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**Spectromorphology**

Language for explaining sound-shapes

Adapted from:
Dennis Smalley, Department of Music, City University, London  
Spectro = spectrum

Morphology = changes in time
Problems of understanding electroacoustic music

The traditional references to note, interval, beat, meter, and harmony are often absent.

It’s often acousmatic – for loudspeakers, i.e., sound heard without any visual reference as to what creates it.

The sounds are often new and foreign, without known cause.

Our understanding of natural sounds is the result of visual observation and listening, and associating physical activities with sounds produced.
Goal of Spectromorphology

A descriptive tool based on aural perception

(Analysis of common practice music is often useful and interesting, but also often NOT based on what a listener actually experiences!)
Spectromorphology is NOT

A description of the technology used to create the piece – from a listening perspective, this is irrelevant.

A visualization technique – no one technique is suitable for all pieces.

(The absence of a universally applicable representation tool has likely inhibited electroacoustic music’s acceptance in musicological circles.)
Spectromorphology

Suitable for music that is more concerned with spectral qualities than actual notes, more flexible time treatment than metrical beats, consists of ambiguous sound sources.

Thus, it is suitable for some forms of instrumental music.

Not suitable for music that is anecdotal, programmatic, featuring recordings of cultural events, musical quotations; in short, that is based on a listener’s understanding of a sound source and its context, and appreciating how the sound is recontextualized by the composer.
Spectromorphology

*Intrinsic* features
Refers to sound events and their relationships as they occur within a piece of music, within a closed system.

*Extrinsic* features
Refers to sound events that occur in real life and culture, external to a piece of music.

While spectromorphology is concerned primarily on intrinsic features, music gains meaning through extrinsic connections. Thus, the two are interactive.
From Extrinsic to Intrinsic

The wide-open, ambiguous sonic world of electroacoustic music encourages extrinsic connections.

Consider this progression of three extrinsic sound descriptions:
1. It is stones falling
2. It sounds like stones falling
3. It sounds as it’s behaving like falling stones

They are increasingly uncertain and removed from reality.

Elaborating on 2. or 3. and describing sound features within the musical context is to engage in spectromorphology.
Gestural Surrogacy

We connect sounds with physical gestures – energy is applied to a sounding body, creating a sound evolution.

When we experience music, we hear it and see the activity in our mind’s eye (if hearing a recording).

We are naturally inclined to identify sources of sounds. It’s an evolutionary survival instinct. Smalley calls this source-bonding.

In electroacoustic music, sounds may or may not easily suggest physical gestures. Surrogacy refers to increasing stages of remoteness from known physical causes of sound.
Gestural Surrogacy

First-order Surrogacy
Every day identification of sound with source. Typically non-musical, although some electroacoustic music is an exploration of familiar sounds. (Variations pour une Porte et un Soupir)

Second-order Surrogacy
A musical-instrumental gesture, exemplifying performance skill, simulating an acoustic instrument and imitating a recognizable sound. (Switched on Bach)
Gestural Surrogacy

Third-order Surrogacy
Sound type or gesture seems familiar, but the sound result isn’t. (Turenas)

Remote Surrogacy
Completely unfamiliar sound, not attached to any known gesture. (Scambi)

Electroacoustic music seeks a fine line between the familiar and the unfamiliar. Too familiar may be unadventurous, but too unfamiliar may not sound human enough to be relatable and compelling to the listener.
A note-gesture has a spectral history; three temporal phases: onset, continuant, termination.

The three temporal phases may not be separable.

There may be times when not all three are present.

In instrumental music, there are three spectromorphological archetypes:

1. Attack alone: an sudden onset that terminates suddenly (dry percussive or staccato sound)
2. Attack-decay: an attack extended by a resonance (string pizzicato or bell)
3. Graduated continuant: all three phases present, gradually morphing into each other (sustained string or wind sound)

Composers choreograph expectation. Expectation of note-gesture types is learned. The creation of new sounds can imitate, elaborate, or deviate from learned norms.
Gesture and Texture

In traditional instrumental music, a gesture is a series of notes forming a phrase, typically based on breath-groups (singers and wind players have to breathe).

There is more flexibility in electroacoustic music. But the notion of gesture has to do with propelling time forwards, moving from one goal towards the next goal with an energy of motion.

Gesture suggests forward motion, linearity, narrativity.
**Gesture and Texture**

If gestures are exaggeratedly slow, they lose a certain physicality.

The ear becomes focused on inner details.

Music that is textural concentrates on internal activity rather than forward impetus.

Most music has a combination of gesture and texture, although we may say that a piece or a part of a piece is *gesture-carried* or *texture-carried* if one predominates.
Expectation Patterns

Based on cultural acquaintance, we try to predict the directionality of spectral change:

Where is a gesture leading?
Will a texture continue behaving the same way?
Is change likely or not?
If there is change, will it be a gradual merging or a sudden interruption?
Expectation Patterns

An event or context can be said to unfold in three stages:

Onset (how it starts)
Continuant (how it continues)
Termination (how it ends)

These stages may apply to varying levels of structure: a note, object, gesture, or motion/growth process in a larger section of music.

Smalley suggests a list of possible terms to describe each stage...as you listen to music in this class, consider how these terms may apply.
Onsets

Departure

Emergence

Anacrusis

Attack

Upbeat

Downbeat

These terms reflect varying degrees of abruptness.

They all suggest moving out from or away from a starting-point, creating some expectant tension.
Continuants

Passage
Transition
Prolongation
Maintenance

{ Looking forward, expressing betweenness

{ Looking backward, referring to the onset

{ Something more definitive, an almost independent status
Terminations – various feelings of completion

<table>
<thead>
<tr>
<th>Event</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>Arrival</td>
<td>Structural goal reached</td>
</tr>
<tr>
<td>Plane</td>
<td>Weak termination, questionable purpose</td>
</tr>
<tr>
<td>Disappearance</td>
<td>A definite period (or end of paragraph)</td>
</tr>
<tr>
<td>Closure</td>
<td></td>
</tr>
<tr>
<td>Release</td>
<td>Strong relaxant function</td>
</tr>
<tr>
<td>Resolution</td>
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Onset-Continuant-Terminations

These are “soft” boundaries; there may be no definite border between them.

We can’t be sure of long-term structure when listening to music.

As a process unfolds, we may change our minds about what its function is.

A section may serve more than one function simultaneously.
Since long-term structures are problematic to hear, what do we hear when we listen to music?

Motion and growth processes, changing sound qualities.

Smalley suggests a number of terms for these processes. They lead us to expect different types of outcomes.

When you listen to the music in this class, consider which, if any, of these terms may apply in a particular piece.

Are those expectations met, or are we surprised?
Motion Processes

Unidirectional (simplest type)

ascent

plane

descent
Motion Processes

Reciprocal
(movement in one direction, balanced by a return movement)

parabola – a curve

oscillation – regularly repeating curves

undulation – less regularly repeating curves
Motion Processes

Cyclic/Centric
(recycling, motion related to a central point, often aided by spatial motion)

rotation
spiral
spin
vortex
pericentrality – moving around a center
centrifugal – flung out
Growth Processes

agglomeration – accumulate to a mass
dissipation – disperse or disintegrate
dilation – becoming wider or larger
contraction – becoming smaller
divergence – growing apart
convergence – growing together
exogeny – adding to exterior
endogeny – growing from inside
Seven Characteristic Motions

- **fly**
- **float**
- **drift**
- **throw/fling**
- **rise**
- **flow**
- **push/drag**

**fly**
- non-rooted/no bass note or fundamental

**float**
- emerge as though they always existed

**drift**
- self-contained initiated by gesture rapid energy-motion

**throw/fling**
- self-contained initiated by gesture rapid energy-motion

**rise**
- earthbound

**flow**
Texture Motion – how does texture quality change?

Streaming – combination of moving layers, in the same direction

Flocking – loose but collective motion of micro- or small elements

Convolution – coiling, twisting to chaos

Turbulence – confused, entwining to chaos

**Consistency continuum**

sustained ➔ granular ➔ iterative
The Note – Internal and External Focus

External

This is the traditional note view, in which the pitch of the note is of primary importance, and its spectrum is its “color.”

Internal

The ear is taken “inside” the note, and attention is called to its spectrum and its evolution.
Note Collectives

When pitches are presented fairly slowly, the intervals between them is the object of focus, as is the case with traditional melodies.

When pitches are presented rapidly enough, they lose their intervallic relationship to each other perceptually.

A group of notes can form a higher-level gesture and become a collective.

A pitch’s identity lies in its context, its relationship to other pitches. When the intervals are de-emphasized, then there are other qualities that are perceptually more significant than pitch.

This does not only pertain to collectives of many notes: if a single pitch is held as drone, its actual pitch is likely not what’s important about it. Again, without the context of intervals to other pitches, the pitch of a note falls in perceptual importance.
Note, Noise, or Both?

Granular Noise
This is Smalley’s term for the traditional example of noise – wind, static, rubbing or scraping objects, etc. It is characterized by randomness, and is considered the opposite of pitched.

Saturate Noise
This is Smalley’s term for a spectral region that is so packed with energy (partials) that it loses its pitch quality. It is a broader, more nuanced view of non-pitchedness than simply that of a random, noise waveform.

Noise can have motion, texture, behavior. It can be narrow- or wide-band. It can be colored or resonant, i.e., pitchy.

Therefore, these are not simple extremes. Noise can be pitchy, and pitch can be noisy.
Harmonic tone complexes fuse into a unified pitch and timbre.

Inharmonic tone complexes do not fuse. They tend to disperse into streams.

Inharmonicity occupies a middle ground between pitch and noise.
Spectral Space and Density

Spectral density is akin to a fog or curtain. It may be thick, obliterating all else, or semi-transparent, allowing other spectromorphologies to be perceived in relief.

Emptiness/plenitude
Is the spectral space covered and filled? Or are there gaps?

Diffuseness/concentration
Is the sound spread throughout the space? Or is it concentrated or fused into smaller regions?

Streams/interstices
Is the space layered into narrow or broad streams with empty space in the middle?

Overlap/crossover
Do things encroach on each other’s spectral space? Do they move around or through each other during motion or growth?
Space and Spatiomorphology

Actual space
Spatialization may be achieved through stereo panning. Use of this dimension is one of the hallmarks of electroacoustic music.

Analogical space
Higher pitches may seem to exist at a higher elevation than lower pitches.

Change in spatial perspective can delineate musical structure.
Spatial Style of a Work

Single spatial setting

Multiple spatial settings

Spatial simultaneity
For example, a texture may sound very much “in your face,” while in the distance there is a sound of a door closing in a large reverberant space. The implication is that we are aware of two spaces at once.

Implied spatial simultaneity
Think of film, where simultaneous events occur through crosscutting. In listening, we can similarly remain aware of a space even if it’s absent if contrasting spaces are intercut and alternated.

Spatial passage
Is passage between different spaces sudden, gradual, or repeatedly intercut?

Spatial equilibrium
Is one type of space emphasized more than another? Do spaces alternate?