

In writing this paper, I first set out to find different methods of analyzing electronic and electroacoustic music because I was invested in wanting to expand and widen the ways in which I think about my own music as well as works of others. I have personally found that while composition and analysis are similar processes that deal with the same subject matter, they are in fact orthogonal processes; the difference arises when taking into account that one must occur before the other begins, for music must exist first in order for analysis of the music to occur. The impulse for creation of a piece of music fundamentally differs from the impulse for analysis and explanation of its functions. The experience of the totality of musics differs when one begins with a blank page versus one in which the conclusion is known. The unifying intersection between the two, of course, is the music at hand.

While this statement may sound obvious and unnecessarily redundant (“Of course, you can’t analyze what doesn’t exist!”), it has serious implications in the case of electronic and electroacoustic music. Technological prostheses in the form of digital and analog machines, both physical and virtual tools, are integral to composition of this music; these hidden constitutive systems necessary for production require an interplay of different technologies including recording and microphone techniques, DAWs, audio hardware, audio synthesis and post-production techniques, and so on. The knowledge of the technological appendages involved in making electronic/electroacoustic music fundamentally change the way in which one listens to this music. As a result, the usual mode of listening for an electronic/electroacoustic composer tilts towards *technological listening*, a term coined by Pierre Schaeffer, in which one conceives of and understands what one is listening to more in terms of *how* that music was created and less so on *what* that music sounds for the sounds themselves. Derivation of musical meaning and structure for a technologically knowledgeable listener differs significantly from that of an unfamiliar listener who do not have knowledge of the tools involved in the compositional process. Such experiential differences across listeners pose a special challenge in developing rigorous and broad analytical tools for electronic/electroacoustic music due to drastic disparities in the whole experience because the technology behind the production of the music is so integral to its creation. The wide phenomenological variability in the listening experience electronic/electroacoustic music therefore necessitates a methodology that is able to account for and/or sublate past these differences.

Moreover, the inseparable involvement of technology in production and propagation of electronic/electroacoustic music also implies novel analysis techniques are necessary because it presents a paradigmatic shift in how this music is meant to be listened to. Assumption of a concert setting in which each momentary sound experience is transient is no longer completely appropriate. Individuated control over the playing of music by the listener given away from its composers and performers, owing to the music’s distribution platforms that encourage personalized and on-demand consumption, throws off systems of analysis that depend on the assumption that the presentation of the music is linear. Methods of projection also differ from individual to individual owing to various listening technologies available to consumers. Context-mindful analytic methods of electronic/electroacoustic

music must take into account that the listening experience is now fundamentally nonlinear and agential and cannot be conceived as a series of sonic events presented one at a time.

To aid in the search for a conception of a new analysis method of electronic/electroacoustic music, it is necessary to examine currently available analytical methods. *Spectromorphology* is an analysis technique and compositional tool meant for composers of electronic/electroacoustic music developed by Denis Smalley that attempts to bridge a gap in phenomenological differences that functions by ascribing a set of verbal descriptors to the constituent sonic events of the music. Smalley first describes and outlines his methodology in his 1997 paper “Spectromorphology: explaining sound-shapes,” which may also be characterized as a sort of a manifesto. He defines his approach as such:

A spectromorphological approach sets out spectral and morphological models and processes, and provides a framework for understanding structural relations and behaviours as experienced in the temporal flux of the music.

Smalley continues to provide a further clarification of the approach:

I have developed the concepts and terminology of *spectromorphology* as tools for describing and analysing listening experience. The two parts of the term refer to the interaction between sound spectra (spectro-) and the ways they change and are shaped through time (-morphology). The spectro- cannot exist without the -morphology and *vice versa*: something has to be shaped, and a shape must have sonic content. Although spectral content and temporal shaping are indissolubly linked, we need to be able to separate them for discursive purposes – we cannot in the same breath describe what is shaped and the shapes themselves. The term may be jargonistic and it is perhaps an ungainly word, but I have not managed to invent an alternative which encapsulates the interactive components so accurately. Each component of the term belongs to other disciplines (visual, linguistic, biological, geological), which is fitting since musical experience radiates across disciplines. But the combination is unique: in music we often need words which are invented specially for defining sonic phenomena.

However, Smalley is careful to add a disclaimer to avert characterization of spectromorphology as a “compositional theory or method, but a descriptive tool based on aural perception” – as something that is “intended to aid listening and seeks to help explain what can be apprehended”:

Although spectromorphology is not a compositional theory, it can influence compositional methods since once the composer becomes conscious of concepts and words to diagnose and describe, then compositional thinking can be influenced, as I am sure my own composing has been. In the confusing, wide-open sound-world, composers need criteria for selecting sound materials and understanding structural relationships. So descriptive and conceptual tools which classify and relate sounds and structures can be valuable compositional aids.

Contrary to Smalley’s claims as to otherwise, I see spectromorphology as very much a detailed analytical method for analysis of electronic/electroacoustic music. Although Smalley specifically designated spectromorphology as meant for compositional purposes, it

is regardless a distinct analysis technique that attempts to structure a defined framework for enunciating and explicating sonic contents and their functional roles contained within a work even if nominally restricted to the lens of compositional practices. Spectromorphology extensively utilizes dichotomous and categorical descriptors that heavily depend on extra-auditory references pulling from multimodal experiences in order to assign characteristics and features to sonic events of a work; if a purposefully bracketed, meticulous framework of which purpose is to describe, group, and explain relational functions of the sonic materials of musical works taking place across the temporal domain is not a functional analysis technique, then I am not sure what else would qualify as an analytical methodology in music.

I see Smalley's dilution of spectromorphology as only a "compositional tool" as an attempt to evade valid criticisms that may be lobbed at its efficacy and is borne out of a conscious, purposeful disingenuity in regard to the method's intended utility. The evasion of critical accountability is especially relevant in the face of a lack of serious, rigorous analytical methodologies currently available for broadly meaningful analyses of electronic/electroacoustic music. As Smalley's spectromorphology has directly influenced a swath of derivative theories and methods – both compositional and analytical – that claim rigor while building further upon its core assumptions, spectromorphology's continuing influence impressed upon current academic works on electronic/electroacoustic music must be acutely examined. An involved discussion of spectromorphology's successes and shortcomings as an analytical method must take place, not in order to vilify its approaches but instead to explore and develop novel approaches that move beyond its assumptions that serves to provide new opportunities for understanding and appreciating electronic/electroacoustic works.

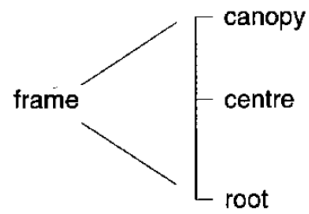
The first glaring issue with a spectromorphological analysis of an electronic/electroacoustic work is the method's overdependence on opaque descriptive vocabularies that bear unclear referents that assume both an internal semiotic consistency as well as external perceptual equivalences across perspectives without actually providing a grounded basis for those signifieds. Smalley's assumption is that by incorporating terminologies that relate across extramusical fields ("visual, linguistic, biological, and geological"), spectromorphology is able to capture "musical experience [that] radiates across disciplines" in order to provide a more complete analytic description of the music. It is true that our phenomenological lives are defined and driven by perceptual experiences across all senses, and musical experiences – by virtue of belonging to the auditory domain – are no exception to these extra-auditory influences. However, to assume a multimodal consistency of musical qualia using extra-auditory sensory descriptors and detailed hierarchical categorizations in order to further divide and dissect sonic components is to mislead that auditory (and musical) phenomenology is by itself incapable of being adequately explained through its own modality and that it must depend on an unstable, endless reflexivity between itself and its signifier; in this case, it is the relationship between the music and its spectromorphological terminologies.

The fundamental spectromorphological assumption is that multimodal descriptors more or less adequately fulfill the role of signs pointing towards a sonic signified and therefore are able to capture some degree of the “essence” of the music and its structural characteristics. This assumption ignores the problem of impossibility of unscathed translation between sensory modalities including between visuospatial and auditory, let alone condensing a visuospatial experience to language while expecting coherent resonance. Thus, there are three concurrent issues at hand: 1) the question of semiotic preservation between sound and language after processes of translation; 2) the question of adequate semiotic representation of sound through language, and 3) the question of the implied speaking subject who lays the semiotic system between sound and language. The first regards *process*; the second *capacity*; and the last *subject*. The last is especially problematic because it insidiously sidesteps sociocultural situatedness of the enunciating subject.

In order to illustrate spectromorphology’s shortcoming in semiotic efficacy and specificity, let us examine Smalley’s treatment of what he terms *spectral space*. Smalley defines the term as such:

Spectral space covers a distance between the lowest and highest sounds. [...]
[S]pectromorphologies move through spectral space as they change over time [...]
[C]ertain motions need to occupy spectral space in different ways.

In other words, *spectral space* is a generalized term Smalley uses to describe a frequency space within which sounds may contain a single or many frequencies while accounting for evolution over time. Since sounds may contain a multitude of various frequencies, Smalley asserts the need for developing a descriptive vocabulary for defining the *occupancy of spectral space* since timbral components are an important compositional feature in electronic/electroacoustic music. Below is a graphical reproduction from “Spectromorphology: explaining sound-shapes” of the spectromorphological system that uses four qualifiers describing the occupancy of spectral space as well as detailed descriptions of these dichotomous qualifiers:



four qualifiers of spectral space

1. emptiness - plenitude
2. diffuseness - concentration
3. streams - interstices
4. overlap - crossover

- (1) *Emptiness – plenitude* – whether the space is extensively covered and filled, or whether spectromorphologies occupy smaller areas, creating large gaps, giving an impression of emptiness and perhaps spectral isolation.
- (2) *Diffuseness – concentration* – whether sound is spread or dispersed throughout spectral space or whether it is concentrated or fused in regions.
- (3) *Streams – interstices* – the layering of spectral space into narrow or broad streams separated by intervening spaces.
- (4) *Overlap – crossover* – how streams or spectromorphologies encroach on each other's spectral space, or move around or across each other to another region. This is directly related to motion and growth processes.

The immediate issues here are: 1) dichotomous dualities; 2) lack of clarity and coherence between categories; and 3) technological listening.

Dependence on dualities for descriptors imply an axial relationship within which confines all options are contained. For example, with the axial descriptive pair *emptiness – plenitude*, the two grouped together imply that there are different degrees of occupying a spectral space ranging from nothing (emptiness) and plenitude (fullness). The criteria for assigning degree of emptiness-platitude are left vague on purpose and are worded entirely in words relating to spatial content. What does it mean for a spectral space to be covered and filled? Would a broadband white noise fail to fit the criteria for *emptiness* because it covers and fills the entire frequency spectrum by virtue of containing every frequency in the hearing range? Would the music of Eliane Radigue be considered *empty* in terms of the spectral space it occupies because it contains only a few select frequencies at a time? How will one treat a *weighted silence* in this paradigm, which requires *presence* of sound to determine occupation of space?

Then there is the issue of the over-reliance of spectromorphological terms on physics and the discipline's associated terminology. All four descriptor pairs depend their imagery on spatial representations, but none tackle issues of timbral qualities which are typically described in terms of *color* and not *space*. A soprano's virtuosic ability is described in terms of *coloratura*, and the sound of an oboe is *warmer* than that of a flute. In a quest for objectivity in which presence versus absence is easier to define and defend,

spectromorphology's treatment of spectral space flattens irreducible qualities of timbral multiplicity to a black-and-white photocopy.

This leads to the next problem with spectromorphological thinking – privileging of scientific and technological thinking in discussion and understanding of structure and form. Despite claiming to be independent from technological listening, the spectromorphological method is dependent upon dissection of music as it would be visible on a spectrograph. Both its spectral and amplitude components are bound by the same presence-absence dichotomy previously discussed. Spectromorphology's driving idea is the application of an *energy-motion trajectory* upon which a sounding body receives physical energy in order to be excited and emit sound. However, this way of conceptualizing flow of music leads to an overly linearized perception of the music in which sonic events are organized sequentially in the order they appear, immovable and ordinal. Sequentialization is exactly the same manner in which force and movement are conceived of in physics; each event frame succeeds the previous, and new events occur by which they follow a preordained trajectory based on inertia over the flow of time. In the same way, the focus of the spectromorphological analysis becomes about describing a series of local-level sonic objects much like beads on a string.

Presence-absence of sound is not the only structural component; rhythms, for example, form both micro- and macrostructures that cannot be explained purely in terms of presence-absence and has a huge influence on perception and experience of the whole of the work. The salient feature of a rhythmic component is not what individual sounds or sonic objects are strictly present or absent but rather the evocation of a combination of dimensionalities including corporeal and sociocultural. Entrainment, or the process of synchronization of organisms to an external rhythm, poses an entirely different structural challenge in structural analysis that cannot be accounted for by just the spectromorphological method. Because the presence-absence dichotomy of sound is only the first order of manifestation in the experience of a piece of music, the inclination of spectromorphology in analysis which assigns contained shapes to individual sonic events truncates possibility of higher-order analysis.

Lastly, spectromorphology ultimately fails to acknowledge the role of the inevitably coupled affective states of perceptual experiences as well as the unrealistic expectation of a listener refraining from associating those emotional experiences to extramusical referents. Spectromorphological terminologies claim a phenomenological universality of a musical work across perceptual modalities but falls short of the other contexts in which perception takes place, including those happening past the initial sensorial experience. A spectromorphological analysis relies on the assumption that perception of meaningful groupings of the music are completely sensorial and restricted to ideas of space and shape, independent of individuated phenomenological perspectives that allow for more than just presence and motion. Every perceptual experience is grounded within the context of the lived experience since every perspective must belong to an agential being who lives in a

world full of rich, meaningful experiences that readily impart depth. Conception and perception of motion and movement cannot exist without affective capabilities that encompass not only the proprioceptive but also the emotive and more abstract phenomenological states. Physical sensations cannot be experienced by a conscious, feeling being purely for what they are without the whole lived context within which the experience is situated.

Moving away from spectromorphological thinking requires employing analysis methods that offer a nonlinearized and non-object-oriented view of a work of electronic/electroacoustic music. Overreliance on designating bound shapes and spatial placements to sound objects must be overcome by being cognizant that ontological properties of music does not mirror the “raw” presence-or-absence of sound. An analysis method that sublimates the issues with spectromorphology must then accomplish the following: 1) provide a nonlinear conception of a work that does not place undue importance on serial, time-locked sonic events driven by energy and motion; 2) refrain from attempting to equate sound experiences to purely linguistic representations; 3) allow non-categorical and un-dichotomized descriptions; and 4) is able to be grasped regardless of technological knowledge.

Because compositional practices and analysis methods of electronic/electroacoustic music are so closely related, a way of sublimating past spectromorphological methods is to employ compositional and production techniques for analysis as well as draw parallels and contrasts with other existing works. What that means is to use technological prostheses in the physical or virtual realm in order to break down and re-constitute a work, whether it is through composing comparative sound materials or pulling examples from other work. Since linguistic descriptions do not translate adequately, using other music in order to describe music at hand sidesteps using language as the primary medium. In the context of electronic/electroacoustic music in which there is no satisfactory analytic language especially for aspects such as timbral complexities, sound-based comparative materials provide an alternative to linguistic descriptions while remaining in the auditory realm.