Variability and the spatial setting: emergent properties and sound relationships in acousmatic music

Ambrose Seddon
Bournemouth University, UK
aseddon@bournemouth.ac.uk

Abstract

The notion of variation is a familiar device of much music, often working in conjunction with familiar pitch-based, temporal and timbral frameworks. Considering acousmatic music, for which the source material can be drawn from a vast world of acoustic phenomena, the notion of sound material variation remains relevant, but in which ways does it operate that are particular to this medium? We might further ask: to what extent has acousmatic music compositional practice revealed any novel approaches to variation and variability, and how can we account for and discuss these approaches? In what ways are they musically meaningful to us as listeners? This paper will begin by discussing aspects of variation in acousmatic music composition, considering its musical significance when listening. Variability will then be viewed from a broader perspective, building upon Smalley's notion of the spatial setting (1997). If space is aesthetically central to acousmatic music (Smalley 2007), adopting a holistic spatial viewpoint becomes a valuable avenue for investigation. As such, the role of variability within the unfolding of settings will be discussed with reference to specific works, exploring how awareness of emergent properties across the various sounds paves the way for a more holistic conception of variability.

1. Introduction

Variation as a means to develop musical ideas is a familiar aspect of much musical creativity, and can be heard in the symphonic motifs of Beethoven, the improvisations of John Coltrane, and the vocal lines of Björk. Whilst existing within different stylistic domains, the music of these artists draws upon established pitch-based, temporal and timbral frameworks to a significant extent. This is not to say that their music can be reduced to solely these features (far from it), but rather these aspects may come to the fore. We may encounter phrases and more extended passages that evolve in ways that create a sense of musical development, yet retain a consistency and connectedness to each other. These evolving musical materials often become the foundations of larger scale structures and forms.

This paper explores ideas around variation and variability in acousmatic electroacoustic music, whose source material can be almost any sound that can be captured by a microphone or synthesised. Variation within acousmatic composition can be heard in existing music and has been discussed in some literature. But in which ways does variation operate that are particular to this area of musical creativity? Are there any novel approaches to variation and variability? And how can we account for and make sense of these?

In this paper existing ideas regarding variation within electroacoustic music will be discussed; we will then consider the idea of the spatial setting and how this potentially frames variation and variability amongst constituent sounds; and finally, an extract from Bernard Parmegiani's *Capture Éphémère* (1967) will be examined to exemplify and illuminate the idea of emergent variables. Parallels will be drawn with Johnson's ideas of embodied meaning making (2007).

2. Variation and electroacoustic music

2.1. Schaeffer's instrumental prerequisite

We can begin by looking at some existing ideas around variation that specifically address electroacoustic music. Pierre Schaeffer states:

> Every device that makes it possible to obtain a varied collection of sound objects—or of varying sound objects—while keeping us aware of the permanence of a cause, is a musical instrument (2017, 31)

Schaeffer's conception of variation is firmly rooted in the idea of 'the instrument' - the instrumental prerequisite (Schaeffer et al. 2017). For Schaeffer "all musical activity" is based on permanence and variation (2017, 23–28); a cooking utensil can become a sound making source by being 'played' and, through repetition of physical gesture and its variation, becomes a musical instrument. Through physical and sonic consistency, and hence a degree of permanence, musical possibilities become available to the player through "the *variation* of *something perceptible*" (2017, 25). Schaeffer elaborates through the ideas of characteristics and values. Characteristics are the aspects that bring consistency amongst sound objects, whilst values are the noticeable aspects of change. As Michel Chion summarises, "the aspects of sound whose variation is pertinent and forms the abstract musical discourse are called values; those which give concrete permanence are called characteristics" (1983, 79-80)

Chion notes that Schaeffer is also calling for a "broadening on the notion on the instrument" (1983, 54–55), the idea on which variation is founded.[1] In addition to pitch, rhythm, timbre, and intensity, we can consider the 'concrete' variations brought about through the additional subtleties of instrumental play. Furthermore, and significantly, variation, by Schaeffer's definition, can occur in two main ways: (i) a series of discontinuous musical objects exhibiting variation of some kind between the instances, or (ii) through the evolution within a single sound object (2017, 448).[2] So we have variations in values between sound events as well as within sound events, whilst the shared characteristics create the sense of permanence as embodied by a common source.

2.2. Variation and sound transformation

Curtis Roads accounts for variation in relation to sound transformation (2015), making a direct link between the technological processing of the sound and the compositional activity. Sound transformation processes can be used to create families of sounds that become the foundational

[1] Complementary discussion can be found in the writing of Lasse Thoresen (2015).
[2] Schaeffer give the example of a glissando. From the pitch perspective it can be viewed in terms of 'discontinuous' calibration, being played between two pitches. However, the actual experience when listening to the continuous pitch glide is of a new object, quite distinct from the interval that defines its pitch range.

audio material for composing with. The combination of a small number of processes can potentially yield a huge range of related but individual sounds that are organised by the composer into the final work. Roads continues that, in some works, the audible and apparent transformation of sounds becomes analogous to variation in traditional music in that a single sound might act as the 'germ' of the work, being processed in diverse ways to evolve the entire sound world. Musical examples of this type of approach include Trevor Wishart's *Imago* (2002) and David Berezan's *Thumbs* (2011).

2.3. Sound transformation categories

Denis Smalley usefully distinguishes two broad approaches to sound transformation that relate to the apparent provenance of the sound. *Source-bonded* transformation describes transformations that link back to "identifiable, transcontextual, source-causes" and which are source specific (Smalley 1993, 282). *Spectromorphological* transformations occur when "extrinsic links and source-causes are imagined, imaginary, or seem so remote that they appear nonexistent" and the "transformation is source freed, more free-floating" (1993, 282). And between the two are differing degrees of source connection and inference. Both principles rely on the notion of a *base identity*. "If we can remember the base identity we are better able to follow subtleties of transformation and we are more likely to be able to recognise transformations if they appear at a later location in the work" (Smalley 1993, 281). For example, Jonty Harrison's *Klang* (1982) features a base identity of sorts (the sounds of a casserole and lid), followed by both source-bonded and spectromorphological variations. The broader musical narrative, moving from source-bonded to more remote material, makes explicit the musical processes at play. But one might wonder - what actually is the 'base' identity in such a context? Is it the notion of a kind of sound source and a kind of gestural play? Or is it a specific spectromorphology, encompassing a distinct spectro-temporal evolution along with its associated source bondings and extrinsic links? Indeed, the idea of variation as a musical process depends very much on the organisation of the material, what is actually heard by a particular listener, and the musical flow.

2.4. Variation, context and structural function

The surrounding musical context in which the base identity is originally heard will greatly influence *whether* it is remembered. Any subsequent transformations will also need to be audible for a connection to be made, and the variation to be perceived. Stéphane Roy frames variation in terms of a theme/variation pair, which considers sonic similarity and difference along with the rhetorical structural function of the audible relationship (2003). For Roy, the theme is most likely a figure (his terminology), "a unit of great prominence and of unstable morphology on a short to medium time span, so highly articulated as to be memorable for the listener" (Stewart 2007, 92).[3] The variation is a "modified restatement of the Theme, in which certain morphological or behavioural aspects have changed…[but] shares the same timbral signature" (Stewart 2007, 94). Roy proposes two kinds of variation: Directed, where a progression is created by successive variations, or Circular, where no direction is implied by subsequent variations. So different kinds of variation emerge as we consider the context and structural function of the variation relationship.

[3] These translations are taken from Stewart's doctoral thesis (2007).

These base identity and theme/variation conceptions are valuable as ways to contemplate 'what is going on' in a work, particularly where poetic processes of variation and transformation create a narrative thrust. It implies a starting point from which new ideas appear to be derived. But variation may operate in other ways, as Roy acknowledges in part through the idea of circular variations. We might encounter families of sounds but without that clear 'base identity' as a starting point. So where might this leave us in our listening?

3. Spatial Settings

3.1. Spatial types

For some works where a base identity is not apparent, but a sense of connectedness amongst various types of sound materials remains tangible, considering the broader spatiality and make-up of the sound image as a whole, and the variability within and across that, offers a useful and complementary viewpoint. The spatiality of the sound image is determined by the sounds we encounter and the sense of space they convey, in combination defining the dimensions of one's spatial experience. Denis Smalley's concepts of source-bonded space, spectral space and perspectival space can be usefully applied to account for our spatial listening experience (2007). Smalley also refers to spatial settings to help define the "spatial style" of a work (1997, 124). Works might be 'set' in a single space, or there might be multiple settings within a work. So, we might contemplate further the idea of the 'setting' because it implies further layers of meaning.

3.2. Settings

The Oxford English Dictionary defines a 'setting' as "the place or type of surroundings where something is positioned or where an event takes place," which emphasises both configuration and location. But we might also consider impressions of temporality within musical contexts - the idea of a setting has overtones of more general permanence, the sense of an environment that we encounter, contemplate and interact with through our ongoing listening. It might appear to be already established (we feel that we have 'dropped in' to it), or perhaps it becomes gradually established as we listen. The concept of the setting can be extended to include not just configuration of sounds, the spaces they bring with them, and the resulting sense of location / place, but also a sense of temporal permanence and, in turn, the establishment of a spatial feel. In this way its existence is rooted in a state of perceived permanence, whether consisting of a single sound, or many sounds.

A setting might appear both fleetingly as well as existing for more extended durations, yet significantly it remains within or not far from our listening consciousness. A setting might comprise explicitly source-bonded sounds, or perhaps those much more remote from reality (and of course combinations of these); it could convey intimacy in proximate space with very few sounds, or it could be far more complex, suggesting more expansive spatial dimensions and a diverse population. And even if the population of a setting changes, the sense of a setting's broader identity can be retained as long as enough of the defining sounds remain present to recreate that spatial feel. Once a setting is established, in certain cases the impression of permanence might be sufficiently strong that it can be assumed to continue, even out of earshot, such that its return is never unexpected.

Considering musical works in terms of their spatial settings offers a useful frame for situating variability and variation. If the 'feel' of a setting suggests a permanence, a spatial and almost environmental aspect, then our engagement with it may reflect this - the apparent details of the musical environment may shift in focus as we scan, listen, and reflect, yet the overriding impression remains with us when listening.

4. Emergent variables

In such works, aspects of variation and variability might gradually emerge, becoming apparent as a section or setting unfolds – we can think of these as 'emergent variables'. Over time the variable aspects of seemingly similar sound events are gradually revealed, as opposed to a process of overt 'statement' and sequential 'variation'. Rather than experiencing a musical development from a 'germ', we encounter a range of sounds and sound types that show a relatedness, yet the scope of those relationships takes time to become clear, whether within one sitting or through re-listening several times. From my own listening experience, this occurs in the opening section of Bernard Parmegiani's *Capture Éphémère* (1967).

4.1. Parmegiani's *Capture Éphémère*

The opening passage (0'00–1'32) features specific kinds of spectromorphological similarities and differences amongst the various sounds, operating at local levels of structure. These create a shifting yet quasi-permanent environment. This sense of permanence in the setting allows for the contemplation of the similarities and contrasts among the constituent sounds, and a small number of sound families gradually becomes apparent as the passage progresses. Within these families, tangible aspects of difference and variation emerge, giving a fuller picture of what these sounds are and how they behave, interact and relate.

The opening sound material grabs attention, featuring a sudden attack, an impact of sorts, with a noise-based decay. On closer listening there is a noise-based, fast attack, slow decay spectromorphology, featuring subtle resonant pitch content, iterative amplitude pulsing, and an ascending shift in spectral focus (possibly a filter sweep). Its onset is synchronous with a noise-based impulse, and these two elements seem to fuse together in the moment to become one entity. Interestingly there is no rhetorical reinforcement of that opening configuration, so whilst it is sudden and acts as a call to attention of sorts, it is seemingly left behind.

4.2. Sound families

The majority of the sounds that follow can be thought of in terms of sound families, and two broad yet distinct families emerge: *noise-based impulses* and *noise-based graduated continuants*. Although different instances of these sound types occur (especially in the case of the graduated continuants), the specific differences amongst the family members gradually establish the aspects of correspondence and variation.

The noise-based impulses correspond on account of their similar morphological profiles - the short impulse - yet vary slightly in terms of density of iteration, register and location in the stereo field (see Table 1 below). However, despite these kinds of variation, the degree of perceived change from one impulse to another is relatively small (compared to the graduated

continuants, see below). Even when heard in rhythmic formations, the underlying impulse identity remains apparent. And this contributes to the general sense of quasi-permanence.

The graduated continuants also share some common spectromorphological traits (graduated continuant morphology, often noise-based spectrum), yet the majority of instances exhibit further distinguishing details. This makes this family of sounds much more diverse. The aspects of difference or variation across this group gradually become discernible as the passage progresses. The types of variation are outlined in Table 1, but to summarise, there are changes in: spectral content/emphasis; morphology; spectral focus; resonant pitch content; iterative pulsing; register; position in stereo field. The listed variations do not always appear alone, with two or more often occurring simultaneously. For example, at 0'11 there is a change to a lower register with additional iterative pulsing. As such, concurrent spectromorphological changes produce subtle shifts within this family of sounds, but an underlying connectedness remains. The moments identified in the table do not form an exhaustive list of every single sounding instance, but rather highlight the different aspects of variation and variability at play throughout the passage.

Sound family	***Variation / variability***
Noise-based impulses	***Density of iterations*** • Single instances at 0'05–0'09 compared with denser rhythmic figures at 0'11 and 0'16 ***Register*** • Compare 0'09–0'12 with 0'14–0'16 (lower register) ***Position in stereo field*** • Exchanges between extreme left or right locations
Graduated continuants	***Spectral content/emphasis*** • Noise bias (0'09–0'17, left side) or pitch bias (0'05) ***Morphology: compression or lengthening of onset/decay*** • Slow onset, slow decay 0'09–0'18 (also feature iterative pulsing) • Medium onset, slow decay at 0'05–0'10 (three instances) • Fast onset, slow decay at 0'17 and 0'19, now with different resonant pitch content ***Shifts in spectral focus (possibly filtering)*** • Descending (0'05–0'10) • Ascending (a series of ascents 1'08–1'25) • Ascent/descent (0'21–0'24) • Reiterated ascent/descent pattern (0'56–1'05; left-hand side) ***Changes in resonant pitch content (different registers/pitch combinations)*** • Compare 0'05 to 0'17 (lower pitch material) • Compare 0'32 (higher register) with 0'34 (lower) • Compare 0'05 to 0'45 (higher register, *layered* with a lower register version) ***Iterative pulsing*** • 0'11–0'18 ***Register*** • Compare 0'05 (fast onset, slow decay) with 0'11–0'18 (lower register; additionally featuring slow onset, slow decay morphology; iterative pulsing) ***Position in stereo field*** • Often in extreme left or right locations

Table 1: Aspects of variation/variability in *Capture Éphémère* (0'00–1'32).

My interpretation of this extract is that there is not a strong impression of a base identity that is subject to iterative, sequential developmental. But rather there are spectromorphologies whose attributes vary in particular ways to contribute to the ongoing spatial setting. Sonic correspondences within the sound families become apparent as each instance is heard, eventually revealing the facets of consistency and difference. When listening I gradually build a richer impression of the musical environment through its emerging details and properties. Observing all the instances or sound events reveals what is common, in turn highlighting what is varying, but without hearing an initial and explicit statement of solely the common or base material. Returning to Schaeffer's instrumental model, there are common characteristics, especially for the graduated continuants, but the range of types of values seems to emerge over time.

5. Parallels with embodied experience and meaning making

Finally, we might consider an interesting parallel with ideas regarding embodied experience and meaning making. Philosopher Mark Johnson, whose work concerns embodied experience, metaphor, meaning, and aesthetics, draws attention to the idea that the *qualities* of situations are meaningful to us in very immediate ways, and form the foundations of our understanding and meaning making (2018). Citing the work of John Dewey, Johnson further suggests that "every experiential situation we find ourselves in is demarcated by a pervasive unifying quality that gives it its distinct identity and meaning" (2018, 16–17). For Dewey this was particularly the case for art works, suggesting that the pervasive quality of an artwork is not additional to other properties, but rather something that distinguishes one art work from another. There is a qualitative unity, but attempting to conceptualise and articulate that unity verbally will usually select out some quality or qualities of the situation, and lose the sense of the unity of the whole. Qualitative unity is something we can experience when listening to musical works. One of Johnson's assertions is that qualities of our embodied experience are the basis of our meaning making, and feed into our processes of conceptualising - there is a ground-up process of meaning emerging from qualitative experience before abstraction or conceptualisation takes place. This idea resonates with the experience of musical works that exhibit emergent variables in the manner of *Capture Éphémère* - the processes through which the musical world becomes apparent in all its richness mirrors, and taps into, our underlying meaning making processes. Our encounter with a work, and the settings that constitute it, is characterised by both its qualitative unity as well as those qualities of sounds emerging from the sonic flux, such as emergent variables, that become the foundations of our listening experience and from which we make sense of 'what is going on' in the music. And so perhaps such listening experience reflects, or is analogous to, embodied meaning making processes.

6. Closing remarks

This paper aims to offer ideas regarding how notions of variability can be thought of and applied to acousmatic music, and in complementary ways to existing theme/variation approaches. *Capture Éphémère* is just one example of emergent variables, of course, but it does exemplify how we might consider works with less overt theme/variation processes. Other works might be usefully considered. Manuella Blackburn's *Snap Happy* (2016–17) features tangible permanence through camera source bondings, gestural fragments and sustaining drones, yet there is an active mobility and variability to the materials of the opening passage through which their various facets are revealed. The opening movement of François Bayle's *Tremblement de Terre Très Doux* (1978) is a pertinent example of variability within a fairly stable pitch-oriented setting, establishing a coherent spatial feel. Along similar lines we might consider Christian Zanési's *Stop! L'horizon* (1990) or Theodore Lotis's *Underwater Theories* (2002). Whilst the pervasive unifying quality of each of these works is distinct, each allows us to gradually build a rich picture of the settings as the aspects of variability emerge more fully, bringing into focus sounding details that stimulate our further contemplation, interpretation and meaning making.

7. References

Bayle, François. 1978. "Tremblement de Terre Très Doux." *Tremblement de Terre Très Doux.* Paris: INA GRM. https://recollectiongrm.bandcamp.com/album/tremblements (accessed 8th December 2021).

Berezan, David. 2011. "Thumbs." *Allusions Sonore* (2013). Montréal: Ymx Média. IMED 13122. Compact disc.

Blackburn, Manuella. 2016–17. "Snap Happy." *Petites Étincelles* (2017). Montréal: Ymx Média. IMED 17147. Compact disc.

Chion, Michel. 1983. *Guide to Sound Objects*. Translated by John Dack and Christine North. Paris: Institut National de l'Audiovisuel & Éditions Buchet/Chastel. http://ears.huma-num.fr/onlinePublications.html (accessed 8th December 2021).

Harrison, Jonty. 1982. "Klang." *Évidence Matérielle* (2000). Montréal: Ymx Média. IMED 0052. Compact disc.

Johnson, Mark. 2018. *The Aesthetics of Meaning and Thought*. London: University of Chicago Press, Ltd.

Lotis, Theodore. 2002. "Underwater Theories." *Époque de l'eau* (2008). Montréal: Ymx Média. IMED 0894. Compact disc.

Parmegiani, Bernard. 1967. "Capture Éphémère." *L'œuvre Musicale* (2008). INA/GRM. INA G 6000. Compact disc.

Roads, Curtis. 2015. *Composing Electronic Music: A New Aesthetic*. New York: Oxford University Press.

Roy, Stéphane. 2003. *L'analyse des Musiques Électroacoustiques: Modèles et Propositions*. Paris: L'Harmattan.

Schaeffer, Pierre. 2017. *Treatise on Musical Objects: An Essay Across Disciplines*. Translated by John Dack and Christine North. Oakland: University of California Press.

Smalley, Denis. 1993. "Defining Transformations." *Interface* 22, no. 4: 279–300.

——. 1997. "Spectromorphology: Explaining Sound-shapes." *Organised Sound* 2 (2): 107-126.

——. 2007. "Space-form and the Acousmatic Image." *Organised Sound* 12 (1): 35-58.

Stewart, Ian. 2007. "Functional Analysis and Electroacoustic Composition: Theory, Extensions and Implications." Ph.D. Dissertation, Music, City University.

Thoresen, Lasse. 2015. *Emergent Musical Forms - Aural Explorations*. Ontario: Department of Music Research and Composition, University of Western Ontario.

Wishart, Trevor. 1994. *Audible Design: A Plain and Easy Introduction to Practical Sound Composition*. York: Orpheus the Pantomime.

——. 2002. "Imago." *Globalalia; Imago.* York: Orpheus the Pantomime. OTP 0066.

Zanési, Christian. 1990. "Stop! l'horizon." *Stop! l'horizon • Profile - Desir • Courir* (1990). Paris: INA GRM. INA C 2001. Compact disc.