revista **Opus 8**
fevereiro 2002
ISSN - 1517-7017

Jean-Claude Risset's Sud: an analysis

Giselle Martins dos Santos Ferreira

Abstract: This article presents a perceptual analysis of Jean-Claude Risset's *Sud*. A theoretical stance is adopted that is based on Gregory Bateson's Theory of Mind (Bateson, 1980, *Mind and Nature*), which suggests that perception operates as a continuous dialectic between concept and sense-data. A complementarity between intrinsic and extrinsic connotations in electroacoustic music is assumed, and a broad concept of structure is suggested, prompting the notion of meaning as a multi-layered construct that relates musical and worldly experiences. From this perspective, *Sud* may be perceived as an encounter between human imagination and nature in two of its most powerful symbols: the sea, alluded to through the sounds of the waves, and the forest, alluded to through the sounds of birds and insects. The piece presents an exploration of the essence of these environmental sounds, which are either modified or recreated with different substances. In its appeal to images widespread in a variety of cultures, as well as in its unique use of traditional musical materials, *Sud* is more than a strongly programmatic and visually evocative piece.

[§]Part of the material presented here was originally published in Ferreira, G. M. d. S. A Perceptual Approach to the Analysis of J. C. Risset's *Sud*: sound, structure and symbol. 1997. *Organised Sound* v.2 n.2 pp.97-106. Permission obtained from the Cambridge University Press.

1. Introduction

Musical Analysis has been traditionally occupied with the exploration of structure understood in terms of compositional ideas and techniques that can be grasped from a score. Despite claims that "analysis should enhance appreciation, or aesthetic enjoyment, and intensify rather than inhibit responses to music", (1) analysis has been normally linked with compositional perspectives, an association identified also within the literature on electroacoustic music. The lack of standard scores is tentatively overcome by an emphasis on technical details of realisation occasionally registered in intelligible ways by composers, (2) and analyses of electroacoustic pieces often become attempts to build a utopian bridge between poiesis and esthesics. (3) Electroacoustic composition is deeply intertwined with the technology that makes it possible, but technology is apparently renewed at a faster rate than its potential can be explored. If analytical research and criticism of electroacoustic music were confined to compositional preoccupations, the effort would most probably result in disparate esoteric theories bearing little relevance to the development of the genre as a cultural fact, and contributing little to its understanding and wider diffusion.

Theoretical approaches to electroacoustic music are predominantly perceptual, despite the objection that "if a level of auditory perception can be identified that provides a grounding for describing relevant attributes of electroacoustic sounds, both in isolation and combination, then the resulting descriptions might offer a relatively neutral method of discussing compositions and compositional practice, quite unlike the highly personal discourses available". (4) However, when a piece of theoretical work is dismissed as "highly personal", it seems that an essentially conceptual problem masquerades as a mere terminological dispute.

Electroacoustic musical thinking is unique in that it does not lend itself to be conceived of as a whole unified by a conceptual framework such as the pitch/timbre/duration reductionist paradigm that tacitly dominated centuries of western musical production. When any sound is potentially musical, the actual musical value of a sound is redefined within each composition, and its identity is constantly reinvented.

Although it is not an idiosyncrasy of electroacoustic music to challenge usual conceptions of musicality and "definitions" of music, the experience of electroacoustic music most deeply challenges listening habits and musical preconceptions accumulated and built over a lifetime of acculturation. The plurality of styles in electroacoustic composition suggests a motion towards the development of a new musical intelligence. Nevertheless, music is a perceptual experience, and a new musical mind, however multifaceted, cannot be conceived independently of an intelligent ear.

The adoption of a perceptual approach to analysis naturally raises issues concerning perception, and assumptions on aural perception are inevitable. Nevertheless, the wide spectrum of potential listeners seems to be reduced to two extremes. On the one hand, an impossible "naive listener" is conceived, a sort of unprejudiced listener who would be able to grasp electroacoustic structures without any previous knowledge of the genre. On the other hand, the experience of electroacoustic music seems to be confined to a minority of "competent listeners" who have "integrated the musical language used in a work". (5) Such assumptions on listeners' abilities equally contribute to reinforce the exclusiveness of the electroacoustic community, as well as its fragmentation, to the detriment of a deeper understanding of the music itself and the actual perceptual processes involved in its appreciation.

This article presents a perceptual analysis of Jean-Claude Risset's *Sud* within a framework based on Gregory Bateson's Theory of Mind. (6) The next section reviews very briefly the fundamental theoretical assumptions and presents the analytical framework. Section 3 presents an overview of the piece, which is then commented in detail in sections 4 to 6. Section 7 remarks on some of the ontological imagery suggested by the piece. A glossary is attached that contains short descriptions of analytical terms, to which links are provided.

2. Conceptual Framework

Epistemological stance

Bateson's Theory of Mind is particularly suitable to provide a conceptual background for the analysis of electroacoustic music because it implies a series of notions such as hierarchy and context which are consistent with both the complexity of electroacoustic musical structures and the transcontextual nature of many electroacoustic materials. It is beyond the scope of

this article to present Bateson's theory and how it was adapted to provide a conceptual basis for the analysis of electroacoustic music, so in this section I will present only the basic assumptions omitting detailed discussions. (7)

The core of the theory involves a discussion of epistemological issues raised when a parallel is drawn between the processes of thought and evolution, leading to a broad definition of mind as an aggregate of interrelated parts that satisfies a certain set of criteria. These criteria arise from a synthesis of concepts borrowed from both information theory and Russell's Theory of Logical Types, (8) implying also notions of a more cognitive nature, despite the lack of explicit reference to cognitive psychology. Bateson's theory is proposed as "an attempt to propose a sacred unit of the biosphere", (9) providing a holistic view that integrates issues as varied as ecology and thought, learning and mental pathology, including also fragments of a theory of aesthetics.

In particular, the epistemological stance outlined implies that perception is a process comparable to thought. According to Bateson, perceptual organisation is immanent in the physiology of the brain, but our percepts, the images through which we know and learn, are objects integrated by perception in a dialectic between concept and sense-data, which Bateson describes as form and process, respectively. Thought, and assumedly perception, is thus classification: "every image is a complex of many-levelled coding and mapping". (10) Thus, one relevant implication of Bateson's theory is that perception is not a naive process, that is, a process that occurs independently of contextual aspects and conceptual knowledge. This is particularly important when perception of electroacoustic music is concerned.

The definition of context is a necessary step towards outlining an analytical framework based on perceptual aspects, since musical analysis is based on a definition of the units upon which music is constructed. Nattiez(1990) suggests that an analysis of the neutral level of a musical work enables the analyst to apprehend these units as traces left by the composer at that level. (11) In approaching music composed using conventional musical notation, for instance, the analyst can tacitly rely on the assumption that the music can be explored based on the traditional conceptual framework centred on pitch. However, in a perceptual approach to the analysis of electroacoustic music, the definition of these basic units becomes a crucial level of analytical effort.

When the objects of analytical inspection are not predetermined, the analytical approach must comprise elements that outline ways in which music can be segmented, that is, the approach must include elements that define the *identity* of those objects. The notion of identity suggested here differs from the connotations of the term within experimental psychology. In psychology, identification requires both recognition and labelling. In this article, a concept of

identity arises from Bateson's discussion on relationship.

Bateson argues that relationship "is not internal to the single person; it is nonsense to talk about 'dependency' or 'aggressiveness' or 'pride' and so on; all such words have their roots in what happens between persons, not in something-or other inside a person". (12) Bateson's argumentation highlights the close connection between identity and context. Identity is not an absolute, but rather a product of relationship.

The process of identification of a material object, for example, entails opposition or contrast with a background to delineate what belongs and what does not belong to the object, its inside and its outside. From this perspective, identity is the quality of being specified in a complex of mutual relationships with that which is taken as background. Identity also arises from a dialectic between form and process: identity is invariably multifaceted, as multiple are the manners in which a context may be segmented or divided into parts. Hence, an idea of meaning is implied as a hierarchical construct that imparts relatedness among identities within a context. Consequently, listening abilities must be a function not only of attention and focus, but primarily of the bulk of concepts that listeners might employ to make sense of what they hear. When listeners experience a musical discourse, this bulk of concepts is central to determine not only the segmentation of the discourse into units, but also the nature of the relationships among these units.

Clearly, music is not conceived as an abstract object that exists in a contextual, cultural, epistemological void. Concepts of music are closely associated with notions of what is *musical*: what belongs to the domain of music as opposed to what does not. From an epistemological perspective, outlining the 'musical' parallels an interpretation of the dichotomy intrinsic versus extrinsic. Intrinsic - that which is internal - and extrinsic - that which is external - in music are culturally determined. They reveal an epistemic basis that includes a concept of music characterised by an emphasis that lies somewhere on a self-referential/referential axis. The chasm brought about by contemporary acousmatics (13) provides both an open end for new musical developments and a framework for the examination of tacit assumption of traditional musical thinking, highlighting the cultural - therefore relative and partial - nature of these assumptions.

A pivotal assumption in usual ways of thinking musically - which has been continuously challenged practically from the beginning of the twentieth century - is precisely the classification of some objects as musical instruments. This is not to dispense with the function of the traditional instrument as a man-made artifact that embodies in many cases centuries of evolving expertise. The essential issue here is that assuming some objects as musical implies assuming some sounds as musical to the detriment of others. However, when sounds are

dissociated from their physical origins and any sound is potentially musical, the legitimacy of accepting the musical instrument as intrinsic to the musical domain is challenged. For music composed to be delivered through loudspeakers, it makes more sense to conceptualise *intrinsic* as that which pertains to the *sonic* domain - perceived through reduced listening (14)- and *extrinsic* as the *extra-sonic*, which includes the attribution of source-causes. Intrinsic and extrinsic are epistemologically complementary, and these concepts *must* be understood as methodological artifacts.

From this perspective, the identity of a sound within a musical situation is a holistic entity that embraces an intrinsic and often a clear extrinsic facet. When identity is viewed as the product of relationship with a background, transcontextuality (15) may be interpreted as the potential of sounds to suggest identities which relate to a background that is external to the sonic. This implies that the perception of segmentation and structure of an electroacoustic musical discourse is a process that integrates intrinsic and extrinsic connotations - associations. Electroacoustic music listening is characterised by a complementarity between intrinsic and extrinsic connotations that are brought into play to redefine the identity of sounds within each composition.

Analytical Framework

Segmentation

The analytical approach adopted here provides a conceptual framework for the identification and the description of *sonic structures*, the perceptual entities that correspond to *Gestalten*(16) distinguished within a musical context. A sonic structure is animated by the context in which its existence is grasped and ultimately justified. The concept comprises the idea of wholeness, unity, being comparable to an apparently detachable object within a context of multiple interrelated objects. Relationships between sonic structures are described as *articulation*, and the musical discourse is conceptualised as a complex of interrelated sonic structures.

Elements of coherence are proposed as perceptual features that work together to outline the identity of sonic structures. These elements contribute to the coherence of sonic structures, constituting the bases for their articulation into a variety of structural levels, and thus contributing to the coalescence of the musical discourse as a whole. The separation of these elements into categories is also a theoretical construct, which incorporates several facets of electroacoustic thinking but aims at accommodating a wider variety of perceptual abilities. The following perceptual features are proposed as elements of coherence: spectral type, morphology and motion, character, surrogacy, spatial imagery, symbolism and ontological meanings.

Spectral type concerns pitch content and organisation, being studied within Dennis Smalley's Typology. (17) *Morphology* and *motion* relate to the temporal unfolding of sonic structures within the dimensions of pitch, loudness, character and location (in the left-right space of the stereo recording). These are studied within a framework based on Smalley's concepts of Morphology, Motion types and Motion styles. (18) *Character* is suggested as a gestaltic percept that corresponds to an amalgamation of qualities of a sonic structure. Although character may be interpreted as timbre when associated with instrumental surrogacy, this first set of perceptual elements is predominantly sonic, once they operate within the framework provided by reduced listening.

Surrogacy corresponds to associations between sonic occurrences and physical source-causes. (19) A surrogacy continuum is suggested to represent the proximity between perceived sounds and sounds created with the associated source-causes; surrogacy is explored within the three main regions of this continuum: immediate, intermediate and remote. *Spatial imagery* comprises images integrated into a virtual acoustic space, an imagined physical space in which sounds diffuse. When sonic structures are integrated into a whole within a musical context in connection with a virtual acoustic space, this whole consists of a *sonic field* or a *soundscape*, the latter associated with a clear extrinsic identity. *Symbolism* is proposed as a level of archetypal imagery related with cross-cultural symbols alluded to through sound. Finally, *ontological meanings* comprise all other imagery that arises from the listener's personal holistic experience, accounting for the most idiosyncratic and less intersubjective aspects of listening.

In the initial listening sessions the analyst identifies the elements of coherence that are central to the perception of relatedness among sonic structures in the piece, allowing the characterisation of the discourse as aural, mimetic or combined. (20) Articulation is centred on the percepts of contrasts and similarities among sonic structures within the dimensions provided by those elements of coherence. Two modes of articulation are proposed as the general ways in which sonic structures are connected: juxtaposition and transformation.

When sonic structures are perceived in *juxtaposition*, perceptual focus is predominantly directed to their contrasting aspects. The basic structural level grasped through reduced listening is perceived as a juxtaposition of sonic events. However, the apprehension of the musical discourse as a whole brings into play other modes of listening, which contribute to the coherence of these basic sonic events into the sonic structures that the listener effectively deals with. These sonic structures may still be perceived in juxtapositions that highlight contrasts of surrogacy order, extrinsic identity or spectral type, for instance.

On the other hand, a *transformation* directs perceptual focus centrally towards similarities

between sonic structures. A combination of sonic structures is perceived as a transformation when either a sole extrinsic identity is persistently suggested throughout sonic modifications, or different extrinsic identities are united through similarities at the sonic level. Juxtapositions may be perceived in connection with any of the elements of coherence, but transformations require extrinsic associations that provide the basis for the percept of change.

Clearly the listener may focus upon similarities between juxtaposed structures, or on contrasts within a transformation. Indeed, perception of the musical discourse is altered by repeated listening, and perceptual focus shifts across the variety of structural levels suggested in an electroacoustic piece. However, the characterisation above accounts for the coherence of several sonic structures into a higher structural level within the musical discourse.

Figure I summarises the analytical framework explained briefly above, stressing the complementary nature of intrinsic and extrinsic elements in outlining the identity of sonic structures.

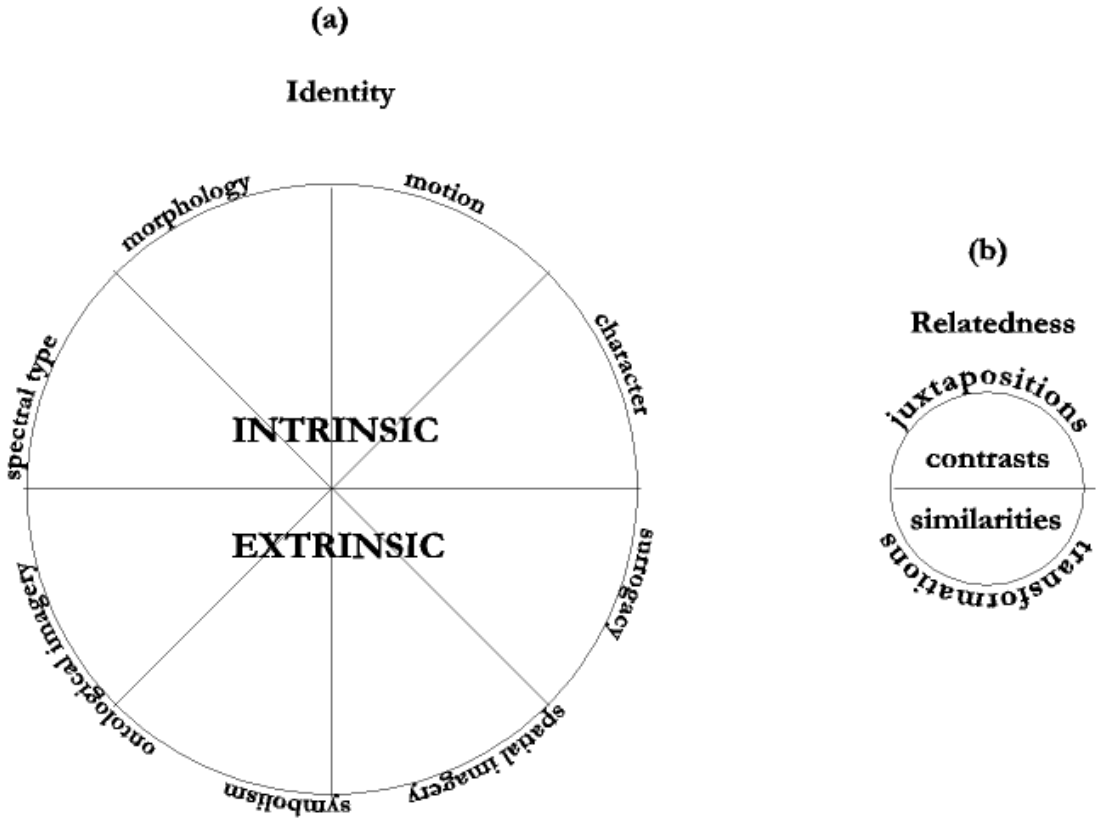

Fig. I: Schematic representation of the analytical framework

3. Overview of the piece

Sud is a piece that revolves around the manipulation of surrogacy, spatial imagery and motion. Extrinsic identities are suggested at various structural levels, from the basic sonic

elements to complete soundscapes. The main extrinsic identities - the sonic subjects noted below - contribute to the perceived unity of the piece at several levels, ranging from the sonic to the symbolic. Despite the predominance of a mimetic discourse, the piece also provides several instances of purer sonic articulation, particularly in the second movement. *Sud* presents a variety of contexts that cohere into different sonic fields and soundscapes, articulated within a framework dominated by transformations.

The first movement of *Sud* presents the central sonic subjects of the composition, which include the sounds of sea waves, as well as sounds of birds and insects. A harmonic framework that permeates the third movement of the piece is also introduced. The predominant elements of coherence comprise surrogacy and spatial imagery, and articulation is perceived centrally in terms of transformations, both as changes of character whilst an extrinsic identity is maintained as well as changes of extrinsic identity through subtle juxtapositions.

The second movement explores several elements introduced previously and incorporates new aspects inherent in a predominantly aural discourse. In contrast with the introductory movement, the listener deals much more with sonic contrasts and combinations. Surrogates of environmental and instrumental sounds are identified, but perception of the musical discourse is much less direct and holistic. Unlike the introductory movement, environmental recordings are seldom perceived, and the whole movement is endowed with a distinctly abstract character. However, allusions to the sounds of the sea waves are suggested, as the accumulation/dissipation pattern is often identified. Additionally, simultaneous structures that follow synchronised trajectories in loudness suggest the image of energy transfer, a metaphor for the relationship between instrumentalist and instrument. In these instances of mimetic discourse manipulations of spectral and motion types are combined to suggest the image of different instruments activated by bursts of energy provided by the wind and the sea. The central elements of coherence are motion and surrogacy, and articulation is perceived in terms of a balance between transformations and juxtapositions.

The final movement is marked by the return to a predominance of mimetic discourse. Harmonicity is explored within a framework based on the manipulation of motion and surrogacy. Immediate and intermediate surrogates of the sounds of the sea waves, birds and insects, are integrated with harmonic structures to suggest the image of harmonic instruments literally 'played' by these environmental events. A variety of surreal soundscapes is thus suggested, and the movement is characterised by an exploration of the gestural content of the environmental sounds.

revista **Opus 8**
fevereiro 2002
ISSN - 1517-7017

4. First Movement (9'45)
Sectional Arrangement

The first movement of *Sud* may be perceived as a sequence of soundscapes and sonic fields represented as the subsections shown in figure I below. Transitions between subsections are characterised by subtle transformations of character and juxtaposition of extrinsic identities, as discussed below. The various subsections cohere into sections that suggest a general construction plan for the movement.

The first section (0'00 - 2'49) presents the sonic subjects of the movement, indeed many of the subjects of the composition. It is dominated by mimetic discourse and the manipulation of environmental soundscapes. The transition between sections I and II is the only instance within *Sud* in which an abrupt interruption is perceived. This pause creates expectation regarding the continuation of the musical discourse. The previous development suggested a sequence of soundscapes clearly connected with extrinsic identities. The second section (2'49 - 5'44) then presents a sequence of sonic fields that suggest extrinsic identities only at the level of basic structures, being dominated by an aural discourse. The identification of relationships between Gestalten occurs in a much less direct way, inviting the listener to penetrate the abstract world devised by the composer with a different approach. The third section (5'44 - 9'45) marks a return to the manipulation of environmental soundscapes, being characterised by a balance between mimetic and aural discourses.

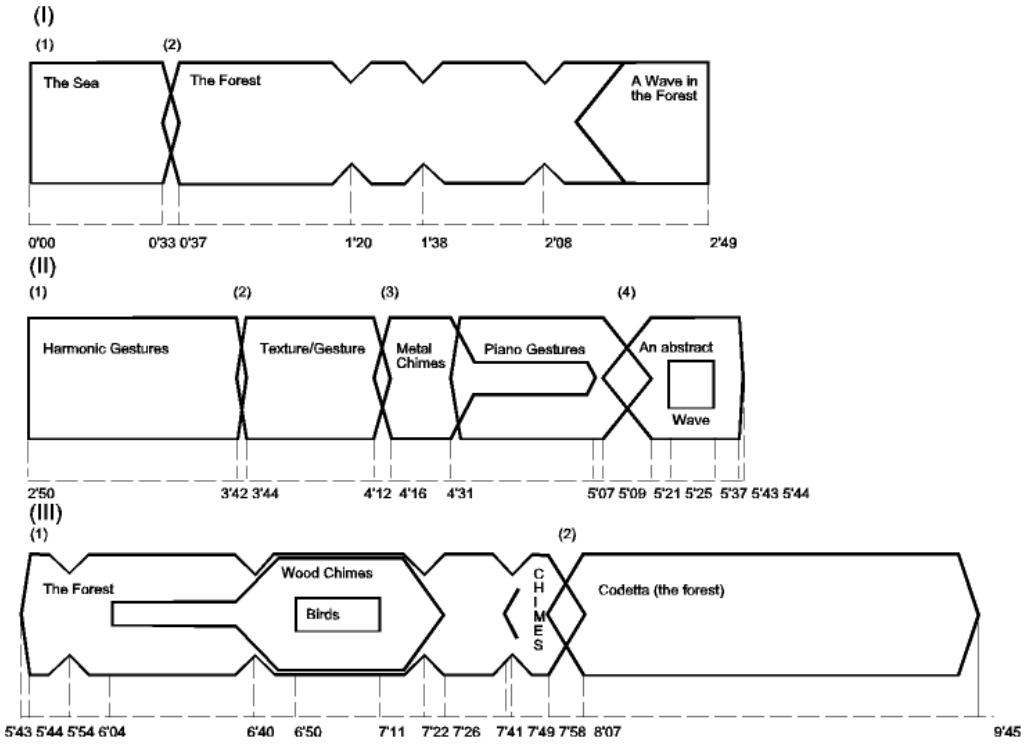

Fig. I: overview of sectional arrangement for the first movement of *Sud*.

Typology

The first movement of *Sud* exhibits a predominance of mimetic discourse. Perception of sonic structures relies predominantly on the listener's holistic experience with sounds rather than on sonic details apprehended through reduced listening. Although contrasts of spectral types are important elements that contribute to the coherence of sonic structures, sonic manipulation provides a basis into which the listener does not frequently need to delve for perception of the musical discourse.

However, contrasts of spectral types are particularly important in the transition between subsections II.1 and II.2. Although coherence of these subsections is connected more with motion, the transition is characterised by a striking contrast between harmonic and noise types which predominate in each subsection, respectively. Subsection II.1 provides a context dominated by harmonicity, within sonic structures and between them.

More importantly, spectral type provides a pivotal feature of *Sud*. At 5'25 in section II.4 a harmonic structure is introduced that provides a framework explored throughout the composition. The framework suggests major/minor diatonic relationships, although these are more clearly perceived in the subsequent movements, when the framework is identified within other structures. In particular, this framework is a central aspect in the third movement, which presents unique combinations of environmental sounds (immediate or intermediate surrogates) and harmonic structures.

Morphology and Motion

These elements are particularly important as bases for the manipulation of surrogacy, in addition to their relevance to articulation within section II. Indeed, a variety of morphology and motion features in *Sud* are abstracted from the sounds of the sea waves that introduce the piece. The accumulation/dissipation pattern emerges in association with the turbulent motion of water that underlies the formation of waves. Granularity and grittiness characterise the dissolution of waves in reflux. This energy pattern and these textural qualities are explored in a variety of juxtapositions throughout the piece.

In the first movement these features are manipulated in two instances as basis for articulation centred on surrogacy. The first instance occurs at 2'08 in subsection I.2., when a granular texture following an accumulation/dissipation loudness trajectory is juxtaposed with several sonic occurrences within the soundscape of the forest, suggesting a surreal wave within this soundscape. Subsequently, in subsection II.4 a similar granular texture is juxtaposed with a harmonic structure that follows that energy profile, suggesting a wave of abstract elements.

Section II is dominated by aural discourse, and contrasts provided by the manipulation of

morphology and motion types are paramount. In subsection II.1 a variety of motion types is identified, such as undulating trajectories in loudness and accumulation/dissipation motion in the pitch space. Despite the synthetic character of the basic structures and the subsection as a whole, links with the real acoustical world are provided by these trajectories, and the subsection predominantly suggests the image of gestural intervention. Structures are perceived as fleeting motion in the several sonic dimensions, in connection with the trajectory types and their average duration. This image is suggested independently of the structure being a stream, a coherent sequence or a body of sound in effluvial state. The predominant harmonicity noted above provides the listener with a known basis upon which different profiles are superimposed. However, an unusual context is created, in which information is conveyed on a 'harmonicity as carrier' basis. (21) Coherence is perceived in connection with the gestural content of the structures, and the idea of harmonicity as a support to harmony is denied.

In addition to the contrasts of spectral types, the transition between subsections II.1 and II.2 is marked by a contrast between the temporal frameworks suggested by each subsection. Subsection II.2 is characterised by long-duration ascending motion. This tendency is followed by all structures, suggesting a build-up of energy content, particularly in the pitch space. The transition to subsection II.3 suggests the application of this energy to the creation of a new sonic event. The energy accumulated is not lost; it is transferred into another sonic occurrence. In retrospect, what was previously an abstract complex of textural elements can be understood as a slow gesture.

Character

Manipulations of character are an important basis for the articulation of surrogacy, particularly in the transitions between and within sections. Transitions consist predominantly of transformations, and shifts of surrogacy level and extrinsic identities integrate transformations of character, in terms of subtle juxtapositions of structures that suggest contrasting characters.

In particular, this sort of transformation of character underlies three central transformations in the following contexts: the transition between sections I and II, subsection II.3, subsection II.4 and subsection III.1. All these transformations are related with shifts of surrogacy level created by juxtapositions of character, but the central element of coherence in all these cases is an extrinsic identity. These transformations are reviewed in more detail below.

Contrasts of character feature as elements of articulation in section II.1, a context dominated by harmonicity. In addition to articulation of motion and morphological types, the subsection

provides contrasts of character upon which the listener may alternatively focus.

Surrogacy and Spatial Imagery

Surrogacy and spatial imagery are the central elements of coherence in *Sud*. In the introductory movement environmental and instrumental sounds are perceived predominantly as either immediate or intermediate surrogates, and several subsections cohere in connection with the contrasts of extrinsic identities associated with different soundscapes. These elements of coherence work together in the integration of different intrinsic identities into one extrinsic identity, which dominates the musical discourse.

The piece begins with sounds of clear environmental origin: the sea. This identity is contrasted to the immediately succeeding identity: sounds of birds and insects suggest the soundscape of a forest or a field. Sounds that strongly suggest metal chimes, piano and wood chimes are also perceived, and these identities are contrasted to one another to provide coherence of the related sonic structures.

As suggested above, surrogacy is manipulated in variably subtle transformations and juxtapositions that contribute to the coherence of structures of different characters according to the framework of one single identity. Subsection II.3 presents a variety of sounds that cohere into two *Gestalten*: sounds of a metallic character suggesting metal chimes, and piano sounds. The listener perceives a transformation of the surrogacy levels suggested by the basic structures within each *Gestalt*, based on a subtle manipulation of their character. The starting situations are not completely dissociated from the real sounds so much as to mask their instrumental origins, and the extrinsic identities suggested provide the basis for perception of the variety of sonic occurrences as a single structure.

In contrast with these structures, whose perception as associated to extrinsic identities is rather straightforward from the very initial listening sessions, several granular structures introduced at 6'04 in subsection III.1 are grouped into one *Gestalt*, in connection with an extrinsic identity that is not clearly presented. The structure as a whole undergoes an uninterrupted transformation in character as the basis for manipulation of surrogacy, but immediate surrogates are not identified. Indeed, the percept of this *Gestalt* is acquired only if the listener intentionally focuses upon its internal motion. Sometimes the structure merges with the context in which it exists, integrating a texture within the soundscape. Other times it dominates the soundscape as an identity on its own. The structure dissolves completely at approximately 7'22, but reappears shortly after, at approximately 7 '41. Towards the end of the subsection it merges back into the soundscape; it is then perceived as an event within that soundscape and not as the predominant identity. The percept of the whole suggests undulating

motion around an identity that is only hinted at. The identity of wood chimes is cognised in retrospect, in connection with the end of subsection I.2, when sounds of clear instrumental origin are perceived.

Interesting manipulations of surrogacy are connected with the creation of surreal soundscapes in subsections I.2, III.1 and III.2. In these contexts the extrinsic identity of the forest is suggested through the sounds of its inhabitants, insects and birds. However, subtle sonic juxtapositions provide the basis for transformations in character and manipulation of surrogacy. Surrogates of contrasting orders are juxtaposed in such a way that the listener's perception of surrogacy at the various structural levels is constantly challenged. At the same time that apparently environmental sounds are perceived, sounds of unclear origin are identified. Subsection I.2, for instance, may be perceived as a slow transformation in four central instances. Although motion in the stereo space tends to constantly challenge this segmentation along different listening sessions, in the first and second instances a sense of artificiality predominates, the third instance is more clearly perceived as a piece of environmental recording, and the last instance comprises the transition to the subsequent section.

Subsection III.1 provides a context in which a balance between mimetic and aural discourses is achieved. At the same time that the extrinsic identity of the forest soundscape provides a framework for unification of the subsection, purely sonic relationships tend to predominate at different instances within the subsection and in different listening sessions. Initially (5'54) random pitch trajectories that suggest the sounds of insects coexist with sounds of real insects. Subsequently (6'50), grain-streams sharply focused in pitch suggest birds songs. The regularity of the motion exhibited by these streams, as well as their strict rhythmic pattern, suggest that these structures are indeed intermediate surrogates. At 6'17 ascending pitch trajectories are superimposed to a low-loudness noise band that suggests the image of a storm approaching. Motion within the stereo space is paramount in reinforcing the image of distance within the virtual acoustic space. At 7'11 this same arrangement is represented, but this time it dominates the soundscape. The image of rain is suggested, in connection with a pattern of accumulation/dissipation identified within the noise band. Several high-pitched grains occur, suggesting intermediate surrogates of insects sounds. In addition to these extrinsic connotations, the subsection provides a context that explores relationships between textures of different natures, including the juxtaposition of monomorphological textures that cohere into polymorphological textures, and the contrasts between textures of different densities.

The ending of section also comprises a shift of surrogacy level of basic constituents that cohere into a *Gestalt* in connection with the extrinsic identity of wood chimes. This sonic

structure comprises isolated grains and short grain-streams of an artificial character slowly transformed into a non-dense texture of clear instrumental origins. The structure as a whole follows an ascending trajectory in the pitch space, and reminds the listener of the turbulent motion of liquids. Towards the end of the transformation, the wooden character of the grains is clearly established. From the forest soundscape emerges a structure that is alien to this soundscape. However, in retrospect the structure finally modifies the character of the soundscape by re-merging with it. The structure's profile provides a link with the materials presented in the previous subsection. Instead of a wave which element is water, the listener might imagine a wave of sounding elements within the forest. A surreal soundscape is created within a context that provides a remote surrogate for the sounds of the sea waves. Surrogacy is thus manipulated in conjunction with morphology and motion at different structural levels.
A similar manipulation of surrogacy at distinct structural levels is perceived in subsection II.4. The identity of wood chimes provides a framework for the coherence of a variety of granular occurrences that undergo a continuous transformation of character and suggested surrogacy level. This granular texture also suggests the turbulence of water in motion, and its juxtaposition with the harmonic structure presented at 5'25 alludes to the sound of the sea waves, as commented above.

5. Second Movement (5'49)
Sectional Arrangement

Figure II shows the perceived segmentation of this movement of *Sud*. The first section (0'00 - 1'32) presents the central sonic subjects, which include a bell-like structure (A), inharmonic and noise-based elements, a harmonic framework introduced in movement 1 (B), and the sounds of the sea waves, introduced at 0'57 in the only instance of a clearly environmental recording within the movement. The transition to the subsequent section is marked by the substitution of a prominently mimetic context for a new context that suggests no direct links with environmental or instrumental sounds. The second section (1'32 -4'26) is dominated by noise-based structures, creating a contrast of surrogacy levels in that transition, although there is a perceived affinity between the contexts based on the grittiness that both display. The third section (4'26 - 5'49) is characterised by a balance between mimetic and aural discourses. The section may be perceived both as a reference to the first movement and a prelude to the final part of the composition, as allusions to the sounds of the sea waves are central to articulation. Additionally, spatial imagery in the second movement of *Sud* provides a transition between the real and surreal soundscapes that tend to predominate in the first and last movement of the piece, respectively. Despite the perception of immediate surrogates, including sounds of the sea waves, spatial imagery in this movement is perceived more in terms of sonic fields rather

than complete soundscapes with extrinsic identities referring to the real world.

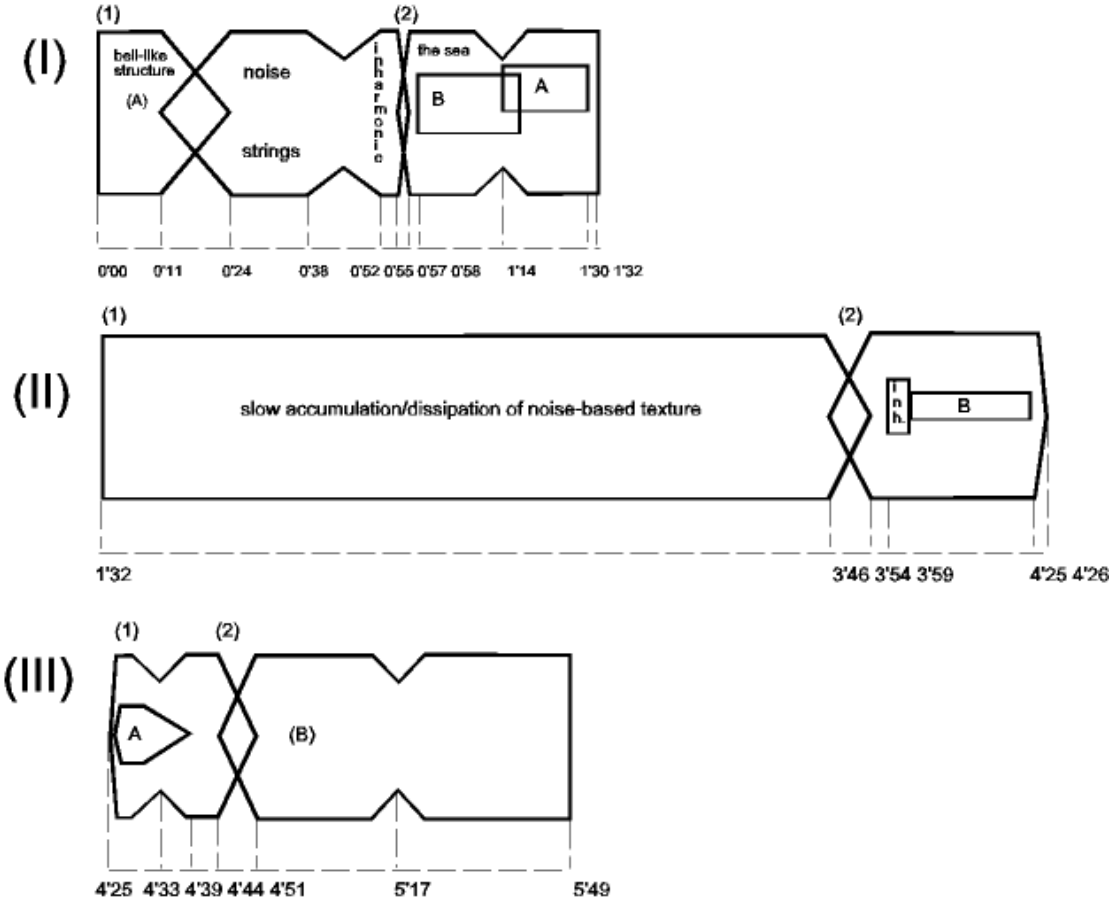

Fig. II: overview of sectional arrangement for the second movement of *Sud*.

Typology and Character

Contrasts of spectral types are specially important in this movement of *Sud*. In particular, contrasts of spectral types are perceived in subsections I.1 and II.2 as the basis of transformations that alter the character of the subsections. Additional contrasts in subsection II.2 provide the basis for the manipulation of motion and surrogacy, similarly to the manipulations perceived in subsections I.2 and III.2. In these subsections harmonic structures are contrasted to noise-based structures perceived simultaneously, and coherence is associated with motion and surrogacy.

Subsection I.1 exhibits a transformation of character based on the juxtaposition of noise-based and inharmonic structures. A predominantly noise-based context is gradually transformed, with the introduction of inharmonic structures from 0'37 onwards. Subsection II.2 presents a shift of predominant spectral type that culminates in the presentation of the harmonic framework introduced in movement 1. Inharmonic structures are presented at 3'46, 3'51, 3'54 and 3'59, followed by a sequence of harmonic structures in which clearer percept of

partials is gradually established. All these structures suggest a same region in the pitch space, and their sequential presentation is perceived as a transformation that activates that region in different ways, suggesting motion within the typological continuum from inharmonic to harmonic types. Nevertheless, reduced listening must be used to identify this transformation, and repeated listenings are necessary. Stronger coherence of these structures is connected with motion.

The harmonic framework B is also perceived in subsection III.2, providing the basis for the coherence of a sequence of structures that exhibit slightly different characters. Previous structures suggesting this framework might be simply compared to chords, whereas in this subsection the major and minor diatonic relationships are gradually brought to the fore in this sequence that culminates in what could be described as an arpeggio.

Motion and Surrogacy

Motion is a pivotal element of coherence in this movement. The accumulation/dissipation pattern is identified throughout the movement, and various juxtapositions provide the basis for a variety of allusions to the sounds of the sea waves. Additionally, perception of simultaneous structures following synchronised trajectories in loudness suggest the image of energy transfer, a metaphor for the relationship between instrumentalist and instrument. Manipulations of spectral and motion types are combined to suggest the image of different instruments activated by the wind and the sea waves, particularly in subsections I.2, II.2 and III.2.

In each of these subsections the harmonic structure B is perceived in association with a noise band, although the arrangement is not merely repeated. The energy profile of the sea waves is suggested, despite the discrepancies between the loudness trajectories, as well as the slight differences of character of B in the three instances. Additionally, in all three cases A follows a loudness trajectory that parallels the evolution of the associated noise band, suggesting an imaginary instrument sounding under the impact of the wind.

In subsection I.2 structure A is perceived in a similar association with the sounds of the sea waves, which underlie the whole subsection and provide a pivotal aspect of its coherence. Structure A corresponds to the juxtaposition of an inharmonic structure with a noise band that follows an undulating trajectory in the pitch space, suggesting a bell-like identity as a remote surrogate, as there is no image of gestural intervention. A introduces the movement, following initially a planar trajectory in loudness, and then dissolving in a gradual descending trajectory in this dimension. However, in subsection I.2 A follows repeated instances of ascent and descent in loudness, in synchrony with the environmental sounds. The image of energy

transfer between these events is suggested.

The accumulation/dissipation pattern is central in the coherence of subsection II.1. This subsection comprises a variety of noise-based structures that follow descending trajectories in pitch and descending trajectories in loudness. Motion in the stereo space is prominent, and remote surrogacy for Doppler effect is suggested. Despite this allusion, the context exhibits an abstractly dynamic character, and may be perceived in retrospect as a slow accumulation/dissipation of a densenoise-based texture. The pattern is most markedly perceived between 3'03 and 3'27, and at 3'14 the whole context reaches its maximum dissipation, although it does not disappear completely.

The accumulation/dissipation pattern is also identified within the sequence of inharmonic structures presented from 3'46 onwards in subsection II.2, as well as in the sequential presentations of B. In this subsection narrow noise bands following descending trajectories in pitch and ascending trajectories in loudness are presented sequentially. In this context the image of energy transfer is suggested, suggesting that B is produced by an instrument activated by the wind, and creating a surreal soundscape.

Motion is central to articulation in subsection III.2, which presents a noise band following repeated instances of accumulation/dissipation, particularly between 5'10 and 5'17, when a polymorphological texture is introduced. This texture then dominates the subsection, suggesting a remote surrogate for the turbulence associated with liquids in motion. From 5'24 onwards, sparsely presented sounds are perceived that clearly suggest the identity of metal chimes, creating a striking contrast of surrogacy levels. A similar context is presented in subsection I.1, when a stream of short duration sounds is perceived that suggests the attack-decay archetype which characterises plucked strings. However, only intermediate surrogacy is suggested in this instance.

6. Third Movement (8'00)
Sectional Arrangement

The perceived sectional arrangement of the third movement of *Sud* is represented in figure III below. The coherence of subsections into sections in this movement tends to occur differently from the way in which it takes place in the previous parts of this composition. In this movement the discourse flows towards suggesting a sequence of surreal soundscapes that cohere in hindsight. The symbolic connotations are paramount to this coherence, much more strongly than in the previous movements. In this sense, the third movement of *Sud* brings together all the elements suggested previously and integrates them into a clearly symbolic framework. The sectional arrangement shown in figure III is, thus, much more clearly a construct than the arrangements of the previous movements, suggesting that *Sud* is a piece of

immense richness and appeal to the listener's imagination.

The movement may be perceived in three sections, each comprising a number of subsections that correspond to the predominance of a given perceived soundscape. Given the strong symbolic facet of this movement, titles for the sections and subsections are suggested, tentatively expressing the perceived and imagined connotations. Section 1 (0'00 - 3'29) is marked by the presence of harmonicity in several forms. Most sounds that suggest extrinsic identities are intermediate surrogates, which are intertwined with harmonic structures in several ways. Subsections 1 (0'00 - 1'21) and 2 (1'21 - 2'39) are perceived as a preparation for subsection 3 (2'39 - 3'29), when harmonicity dominates the soundscape. However, harmonicity is not perceived as an abstract invention superimposed on to the environmental surrogates: indeed, the discourse suggests that harmonicity emerges from soundscape. Essentially, section 1 suggests that harmonicity is an aspect originally embedded in the world of environmental sounds and can be perceived if the listener 'tunes in' to it.

Section 2 (3'29 - 6'08) carries on the theme of a 'harmonic nature', being marked by the sounds of birds and insects continuously transformed. Similarly to the previous section, the sounds in section 2 also are mostly intermediate surrogates. In subsections 1 (3'29 - 4'55) and 2 (4'55 - 5'22) there is a predominance of the 'energy transfer' image: a metaphor for the relationship between the hand that plays an instrument and the sound produced. However, in subsection 3 (5'22 - 6'08) the 'hand' and the 'instrument' fuse, with surrogates of birds and insects sounds changing into hybrids that integrate the sonic identities of birds, insects and metal chimes.

Finally, section 3 (6'08 - 8'00) suggests a return to the origins: the sea. The section is marked by a transformation related with the identity of the sea waves, perceived in three instances. Initially (6'08 - 6'55), harmonic structures suggesting the accumulation/dissipation pattern are perceived. Subsequently (6'55 - 7'21), intermediate surrogates with strong harmonic content predominate. Finally (7'21 - 8'00), immediate surrogates are perceived. Ontologically, this transformation may be understood as a cyclic closure to the concrete music programme: *Sud* begins with immediate surrogates of environmental sounds and follows a path from the concrete to the abstract, and the final section of the composition takes the listener back from the abstract to the concrete.

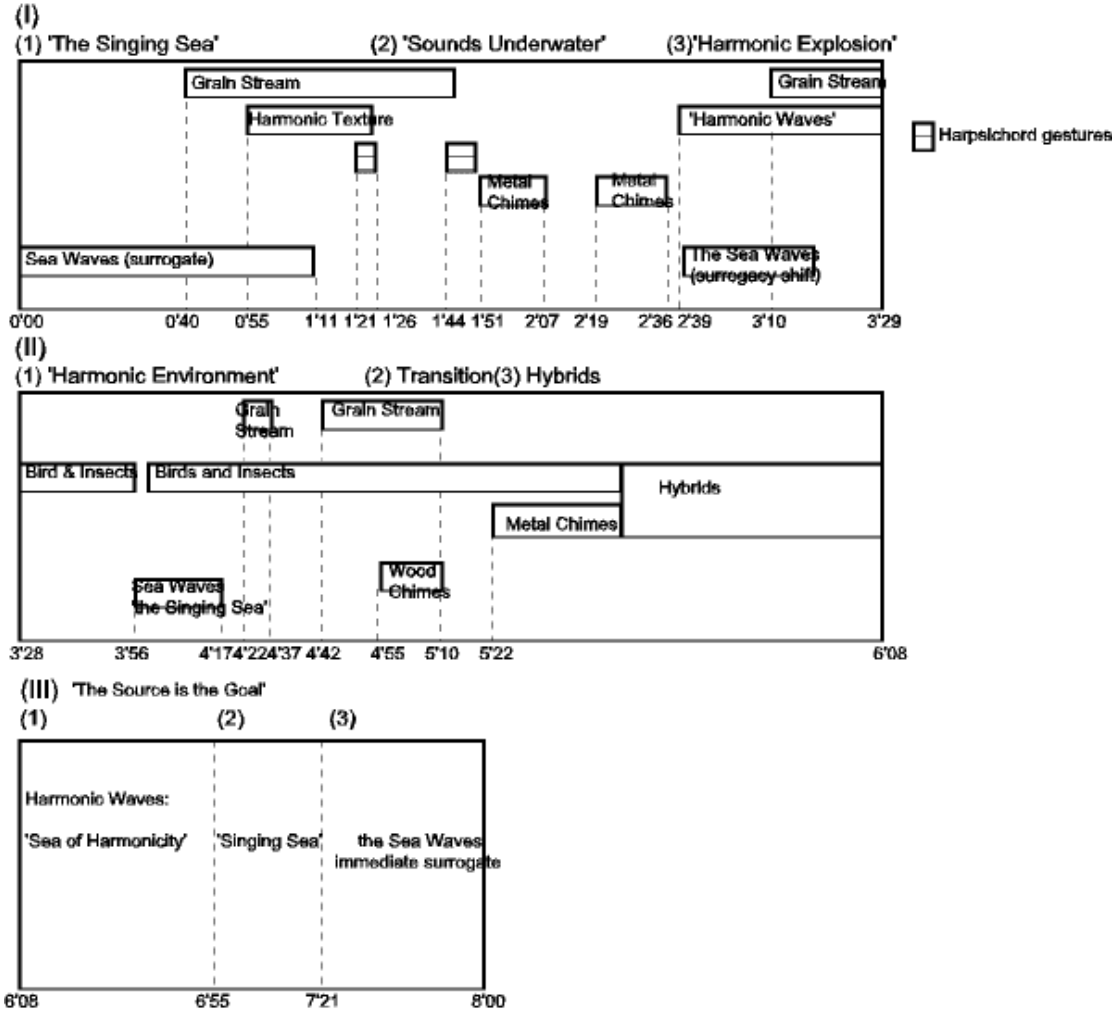

Fig. III: Overview of sectional arrangement for the third movement of *Sud*.

Typology

As suggested above, harmonicity is a central element of coherence in this movement of *Sud*. Indeed, the major/minor diatonic framework perceived previously permeates the whole of this third movement, characterising abstract textures, grain streams and even contributing to the coherence of intermediate surrogates of environmental sounds. Section 1, for instance, is perceived as a coherent whole in connection with harmonicity. A harmonic texture introduced at approximately 0'40 in subsection I.1 is transformed in its spectral type from note proper to note, and is eventually perceived as a textural complex with several pitch centres that evolve in a variety of trajectories. Subsequently, in subsection I.3 harmonicity is explored together with the accumulation/dissipation pattern to create a remote surrogate for the sounds of the sea waves, noted in figure III as 'harmonic waves'. Similar structures are perceived later in subsection III.1, noted in figure III as 'sea of harmonicity'.

Other interesting instances of perception of harmonicity are sections I.1 and III.2, both noted

in figure III as the 'singing sea'. In both cases, this refers to the perception of a complex that integrates the energy profile of the sounds of the sea waves and an element of harmonicity, which coheres at the symbolic level suggesting the image of the 'singing sea'. Also integrated at the symbolic level are the structures perceived in section II.1 and noted in figure III as the 'playing birds' and the 'playing sea'. In both cases the image of energy transfer is suggested, as if the birds and the sea were players of an imagined harmonic instrument that resonates under their impact.

Harmonicity characterises also the grain streams perceived in subsections I.1/2, I.3, II.2 and III.3. All these streams are connected by a similarity of character and suggest remote surrogacy. The grains suggest a note proper spectral type with clear pitch locus. The streams' random motion in pitch, together with their remote surrogacy create an interesting contrast within the surreal context in which they are identified.

Morphology and Motion

Together with spectral type, morphology and motion are the basic elements upon which surrogacy and spatial imagery are manipulated in this movement of *Sud*. As mentioned above, this third movement might be viewed as an exploration of the gestural content of environmental sounds, particularly the sounds of sea waves.

There are three central ways in which the gestural content of environmental sounds is explored in this piece. The discussion above mentions the accumulation/dissipation pattern identified in the sound of the sea waves and perceived in various instances throughout *Sud*; the image of energy transfer has also been noted. The third aspect of this exploration is perceived essentially in section 2: the iterative quality of the sounds of birds and insects. Throughout section 2 a variety of surrogates for the sounds of birds and insects are identified, and all these sounds are related to one another due to both their suggested extrinsic identities and their perceived iterative morphology. These surrogates also explore the major/minor diatonic framework noted above.

Surrogacy and Spatial Imagery

Most sonic structures perceived in the third movement of *Sud* are immediate surrogates of environmental and instrumental sounds. In addition to the sea waves, birds and insects, piano and harpsichord gestures are perceived, as well as the sounds of wood and metal chimes. These surrogates are perceived as combinations and/or modifications of the original sounds that create hybrids suggesting ambiguous or dual extrinsic identities. This intermingling of sound substances creates a strongly surreal musical context. There are also a number of

transformations that suggest a shift of surrogacy levels; an example is the transformation of the sounds of sea waves starting at approximately 2'40 in section I.3, which suggests a change from immediate to intermediate surrogacy.

An example of the intermixing of identities noted above is perceived also in section I.2. A variety of instrumental surrogates are perceived, with slightly modified character suggesting the intermediate region of the surrogacy continuum. These surrogates suggest the diffusion medium of the sounds is water, as opposed to the usual air, suggesting interesting associations at the symbolic and ontological levels noted below.

The most interesting instance of ambiguity of identities is perceived in sections II.2 and II.3. Indeed, starting at 3'59 in section II.1, surrogates of birds and insects sounds are perceived, and a gradual transformation starting at approximately 4'55 prepares the listener for the presentation of hybrid sounds that suggest a mixture of birds/insects and metal chimes.

7. Remarks on the Ontological Imagery and Symbolism in *Sud*

Sud is introduced with the sounds of waves rising and falling, following their natural cycle of reaching for and gradually dissolving in repeated meetings with the shore. Eventually, waves might encounter a dock, a pier, or the hull of an imaginary boat in which the listener is invited to travel. Nevertheless, the listener is not presented with an idyllic soundscape, beyond the reach of human intention, untouched. The contact between a natural element and imagined human artifacts suggests nature modified by human will and action. Indeed, *Sud* may be perceived as an encounter between human imagination and nature in two of its most powerful symbols: the sea, which is alluded to through the sounds of the waves, and the forest, which is alluded to through the sounds of its inhabitants. Both symbols allude to the female principle, the origin of life in complementary manifestations within different cultures and specific symbolic systems. (22) These symbols are brought together not according to an aesthetics of collage, but through an exploration of the essence of the environmental sounds, which are either modified or re-created with different substances. Obviously nature is not portrayed: it is re-invented or filtered through the imagination of the composer. In appealing to symbols so wide-spread in different cultures, *Sud* is pregnant with ontological meanings and symbolic connotations. Together with the perception of a limited set of sonic subjects, it is those meanings and connotations that bring together the three movements of *Sud*.

In cultures in which the sea played a vital role for subsistence, the sea is centrally connected with the concept of primordial creation, the origins of life. (23) Vishnu, one of the three faces of the Creator in Hindu mythology, responsible for the preservation and maintenance of Creation, dwells in a Sea of Milk, from which a variety of other mythological figures are

created. (24) In Greek Mythology Aphrodite is born from the foam of the sea. (25) Iemanjá, the mother of most orixás of the Afro-Brazilian pantheon, has the sea as her kingdom. (26) The idea of creation is personified in the figure of the Mother, which manifests the complementarity between giving and receiving, blessing and punishing, forgiveness and revenge. When Obaluaê is mercilessly abandoned by his mother Nanã, due to a contagious illness, Iemanjá receives the orixá in her bosom and heals him, always with a complacent and forgiving attitude towards the real mother. (27)In the Iliad Poseidon, the ruler of the sea, answers the prayers of Greeks and Trojans alike, only to eventually reveal his preferences for the former by striking down the Trojan priest who tries to warn his people of the dangers hidden within the infamous wooden horse. (28)

Within the framework of the female principle, the sea is also connected with the unconscious and the collective unconscious. It houses the 'monsters of the deep', related with the emotions and human sexual desire, with a curiosity that leads to adventure and experiment. (29) The Greek Sirens sang enchanting songs that would put the sailors into an irresistible trance, causing them to lose their course and dash their vessels to pieces on the rocks where the mythological creatures lived. (30)

The sea is also viewed as the repository and giver of treasures, as a source of nourishment and abundance. The fisherman is not simply the one who strives to harvest material sustenance: he becomes the seeker of items of knowledge, wisdom and truth, which can never be grasped completely. (31) In Christian symbolism the supreme and divine Fisherman is Christ himself, who has the fish as one of His symbols. Complementing this view is the view of the sea as the taker, the collector of sunken riches.

The sea also alludes to the limits of the world as known. The meeting of the sea and the sky gives birth to the horizon, a boundary that can never be really reached by the explorer, but which gives hope for those who wish for something new or long for something lost. Aegeus, the King of Athens, confidently awaits for his son Theseus to return from his journey to Crete, where the Minotaur terrorises the people with demanded human sacrifices. Theseus, however, forgets to change the black sails for white, as had been previously arranged with his father. In seeing the ship approaching with the black sails, the King assumes the son is dead and plunges himself in the rocky shores of Attika. (32)

Perhaps the most remarkable symbolism associated with the sea concerns the concepts of time and changes. Waters in flux are the mediating agents between the non-formal (air), and the formal, (earth) between life and death. The sea waters are not only the source of life but also its goal, and the return to the sea is the return to the Mother, or death. (33) It is interesting to note that the piece begins and ends with immediate surrogates of the sounds of

the sea waves, as if it were symbolising the unity of source and goal embodied in the sea. The tide represents the natural cycle of birth, growth and decay to which all life must inevitably submit. The accumulation/dissipation pattern, identified within the sounds of the waves, may be interpreted as this cycle dynamically imprinted on the sonic domain.

As suggested above, the forest also is linked with the female principle, the Great Mother. The forest is the place where life thrives without cultivation, without control. It symbolises freedom in a very irrational sense, in connection with instincts and animal traits. (34) In the forest the Centaurs live, half-man and half-horse creatures. Despite their knowledge of natural things and their wisdom in leading a life completely integrated within their environment, they are frequently overcome by their animal half. Guests in a wedding party but unable to control their attraction for the bride, they try to kidnap her. (35) The forest is also the dwelling of Pan and the Satyrs, creatures half man and half goat who passionately indulge in dancing at all times and at all places. (36)

The forest preserves itself from the outsider, and in the midst of a profusion of life its inhabitants are veiled, being often perceived only through their contribution to the acoustic environment. It is a place for seclusion. (37) Artemis, the Goddess of Hunting in Greek Mythology, and Oxóssis, the orixá of the forest in the Afro-Brazilian Pantheon, are both solitary and little sociable figures, who mingle little with the affairs of their brothers and sisters. In the Ramayana, Rama, his wife Sita, and his brother Lakshmana are sentenced to exile from his kingdom for fourteen years, and settle down in a forest. The forest offers them cover, but also many hidden dangers. It is not only the home of sages and men seeking for wisdom, but also the home of outlaws and men-hungry monsters. (38) Similarly to the sea, the forest may also symbolise unconscious terrors. (39)

In addition to the symbolism of the sea and the forest, birds and insects possess their own symbolic connotations. Birds, in particular, have symbolic and mythological associations that date as far back as Ancient Egypt, with a variety of images common to several later cultures. A common symbolism relates birds, human soul and spirituality. (40) In Egyptian iconography birds with human heads are seen leaving the mouth of the dying. This connotation is also found in Hellenic iconography, as well as in several tales of A thousand and One Nights, in which the villain cannot be killed because his soul is a bird well-guarded somewhere else. (41) Birds are also viewed as messengers bringing decrees from the gods or news from wandering heroes. Hermes, the Greek God who acts as the Divine Messenger, is a winged man. (42) Garuda, the half-giant and half-eagle vehicle of Vishnu, comes to his aid in a battle in the Ramayana epic, when Vishnu is personified as Rama, and eventually carries Rama back to the paradise where he eternally dwells. (43)

Thought, imagination and aspiration are also connected with birds as symbols. (44) In a Greek myth Daedalus, the architect who built the Cretan Labyrinth, eventually falls prisoner of his own creation, together with his son Icarus. After days of failed attempts to leave the labyrinth, Daedalus builds two pairs of wings out of feathers and wax, so that father and son can escape. But feeling inebriated with the freedom of flight, Icarus disobeys the father's instructions and flies too high and too close to the sun, melting the wax that holds the feathers together and finally falling within the waters of the Icarian Sea. (45)

Sud may be understood as a search for inspiration in its source, a return to the concrete that integrates P.Schaeffer's program into a much more general framework. The sea and the forest suggested are neither bucolic landscapes, idealised in a world of standardisation and mechanisation, nor merely providers of resources, exploited to exhaustion. A legitimate exploration is suggested, an exploration that seeks to understand. From this perspective, the piece hints at an integration between extreme views of nature: nature is suggested neither as a lost or endangered paradise nor as a simple machine-like sum of parts.

The recurrence and similarity of themes alluded to by both the sea and the forest as symbols makes the choice of materials for *Sud* much more than a matter of the composer portraying the place where he lives. (46) This kind of information is naturally of poietic relevance, but it does not necessarily alter perception of the piece. Although *Sud* is strongly programmatic and visually evocative, particularly for listeners who may have directly experienced similar acoustic spaces as part of a holistic experience, the symbolism suggested by the sea and the forest endows the composition with a strong universal character. The richness of connotations, both intrinsic and extrinsic, contributes to make *Sud* an excellent piece to introduce new listeners to electroacoustic music, and an enjoyable and rewarding experience for the more experienced audience.

Notes

(1) DUNSBY & WHITTAL, 1988, p.5.
(2) GRIFFITHS, 1984; KOBLYAKOV, 1984; DOATI, 1991.
(3) *Poiesis* and *esthesics* are terms proposed by NATTIEZ(1990) as part of a tripartition that defines the total musical fact. Poiesis concerns the creative processes and procedures involved in composition, and esthesics concerns the interpretative mechanisms involved in appreciation.
(4) WINDSOR, 1996.
(5) ROY, 1996.
(6) BATESON, 1980.
(7)A detailed discussion is provided in FERREIRA, 2000.
(8) WHITEHEAD, A.N & RUSSELL, B. (1910). **Principia Matematica**. Cambridge: Cambridge University Press.
(9) BATESON, 1980, p.21.
(10) BATESON, 1980, p.210.
(11) The neutral level is the third facet of Nattiez's tripartition noted in (3). Although Nattiez's approach conveniently clarifies the gap between composition and interpretation, the idea of a neutral

level that can be inspected independently of poietics and esthesics seems to contradict its definition as the "physical traces that result from the poietic process".
(12) BATESON, 1980, p.147.
(13) Acousmatics is a term derived from ancient Greek, and refers originally to initiates in the Pythagorean brotherhood, who were required to listen, in silence, to lectures delivered from behind a curtain, so that the lecturer could not be seen. The term was first used contemporarily by Schaeffer (1966).
(14) The idea of reduced listening was proposed by SCHAEFFER (1966). It is an application of Husserl's phenomenological reduction to sound, and refers to a mode of listening that ignores source-cause and further associations.
(15) SMALLEY, 1992.
(16) *Gestalten* are "wholes, the behaviour of which is not determined by that of their individual elements, but where the part processes are themselves determined by the intrinsic nature of the whole" (ELLIS, 1938, p.2). In other words, a *Gestalt* is an organised whole that is perceived as more than the sum of its parts.
(17) SMALLEY, 1986.
(18) SMALLEY, 1986.
(19) SMALLEY, 1986.
(20) EMMERSON, 1986.
(21) The expression 'timbre as carrier' is suggested by ERICKSON (1975) and refers to the idea of timbre as the conveyor of musical information, which is understood essentially in terms of melodic functions.
(22) VRIES, 1974, pp. 405-407.
(23) VRIES, 1974, p. 406.
(24) MACKENZIE, 1994, p. 123.
(25) GUERBER, 1994, p. 82.
(26) VERGER, 1981, p. 190.
(27) NASCIMENTO, 1995, pp. 63-64.
(28) GUERBER, 1994, pp. 297-298.
(29) VRIES, 1974, p. 406.
(30) GUERBER, 1994, pp. 313-315.
(31) VRIES, 1974, p. 406.
(32) GUERBER, 1994, p. 226.
(33) CIRLOT, 1971, p. 281.
(34) CIRLOT, 1971, p. 112.
(35) GUERBER, 1994, p. 227.
(36) GUERBER, 1994, p.265.
(37) VRIES, 1974, p. 199.
(38) MACKENZIE, 1994, p. 47.
(39) CIRLOT, 1971, p. 122.
(40) VRIES, 1974, p. 47.
(41) CIRLOT, 1971, p. 28.
(42) GUERBER, 1994, p. 109.
(43) MACKENZIE, 1994, p.428.
(44) VRIES, 1974, p. 48.
(45) GUERBER, 1994, pp. 221-222.
(46) LANDY, 1990, p. 258.

References

BATESON, G. 1980. Mind and Nature: A Necessary Unity. New York: Bantam Books.

DUNSBY, J. & WHITTAL, A. 1988. Music Analysis in Theory and Practice. London: Faber Music.

CHION, M. 1983. Guide des objets sonores. Paris: Buchet-Chastel/INA/GRM.

CIRLOT, J. E. 1971. A Dictionary of Symbols. London: Routledge & Kegan Paul.

DOATI, R. 1991. "Gyorgy Ligeti's *Glissandi*: An Analysis". Interface v.20 pp.79-87.

ELLIS, W. D. 1938. A Source Book of Gestalt Psychology. London: Routledge and Kegan Paul.

EMMERSON, S. 1986. The Language of Electroacoustic Music. London: MacMillan.

ERICKSON, R. 1975. Sound Structure in Music. Berkeley: University of California Press.

FERRARA, L. 1984. "Phenomenology as a Tool for Musical Analysis". Musical Quarterly v.70 n. 3 pp.355-373.

FERREIRA, G.M.d.S. 2000. A Perceptual Approach to the Analysis of Electroacoustic Music. D.Phil Thesis, University of York, UK.

GRIFFITHS, P. 1984. "Three works by Jonathan Harvey - the Electronic Mirror". Contemporary Music Review v.1 n.1 pp.78-110.

GUERBER, H. A. 1994. Myths and Legends of Greece. London: Senate.

KOBLYAKOV, L. 1984. "J. C. Risset's *Songes* (1979) (9')". Contemporary Music Review v.1 n.1 pp.171-173.

LANDY, L. 1990. What's the Matter with Today's Experimental Music? London: Harwood Academic Press.

MACKENZIE, D. A. 1994. Myths and Legends of India. London: Senate.

NASCIMENTO, A. 1995. Orixás: the Living gods of Africa in Brazil. Rio de Janeiro: IPEAFRO/Afrodiaspora.

NATTIEZ, J. J. 1990. Music and Discourse: Toward a Semiology of Music. Princeton: Princeton University Press.

ROY, S. 1996. "Form and Referential Citation in a Work by Francis Dhomont". Organised Sound v.1 n.1 pp.29-41.

SCHAEFFER, P. 1966. Traité des objets musicaux. Paris: Seuil.

SMALLEY, D. 1986. "Spectromorphology and Structuring Processes". Emmerson, S. (Ed.) The Language of Electroacoustic Music, pp.66-93. London: MacMillan.

SMALLEY, D. 1992. "The Listening Imagination: Listening in the Electroacoustic Era". J. Paynter, T. Howell, R. Orton & P. Seymour (Eds.) Companion to Contemporary Musical Thought, pp.514-554. London: Routledge.

SMALLEY, D. 1997. "Spectromorphology: Explaining Sound-shapes". Organised Sound v.2 n.2 pp.107-126.

VERGER, P. F. 1981. Orixás: os deuses iorubás na África e no Brasil. Salvador: Ed. Corrupio.

VRIES, A. D. 1974. Dictionary of Symbols and Imagery. Amsterdam and London: North-Holland Publishing Company.

WHITEHEAD, A. N. & RUSSELL, B. 1910. Principia Matematica. Cambridge: Cambridge University Press.

WINDSOR, W. L. 1995. A Perceptual Approach to the Description and Analysis of Acousmatic Music. PhD Thesis, City University, UK.

WISHART, T. 1995. Audible Design. York: Orpheus and Pantomime.

Discography

RISSET, Jean-Claude. 1987. ***Sud***. Paris: INA/GRM, INA C1003.

Glossary

Accumulation/Dissipation - a pattern of growth and decay within a sonic structure, which suggests the image of "momentum gathering" and "expenditure", that is, increase followed by decrease of the energy content that animates the structure. (based partially on Wishart, 1995)

Doppler effect - change in the pitch (or pitch band) of a sound due to relative motion between the sound source and the perceiver.

Granularity - quality of a musical context dominated by grains.

Grittiness - image evoked by sonic structures that exhibit some sort of granularity or inequality within a compact body, suggesting as metaphor the quality perceived by the sense of touch.

Harmonic - connected at the sonic level within the framework of harmonicity.

Harmonicity - framework yielded by relationship that suggest the harmonic series. Perceptually, superposition of sinusoidal partials tends to cohere into a single sonic structure interpreted as a pitch centre accompanied by a 'colour' or 'timbre'. If the partials are not sinusoidal, this coherence does not necessarily occur.

Harmony - simultaneity of elements in a musical context. Due to the usual link between harmony and tonality, this term is rarely used within the electroacoustic analytical context.

Morphology - (Smalley, 1986) framework for the perceptual inspection of sounds according to their evolution in time. A sound is divided into three portions: onset, continuation and termination. Onset corresponds to the interval of establishment of the sound as a percept. Continuation corresponds to an interval during which inner motion may be perceived. Termination corresponds to the interval of termination of the sound as a percept. The stringing of sounds gives rise to perceptual situations summarised as the **attack-effluvium continuum**. The categories within this continuum are not clear-cut, but correspond generally to: identification of separate attack-decay elements (sounds which the onset is extended by a resonance that quickly or gradually decays; e.g. plucked string), iteration, granularity or an indivisible body.

Sonic Subject - central material(s) or source(s) of materials of a composition as perceived (or deducted) by the listener.

Textures - texture relates to the idea of arrangement of constituent parts; a sonic structure is associated with the notion of texture centrally due to its duration, which, if long enough, induces focus on its inner qualities. A **dense** texture is a texture that exhibits compactness in spectral and/or morphological constitution. A **monomorphological** texture comprises inner elements that exhibit the same spectro-morphology. A **polymorphological** texture comprises inner elements that exhibit different spectro-morphologies.

Trajectory - variation in time yielded by motion of a sonic dimension; a trajectory may suggest the image of alteration of the energy content within a dimension, or the activation of distinct levels within a scale of values perceptually assigned to the dimension. An **ascending trajectory** is yielded by ascending motion within the corresponding dimension, relating to the image of increase in the energy content of that dimension. A **descending trajectory** is yielded by descending motion within the corresponding dimension, relating to the image of decrease in the energy content of that dimension. An **undulating trajectory** is a variation in time yielded by motion within a limited set of values, suggesting the image of slight fluctuations in the energy content within the dimension concerned.

Typology - (Smalley, 1986) framework for the perceptual investigation of sounds based on correlations between identification of internal pitch organisation and spectral constitution. The central **spectral types** are note, node and noise. **Note** is a spectral type that yields the percept of some form of internal pitch organisation, and includes three sub-types: note proper, harmonic spectrum and inharmonic spectrum. **Note proper**: spectral type that yields clear definition of a pitch centre. **Harmonicspectrum** is a spectral type in which harmonicity within the constitution of the sound does not yield the percept of a coherent structure focused on pitch, but the percept of individual components exhibiting harmonic relationships (harmonicity) within the framework of a single sonic structure. **Inharmonic spectrum** is a spectral type that yields the percept of partials not related by harmonicity; e.g. bell sounds. **Node** is a spectral type that yields poor identification of internal pitch organisation, and **noise** does not yield the percept of any kind of internal pitch organisation, corresponding to random spectrum. Spectral types are organised in a **pitch-effluvium continuum**.

Giselle Ferreira: (B.Eng., B.Mus., M.Sc., D.Phil York) has a multidisciplinary background that includes studies in electronics engineering, piano, systems theory and musicology. As a Lecturer in Telematics at the Open University, UK, she is involved in the development and delivery of distance learning courses, contributing chiefly to areas where Telematics interfaces with the Arts and the Social Sciences. Her research interests are in the areas of music epistemology and music technology.