguably the greater the communication.² We will remain concerned here with the choices open to the composer of electroacoustic music, rather than the possible interpretation of those choices by the listener.

The use of natural sounds in the composition of electroacoustic music on tape allows us to claim that this is the first musical genre ever to place under the composer's control an acoustic palette as wide as that of the environment itself. Hence the vastly increased possibility that sounds may appear imitative. This contrasts strongly with the clear distinction, dominant in Western music aesthetics of recent centuries, between potentially 'musical' material based on periodic (pitched) sounds and 'non-musical' aperiodic sounds (noise). The evocation of image is further enhanced by a specific property of Western art: its deliberate removal from original context. Rarely does one view a landscape painting or listen to Beethoven's 'Pastoral' Symphony in a setting which is its apparent subject. By deliberately removing the visual clues as to the cause of sounds, indeed by removing or reducing visual stimulation of any kind, the composer is almost challenging the listener to re-create, if not an apparent cause, then at least an associated image to 'accompany' the music. The data for such a construction are entirely aural.

It is at this point that the composer must take into account audience response; he may intend the listener to forget or ignore the origins of the sounds used and yet fail in this aim. The earlier works of Pierre Schaeffer's group in Paris³ (most notably Schaeffer's own *Etude aux Objets*) stubbornly refuse to relinquish this reference to the real world. The listener is confronted with two conflicting arguments: the more abstract musical discourse (intended by the composer) of interacting sounds and their patterns, and the almost cinematic stream of images of real objects being hit, scraped or otherwise set in motion. This duality is not new, as remarked above, and is

familiar, for example, in the argument that Berlioz's *Symphonie Fantastique* is a better work than Beethoven's 'Battle' Symphony because the Berlioz has more 'abstract musical' substance, which is furthermore in inner balance with its programme—its mimetic content. The 'Battle' Symphony, like some early *musique concrète*, has been accused of being 'mere sound effects'. This 'abstract musical' substance I wish to redesignate 'aural discourse' to differentiate it clearly from 'mimetic discourse'. The two, to varying degrees in any specific work, combine to make the totality of 'musical discourse'.

For the composer of electroacoustic music this duality in content may be used to advantage. Even for those not interested in manipulating these associated images in composition, it must be at least taken into account. We must examine how these two possible approaches to language—which never exist in pure forms—might interact. Confining oneself for the moment to works which deliberately use recorded sounds as material (not necessarily exclusively), we can see a continuum of possibilities between two poles. At one extreme, the mimetic discourse is evidently the dominant aspect of our perception of the work; at the other, our perception remains relatively free of any directly evoked image. From this continuum, let us draw for convenience three points of reference.

Works in which mimetic discourse is dominant include Luc Ferrari's series of works which he has described as 'anecdotal', including those entitled *Presque Rien*, and Trevor Wishart's *Red Bird*. In the Ferrari works, the composer uses extended recordings of environments: in *Presque Rien* no. 1, the sounds of the activities on a beach in the first few hours of the day; in *Presque Rien* no. 2, environmental sounds evoke a strange 'internal' travelogue. These recordings are left substantially unprocessed to 'tell stories'. The Wishart work is subtitled 'A political prisoner's dream' and evokes images ranging from freedom to claustrophobic horror using human and environmental sounds. Works in which an aural discourse is dominant include many from composers based at the Groupe de Recherches Musicales in Paris in the period since the late 1950s. In many of these, while basic materials remained predominantly concrete in origin, the increasing sophistication of the possibilities of montage allowed a much more developed sound world to emerge, in which extended and complex sound-objects, free of associations, could be created. The earlier works of Luc Ferrari, Ivo Malec and François Bayle, and more recently Denis Smalley's *Pentes* may be included here. Between these two extremes lies our third reference point; an interesting balance of the two may be found most notably in such works as Bernard Parmegiani's
Dedans-Dehors, Michael McNabb's Dreamsong and Luigi Nono's La Fabbrica Illuminata. In all these works, from a diversity of traditions, the listener is aware that while recognition of the source of many of the sounds is intended, the impressions are welded together in other ways than those based on associative image.

This first series of examples is too crude, and I wish now to look at the term 'syntax', to analyse more carefully the possible approaches a composer may have to the organization of material, whether in aural or mimetic discourse.

Abstract and abstracted syntax

Much more analysis in recent years has been concerned with the relationships between objects or events and their possible transformations, rather than the nature of the events themselves. Lying behind such a structuralist approach is the premise that there exist universal forms of thought in any human mind, giving rise to specific utterances whose objects are defined by the particular cultural environment. We must examine how the failure of such a methodology to consider its use of terms such as 'law' ('rule') and 'explanation' has led to significant ambiguities in terminology which have important consequences in discussion of contemporary music in general and electroacoustic music on tape in particular. Paradoxically, Claude Lévi-Strauss, while holding an important position in the structuralist pantheon, gives a quite clear pointer to this problem when he writes in the 'Overture' to The Raw and the Cooked of two levels of articulation of language:

the first level of articulation... which consists precisely of general structures whose universality allows the encoding and decoding of individual messages... This is only possible because the elements, in addition to being drawn from nature, have already been systematized in the first level of articulation... In other words, the first level consists of real but unconscious relations which... are able to function without being known or correctly interpreted.\(^5\)

The second level is that of the messages themselves. He goes on to imply that it is the absence of this first level—"unconscious relations... able to function without being known or correctly [i.e. consciously] interpreted"—which creates a fundamental problem both for what he describes as 'musique concrète' and for serial music.

It is true that the aims of both these kinds of music may be summarized as the discovery and use of 'universal laws'. These correspond to the 'general structures', referred to by Lévi-Strauss, which ideally form the basis of their communicability. However, the ambiguity in the term 'law' or 'rule' now emerges. The philosophers of science tell us of two traditional interpretations of these words: law as an 'empirical generalization', that is, a summary of all observed instances of a particular event, and law as a 'causal necessity' having some sort of status 'above' the events and determining their occurrence. These interpretations are often confused in the arguments of musicologists and composers. The determinist and serial tradition tends to favour the latter interpretation, while (although some of the writings of Pierre Schaeffer appear to aim at a similarly universal 'solfège') the GRM group in Paris has developed a systematic approach favouring the former interpretation. Schaeffer's Traité des objets musicaux\(^7\) is an attempt to establish rules for the combination of sounds, abstracted from an analysis of their perceived properties. This interdisciplinary approach is essentially empirical.

It must not be thought that the composer seeking this type of solution to musical organization starts entirely without preconceptions. Sound-objects do not suggest their own montage in an objective way! There lies, above the process of aural choice advocated in this approach, a set of beliefs as to what it is that 'sounds right' in any given situation. Loose terms such as 'gesture' may abound, but it is to this area, combining psychology of music with investigation of deeper levels of symbolic representation and communication, that future research must urgently be addressed. Such value systems remain to a large extent unconscious; we are not aware at the moment of perception why it is that a particular combination of sounds 'works', although we may rationalize our choice later and attempt a full explanation of what we have done.

It is only at this stage that we may examine the second of the two key words which the rationalist (and determinist) tradition of music composition has confused: 'explanation'. The perfect explanation of an event is so complete that it may be predicted\(^8\); for example a complete explanation as to why the sun has risen this morning and on previous mornings will allow us to predict with certainty that (given the same premises as pertained today) the sun will rise tomorrow; explanation and prediction are thus ideally symmetrical. While arguably true in the physical sciences, in the human sciences and the
arts 'complete' or 'ideal' explanations are never attained, and the symmetry is flawed. It is not merely in post-war serial and other rationalist theories of pedagogy that analysis (explanation) of what has gone before is used as the basis for composition (prediction); it is in many ways the basis of the pedagogy of tonal music as well. Works are analysed, principles of an abstract nature deduced; works are then created from these principles (pastiche composition). Such a process may work reasonably well given an environment which encourages criticism and the serious reconsideration of its principles—in other words a simple feedback loop to enable the composer to modify his ideas. But one which fails to embrace this empirical and critical approach cannot hope to develop its language significantly.

This argument concludes that analysis and explanation should not be used blindly as the basis for systems or theories of composition, but can act only as pedagogic tools: part of a process of understanding, refining and perhaps assisting, decisions based on perceptual criteria. We may contrast this with traditions of contemporary composition whose essence is that of the creation and manipulation of essentially a priori shapes and structures by the composer. Serial composition is an important part of, but by no means alone in, this field. From the use of star maps to mystical number grids and formulas the use of principles not derived from the sound materials themselves all fall into this category. We may observe two quotations from Pierre Boulez to illustrate this point:

It is important to choose a certain number of basic concepts having a direct relationship with the phenomenon of sound, and with that alone, and then to state postulates which must appear as simple logical relationships between these concepts, independent of the meaning attributed to them.9

These 'postulates' and their relationships in deductive systems have a status apparently autonomous from the particular musical material, although related to sound structures in general. Furthermore:

...in relying almost entirely on the 'concrete, empirical or intuitive meaning' of the concepts used as starting points, we may be lead into fundamental errors of conception.10

While Boulez at least relates the origins of his basic concepts to sound, Stockhausen, during the 1960s, increasingly refined his ideas of abstract proportion derived from serial and numerical models with no apparent musical origin. We see the increasing use of the Fibonacci series to determine the section durations in Mikrophonie I, Mikrophonie II and Telemusik, apparently independently of the specific materials used. He finally reduced the definition of the musical objects to zero, defining only the abstract processes of transformation, as in the series of works using the 'plus--minus' notation11, or even in some of the 'texts for intuitive music'12. In such ideas, Webern's 'nomos'—the 'law' immanent in the 12-note row—has finally been elevated to an abstract, near mystical, principle.

The abstract rules of Boulez and Stockhausen part company entirely at the formal level. Boulez rejects any referential or mimetic material, as such characteristics could never be 'adapted to each new function which organises them';13 he sees serial organization as pertaining directly to, because derived from, the parameters of a purely aural ('abstract musical') discourse. Stockhausen, however, in applying his abstract ideas to the formal levels of a work, allowed mimetic discourse to reappear; the two obvious cases are those of Telemusik and Hymnen, in which much is lost if the listener does not associate the folk or anthem materials with wider images of human culture.

So we may interpret the contemporary music polemic of the post-war era—in Europe the divide between 'elektronische Musik' and 'musique concrète', in America the divide between the legacy of serialism from Europe and the freer approach of many younger composers—as the opposition of an 'abstract' syntax to one 'abstracted' from the materials. In practice these two Utopian positions are rarely found in isolation, and many composers wander somewhat uneasily between the two.

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The remarks above derive equally from considering examples whose primary concern—whatever the origins of the sound material—has been an aural discourse, and from those which—using the images evoked by referential material—make a conscious attempt at a mimetic discourse. For composers who have attempted to tackle this latter aspect, the same split between 'abstracted' and 'abstract' principles applies. The composer may preserve the relationships of the sound-objects made in an environmental recording, for example in the Ferrari works already referred to, thus 'abstracting' his syntax from them. Deliberately abstract forms and relationships may, however, be created as the basis of the montage, as in Stockhausen's Telemusik. Or the reconstructed image may be manipulated into unexpected juxta- and super-
positions not usually encountered in the real world, creating surreal dreamscapes or dialectical oppositions, thus superimposing a ‘story line’ upon the material, and mediating between these two extremes. Trevor Wishart’s Red Bird will be a case study for this approach.

Therefore, in summary, we may see the possible languages of electroacoustic music on tape in two dimensions. From one angle we may hear the music as having either an aural or a mimetic discourse; from another, either of these may be organized on ideas of syntax either abstracted from the materials or constructed independently from them in an abstract way. As we have noted, these are not fixed possibilities—indeed our one-dimensional line at the end of the previous section has become a two-dimensional plane over which the composer is free to roam. The next section will examine in more detail this ‘language grid’ (Fig. 1) and give examples of electroacoustic works to illustrate more clearly the problems and dilemmas which composers have encountered and their tentative solutions to them.

Case studies

In examining works to see how our discussion of approaches to language operates, we will consider, as in Figure 1, the degree to which the composer has decided to use mimetic reference as a compositional device, as the major axis. As in our first crude distinction, made at the end of the first section, we will divide this arbitrarily into three: I, works in which aural discourse is dominant; II, works in which aural and mimetic discourse combine; and III, works in which mimetic discourse dominates. In each of these three categories, however, we will examine a further subdivision into three, along the second axis at right angles to the first, depending on the syntax type: works in which an abstract syntax has been imposed on the materials, works in which there appears to be a combination of abstract and abstracted aspects of the syntax, and works in which the syntax has been abstracted from the materials.

It cannot, however, be stressed too strongly that these nine ‘compartments’ are arbitrary subdivisions of a continuous plane of possibilities, the outermost boundaries of which are ideal states which are probably unobtainable.

I. Aural discourse dominant

Let us examine the types of electroacoustic material most likely to be found in works in which the composer intends a primarily aural discourse. While sounds of electronic origin tend to have less potential for mimetic reference and those of concrete origin potentially more, there is no such clear distinction in practice. Sounds of electronic origin may be used to evoke strong real-world images, as we see in Subotnick’s Wild Bull, for example, or in Ligeti’s Artikulation. In this latter work, while the composer’s intention to model the electronic sound materials on speech was hardly an attempt to imitate but rather a simple means of differentiation, the sense of ‘conversation’ is encouraged through the use of statement–response, monologue, dialogue and ‘argument’ gestures. In this case syntactic mimesis predominates over timbral mimesis. Conversely, the development of sophisticated tape techniques in the 1960s lead to a genre of works in which concrete sounds could be manipulated as abstract objects depending on their acoustic content, losing all reference to their origins or environment. These sounds appear increasingly ‘electronic’—though in a particularly complex sense—and lend themselves ideally to being manipulated in a purely aural discourse. The listener need not know the origins of the material which, whatever its electroacoustic origins, lacks reference to images of the real world.

The most obvious types of material least likely to invoke images of or references to the ‘real’ world are those sounds of electronic origin not immediately modelled on sounds of the environment. The two Electronic Studies of Stockhausen from 1953–4 are examples in which the materials, created entirely from sine waves in combination, avoid any attempt at imitation not only of environmental sound, but even of instrumental timbres.
Most electronic synthesis is modelled on instrumental or vocal sounds and thus at a deep level few sounds are entirely free of all mimetic reference. We may concede that instrumental sound-images and evocation, being primarily musical, may still be allowed within this category. It is the sounds of the environment not traditionally associated with music whose imagery we wish to discuss as mimetic discourse. Thus Stockhausen’s Kontakte, while containing an enormous variety of quasi-instrumental sounds, remains primarily ‘aural’ in all aspects of its discourse.

The use of speech in electroacoustic music presents this categorization with a problem. Yet another layer of articulation is apparent in that speech may evoke images due on the one hand to its acoustic nature and on the other to its actual meaning. In order not to confuse the issue, let us consider that speech used primarily for its phonetic content is being used in an aural way, while that used for its semantic content (including gestural contour) contributes to more mimetic possibilities. Let us now look at the methods that composers have used in the organization of these non-referential materials into musical form. As outlined above we will examine the range from abstract to abstracted syntax.

1. Aural discourse: Abstract syntax. Applications of serial principles to electronic sources give us the clearest cases in this first category. The principles of organization of works as diverse as Milton Babbitt’s Ensembles for Synthesizer or Stockhausen’s Electronic Studies concern the creation and manipulation of abstract shapes created independently of the perceptual qualities of the materials used. Of course, the particular serial patterns chosen may be influenced by the materials of the work. In the case of Stockhausen’s Study II, the composer, in his search for a principle of unity to determine both the organization and the acoustic properties of the sounds, used the same numerical ideas. The individual components of the ‘tone mixtures’ are based on the same interval system as that used to organize the mixtures themselves.14 This is not the same as an attempt to draw language from the intrinsic nature of the sounds. While an attempt has been made to integrate and relate the two aspects—material and structure—the syntax still originates from an abstract domain, superimposed on, and not drawn from, perception of the sounds themselves. In Kontakte Stockhausen moved one small step away from such slavish adherence to the ideal. Heikinheimo has pointed out15 the interesting discrepancies between the composer’s intended section (‘moment’) lengths and what actually resulted in the studio, and it is evident that Stockhausen is making many more individual decisions based on the evidence of the ear. Kontakte is thus somewhat further along our scale towards the abstracted pole.

A surprising group of works to find in the same company as these serial or determinist examples are those based on an apparently diametrically opposite philosophy, but one equally remote from perceptual properties of the musical materials. Those works of John Cage which utilize chance procedures, such as Williams Mix or electroacoustic realizations of Fontana Mix, all apply abstract schemata in one medium or another to the creation and montage of sound materials. Williams Mix is a tape composition in which the composer, after division of the material into seven categories (only one of which covers sounds of exclusively electronic origin), used a Ching-based chance procedure to determine the details of the montage.16 The score of Fontana Mix consists of a series of plastic strips whose disposition after being let fall may be used to determine both the materials and organization—created in performance or fixed in advance—of any number of versions.17 It is not the origin of these schemata which is at issue, but their existence prior to the perceptual properties of the particular materials which they create or organize.

2. Aural discourse: Combination of abstract and abstracted syntax. The next group of works to consider within this section are those which harness some aspects of the perception of sound, and yet rely on formal schemes at other levels of language. The composer may have conducted extensive analyses of the materials and then integrated this empirical evidence within shapes and patterns of a more abstract nature. This has most often emerged in the works of composers who have attempted to apply the rigour of serial thinking to more perceptual aspects of sound than the crude parameter applications of the 1950s. Stockhausen appeared to be moving to this position in such non-electroacoustic works as Momente, in which scales based on equal perceptual intervals were constructed; it is interesting to note the influence of electroacoustic thinking on this work in that the primary scale elaborated is that from ‘note’ to ‘noise’. Electroacoustic composers of that era still lacked the technical means to investigate and re-create such a range of possible timbres, and controlled experiments had to wait until sophisticated computer-aided analysis and resynthesis became available in the 1970s.

Jonathan Harvey’s Mortuous Plango, Vivos Voco is a case in point. Composed at IRCAM in Paris in 1980, the work combines use of the Stanford sound analysis package with MUSIC V and the more recent CHANT program. The composer based the pitch series, used as the central
tones of each of the eight sections of the work, on partial tones drawn from a
spectrum analysis of the great tenor bell at Winchester Cathedral; many other
aspects of its material and organization derive from this series, including the
ways in which recordings of a chorister’s voice are tuned and combined to
blend with the bell sound. Such a process could have been applied in an
entirely abstract manner, but Harvey has sensitively combined these schemes
with striking integrations and transformations of timbre, carefully controlled
and modified by aural perception of the results.  

3. Aural discourse: Abstracted syntax. Our third group within this category
of aural discourse consists of those works whose composers have attempted to construct a syntax abstracted from perception of the material
itself. While this was the avowed aim of the GRM from its inception in 1948,
its first major successes did not appear until the late 1950s and early 1960s;
from the reorganization of the group in 1957, the sound-object could,
through far more extensive manipulation and investigation, be made
completely independent of any reference to source. The real possibility of a unity
of the sound worlds of musique concrète and electronic music existed for the
first time. They were, however, to remain stubbornly separate in their
approach to organization of this material, and the advent of voltage-
controlled electronic synthesis in the 1960s was, in the short term at least,
to perpetuate this divide. The approach examined here reached the highest
levels of technical and musical refinement in the 1970s.

Most of the materials for Denis Smalley’s Pentes (“Slopes”) are derived from
the sounds of small percussion instruments and the Northumbrian pipes.
Through a montage process involving innumerable juxtapositions and mixing
routines, the composer has created textures and drones, complex attacks and
continuums, assembled in a way which is clearly dictated by aural judgments
of gesture and patterns of growth. The overall harmonic plan is minimal and
does not function as a carrier of interest; in the composer’s words:

A significant feature of Pentes is the slow evolution of a harmonic
progression introducing the Northumbrian pipes’ melody. If played on the piano this progression would appear mundane.
However, ... its temporal elongation and the careful revelation and control of the internal, fluctuating harmonies extracted
through transformations in the studio ensure that many more qualities contribute to its impact than merely the effect of the
chord progression alone. Interest focuses on the subtle pulsed shifts in the harmonic spectrum.  

With the exception of the pipes’ melody referred to, the origin of the materials
is entirely and intentionally lost in a sound world of enormous subtlety and
power. This approach is summed up in the credo:

Today it is ironically necessary to reassert the primacy of the aural
experience in music; perceptual acuity and experience are often
more reliable and valuable in this search than formal research.

This effectively reiterates two principles of research into the sound-objects of
musique concrète— ‘Primacy to the ear!’ and ‘Search for a language!’— first
propounded by Pierre Schaeffer’s Paris group in 1953. Pentes was
commissioned by the GRM and composed in its studios in 1974.

Bernard Parmegiani’s De Natura Sonorum (1974–5) is from the same era
and studio. The work is in ten independent movements, which the composer
has grouped into two series (with some variants in performance), each an
‘étude’ concentrating on one aspect of the sound-object or a principle
of montage. This is the form most favoured by Parmegiani in works in which he
intends to minimize mimetic reference. In this case sounds of electronic origin
are combined with those—mostly instrumental— whose origin we can, if we
wish, reconstruct while listening. But in this case the composer skillfully
combines the material in ways which concentrate on the perception of specific
acoustic properties, moving our attention away from any possible mimetic
references, not merely towards the microstructure of the sounds but towards
the way the sounds combine to reinforce this perception. This is most striking
in the movement ‘Incidences/Résonances’ (the first in the first series), in which
the attacks and resonances of natural instrumental sounds are combined with
— and effectively prolonged by— sounds of electronic origin. This is not simply
‘colour composition’, but a process in which dynamic gestures and organic
structures evolve and form an important part of the language, which remains
rooted in the nature of sound itself.

II. Combination of aural and mimetic discourse

We will now consider three works or groups of works which attempt to
combine an aural discourse with a mimetic one; in other words the composer
intends the listener not only to appreciate the more abstract aspects of the
work, but also to recognize and appreciate a series of images evoked by the
material as an integral part of the composition. This dual use of material may,
as before, be structured by a syntax varying from the abstract to that abstracted from these materials.

4. Combination of *aural* and *mimetic* discourse: Abstract syntax. Luigi Nono was one of the original members of a group of European composers who have come to be known as the ‘Darmstadt school’ owing to their association with the summer school of that name in Germany in the early 1950s. Nono’s political commitment has, until recently, been explicit in his music; it is not surprising, therefore, that in his avowed advocacy of a left-wing, ‘realist’ view of art, he should seek to convey his strong views on this reality in the use of explicit texts and images. Between 1950 and 1960, Nono’s works were entirely instrumental and vocal, developing and extending his ideas of serial technique. Then, quite abruptly in 1960, an invitation to the electronic music studio of RAI Milan 26 resulted in his discovery of the potential of the tape medium for these ideas.

The dialectic is the basis of much Marxist discourse. Two opposites are juxtaposed and form a new relationship (thesis, antithesis, synthesis), this relationship in turn creating a further dialectic, and so on. Nono’s music may be seen as applying this process on several levels. In many of his works involving tape, the ending is often musically unsatisfying, abrupt and unexpected or faded out, suggesting, perhaps, his belief that a final synthesis is not possible – the struggle is not complete. He juxtaposes apparently irreconcilable materials. In *La Fabbrica Illuminata* (1964) for soprano and tape, the most important dialectically opposed pairs are ‘man: machine’ and ‘individual: group’. For Nono, the voice is the essentially human agent, pitted on the one hand against factory sounds, on the other against crowd sounds, all intended to relate to the experience of the audience and to provoke discussion. In addition to this ‘programme’ behind the music, Nono retains a determinist (usually serial) approach to much of the work’s organization, in the ordering both of the pitched material (for the soprano, both live and pre-recorded) and of the ‘blocks’ of factory sounds. The pairs of opposites overlap and develop. Their interrelation may be shown in a simple model, Figure 2.

It is evident that the tape carries the most developed parts of the argument, and itself embodies the original ‘man: machine’ division on which the whole work is based. In *La Fabbrica Illuminata* there is no mediation between these extremes. In this respect Nono’s work is an example of a true collage principle, in sharp contrast to the prevalent ideas of that era of transformation and mediation functions derived from aspects of serial principles 27. The

![Figure 2: Dialectical opposites in the music of Luigi Nono](image)

‘tree-like’ model of dialectical pairs above cannot, therefore, be interpreted in the same way as, say, the form plan of the materials of Stockhausen’s *Momente* in which similar binary opposites are repeatedly divided 28. Some of Stockhausen’s other proportion systems define a mediating role and a continuum between any two of the sound categories. For Nono, the incompatibility of lyricism and the violence of exploitation cannot be mediated, which is why, at first hearing, so many of his works appear unintegrated and inconclusive.

It is thus not so much the acoustic nature of the recorded sounds which defines the syntax of the work – Nono could not have accepted such an ‘aesthetic’ position at this time – but the nature of the origins of those sounds in society which he seeks to illustrate. This therefore remains an abstract syntax in that it is one not derived from acoustic properties of the sound materials, albeit one intended to have a very explicit narrative function.

5. Combination of *aural* and *mimetic* discourse: Combination of abstract and abstracted syntax. The next area to consider in our language grid lies in the centre at the balance point both of discourse type – *aural* and *mimetic* – and of syntax type – abstract and abstracted. Michael McNabb has written concerning his work *Dreamsong* (1978):

The basic intent of the piece was to integrate a set of synthesised sounds with a set of digitally recorded sounds to such a degree that they would form a continuum of available sound material. The sounds thus range from easily recognisable to the totally new, or, more poetically, from the real world to the dream world of the imagination ...

The listening experience confirms the composer’s intention. There is a fine balance in the combination of mimetic discourse – a series of dream images
and transformations of 'real' objects — with more aural ("abstract musical") organization of pitch structures and timbres.

In some cases the composer has re-created apparently real sounds using synthesis techniques: a cluster of bell-like sounds coalesces into a vocal sound, a chorus of voices descends into a bass drone. Such seamless transformations are still easiest using additive synthesis techniques to allow complex interpolation between the spectrum types. The data for this synthesis were based on Fourier analysis of the original recorded sound. The development of this 'analysis—resynthesis' approach at Stanford (subsequently utilized at IRCAM) is the fundamental tool which will allow the integration of electronic and concreté techniques. Even the most complex pre-recorded sound used, that of a crowd (perhaps awaiting a performance of some kind), is phased and filtered in such a way as to pass easily into the pitched material which follows. The fact that the synthesized sounds used are almost instrumental in nature (rather than complex timbres or textures) allows one to see the work in terms of a 'dream orchestra' in which all sounds have become instruments and in which one instrument may be transformed into another.

This approach to timbre makes demands on the syntax of the work in terms of combinations of sound-objects and their possible durations and structures. However, the composer has united these limited demands with a more abstract and traditional conception of technique. The work is based on two modes: one myxodidymian based primarily on B flat, the other a synthetic mode of semitones, tones and thirds ranging over two octaves. In addition, two themes are drawn from these modes, one of them being a fragment of a Zen sutra.

On matters of duration McNabb writes:

... most of the slower rhythms and section lengths derive from Fibonacci relationships, not because of their numerologic or mystic implications, but because they present a convenient and effective alternative to traditional rhythmic structures. Of course, a little acknowledgement of the gods of mathematics never hurt any computer musician.

This is an interesting admission to a pragmatic approach to systems. There is no doubt that the composer would have tried another approach had the Fibonacci series resulted in unsatisfactory aural results; it is up to others interested in the application of artificial intelligence to future programming to investigate under what conditions such systems might 'work'.

The fact that this work sits exactly at the fulcrum of our language grid, balancing so many of the tensions of materials and technique that had emerged over the previous thirty years, should not in itself give special credence to the ideas that McNabb has put forward. But it is precisely his success in uniting and transcending these disparate forces which suggests that Dreamsong is a pivotal work, an essential landmark for the fourth decade of electroacoustic music.

6. Combination of aural and mimetic discourse: Abstracted syntax. Finally in this group of works we must examine an example of a tape piece which, while combining aural and mimetic discourse, seeks to derive its syntax entirely from the acoustic properties of the materials themselves.

In all of Bernard Parmegiani’s works a very special role is played by the natural sounds he has recorded. His is the most acute ear for spectral detail; each sound is recorded in such a way that its internal structure is the object of intensified perception. He has succeeded in creating an aural discourse from the subtleties of these sound-objects while still allowing, and in some cases encouraging, recognition of the source of the sounds. He has achieved in several works a simultaneous exposition of aural and mimetic structures in which the two interact and support each other to such an extent that at most times no distinction can be made. This is the case with Dedans-Dehors, composed in the GRM studios in 1976–7. The composer’s note to the work encapsulates just this balance. On the one hand he explains some of the purely technical aspects of its syntax: the principles of metamorphosis of the sounds and their morphologies. Yet he goes on to list ten ‘sound symbols’ related to the basic idea of ‘within-without’ — some elemental or natural, pertaining to earth, air, fire, water and animal sounds, others human-created. The work, while playing continuously, is divided into ten sections: ‘En phase/hors phase’, ‘Jeux d’énergie externe et interne’, ‘Retour de la forêt’, ‘Action éphémère’, ‘Métamorphose 1’, ‘Métamorphose 2’, ‘Le lointain proche 1’, ‘Le lointain proche 2’, ‘L’individu collectif’ and ‘Rappel au silence’. While aural and mimetic references are mixed in these titles, there is complete balance of the two in a structure whose order is drawn entirely from the perceived nature of the materials: the juxtaposition of long drone sounds and exquisitely recorded fire and water sounds, for example, has just the right sense of timing and spectral contrast related to feelings of human and natural time-scale and gesture.
It could be argued that the language of Dedans-Debors in its references to obvious narrative and extra-musical images may move somewhat towards the abstract pole. We must be clear about exactly what aspects of a work are pre-defined by having such a narrative. In the case of Parmegiani, the composer uses narrative image ideas as a stage in the composition where he is building up a basic library of sounds. The images suggest the sound world. Unlike the works to be discussed in the following section, he does not then construct the finished work with a view to communicating this image sequence directly to his audience. The narrative remains, but in fine balance with a sense of aural flow which is the result of a montage in which the moment-by-moment combination of sounds is judged and adjusted by aural criteria. We may see a parallel in earlier music collage forms: the programme of Stravinsky’s Petrushka, for example, will influence its structure and the types of materials used in each block of sound, but the note-by-note composition within these formal constraints is not defined. Such preconceived narrative image structures do not therefore necessarily interfere with choices and judgments of sound combinations — though they may be made to do so if applied too literally.

III. Mimetic discourse dominant

The return to an interest in mimetic reference in electroacoustic music, at least in Europe, came as a reaction against the developing sophistication of tape, and hence sound-object, manipulation of the late 1950s and early 1960s.

Stockhausen’s Telemusik, Trevor Wishart’s Red Bird and Luc Ferrari’s Presque Rien no. I have been chosen to illustrate the abstractabstracted distinctions in this group. They have much in common. All have aims apparently outside those traditionally accepted as ‘musical’: the Wishart and Ferrari, overtly in terms of political or social issues, the Stockhausen in terms of an attempt to integrate many disparate musics of the world. There is interestingly a little-discussed connection between the ideas of Luc Ferrari and Stockhausen in the period 1963–6.

Luc Ferrari worked at the GRM in Paris from 1958 to 1963. His first works were in the then prevalent ‘abstract expressionist’ genre, in which the sounds were hardly ever recognizable, and the principles of organization were basically those at the heart of Schaeffer’s thinking. In the early 1960s he felt it necessary to return to an approach in which the sounds could be exploited with respect also to a recognition of their origins — ‘electroacoustic nature photographs’

Ferrari termed the reintroduction of this narrative element into the materials ‘anecdotal music’. His first work in this genre was Hétérozygote, composed in 1963–4. While we shall return to a discussion of this genre with respect to a later work (Presque Rien no. I), this work proves to have important links to Stockhausen’s Telemusik and the later Hymnen.

Ferrari left the GRM in 1963 and was invited by Stockhausen, as director of the Cologne New Music Courses, to be course director for ‘musique concrète’ in the 1964–5 and the 1965–6 courses. At the same time, Stockhausen had chosen Ferrari’s earlier work Tautologos II as one of the music examples in the very first programme in the first of two Westdeutscher Rundfunk radio series entitled ‘Do you know music that can only be heard over loudspeakers?’, which he presented between 1964 and 1966. The same work was also presented during the second Cologne course in December 1965. Tautologos II combines a vast variety of sound types, some recognizable, some ambiguous, some abstract. Furthermore, Ferrari was at work on Hétérozygote, his first ‘anecdotal’ composition, at just this period. Early in 1966, Stockhausen left for his first visit to Japan, during which Telemusik was composed. On his return in April of that year, Stockhausen embarked on the second series of broadcasts, not merely including Ferrari’s Hétérozygote in his review of the work of the GRM, but devoting considerable time to discussing it:

Such a mixture of nameable and nameless, defined and ambiguous sound events jump to and fro between outer, objective situations, and the inner imaginary subjective sound world... It appears to me that the music of the immediate future will essentially be determined from such relations... linking musical photography (by that I mean exact reproduction of acoustic events) with free sound images... Hétérozygote... [is] remarkably independent, open, plural... Discovery of the subtle rules of relation of this new polyphony will be the task of the immediate future... 34

It should be noted that for Stockhausen the ‘discovery of the subtle rules of relation’ was rarely empirical and should more correctly be termed ‘invention’, though there is much greater freedom in the language of Hymnen, the work which immediately followed the broadcast, than in that of Telemusik which preceded it. 15

7. Mimetic discourse: Abstract syntax. The structural plan of Telemusik uses the proportions of the harmonic series, what Stockhausen terms a
formant rhythm) in which each ‘node’ of a ‘harmonic’ is articulated by an attack on a (pre-recorded) Japanese temple instrument – a different instrument for each harmonic. This process determines the basic order of the 32 sections of the work. As all but prime numbers will produce coincidences in this scheme, the composer modifies the details to avoid these. The sections generated from the same harmonic are all assigned a specific duration derived from the Fibonacci series. Thus the function of the instrumental strokes is such that each instrument indicates the duration of the succeeding section. The composer also modifies the number of occurrences of each section type to fall on a Fibonacci series value. Disregarding slight discrepancies in the resultant lengths, there is one section of 144 seconds, two of 89 seconds, two of 55 seconds, eight of 21 seconds, and thirteen sections of 13 seconds.

Each moment was designed to be realized with relative independence from the others in the short time available. Stockhausen created an abstract architectonic form into which the material was ‘poured’. While the mimetic nature of the sounds – pre-recorded examples of folk music from around the world, with additional Japanese material recorded specially – is obscured by the electronic process of ring modulation, the vision of a ‘radiophonic’ integration of all such types of music remains very powerful.

The composer has stated:

Metacollage means ... going beyond collage ... Collage is gluing together and seeing what happens. It's not really mediation ... Our music represents models of elements that are very heterogeneous and seemingly unmatchable ... These are complementary societies and structures ..."16

You hear this 'found music' not merely as it was originally, but I have tried to bring those apparently so heterogeneous appearances into a close relationship."37

Thus the motivation towards the material ('found music') lies with respect to its origins and associations, which the composer seeks to 'intermodulate', both literally – the superimposition of the rhythm of one on the timbre of another – and spiritually, into a 'world music'.

8. Mimetic discourse: Combination of abstract and abstracted syntax. The symbolic representations underlying the mimetic references in Trevor Wishart's Red Bird are discussed fully in the score. It represents a work in which mimetic discourse is dominant and whose syntax combines montage based on both the specific acoustic properties of the sounds and a more abstract schema based on a carefully determined symbolic narrative. It was argued in the previous section that narrative ideas used to determine the form of a work did not necessarily negate the idea of a montage based on sound relationships alone. In the case of Parmegiani's Deline-Dehors, such a narrative established the boundaries of the sound world and the library of sounds the composer wished to establish. This is true of Red Bird also, but the function of the narrative is substantially more determinate. The final order and combination of sound events is strongly influenced by what is effectively a 'story line', while the composer retains an aural judgment as to the exact nature of many of the studio montage procedures. The work thus combines elements from 'abstract' and 'abstracted' syntax poles.

At all times the sound materials refer to images of the real world; Wishart's commitment to a realist philosophy parallels that of Luigi Nono, in that they both see music as an active ingredient in the formation and reformation of consciousness, but differs from it in its insistence that renewal of language must be based on a corpus of existing and widely held ideas and symbols. Wishart develops (where Nono does not) the idea of image transformation: words 'become' birds, clock ticks 'become' the slamming of the prison door.

As in the works of Parmegiani, this juxtaposition produces a surreal edge to the realist associations: not the egocentric self-indulgence of many surrealist images, but a violent and alienated nightmare which has all too real an existence.

... the 'drama' is played out entirely in the transformation of sound elements of a symbolic landscape... Even where the sounds are at their most abstracted [see Note 39], they can always be related back to the recognisable sound symbols out of which they have been evolved by transformational procedures.39

It is, from the composer's point of view, a balance of abstract and abstracted composition syntax, with a bias towards the latter. Having established the idea of a myth-narrative structure based on symbolic sound references, Wishart goes on:

What is needed is some means of systematically forcing the imagination to consider the possibilities from as many different points of view as possible. This was achieved by using a
We have now completed our zig-zag walk across the grid of syntax possibilities which we defined at the outset. All the approaches had in common the conscious involvement of the composer in the creation of musical syntax, abstract or abstracted. In comparing Ferrari’s *Presque Rien no. 1* with Stockhausen’s *Study II* at diametrically opposite corners of our grid, we may see the enormous distance traversed.

**Conclusion**

This discussion of the grid of possible discourse and syntax types for electroacoustic music on tape refers primarily to those works in which timbre (‘colour’) composition plays an important part. There remain genres of electronic and computer music which retain an ‘instrumental’ emphasis on pitch relationships. Almost all pitch-oriented electroacoustic music belongs in the first area we examined: the discourse is exclusively aural (‘abstract musical’), the syntax almost always entirely abstract (often serial at root), not based on intrinsic sound-object relations. These have not been the main concern of this chapter.

Such a grid as has been presented here allows us to see more clearly differences between what are too loosely described in the literature as ‘musique concrète’, originating in Paris, and ‘elektronische Musik’, originating in Cologne. It is important to note that the introduction of electronic generators to the GRM studios in Paris, or of concrete resources to the WDR studios in Cologne, made little or no difference to the respective approaches to composition with which they are associated. It is a gross simplification to imply that Stockhausen’s *Gesang der jünglinge*, in using the recording of a boy’s voice as part of the material, broke the barriers between the two groups. The differences between the two approaches were fundamentally between the abstract and abstracted approaches to syntax. It is perhaps only with the developments represented in this discussion by Michael McNabb’s *Dreamsong* that unity of both the aural/mimetic and the abstract/abstracted dimensions of the language of electroacoustic music becomes possible.