

Scaling Form

John Young

It is self-evident that composers find it necessary to realise musical designs on varying scales or durations. What we might judge as a long, short or medium length musical work is to a certain extent relative. It is not necessarily connected to any value-driven notion of profundity, nor can profundity be linked to genre: there is no reason why a three-minute popular song cannot encapsulate or stir in us a deeper reflection on life than a 45-minute symphony. Similarly, duration as measured by the clock does not correspond linearly with psychological time. How musical contexts are created and what the listening imagination is offered in the materials of a work shape the way it is experienced, but so does the mind and cultural frame of the listener. This article examines the notion of scale in acousmatic forms, to locate ways in which we can find satisfaction in forms of different lengths and to locate some of the conditions by which material and its organisation necessitate or determine formal scale. In doing so, I am interested in how we sense the way a durational scale arises from the nature of the materials to hand and musical design processes. A key point of contention is whether acousmatic working methods lead composers to inherently lengthening the timescales of their materials. If so, this may be to do with how we use tools. An elemental sound processing method such as sample rate conversion-based transposition is often taught as a starting point – repositioning upper partials of sound as richer, slower evolving midrange sonority can be an appealing prospect. The naturally reverberant effect of granular time stretching can be accepted by the ear as an engaging state of spectral slow motion. These openings-up of spectral and temporal space tend toward expansiveness. A short-form work may have to take these tendencies into account. Has enough time been given to allow a satisfying sense of movement through time to be established or a sense of character to be conveyed by the music? Use of recognisable sounds, say from field recording, can require little time to establish an image in the mind of the listener, but embodying that in a form that involves sound transformations and abstractions has consequences for scale and balance of elements. These thoughts raise questions that we encounter in any compositional project. Many sounds created following different lines of thought that may not be yet connected ... how do I conceive a coherent form with them? Is my material and my approach to it going to lead me toward a particular scale of form, and what are the consequences?

What do we mean by form?

Bonds (1991: 13) shows that the term ‘form’ is applied in music with two distinct meanings. Firstly, as a ‘conformational’ principle, where structural patterns can be observed across numerous works (such that we might refer to ternary or sonata form) and, secondly, as a generative principle in which the elements of a composition give it a unique shape (in the sense that no two sonata forms are exactly alike). While these two meanings have different implications, Bonds emphasises that both perspectives are nevertheless important to developing a full picture of the experience of musical form. Yet in the generative sense, the ‘elements’ of a form cannot be reduced to an accumulation of material. We often ascribe value to the way *elemental materials* are stated, shaped and reshaped over time in the construction of a musical design as evidence of craft and imagination. So, compositional practice negotiates time to offer an experience in which traces of the technical apparatus of compositional practice may assume identities as forces acting on sound. For instance, in acousmatic terms actions such as filtering, shredding, time stretching, spectral blurring, spatial motion and envelope substitution might serve as generic kinds of sound-shaping that can be recognised as agencies in their own terms, independent of an underlying sonic substance. How such experiences emerge and are interpreted as form is subject to conjecture. Levinson (1997) argues for a ‘concatenationist’ view of musical experience which is to say that music is apprehended as a series of moments rather than being grasped as a single architectonically coherent entity: ‘... it seems that one cannot *perceive* the form of such a [large scale] musical composition as a whole, one can only conceive it (or perhaps *imagine* it, in a non perceptual way).’ (Levinson, 1997: 20). Turning to the question of whether this makes a narrative approach to musical form relevant, Levinson puts forward two parallel frames – a kinetic-dynamic one and a spatial-architectonic one. The former we might characterise as resting on anticipation aroused by implication-realisation and the latter the broad sense of journey from beginning to end. These two frames are not limited to musical experiences, they relate to ways we respond to literature, fine art, sport, and to life as whole. Rather than negating the value of a large-scale musical form, Levinson allows us to take a perspective on it – for there should be nothing inherently negative in an imaginative conception of an entire extended form. The stirring of reflective imagination after the fact is one of music’s powerful effects – questions about the nature of object and our encounter with it arise – and the same is true of any meaningful aesthetic experience. A work that leaves us with an incomplete image of its architecture may call us back to resolve or re-live the questions it poses. Figuring out a relationship between the kinetic-dynamic and the spatial-architectonic is relevant not only to a listener but, from the outset, to the creator – composing is seldom a process of starting at the beginning and finishing at the end and typically involves rotating processes of action and reflection, taking into account relationships between the parts and some phantom or emergent conception of the whole. Composers also live in the moment: in acousmatic music one easily becomes absorbed in the kinetic-dynamic dimension with decisions about shaping, connecting, interrupting or extrapolating elements in a network of musical material,

such that an architectonic ‘solution’ can feel a remote goal, a mirage even, but one that allows composers to directly engage with material at every stage in the compositional process – even at points when things might appear conceptually vague – as an inhabited ecology of sound.¹ McAdams and Battier (2005) ran an experiment on the comprehensibility of large-scale musical form in collaboration with composer Roger Reynolds. An extended composition for large ensemble and electroacoustics *The Angel of Death* (2001) was conceived by Reynolds (Reynolds, 2004) with the aim of gathering audience responses in studio and in live concert settings. Two versions of the work’s materials were realised, a sectional (S) version and a domain (D) version, with the S version combining types of material such that clear boundaries between them could be discerned, and the D version taking a more organic approach by interweaving these same elements. From this study a useful observation is made by Philippe Lalitte that an audience might, in the first hearing of a work, develop an image of a protoform: ‘a minimal representation based mainly on surface features, which the listeners may or may not remember in their correct order, but from which they will nevertheless build up a succession of emotional states, believing that these were intended by the composer. ... If a work cannot generate a protoform, the listener will lose interest very rapidly. In the strictest sense of the word, the composition remains “formless” for the listener, in spite of the composer’s intentions.’ While it is unlikely that we could regard any music as being truly formless – musical form is most importantly an experience that is aroused by a given stimulus structure in the mind of the listener – the consequences are perhaps more related to the finding of meaning or insight through aesthetic affinity (see also footnote 2 below). Recognition that there are numerous types of listening behaviours of particular relevance to electroacoustic music has had significant effect on theoretical research in the field. (Marty, 2019).

Working with sound

Important to acousmatic music is the notion of taking a given sound and working compositionally from its inherent properties. But a general characterisation of the materials in the genre is problematic. In it we find anything from coherent field recordings sourced from nature or culture, through carefully crafted sound-shapes derived

¹ Such a sentiment might be related to Boulez’s (2018:142-3) statement: ‘We wanted to explore mobile forms out of a desire to escape the empty shell of teleological form, and to offer the performer the power to select from several pathways, several solutions.’ In describing his incomplete Third Piano Sonata (1955-57, 1963 –) as ‘... a maze, a spiral in time’ (Boulez, 1986) a concept of form is enshrined in the very notion of variability: the form is the journey and its guided manifestations of pathways through the material. Lalitte (in McAdams and Battier, 2005) takes a different view: ‘To believe that an aleatoric assemblage of the sections, without regard for their sense of direction in time, will produce the same effect as the composition proper, is to deny the existence of form.’ <https://mpcl.music.mcgill.ca/angel/3.5.1.html> [accessed 18.10.23]. Levinson shapes this more contextually, stressing capacity for tacit knowledge, with a view of the comprehending listener: ‘Being musically literate is being sensitive to differences, departures, and digressions, relative to internalized norms of style, genre, and form. (Levinson, 1990:25).

from a studio *séquence-jeu* session (Reibel, 2000) to the most seemingly immaterial shreds of sound which challenge perception of pitch and timbre. Sound manipulation techniques can render original materials unrecognisable, or function as datasets to transform other materials. Schaeffer's (2017) mapping of sound typology marked a serious attempt to grapple with the enormity of the electroacoustic sound world, summarised in a 6 x 5 table (Schaeffer, 2017: 351). There we find expressions of the relationship between a sound object's mass as 'occupation of the pitch field' (2017: 318), the nature of the sustaining energy (based on models of impulse, iteration, continuity) and its duration, converging in the centre of the table on the phenomenon of the impulse. Sound typology in this sense recognises that every sound – sound object – has its own form in time, distinct from the way we might recognise it as comprised of 'matter.' (2017: 216). Significantly, Schaeffer took into account the effects of duration and variability in mass. At the core of the typology table are 'balanced objects' – the zone of traditional stable note-forms of normative duration, while extended durations with high levels of variation in mass being found at the extremes of the typological framework and characterised as over-original. Schaeffer placed varying degrees of musical utility in these typological regions. In his terms, for musical purposes, sound objects should have a degree of stability with some variation in construction (as facture). If overly prolonged in duration sound objects risk banality and redundancy through insufficient change over time. Eccentric sounds, characterised by extreme forms of change in the structure of a sound produce in Schaeffer's terms 'an excess of originality' which he warned against for musical purposes '... the dynamic and melodic profiles will be tortuous, confused. The excess of information generally makes people say of these sounds that they are formless' (2017: 360). Similarly the outer extremes of the typological table take into account and marginalise irregular accumulations of iterative energies. As is doubtlessly obvious, these 'constraints' though perfectly rational in characterising aspects of ecological listening strategies have become the stuff of much electroacoustic music, for instance through extreme forms of time-stretching or the micro editing into amalgamated energy profiles of disparate sound sources in concatenative synthesis.² Similarly, Schaeffer's phenomenological focus, which aimed to define the sound object without regard to source recognition has not been followed by probably the majority of composers working in the field, leading Chion (2016) to

²A recent example is Romain Perrot's [2023] *Muro di Rumore*. Perrot writes that the work is 'composed from multilayers of free form noise, to induce spectral individual sounds which will appear differently to each listener.' In one sense this can be exhilarating – within the work's 10 minutes and 59 seconds of high-density noise, detail and flux in the spectrum are available to the ear, but maintaining focus with a level of attention that can consistently enable discernment of sonic detail becomes more an act of will than engagement with the sound world. Works of this kind take us into a confrontation with the phases and modes of listening, but inviting us into that experience also potentially risks oversaturating capacity for attention. Yet, because there is no essential dynamic change in the course of the work, it does concede the possibility of listening at different fixed levels, as a way to interact with the ear's inherent variations in frequency sensitivity. *Muro di Rumore* was composed specifically for the 2023 Prix Russolo which stipulates a maximum duration of 11 minutes, which therefore presumably determined the work's final duration.

propose the alternative term *auditum*.³ But a key point about Schaeffer's work in this regard is that he recognised a distinction between time as measured chronometrically and as psychological time, in which sense he referred to the way a 'listening journey' (2017: 196) can evoke varying conceptions of the passage of time. An example of a piano note heard as recorded or reversed served this example:

... whether the sound played backward appears longer or shorter ... produces very varied, and sometimes contradictory, answers. For some the "suspense" makes the time feel long; for others it fills and shortens it. The important thing is the observation that the listening *journey* [originally '*trajet de l'écoute*', italics in original] is neither of the same length nor of the same type in sound played backward or forward. (Schaeffer, 2017: 196).

Richness of musical content is not necessarily the same as density of information, say in spectral or rhythmic complexity. In an initial sound object these may provide the composer with models out of which many new materials may be derived and developed, while simple initial materials may afford clarity of content from which more elaborate designs can be forged. (Young, 2016). But how might the nature of materials afford or influence the kind of timescale on which a composer can build a work? Truax (2014) pointed to the fact that social contexts have a very real impact on the way we think about musical duration. In terms of continuous duration, the most extended of Bruckner's symphonic movements at 25-30 minutes are considered 'long', while a 35 second prelude by Scriabin is clearly 'short', with consequently different social, artistic and programming implications. A musical experience may be of short duration but have stature and depth as a statement.⁴ To draw from Schaeffer, beyond the listening journey of a single sound object, a musical journey can be projected on a slender timescale: simply, as in Chopin's A major Prelude or with some complexity as in one the fugues in Bach's *Das wohltemperierte Klavier*. Recall that, in relation to his *Bagatelles for String Quartet* (1911-13), Webern (1963: 51) wrote: 'Here I had the feeling, "When all twelve notes have gone by, the piece is over."' Although this is not what transpired in the finished work, some of the seeds of his later more extended structures are found there (Chrisman, 1979). Webern's evident sensitivity to the colour and quality of each sound, blends and registral placement and, perhaps most importantly, the sense of line and phrase that defines each of the movements invests in each a distinctly audible overall design. Coming down to very basic elements of musical content, Hindemith (1952:68) expressed the view that 'single tones ... are mere acoustical facts which do not evoke any genuine musical reaction. No musical effect

³ 'Unlike Schaeffer's sound object, the *auditum* is subject to all modes of listening – reduced, causal, figurative, semantic, which make up different, at once linked and independent, levels of apprehension – knowing that it is helpful to distinguish among these modes of listening that take aim at the *auditum* and for which it is the foundation.' (Chion, 2016: 193) italics in original.

⁴ Expressions of the value in succinctness are found in Shakespeare (Polonius) 'brevity is the soul of wit' to Pascal (2012) in *Provincial Letters* 'The present letter is a very long one, simply because I had no leisure to make it shorter'.

can be obtained unless tension between at least two different single tones has been perceived.’ Deryck Cooke (1989:27) challenged this with the example of the trumpet note at the opening of Wagner’s overture to *Rienzi* which, he contended, is capable of evoking an emotional response: ‘beautiful, mysterious, thrilling ...’ Of course it is not a completely detached event – it does not die into silence as Cooke suggests⁵ which renders inaccurate the image he uses on the title page of his book. Still, that image of the single tone, with its dynamic rise and fall followed by a question mark is a telling one. If we were to hear it so isolated, the question mark is precisely an expression of our tendency to allow even the simplest sound-form to lead us somewhere: and it is the dynamic profile, the implication that the tone, having emerged from silence will recede back into silence that is most responsible for that mysterious thrill rather than the phenomenon of the single note itself. In that sense, sound, rather than existing in relation to another sound becomes relational with silence. A remark that perhaps brings these views into perspective, by neatly separating the idea of material from organising concepts, is from Elisabeth Lutyens, who related an aphorism of one of her most talented students: ‘the first note is a sound, the second note is a decision.’⁶ Acousmatic and spectralist thinking of course regard the ‘note’ as a sound object, as an event whose interior construction affords a world of possible material, but which still necessitates an approach toward concepts for extrapolation into a form – identification of what the spectral interior of a note might afford requires a suitable form of analysis and a ‘decision’. From the opposite end, if we take a composer’s initial visualisation of global design, such as those Kaija Saariaho considered for the large-scale work *Verblendungen* (Saariaho, 1987:106) we might agree that what is represented in these ways could imply virtually any duration or scale. What is critical in practice is the relative state of each of the images along its path. Departing from that idea, a set of underlying dynamic profiles show Saariaho’s thinking beyond the imagery with independently developed parametric layers, necessarily expanding the timescale on which the work evolves. Certain kinds of ideas do necessitate extended treatment. In acousmatic music we find this in Francis Dhomont’s *Cycle des profondeurs* of themed large scale works *Sous le regard d’un soleil noir* (1979-81, rev. 1983), *Forêt profonde* (1994-96), *Le cri du Choucas* (2014, rev. 2015) and in Trevor Wishart’s *Red Bird* (1973-77), all projecting deeply interwoven layers of narrative.⁷ As a means of contextualising an

⁵ Each of its three statements overlap successively with: the same note in low strings an octave lower; a short woodwind chorale and; a unison G in low strings.

⁶ Interview extract included in BBC *Woman’s Hour* 25/05/2012, <https://www.bbc.co.uk/sounds/play/b01hxt5l> [15:54, accessed 14.11.23]

⁷ Early pieces from the acousmatic canon frame and collage the colour and character of sound objects on modest scales, such as Pierre Schaeffer’s *Cinque études de bruits* (1948), with more extended suites of pieces emerging as more expansive statements as in Pierre Henry’s *Le microphone bien tempéré* (1950-51), and larger forms based on interconnected shorter units or movements, notably François Bayle’s grand cycles commencing with *L’Expérience Acoustique* (1969-72) comprising fourteen subtitled pieces, ranging from almost 25 minutes to 35 seconds in duration grouped into five chapters and Bernard Parmegiani’s *De natura sonorum* (1974,75) and *La création du monde* (1982-84). Annette Vande Gorne’s and Werner Lambersy’s electroacoustic opera *Yawar Fiesta* (2006-12) marks an important achievement as a full-scale acousmatic opera.

approach to long-form storytelling and connecting different perspectives on wartime experiences I have deployed a ‘funnel’ form in which content is progressively narrowed toward revelation of a key event or thought. (Young, 2018). For the purposes of this article, I am treating anything beyond 12 minutes of continuous duration as ‘long’ and around three minutes or less as ‘short.’⁸

Form in practice

Curtis Roads suggests three pathways to a musical macroform: top down, bottom up and multiscale planning. The latter, he proposes:

...encourages an interplay between inductive and deductive thinking, that is, from the specific to the general, and from the general to the specific. We use induction when we start working with a specific fragment and then see how many fragments can fit together within a larger framework. We use deduction when we conclude that a detail is inconsistent with the work as a whole. (Roads, 2015:298).

In acousmatic practice, the process of making and shaping sounds can easily be separated from any immediate musical intent. Signal processing routines frequently operate at rates faster than sound itself and generating many variants of the same formula is easily accomplished. A composer might have a concept of a possible concrete outcome from signal processing, or not. So, with a creative goal, surrounded by many sounds and aiming to make some coherent sense of them, a pertinent question is whether different sounds, phrases, accumulations or sections of musical material with varying surface qualities might overlap in their capacity to influence formal functionality – which is to say: can we make the same kinds of musical meanings with different materials? A perspective on this can be taken from Lakoff (2006) who articulates a hypothesis that cognitive primitives (or ‘cogs’) influence perception of form in (he exemplifies) visual art. Cogs are hypothesised as ‘secondary’ neural circuits that structure primary perceptions and motor actions as well as imagined instances of them to evoke schemas. A key idea is that they connect physically embodied experience of doing and acting in the world with language and are generalisable across actions and concepts – such as in schemas that articulate or express motions like grasping or stroking, incorporating associated phases of movement and identification of a target object. Through metaphor these can valorise language – to either ‘hurl’ or ‘inject’ an insult reflects embodied meaning but have different qualities in the metaphorical action. An example from visual art offered in Lakoff (2006:164) demonstrates how this can inflect meaning in form by summarising Arnheim’s (1969) comparison of Jean-Baptiste-Camille Corot’s painting *Mother and Child on the Beach* (ca. 1860) and Henry Moore’s wooden sculpture *Two Forms* (1934). In the painting we see a mother reaching with tender gesture toward her child while in the sculpture we feel that same

⁸ Barrett (1997:72) expresses a sense of difficulty with durations over 15 minutes.

caring, protective gesture, as the larger form inclines toward the smaller one. Central to this embodiment-based interpretation is that in both works the smaller ‘child’ figures are upright and apparently static, perhaps implying a vulnerability to which the larger figure responds. Lakoff explains that that ‘cogs’, as secondary structures ignore specific details of perception ‘... at once embodied, since they are part of the sensory motor system, and abstract since they do not include details.’

Discussion of acousmatic music also frequently draws on the embodied nature of metaphor. Wishart’s (1996: 182ff) sketch of complex sound archetypes takes phases of generalised physical phenomena to characterise sound-energy relationships, and applies similar thinking to group and streaming phenomena. What Wishart refers to as the ‘Dunlin effect’ – murmuration of flocking birds – also characterises a container schema (outlined in Lakoff, 2006): although not contained within a solid receptacle the boundaries of spatial occupancy at any moment can be registered as containment. In sonic terms, granular clouds project this schema with capacity for form-building processes of change – pathways, expansions, contractions.⁹ Smalley’s (1997) motion and growth processes, seven characteristic motions, behaviour types and representations of spatial forms and settings also exemplify an embodied schematic approach, describing states of material and capacity for interactions. Materiality and embodiment also are at the heart of an earlier writing by Smalley (1992) making more overt links to the physicality, ‘object-ness’ and ‘thing-ness’ transmitted by sound. More recently Smalley (2010) has offered reflective insight into the values and pitfalls of devising descriptive terminology for sound. This includes recognition of changes in the conceptual potency of terms when translated, as well as an admission of an incorrectly designated term in Smalley (1986). In educational settings it has been my experience to find students resisting schemes such as Schaeffer’s categorisations and Smalley’s spectromorphological terminology as being too prescriptive – an imposition on the listening and creative experience. But grounded characterisations of the materials of acousmatic music from these perspectives are helpful, because they stand independent of any particular sonic material and indicate possible ways of connecting and valorising content.

First and last impressions: what to open and how to close?

We can get a clear impression of the possible scale of an acousmatic work by the way material is assembled in its initial stages. My hypothesis is that a generalised model for analysing the implications of ‘opening’ is that of entering a ‘space’. Space is used here as a metaphor for the volumes, distances and material associations that a listener might infer from the nature of sound, the timing and style of their presentation. As metaphors for opening, I suggest that we might think of an initial musical space as *formed*, or in the process of *forming* – a reflection, perhaps, of the fact that *form* is both

⁹ Smalley’s (1986:79) acknowledges the challenges in sustaining ‘musical coherence’ in works nearing 15 minutes in duration.

noun and verb. A formed setting provides the impression of a spatio-sonic identity that the listener can comprehend as a coherent scene in which an ensemble of materials interact or co-exist. This need not be naturalistic, but may be a complex amalgam of divergent material sources. Forming settings involve gradual assemblage of materials which unfold, elaborating characteristics and dimensions of an acousmatic space. Enrique Belloc's *Para Bla* (1993) I regard as opening with a forming space – as two elements: between relative pitch and noise, and a registral space between. The three short low-pitched attacks are all on the same tone (around G) but the five envelope-shaped noise bands (with slightly varied attacks) have different centre frequencies. We might infer a whiff of pitch in the noise elements, but the real impression is the establishment of zones within the space that it is forming before us in the course of 54 seconds. The work's subsequent evolution is perhaps surprising after this, being concerned largely with watery textural figures underpinned by tube-like resonances. The ending of this six-minute work recalls the noise band envelopes, mixing these with intimate water sounds, high-pitched attacks resembling impacts of glass objects and a final low drone canopied by upper harmonics. As a partial echo of the opening this projects a kind of still-forming ending. The opening statement of Gilles Gobeil's *Le vertige inconnu* (1993) might be briefly described thus: an initial rapid *da niente* crescendo of a hollow pulsing sound from which a short surge of filtered noise forces a powerful whip-like explosive attack (the ear is drawn upwards to a higher region in the spectrum after the initial attack). A deep low-level resonance of this underpins a web of rising and falling glissandi that push into a second attack, more deeply resonant than the first and which generates a more extended ongoing resonance with a brief trail of high frequency 'shards' (defined by components between ca. 3.5 and 11kHz). A cloud of broadband noise recedes into virtual distance underscored by a deep drone anchored around 60Hz. This happens within the first eight seconds and conveys a formed sound image because the flow of elements feels convincingly propelled by one coherently sourced energetic flow – if we were to think in materialist terms not necessarily one substance but conveying a richness of design in one musical action. As a design, *Le vertige inconnu* can be seen to develop from this compact initial statement through a sequential process in which energy surges and impacts become increasingly separated from the more stable states they appear to initiate. These more stable states offer a range of obscure but tangibly 'real' mechanical and environmental imagery. A further feature is the way slow increases in energy suggest the approach of sound toward the listener – generally influenced by carefully constructed rises in high frequency energy.

Structuring closure in acousmatic music is more problematic than opening, and this can be understood through a distinction made by Leonard Meyer (1989, 2000) to evaluate the functional value of musical materials: namely in terms of primary (syntactic) and secondary (statistical) musical parameters. For Meyer primary parameters are those capable of being segmented into 'perceptually proportional' steps, with relationships between them shaped by syntactic constraints that enable a set of tangible, hierarchic value relationships to emerge. They are syntactic where elements within a parametric frame can be related in terms of function, e.g.: leading note/tonic, upbeat

/downbeat (Meyer, 2000: 286). The psychologically complex consequences of discrete pitch steps used to evoke a tonal centre, whether definitively or ambiguously, as well as metrically-proportioned rhythmic formations are core examples of the musical efficacy of syntactic parameters. These elements are capable of inducing an underlying structure such that a syntactical unit, for instance the tonic chord in tonal music, can be implied, or anticipated in the mind of the listener from within the musical flow without it necessarily eventuating. Secondary parameters cannot be separated definitively into proportional values, nominally: tempo, dynamics, and timbre (Meyer uses the term ‘sonority’) and these tend to function through relative increases and decreases in quantity or alterations in character, rather than a genuinely relational-implicative syntax. These Meyer regards as operating statistically and are ‘... experienced and conceptualised in terms of amount rather than in terms of kinds or class-like relationships such as *major third* or *antecedent-consequent* ...’ (Meyer, 2000: 287, italics in original). One timbre may be brighter than another, and these can be understood ecologically from lived experience – impressions of height, tightening, openness, and so on (as the quick sketch above of *Le vertige inconnu* implies) – but this cannot be valorised with quite the same specificity and syntactical potency as the degree of stability or directional implication of an interval between two notes in a tonality-centred context.¹⁰ Outside of that a potentially fruitful way of making useful distinctions and oppositions with sound in the broadest relational terms is in the notion of polarity: a sense of opposed extremes in sound, whether absolute or not. For instance, in terms of pitch and spectral types, following Schaeffer’s model,¹¹ Smalley’s continua of note-to-noise and spectral density (Smalley, 1997: 120-121) theoretically summarise a sense of both the psychological distance between sound states and the potential for grasping an uninterrupted sense of parametric coherence between them. For this to really work in music, we need to be attuned or acculturated to the notion of such a continuum in order to gain meaning (such as tension/relaxation or goal states) from stages and states of progression or play within it. So although we can hear that Smalley and Schaeffer’s nodal states of spectral definition and density are perceptually relevant, and despite the fact that in certain circumstances we might reasonably regard a focal pitch or a progression toward noise as a relative goal state – which is a strategy of some spectralist instrumental composers as well – movement through the continuum cannot be inherently hierarchic. It is still *movement* which may have affective qualities such as tension through intensification, but a definitive point of arrival (or closure) will tend to be tenuous: we can never be sure which is the final value ... which is the most saturate point in noise, say.

Syntactically viable elements can also behave statistically – the repeated alteration of tonic and dominant at the end of a classical symphony¹², and the harmonic

¹⁰ Engebretsen (2020) summarises several decades of thinking about timbre in music, pointing to increasing recognition of the capacity of timbral play to evoke musical tension and release.

¹¹ See Schaeffer (2017:413). Grisey (1987:244) also presents a more generalised view of a continuum of sound structures.

¹² See Awagu (1987) for a commentary.

oscillations in much of Philip Glass's music exploit exactly this. Needless to say, any emphasis on syntactical frameworks such as what we might think of as tonic-centredness in a Eurocentric sense, are culturally constructed. Yet, as a grammatical system, tonality is learned through mere exposure and its cultural ubiquity inevitably makes it, at very least, a background frame of reference brought by most listeners to all musical experiences. A deeper understanding of the consequences of that, along with other culturally-derived forms of understanding is an important area of investigation. But syntactical relationships of the tonal kind are not the only factors in projecting musical closure.¹³ There is a rhetoric of closure. A short punctuating sonority, fading out, slowing of activity corroborate syntactical devices and can serve to inflect and intensify a syntax – in musical performance and in the presentation of compositional ideas – to influence and animate phrase shaping at all levels. A useful example of a statistically directed process for closure is Schoenberg's idea of *liquidation*, where a phrase end drifts to closure through a weakening of the influence of a motivic figure (Heneghan, 2019). Many tools commonly used in acousmatic music enable forms of liquidation: the 'blurring' potentials of granulation and frequency domain processing, time-stretching or time-compression, extended reverberation times, looping, filtering. Fading and dissolving of sound matter itself is perhaps most poignant in acousmatic music – the ontology of the genre is such that sound materialises around us from no apparent performative action, it emerges and 'disappears'. This disappearance of sound had significant consequences and the fading of sound energy is described by Michel Chion as evoking a *window of mental totalisation*. He gives the example a single piano tone which, in the case of a note in that instrument's lowest octave, may resound for 30 seconds or more. But we can surmise its morphological fate very quickly – Chion (2016:33) says: 'the end is but the logical consequence of its beginning, and the sound is totalised before it is truly completed.' If we recall that Schaeffer's zone of balanced objects is bracketed by objects of more extended duration and possibly unpredictable shifts in spectral content or dynamic shape, then a tendency toward mental totalisation might become an agent of tension when, say, from within our extended piano note a new growth in energy is observed in a particular part of the spectrum. In this sense we can appreciate the difference between cessation of sound and syntactical closure based on the establishment of a relational architecture between elements in a musical discourse,¹⁴ as well as potential consequences for the scale on which a form might be constructed.

¹³ Thoreson (2015) stresses this as a riposte to Meyer's emphasis on primary parameters as most evidently syntactical:

... closure and segmentation are not synonyms; it is possible to create segmentation – divisions into sections, etc. – through timbre. Probably closure may only be a special case of segmentation, and no more than segmentation is needed for laying the fundamentals of musical form and syntax.' The crucial point remains however, that syntactical organisation is more than what we hear in the moment, but a system in which an underlying relational architecture binds elements functionally, such that direction of travel can be anticipated – whether correctly or not – before it is experienced.

¹⁴ After all, how many times has the abrupt clatter of faders brought down on a diffusion mixer broken a silence and announced that a work has, indeed, faded out for the last time?

The use of dynamic fading as a phrasing device that has consequences for formal scale can be found in a comparison of Francis Dhomont's *Points de fuite* (1982, duration 12:21) and Charles Amirkhanian's *Bajanoom* (1990, duration 3:00). *Points de fuite* (vanishing points) opens with a series of surge gestures fading into silence or near silence. The first gesture alone is a microcosm of colour and energy distribution. The initial rise draws attention to a noise-sheen weighted around 7.6kHz with an increased dynamic surge at 2.8 seconds opening to a more defined pitch centre of G-sharp (3.3kHz), while remaining essentially a dense quite noisy spectral mass. Four further surges follow¹⁵ with varying dynamic profiles, spectral weightings and durations, with varying lengths of pause between each. A telling aspect of Dhomont's phrasing is the measured sense of timing of the first three gestures in relation to the quicker appearance of the fourth which also has a quicker rise in amplitude to create an impression of impetuosity. Each also offers a different residual pitch flavour: G-sharp/B/D-sharp/D-sharp falling to C-sharp via D. Some of these pitch impressions are more distinct than others, partly because of the complexity of the spectral masses from which they flow, but the singular identity of pitch as a phenomenon allows the ear to lock in¹⁶, with the capacity to be held easily in memory – this and the subtlety of phrasing contributes to a playful quality of rhetoric. This is a 'forming' opening, and one evoking an impression of a necessarily lengthy unfolding. The fourth gesture's more nuanced projection of pitch and slightly more protracted duration allows it to give the impression of reaching down to meet the deep drone that emerges under it. A moment such as this, where tones embedded in a spectrum conjoin, represents a way in which syntactical closure of a phrase can be evoked by spectral means. A fifth such gesture (0:33.5) followed by two more reinforce an image of growing energy continuity and spectral density toward the emergence of what appears to be the distant sound of a jet aircraft (1:08). A cluster of bell-like attacks (1:16) heralds an eighth surge gesture which dissipates into a cluster of metallic attacks that dissolve into silence. To this point we have been taken on a journey from one kind of morphological type – the surge gestures – to a quite different sound world in which sharp onsets bring us closer to a material world, with a hint of lived reality just outside our reach (the aeroplane). A ninth surge gesture presents quite different spectral colouration, evidently influenced by the more crystalline sounds that ended the previous phase. Its placement, bracketed by silences – Roy (1996) regards this as parenthetical – suggests a regeneration of the opening phraseology. In formal terms the balance of recurrence, variation and novelty of material to this point confirms the impression that the work will develop on a substantial scale. The idea of the surge gesture remains an underlying motivator, but in the latter stages (from about 9:28) a series of interruptions threaten to destabilise a possible closure that is implied by textural stability. A final 'slow motion' surge gesture lasting 70 seconds makes a final rhetorical signal that the work has receded into silence for the final time.

¹⁵ Later we see Smalley describe this fade-in-out morphology as a graduated continuant.

¹⁶ See Young (2013) for a discussion of this in relation to Pete Stollery's *Shortstuff*.

Bajanoom plays out on a much shorter scale. At the outset a series of three metallic attacks decay into threads of pitched resonance, each time with increasing inharmonicity, but the first of these is 21 seconds long (as opposed to the 7 seconds of the first gesture in *Points de fuite*) and consequently draws greater attention to the consequent pitch strands. A further series of varying attacks, quickening in pace, are integrated by the projection of partials in common from one timbre to another (0:50 – 1:16), slowing in the rate of attacks until 1:43 where a cluster of convoluted glissandi heralds further new materials: a rich string-like resonance, hollow clattering, muffled voice-like sounds. A richly resonant state is maintained throughout, providing a consistent sonic aura despite phases of variation and novelty. A false ending is implied when an impression of spectral cadence is created at 2:17 as a strand of the voice-like tone falls slightly to meet the pitch of a new metallic resonance – this sustains for almost 11 seconds further insinuating the possibility of closure. A short ‘coda’ follows, bringing together in compressed form a series of gong-like attacks and gliding harmonics. The coherence of the work is a consequence of the consistency of the sonic world, but with sufficient variation in material to evoke a journey in sound with deftly integrated spectra and sensitive timing of decays and overlaps. By setting up an initial context in which the effect of mental totalisation is triggered but then pushing away from that with carefully timed new events which individually retain a sense of balanced holism as sound objects, tension that might require a ‘working out’ is restrained and *Bajanoom* achieves a successful state of brevity. *Points de fuite*, on the other hand, generates tension through its extended state of a forming opening, a tension which demands a more extended formal scale for resolution.

Design impressions

Let us return to Lakoff’s cog schemas and the notion that very basic designs can stimulate embodied understanding as form. I attempted to put this into practice in the final movement from my work *Three Spaces in Mid-Air* (2017). As a source design I took Chopin’s Prelude in A major, op. 28 no. 7. In this work dominant-tonic rocking harmony underpins the lilting melody which forms arches over the first eight bars. The transition to B minor via the climactic F-sharp 7th chord in bar 12 articulates a sudden upward projection in register and a moment of greatest pregnancy before gently resolving to the home key. This basic design impression might be notionally represented as an undulating line across which, at about two-thirds of its length, an oblique upward line is propelled before settling again to the lowest position of the undulating line. In my piece a slowly pulsing sonority, rooted around the tone of F (around 44Hz) analogises the rocking motion of Chopin’s harmony and is canopied by two identities in succession: a downward glissando gesture and rotating pure tones outlining a perfect 5th (2532Hz and 1688Hz) creating arches above the pulsing sonority. The latter heralds a rising tremolo figure which is projected much more strongly into the frequency space, injecting the only real tension into the movement and fading as it rises into the upper regions of the work’s spectral space, its evaporation softened

by rotating pure tones now a semitone apart. While these are only sketched descriptions of the contents of these pieces, the basic lines that etch the form might be seen as congruent: the embodied sensation as one of being taken from a stably rocking state with arching lines anticipating a higher space above to a more dramatically realised elevation with a return to the ground. As expressions of form these generalisable and potentially transferrable ‘images’ with implications of relatedness, contrast and motion, I call *design impressions*.¹⁷

A further illustration of how one might convey a design impression is in the ‘Helsinki’ movement from my work *Five Versions of Reality* (2014). In the work five short-form movements¹⁸ are each based on recorded snapshots that I identify as place-related, though not intended as definitive expressions of place – sounds, mostly ephemeral or transitory, recorded in a place are framed as sources for spectromorphological extrapolation. The movements are linked by some common gestural features, for example a falling arpeggio-like figure and sounds resynthesised from a trumpet sample to generate spectral clouds that prolong a pitch flavour or redirect harmonic colour. In ‘Helsinki’ the core identity is a melody¹⁹ played on a bass trumpet by a street musician in the city centre. In broad terms the work offers play between what might be ‘windows’ on an outdoor music performance and ‘interruptions’ by co-active abstract sound agents. The opening suggests a kind harmonic/spectral ambiguity, initially with an E-flat flavour opening to a C spectrum by 0:17, sustained until 0:33 when the first roughly recorded trumpet melody (in F minor)²⁰ cuts in. In this opening the timbre of the trumpet is hinted at with extraction of some of its spectral layers, resynthesised in an overlapping sequence of pitched timbres, cut into by a wind-noise distorted recording. This ‘cutting in’ and deployment of rough sounds aims to metaphorically suggest a natural space opened in the midst of a more abstract one. At 1:16 the clearest image of the trumpet, in E-flat minor, is presented and whose final cadence, rising to E-flat, is met by a C-flat major chord. The long resonant state that is maintained to the conclusion emphasises a tone between E and E-flat (around 322Hz, which I will refer to as E) – with a number of cross-cutting figures. The design impression is one of a resonant field broken into by two ‘found’ musical images, one hazy the other clear, with a final liquidation of the quasi-tonal corroboration of these two sides of the ‘world’ that has been fabricated (one ‘human’ and performative, the other abstract). That liquidation is signalled by the confluence of trumpet and resonance in the synchronised cadence: from that point of accord the ‘purpose’ of the piece is made bare and the closure determined. I was aiming to promote a sense of the work moving inevitably to an end from that point – something akin to Chion’s idea

¹⁷ In principle, this may be close to Lalitte’s idea of protoform, but I use design impression to emphasise the potential transferability of the image of a form, which would persist even through further listenings as a deeper understanding of form develops.

¹⁸ Namely: ‘Paris’ (2:45), ‘Prague’ (2:04), ‘Helsinki’ (3:20), ‘Christchurch’ (3:17), ‘Corfu’ (2:49).

¹⁹ The piece is *Donauwellen Walzer (Waves of the Danube)* by Romanian composer Iosif Ivanovici recorded on the corner of Kluuvikatu and Aleksanterinkatu, Helsinki, April 2011.

²⁰ These pitch/key references are approximate as the instrument was tuned sharp against a 440Hz reference.

of mental totalisation – but to delay it and arouse tension via the reinjections of sound energy as conflicting agents across the sustained E tone colour. Transient colours of A (1:47) and C (2:19) push across this in maintaining some tension as potential agents of interruption. The basic tonal stability ‘borrowed’ from the trumpet music offers a basis for syntactical closure, prolonged with interruptions at 2:05, 2:09, 2:14, 2:16 and 2:19. These five gestures (which I think of in anthropomorphic terms as attempts to cut across the stability of the continuous tone) could in themselves be considered a series of weakening attempts at interjection – clusters of attacks smeared or weakened in amplitude on each occasion. The gesture at 2:14 meets the pitch of the sustained tone, apparently absorbed by it, negating any possible interruptive effect. Further such elaborations of the ending are at several points where I anticipated heralding moments of closure – the noise sweep at 2:25; the quick tumbling gesture at 2:36 and finally the pulsing glissando at 2:43: all are falling figures, remembering that ‘cadence’ derives from *cadere* (to fall). In composing this part, something more felt right to draw out the resonant coda, but the fate of the work to close was sealed by the continuity of the E tone. Overall, then, we might characterise the design impression as: forming resonance – revelation (obscured) – disturbed resonance/interruptions – revelation(transparent) – accord – stasis/ interruption – resolution (figure 1), which might be interpreted with even broader zones implying phases of tension / windows / surprise / settling / dissolve. Because the first revelation is the ‘dirty’ window on the trumpet, followed an interrupted ‘shadow’ of the trumpet at 0:56, the sonic clarity of the second revelation (1:16) has a confirmatory function – physically we appear to be in more intimate proximity with it. The composition process led to the idea that, by realising a design impression with a sufficient mix of contour, variation and connectedness, a multi-layered but lucid sound journey could be created in a short form.

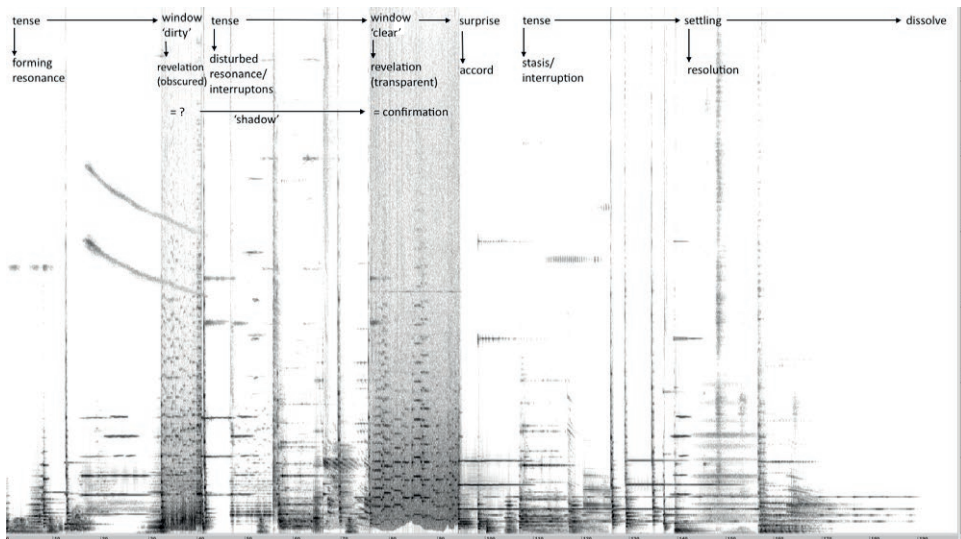


Figure 1.

Two related works by Natasha Barrett demonstrate an attempt to use something akin to the idea of a design impression to transpose formal scale, namely in *Racing Unseen* (1996) and *Racing Through, Racing Unseen* (1996). As the titles imply *Racing Through, Racing Unseen*, at three minutes duration, is a compressed version of material used in *Racing Unseen* (19:42 duration, in two movements of 10:21 and 9:21 respectively). Barrett's initial idea was to 're-scale' the main segments of *Racing Unseen* but found this to be '...impractical because proportional reduction destroys the timing and counterpoint of internal detail.' (Barrett, 1997: 94). *Racing Unseen* presents progressive envelopes of mixed sound forms in broad patterns of growth and decay, in which sound identities are masked and unmasked, often with material seeming to force its way through a texture through repetition. This is kaleidoscopic in effect, but the work's processes of apparently capricious textural massing and thinning, referential allusion and obfuscation emerge as features of a design impression. Such textures require time to establish and for the listener to 'hear into' them to locate and differentiate materials. Consequently, with a view to temporal compression, Barrett's ultimate strategy for *Racing Through, Racing Unseen* was to identify the most memorable elements from *Racing Unseen* after one continuous listen and to re-mix them with 'only an approximation to the original sound chronology.' From a design perspective, Barrett's conclusion that, in terms of the original work, 'prominent material characteristics have a stronger role in the work than proportional representation' (Barrett, 1997: 95) is a valid observation. Nevertheless in *Racing Through, Racing Unseen* we find some common organisational features: loop-like repetitions that create a time-space to draw attention to a sound identity and rich amalgams of contrasting sound types – although, as a consequence of the use of reiterated cycles of sounds in *Racing Unseen*, that work projects a greater overall impression of intensity. Both works end with fades: and despite the disparity in overall length these are similarly paced. A breath/wind-like resonance ends *Racing Through, Racing Unseen* over a period of 20 seconds. That same material is the penultimate identity in *Racing Unseen* giving way to distant bell ringing which fades for 20 seconds. This rhetorical closure device is proportionally consistent between the two pieces.

Some further case studies

Denis Smalley: *Valley Flow* (1991-2)

Smalley (2014) says this of his *Valley Flow* (1991-92):

The opening of *Valley Flow* is an example of what I regard as a fairly abstract sketch in spectral space that relies on slightly thin, distal spectral bands and ascending and descending contours – all of them what I call graduated continuant morphologies²¹ –

²¹ Smalley (1997:113) defines the graduated continuant thus: 'The onset starts gradually as if faded in, and the note terminates gradually as if faded out. In between, the note is sustained for a time.'

meaning that they are relatively unpressured in their appearances and departures. The focus is on their graduated continuity. Graduated continuant or sustained strands and layers, whether high or low, are very useful for suggesting spacious expanses and over longer periods of time than is the case here – they can take on a certain timelessness. Here, [at the opening of the work] higher levitated spectral regions are outlined, using only a few sustained but grained strokes of sound. A sense of spaciousness is aided by the gaps between the lines and the glides among them. It is the entry of a lower morphological push that finally tells us more about the extent of the spectral space scale. This opening evolution of spectral space is primarily responsible for creating the basic spatial image of the piece.

This quality of unpressured spaciousness giving way to more pressured *interaction* of material can be situated in terms of Smalley's (1997) idea of a 'voluntary-pressured continuum' which characterises the behavioural dimension of 'motion passage' – a phase of shift in musical/material context. We hear this in *Valley Flow* in a way that has implications for the work's extended duration of almost 17 minutes. The opening elicits a kind of stately tension established through the gentle applications of pressure as the spectral space evolves. The very first sound is a shimmering pitch centred on 1615Hz (around G-sharp). While the widening of frequency content at a relatively slow pace (notably at 0:42 and more decisively 1:04) suggests capacity for extended structural development on the basis of spectral space alone. The remoteness of the opening sounds, for the first 40 seconds in particular – their apparent distance from the listening position, the ethereal effect of the graduated continuant and the slight instability in pitch centre – which in itself if taken as a doppler shift implies movement across the distal space – creates a kind of uncertainty, but perhaps also a suggestion of latent energy. By 60 seconds we may feel that the spectral expansion can continue to move toward some kind of saturation, but not indefinitely. Increasing intensity in amplitude and expansion of spectral space combine in an effect of sonic matter in increasing proximity to the listener. This, along with the audible impression of a registral void of about five and a half octaves (at 1:04) creates expectancy, in the order of: 'what kind of ongoing envelopment will I feel from these sounds, and how will the gap in the spectral space be filled?' The rising centre of pitch and spectral saturation is interrupted with an explosive gesture of impulsive sounds (at 1:48) which discharges tensions of the previous section but also introduces a cluster of new species morphological types. These are noisier, characterised by sharps attacks, a hollow vowel-like formant quality and evoke sensations of rattling or rebounding objects. From this we might register a sense of surprise as well as gathering some retrospective insight: surprise in that the material is of a new attack-based form with a sudden increase in the rate of change relative to that previously experienced but which, as the apotheosis of growing spectral intensity, could be construed as a close-up encounter with the obscure shimmering of the opening material (Young, 1996). From this initial section of *Valley Flow* emerges a process in which spectral space expands from a narrow seed to set up a dramatic contrast between resonant pitch-bearing graduated continuant spectra and rougher, impulsive sounds which presages an expansive formal development.

In context the graduated continuant spectra can be characterised as pitch-flavoured since they project a quality of resonant filtered noise and in isolation are almost never fully stable in pitch, betraying their likely origin in granular synthesis. Gliding noise-bands in the zone above 2kHz are often associated with such resonance, almost as upper formants (we become aware of this identity at about 0:36, and at 3:45) and a sparingly used low-frequency pulse at 3:05 and 8:08 (which we could retrospectively associate with the deep ‘bounce’ at 1:54). We might term these ‘personnages spectrales’ and ‘personnages gestuels’²² articulating a core distinction between materials and underpinning familial relationships among sounds contributing to the shaping of form as a series of transfigurations and interpolations. As examples:

- At 2:31 a flange-like attack initiates the co-existence of a series of graduated continuant resonances on a D pitch with more active sweeping noise bands and hollow attacks. There is a kind of play for dominance here with a sharp noise attack at 2:55 failing to subdue the repeating resonances. A more powerful attack of inharmonic resonance followed by a further noise attack dragging the spectral space down to a deep resonance brings the interaction to a close. At 3:35 the focus shifts to a higher stratum of vowel-like noise glides, with the D-flavoured graduated continuant persisting but pushed further from listening focus with a reduced set of partials.
- From 5:34 – 8:06 tension is established through a series of shifts in apparent pitch flavour. At 5:37 a B-flat centre is prominent since at 932Hz this touches a very sensitive zone in the ear’s response but is also underscored by a recurring deep resonant mass with a peak response at approximately 29 Hz, in context creating the sensation of a B-flat root. At 6:26 attention is pulled upward toward an E pitch flavour, but with a more decisive turn to a G-rooted spectrum (tones at 392Hz and a notional 3th partial at 1178Hz form an outline for that flavour).
- At 7:41 a more powerful surge reasserts a B-flat flavour, swamped by a denser more ambiguously focused crescendo at 7:50 (B-flat and E are key flavours). At 7:56 a shadow of the hollow-rattling identity gently rises in the form of a graduated continuant, suppressed by a resonance which decisively conveys a B-flat spectrum to close the phrase. Woven above this unfolding interplay are gliding resonant noise-bands that corroborate in the flow of gestural energy but also function to cloud precise identification of shifts in pitch centre.

I have offered this sketch of some sections of *Valley Flow* to indicate the kinds of slow evolving interactions between distinct sound types which unfolds as a design impression of dominance-subordination between the principal agents of pitch and noise. The nature of these interactions as expanding over an extended timescale is prompted by the way materials unfold in the first two minutes, which is to say there is a necessity to allow the ear time to enter into the network of spectral characters and their mixes. With another nod to Messiaen one might think of this form as one derived from a process of arrangement of variations in material typologies.

²² A reference to Messiaen’s notion of *personnages* as defined agents that undergo change in the course of an expanding a musical argument. See Healey (2004) for a resumé.

In contrast to *Valley Flow*, Smalley's *Sommeil de Rameau* (2014-15) is less concerned with morphological contrast and drama, revolving more around slow spectral integration and colouration. A stimulus for the work was the sleep scene from act four of Rameau's opera *Dardanus*. Smalley reflects the rondo form of Rameau's scene with an episodic structure marked by varied chordal refrains. Three chord patterns are employed: an oscillating D-flat/G-flat minor (1:20), a diversion of this to a diminished seventh sonority (1:30), and a cycle of fifths progression revolving around an F minor sonority (2:32). They are realised in a way that characterises the overall musical flow, with slow onsets sinking into rich sonority reminiscent of viols, emerging from and shrouded by a range of coloured noise-clouds. The work opens with what we might initially predict as a graduated continuant but unfolds upward over the first 30 seconds through an initial focal pitch of F (perceptually at 349Hz) towards a canopy pitch four octaves higher (around 1397Hz). Each of these focal tones is pulled at by a pitch a semitone lower, and the figure of a rocking semitone continues to be a feature as the work progresses.²³ Still, this is an oversimplification of the initial stages of the piece as other inharmonic frequency components and wisps of noise colour the work's spectral spaces. This choreography of spectral space with emergent zones of focal pitch, as though illuminated gently by a spotlight, infers a potential for further such revelations out of the rich spectral architecture. There are three episodes, the first two (4:41 and 7:22) are marked by more transparent spectral textures, the first with a relatively stable B-flat minor flavour and the second with more undulating tonal movement. The third episode (9:55) is the longest and most complex, with the relatively remote tone colour of E (at 10:08) setting off a canonic effect of falling semitones at the major second, spawning the section with the greatest tension in the work. In previous sections many of the definable spectral constellations were conjoined by a common 'pivot' partial, but in this section the ear is drawn to falling semitone partials, especially from 11:30 such that, in particular, a progression at 11:58 from an A minor to G-sharp minor flavour has a remarkably novel quality in the context of the work. In these stages the tonal shifts and moments of spectral illumination, such as the luminous A harmonic sonority at 12:43 are remote from the work's earlier cyclic harmonies. But the falling semitone voice-leading finally leads to the familiar rocking D-flat/G-flat minor resolution at 13:25. As such a design impression would consist of: spectral forming/chordal refrains/episode (stasis)/chordal refrains/episode (rocking)/chordal refrains/episode (remote)/chordal refrains. In the scale of the work the brooding emotive effect of the refrains is a key factor – they occupy time playing out at a slow rate, and the deployment of three chord patterns allows for their melancholy affect to be sustained by variations in presentation. The episodes necessarily balance that measured quality, with the more extended and tense tonal wandering of the third episode lending an especially profound twist of tension to the form.

²³ The intervallic structure of the chordal sonority at 0:14 bears resemblance to a point in an earlier work by Smalley – *Pentes* (1974). The drone in *Pentes* at 7:22 contains two semitones a major third apart: G/A-flat and C/D-flat, mirrored by B/C and E/F in *Sommeil de Rameau*.

Noto: *kristallgitter*

Noto's [Carsten Nicolai's] album *Autorec* (2002) comprises twenty tracks of varying duration from 14 seconds to 8:19. In these pieces we find granular shards, streams of iterated pulses, sine tones and filtered noise, often placed in very sensitive regions of the ear's response, which tends to reward moderate to low levels of audition and brings to the experience a powerful sense of intimacy with the sound. In some, a particular colour or sound type is focal, and in the longer works contrasting elements coexist. The pieces have an inscrutable quality such that time seems to stand still, and the question of a teleology is made to feel irrelevant. But the pieces do rest on patterning and an awareness of register, sound-shaping and timbre as differentiating factors in these hypnotic sound ecologies. The work *kristallgitter* [crystal lattice] creates the impression of a layering of static elements which pass and connect in quasi-cyclic fashion using a range of clicks, pulses, continuous tones and bursts of broad-band noise. At the outset a sharp click, a buzzy graduated continuant spectrum of partials harmonically related to G (100Hz) and a slightly resonant deep pulse at around a C-sharp (ca. 34Hz) are interleaved to form the impression of a triple metre at approximately 90bpm,²⁴ with a more rapid click element introduced at the half-way point. As the work progresses, a periodically arranged set of clicks, buzzes pulses together spanning the entire audible range create a spacious texture. A one-second-long wide-band noise burst punctuates at seven unequally spaced points in the flow, and also serves as a boundary marker for new material. Continuous tones, mostly harmonically related to the 100Hz, float across this texture but barely interact in any sense of voice leading (the closest to that being between 1:00 and 3:00). There are subtleties of organisation, and perceptual curiosities. For example in the low frequency pulse left and right channels are out of phase which influences spatial localisation. The first entry of the 100Hz tone at 12.3 seconds has the effect of refocusing the sense of pitch in the low pulse, bringing it perceptually more into alignment as a D tone, which is to say harmonically related to the pitch percept of the 100Hz tone. Amplitude modulation and phase inversion of some pure tones (100Hz and 400Hz) imparts spatial 'life' and, as one would expect, the spectral spread and porosity means some very divergent impressions are imparted on different loudspeaker systems. Although sequential in structure, the design impression of *kristallgitter* as a form is not linear. The duration of the first 100Hz tone is two minutes, placed within the pulsing texture and with minimal change around it. The ongoing impression is of a series of almost-still frames offering new angles on an object of scrutiny. This produces an almost zero-scale form: it could continue with many variations of the basic textural-spatial formula. A canopy of faster pulses appears at 3:00 and the low pulse disappears at 3:48 for one 'period' marked by the noise band; tones establish new listening horizons but none contribute to a definitively teleological sense of form. A shorter form is imaginable: if the durations of the frames were compressed, and the pure tones made to overlap, a more tangible

²⁴ Coliis (2008) finds a connection here with traditional and contemporary dance forms.

design impression would form. And yet it is compelling listening – the durations of the sections/frames are just of an order that time appears to stand still. An ending is contrived with the reduction of the texture to 400Hz and 100Hz tones together with the buzzy graduated continuant – the latter two fading to a slightly reverberated noise burst punctuating the end.

John Young and Simon Perril: *Sun Deck Set Cogitation* (2022-23)

The sound installation genre has been characterised as one forming negotiations between space and place (Ouzounian, 2008). Installations may, for instance, be site-specific by intervening on or drawing attention to the inherent sonic features of a location, position sound in ‘non-spaces’, co-opt the audience as participants through direct play or responsiveness to their mere presence, or exist as a trace of a performative process. As Bandt (2006) and van ’t Klooster (2017) note, a distinctive feature of installations tends to be their presence over long timescales in which audiences are likely to engage at will with potential to make return visits, as in a traditional art gallery or other public or sequestered area. This has consequences for the experience of the sound installation as form: beginning and ending may not be distinguishable – whether merging into the daily lived experience of a place, or as an exhibit in the rarefied space of a gallery – the conditions in which a complex teleologically framed musical argument is followed to its end are compromised. A listener may enter and leave at any time – we might think of the form as being synonymous with, and as varied as, as the conditions and pattern of each auditor’s engagement with an installation. Beyond questions of form-as-object, form-as-process, and form-as-read by the listener, form is then shaped by the behaviour of the listener arising from their engagement with the space of the work as well as the space in which it is placed. With that in mind *Sun Deck Set Cogitation* (2022-23) is a sound installation I created in conjunction with poet Simon Perril. It is an acousmatic setting of the first set (‘Promenade: Deck One’) of Simon Perril’s poem *Sun Deck Set Cogitation* which is derived from textual treatment of the contents of a descriptive text by Claude Lévi-Strauss, namely the *Written on board ship* section from the ‘Sunset’ chapter in *Tristes Tropiques* (Lévi-Strauss, 2011: 62ff). Perril’s compositional approach took impetus from Lévi-Strauss’s observation of the intricate nature of dandelion seed heads (Wilcken, 2010:114). Via improvised ‘riffs’, drawing words from the Lévi-Strauss text through freely spatialised scanning of the page, a new text was constructed. In this process Perril regards the treatment of the source texts as ‘scattered and recombined word-seeds in surprising combinations: akin to blowing on a seed-head and spreading palimpsestic filaments.’²⁵

²⁵ A key influence on Perril here is Tom Phillips’s *A Humument: A Treated Victorian Novel* [1966-2016] which transforms the contents of a neglected Victorian novel (*A Human Document*, by W. H. Mallock) through processes of textural erasure by transforming the original pages through overpainting, cut-up and collage to form entirely new textual constructs, see <https://www.tomphillips.co.uk/humument> [accessed 4.12.23]. See also Macdonald (2009) for an outline of erasure poetics.

The result is concentrated text of paratactic verse, continuously and playfully descriptive but without a consistent or central subject or object. The first four stanzas of 'Promenade: Deck One' are as follows:

for one omenon
 according morning
 clear speculation aspect

betrays concrete
 oscillates indivisible incidence
 mixes more different

an overture at the end
 the face of immediate weather
 lowering rain

the early during
 frothy guarantee
 meteorological as rest

A cognate process was applied in my acousmatic treatment of Perril's recorded reading of his text. The vowel components of speech were erased from the recorded reading, paring it down to a skeletal outline consisting only of consonants, breath and other incidental noise elements retained precisely in their original positions.²⁶ There are 16 variations of exactly the same length, constructed around this 'ground' to make up the work, forming a 92-minute cycle in total. Each cycle consists of a randomly ordered non-repeating sequence of the 16 variations. The rhythmic framework of the ground, whilst always present as an underlying marker of time, is not always clearly perceptible as it is subjected to layers of spatialised digital smearing in the form of spectrally focused reverberation and granulation across a circular octophonic field. Layers of direct and processed signal provide points of initiation and connection for materials woven around it – for example particularly strong plosives are frequently used as attacks to trigger another sound woven into the texture, comprising strata of found environmental and domestic sounds and digitally synthesised sonorities. There are consistently applied forms of sound manipulation across the variation space – for instance impulsive sounds, such as particularly sharp consonants are formed into repetitive chains that mark out defined spatial trajectories, and selected words have their steady state time-stretched to form resonant envelopes which can then align with other pitched abstractions while retaining connection to their textual-vocal origin. Recognisably complete fragments of Perril's text (fragments of fragments) are woven into several variations and precisely aligned to their cognate points in the stream of consonants forming a palimpsest of text and com-

²⁶ Sound example at <https://on.soundcloud.com/323a7> (see music references for all examples for this work).

posed material. By imposing this additional erasure process, new aphoristic micro-texts are produced which, through the continuous persona evoked by the presence of the voice, can be read as commentary on, and conversation with, the enveloping soundscape.²⁷ As noted above, around the many practices of sound installation, a common issue is the transience of the audience. A key formal consideration was the problem of creating a compelling experience for a transitory, ambulatory audience, and to address that by balancing micro and macro formal considerations. The aim was to form each variation with a distinct character, but to project common sonic/textual elements to evoke macro-form arches and patterns perceptible within the randomised order of variations. Strategies included repetitions of specific word-seeds (whether presented overtly or obscured through ‘cut-up’ via granulation or envelope substitution)²⁸, projection of recognisable models of spatial behaviours, floods of resonance linked across the work through familial resemblance, and elongated vowel forms drawn from words discernible in many parts of the work.²⁹ In these ways the work is invested with a capacity to imply long-range narrative – which might encourage sustained listening – balanced with sequences of event structures that move and connect in ways that provide interest for short-term engagement.

In conclusion

There is growing recognition of commonalities between the materials and practices of electroacoustic music composers and film sound designers (Knight-Hill and Margetson, 2024). As well as in cinema, other electronically enabled forms of sound design are ubiquitous across mediated experience – gaming, radio, television, the web, advertising. But the creative shaping of sound into intrinsically standalone forms – not in support of acted out drama or in short bursts to illustrate or illuminate cinematic action – such that sound tells its own stories and projects its own unique capacity for meaningful expression is the distinctive domain of acousmatic music. For acousmatic composers to speak to listeners in powerful ways, working toward an understanding of the experience of music as connections between the shaping of sound and the scaling of form should remain key aims. In that spirit, I will accord Trevor Wishart the final words:

One of the big experiences I have is you can't make the whole piece at once, you make it in bits and those bits sound really great, the length is just right, everything is perfect. But when you come to put it in the piece alongside the other elements, it usually turns out that it is too long. So in the context it has to be shortened. And I do that by just listening over and over again. (Knight-Hill and Margetson, 2024:177).

²⁷ Sound example at <https://on.soundcloud.com/tuRhR>

²⁸ Sound example at <https://on.soundcloud.com/bmPt7>

²⁹ Sound example at <https://on.soundcloud.com/Yf6KP>

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Spectral analyses were carried out with IRCAM Audiosculpt v. 3.4.6, and music auditioned through Neumann NDH 20 headphones with AVID M-Box audio interface; Neumann KH-80DSP loudspeakers with 750DSP subwoofer with RME M-32 audio interface; ATC SCM110S SL loudspeakers with AVID HD I/O audio interface.