
Juxtaposition and Non-motion: Varèse bridges early modernism to electroacoustic music

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Edgard Varèse's *Poème électronique* can be viewed as a bridge between early twentieth-century modernism and electroacoustic music. This connection to early modernism is most clearly seen in its use of musical juxtaposition, a favoured technique of early modernist composers, especially those active in Paris. Juxtaposition and non-motion are considered here, particularly in relationship to Smalley's exposition of spectromorphology (Smalley 1986), which in its preoccupation with motion omits any significant consideration of non-motion. Juxtaposition and non-motion have an important history within twentieth-century music, and as an early classic of electroacoustic music, *Poème électronique* is a particularly striking example of a composition that is rich in juxtapositions similar to those found in passages of early modernist music. Examining *Poème électronique* through the lens of juxtaposition and non-motion reveals how the organisation of its juxtaposed sounds encourages the experience of sound structure suspended time.

1. INTRODUCTION

Denis Smalley's exposition of spectromorphology (Smalley 1986) attempted to clarify developments in the recent language of Western music that are most clearly exemplified in electroacoustic music. With Schaeffer's 'reduced listening as the main investigative strategy', Smalley's 1986 essay attempted to concurrently address 'perceiving and conceiving' within the context of this new, evolving language (*ibid.*: 59–63). One way in which Smalley's concept of spectromorphology stays within the conceptual framework of other Western musical discourse is in its preoccupation with motion. Smalley takes 'it for granted that music is motion in time' (*ibid.*: 73). He also proposed the idea that in electroacoustic music, patterns at the lowest level of structure (onset, continuant and termination) are extended into larger-scale structuring processes. While Smalley is not claiming to describe all electroacoustic music, for him motion is clearly at the heart of everything. Non-motion is largely relegated to the category of 'texture' that Smalley views as 'rapt in contemplation' (*ibid.*: 82).

Non-motion plays an important role in twentieth-century music that certainly extends well into the era of electroacoustic music. Smalley's 1986 essay and his

subsequent reformulation in 1997 (Smalley 1997) have been influential reference points in the discussion and analysis of electroacoustic music, and yet the focus on *motion in time* omits any significant consideration of non-motion. Early modernist composers, especially those active in Paris, embrace non-motion enthusiastically, almost in direct proportion to their distaste for the overbearing late nineteenth-century music from which they endeavoured to separate themselves. Stravinsky's famous remark that music is 'incapable of expressing anything' (Stravinsky 1971: 116) can be considered in relation to the central role of non-motion in his music. Underlying many manifestations of non-motion in modernist music like Stravinsky's is some form of juxtaposition, the presentation of musical ideas that contradict each other and that deny a sense of progress through time. Non-motion and juxtaposition carry over into electroacoustic music wherein the sound material is vastly different but the continuity with early modernist ideas can clearly be traced.

Edgard Varèse's *Poème électronique* is particularly illustrative of this point. *Poème électronique* like many early modernist works (and many of Varèse's own instrumental works) utilises juxtaposition as a primary technique and manifests non-motion on many levels. It is also the only work of electroacoustic music that is created by a major composer of the early modernist period. *Poème électronique* is a product of a new technology in the hands of an older generation. In fact, both Varèse and Le Corbusier who co-create the famous Phillips Pavilion of the 1958 World's Fair are acknowledged masters of modernism in their respective fields. The *Poème*, the entire projection of form in space, sound and light, was a pinnacle of modernist art achieved at the end of their careers. The vision that Varèse declares of having 'instruments obedient to my thought' (Varèse 1917) and its fulfilment in *Poème électronique* has for many people become the central narrative of Varèse's life.

The primary goal of the discussion that follows is to circumscribe the particular attributes of juxtaposition and non-motion as modernist techniques and to connect them to electroacoustic music through Varèse. This goal is particularly motivated by the observation that

histories of electroacoustic music often make connections to earlier twentieth-century music (serialism or experimental music inspired by Cage, in particular) while Varèse's electroacoustic composition has a different point of origin: early modernism. It is also illuminating to discover elements of the electroacoustic language that have their genesis so much earlier in the century. The importance of juxtaposition prior to the era of tape and turntable manipulation helps us to understand how its presence in early electroacoustic music could be heard both as radically new and immediately comprehensible.

2. JUXTAPOSITION AND NON-MOTION

2.1. Juxtaposition and modernism

Juxtaposition is a phenomenon of *perceived relationship between sounds in the context of a composition*. It is not purely a product of perceptual processes such as auditory streaming, although streaming may play a supportive role. And, while late nineteenth-century music may contain extreme contrasts, these are not examples of juxtaposition, because, even if they are associated with intense expression, they occur in contexts that are otherwise steeped in continuity and motion. It is the early twentieth-century modernism that witnesses the birth of juxtaposition as an original organising principle. This is most often discussed in relation to the music of Igor Stravinsky. Edward Cone (1972) describes Stravinsky's compositional process as involving the stratification, interlock and synthesis of juxtaposed elements. He says 'by stratification I mean the separation in musical space of ideas – or better, or musical areas – juxtaposed in time' (*ibid.*: 156). While Cone's article focuses on pitch structure, juxtaposition is deeply embedded in many other aspects of Stravinsky's music. Edgard Varèse's music shares similar roots in the early modernist thinking (Bernard 1987). His works of the 1920s and 1930s maintain and extend pure modernist ideals during a period of neoclassical retrenchment by others. The vision that he articulates in 'New Instruments and New Music' assumes that juxtaposition will create the space in which his 'sound-masses' and 'shifting planes' collide (Varèse 1936: 197).

2.2. Contrast vs juxtaposition

What is unique about the modernist concept of 'juxtaposition' as opposed to 'contrast' as exhibited in earlier music? Contrast functions in a variety of ways in eighteenth- and nineteenth-century music – as a boundary marker in the formal structure, as a signifier of strong emotion, etc. There are degrees of contrast that range from the subtle to the extreme, but in all these circumstances, the contrasting elements are understood as belonging together. They are contained within a

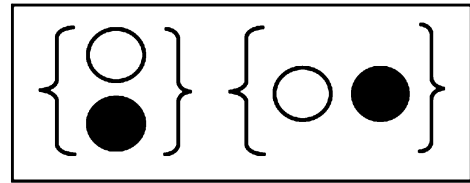


Figure 1. Contrasting elements are contained within a unifying domain whether simultaneous or sequential.

unifying musical domain and are similarly located within that domain (figure 1). (The term 'domain' here is used for broad categories of musical phenomena in which content is organised, such as tonality, harmony, metric/rhythmic organisation, timbre, etc., even though the boundaries of these domains are not always clear and even though the relative importance of individual domains may differ in one kind of music to another.) Even the most dramatic contrasts in eighteenth- and nineteenth-century music are contained within the domains of harmonic and metric organisation: they belong to a common harmonic progression and are organised in a common rhythmic/metric structure. The key feature of contrast is that the sense of continuity is maintained. The contrasting elements may appear disparate or they may appear to complement each other, but, in either case, the threat of discontinuity is assuaged.

While juxtaposition certainly necessitates contrast, juxtaposition also requires that the contrasting elements are understood as divorced from each other. They are more than simply different and juxtaposition is not just a higher degree of contrast. There is disjuncture (figure 2). Disjuncture can be heard in any number of musical domains, but for it to be musically significant, the domain of the disjuncture must be understood as important in the context of the musical work. Juxtaposed elements hold separate locations within their musical domains, or they even belong to separate categories within those domains. The heart of juxtaposition is discontinuity in musical space. Parallels in early modernist art are especially clear in cubism; consider the juxtaposition of multiple perspectives within a single frame or the juxtaposition of categories created by incorporating everyday objects like newspaper clippings

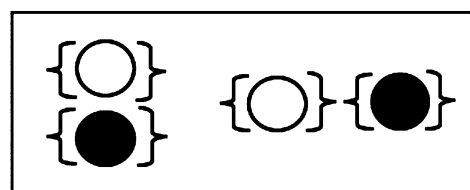


Figure 2. Juxtaposition requires disjuncture, both for simultaneous and sequential events.

within a work of art. Similarly, in early modernist music there is the juxtaposition of tonal centres (polytonality), the juxtaposition of chords (polychords), the juxtaposition of rhythmic/metric organisations (changing metre and polymetre), and the juxtaposition of sounds from the everyday world with the instruments of the orchestra (poly-timbre?). All of these are among the hallmark inventions of early modernist music.

As a distinctive feature of modernism, juxtaposition appears to capture and reflect the living experience of disjunctures and discontinuities. The embrace of juxtaposition in art can be experienced as liberating because it bridges the vast distance between the disparate elements of modern life. That juxtaposition can itself be the artistic idea and not merely the by-product is thoroughly modern. The disjuncture between the juxtaposed elements, the schism that is created, itself is content.

When Stravinsky says that he considers ‘music, by its very nature, incapable of expressing anything’ (Stravinsky 1935: 116) and Varèse says his music is ‘unable to express anything but itself’ (Varèse 1983: 41), one of the ways in which music does not *express* is by juxtaposition. Juxtaposition itself does not express a thing; it is a disjuncture of things. In response to disjuncture, a listener could experience anything from shock to delight – shock at the unexpectedness or incongruity, delight at the novelty or audacity. In response to juxtapositions, the listener might adopt a listening strategy of anticipating how the gap between the juxtaposed elements would be bridged. This is how Cone understands the juxtaposition of pitch content in Stravinsky: the juxtaposition of two seeks resolution in a third. Alternatively, the listener might experience the juxtaposition simply as content in its own right without the need to anticipate or resolve. This alternative is important. When accepting the juxtaposition as content, the listener is empowered to be an observer, to release expectations and to transcend the apparent contradictions. This is one way in which such early modernist music separates itself from the heavy-handedness of much late nineteenth-century music.

2.3. Juxtaposition and non-motion

Because contrast in eighteenth- and nineteenth-century music is embedded in continuity, there is little question of contrast arresting motion; in fact, contrast is usually understood as reinforcing motion. While there may be many competing theories of musical motion in eighteenth- and nineteenth-century music (Schenker 1933, Meyer 1968, etc.), clearly the experience of pitch patterns unfolding in time plays a primary role. For the listener of twentieth-century music, there may be many changes simultaneously unfolding in many musical dimensions. When is change perceived as motion?

A prerequisite of perceived motion through time is the connected path of change – a musical element in state A progresses to state B through a process that enables the listener to apprehend the continuity between A and B. For example, in eighteenth- and nineteenth-century music, the motion could be as simple as an individual voice changing notes due to being suspended in a new chord. The change from state A to state B can be experienced as motion because there is a recognisable process (resolution of a suspension) and because continuity is maintained (by proximity in pitch). The recognition of motion gives rise to expectations, and for music primarily centred in pitch patterns, expectations are crucial. Contrast may play a supporting role adding emphasis or nuance.

Sequential juxtaposition, on the other hand, denies the possibility of motion through time. It is a break in continuity and destroys the possibility of forward motion. This is not to say that the clock does not keep ticking; the passage of time is essential to the recognition that a sequential juxtaposition has occurred. Rather, the listener is thwarted from making the inferences and associations that would make the recognition of motion possible. Sequential juxtaposition denies motion through time because sequential state A in juxtaposition to state B provides no connecting path. Also, there is a breakdown of continuity because state A and state B cannot both be similarly located in a musical domain (figure 3).

In the extra-dimensional world of electroacoustic music (where ‘pitch’ and ‘note’ have to be completely reconsidered), motion can take many forms, such as those described by Smalley (1986). The listener’s recognition of continuity between state A and state B is likely guided first and foremost by the perceptual continuity of auditory streams, though cognitive factors can clearly augment perceptual ones. For example, listeners might infer continuity on the basis of the relatedness of sound objects: the sound of a drip giving rise to the sound of a brook. If the process of change is solely the result of technological manipulation, then the listener must learn about the process from the music itself. Otherwise, the listener can assume that the process is analogous to phenomena in the physical world. In this way, the day-to-day experience of living in an acoustic environment strongly shapes how we hear motion in electroacoustic music.

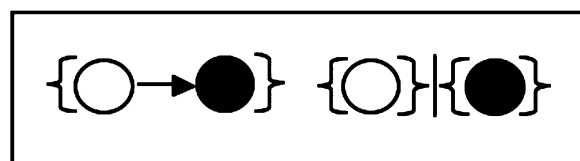


Figure 3. Motion vs sequential juxtaposition.

It is no surprise then that Smalley begins his explanation of spectromorphology by categorising ‘the spectral shapes and shape-sequences created by the energy of physical and vocal articulation’ (Smalley 1986: 62). Starting from the *morphological archetypes* of instrumental sounds described in terms of their ‘onset, continuant, and termination’, he goes on to create an expanded set of *morphological models* that include reversed forms of attack-decays and additional categories of continuants (both models that appear to be products of listening to technological music). Motion for Smalley ‘always implies a direction’ and ‘is concerned with expectations gratified or foiled’ based on ‘spectromorphological shaping and the musical context’ (*ibid.*: 73–5). Smalley views the *morphological archetypes* as ‘sounding extensions of human action’ with ‘a causal relationship between the action of breath or physical gesture and the consequential spectral and dynamic profiles’ (*ibid.*: 68–70). Therefore, the listener’s comprehension of motion involves an act of inference based on the continuity of causal body experience. This creates the context in which patterns can give rise to expectations and goals.¹

Juxtaposition, on the other hand, offers no analogies in body experience. A better domain for analogy would be mental attention. Attention does not require that state A be connected to state B. Shifts of attention do not require a path of change, nor do they require the experience of continuity in time, only separation in time. In this sense, the listener’s awareness and recognition of juxtaposition arises out of discontinuities in mental experience. The emergence of juxtaposition in musical art is among other things about the relocation of experience from the body to the mind that has occurred along with the rise of modernity. Juxtaposition as a cultural phenomenon may only have emerged with the invention of the moving picture and the viewer’s experience of instantaneous splices (typically with the body at rest).

Unlike film, music has the capacity for simultaneous juxtaposition that similarly thwarts forward motion. Simultaneous juxtaposition produces disjunctures that are sustained through time. In eighteenth- and nineteenth-century music, simultaneous contrasts are contained within some unifying domains and must absolutely be contained within the domain of harmony. If two harmonic chords are present at the same time (such as, for example, a diminished seventh over a tonic

¹By 1997 when Smalley reconsiders his earlier ideas, a greater allowance has been made for sounds that occur without association to the body. Electroacoustic music then presents ‘a bewildering sonic array ranging from the real to the surreal and beyond. For listeners, the traditional links with physical sound-making are frequently ruptured’ (Smalley 1997: 107). But even these allowances only stretch as far as ‘remote surrogacy’ with its ‘gestural vestiges’ that ‘remain linked to the psychology of primal gesture’ (*ibid.*: 112). The concept of body experience and its centrality to listening comprehension remains intact.

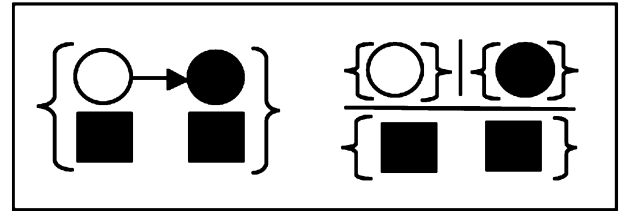


Figure 4. Simultaneous contrast vs simultaneous juxtaposition.

pedal), one harmony must move to resolution in the other thus situating both in the same location within the domain of harmony. Simultaneous contrasts of this type enhance motion because the motion toward the resolution is inevitable and unavoidable. In modernist music, simultaneous juxtapositions do not imply motion because the juxtaposed elements are by definition in disjuncture. One does not resolve into the other (figure 4). The persistence of simultaneous juxtaposition through time denies any sense of progress or motion through time. It is one of the primary ways in which the sound blocks and masses of modernist music sustain their separation.

2.4. Embedded levels of motion and non-motion

Non-motion has an important history within twentieth-century music, and different compositional movements have manifested non-motion in different ways. While risking over-generalization, it may be useful to capture some sense of the distinctiveness of each. In early modernist music, non-motion is often experienced in the juxtaposition of a limited number of strongly polarised elements. The identity of the poles is typically clear and non-motion is important in building the musical architecture. Sustained non-motion in the presence of highly polarised elements produces a sustained and unresolved dynamic energy. In the *Poetics of Music*, Stravinsky speaks of ‘inducing in the mind of the listener a feeling of euphoria and, so to speak, of “dynamic calm”’ (Stravinsky 1942: 31). In experimentalist music in the tradition of John Cage, especially indeterminate music, non-motion is typically experienced in the unfolding of open possibilities. Jonathan Kramer considers many of Cage’s works to be ‘vertical music’ where ‘No event depends on any other event’ (Kramer 1988: 55). This is music of process rather than architecture and form. The release of expectation that is elicited by the listener’s inability to anticipate outcomes captures a very different sense of non-motion from the early modernists. There is an openness or open-endedness to content and its organisation; in this way Cage’s music is clearly postmodern. Minimalist composers such as Phillip Glass and Steve Reich are often labelled as postmodernist, and yet the quality of non-motion experienced in

their music is more akin to the early modernism. Minimalism exhibits an interest in the play of form and structure without the polarisation of early modernism. Juxtaposition is both assimilated and integrated into the finer grain of the music. In this way, Glass and Reich seem more like late modernists.

Such distinctions about non-motion can be understood as by-products of the interplay of levels at which non-motion and motion are instantiated. Motion can be embedded in non-motion and vice versa. This can happen at all levels from the individual sound events to the large-scale organisation. The importance of Smalley's *morphological models* is not just that they represent patterns of 'tension design' for individual sound events, but also that they serve at 'higher structural levels' as 'larger-scale focuses and functions' (Smalley 1987: 72). This is really the crucial point of it all. As a musical phenomenon, juxtaposition, like Smalley's morphological models, must occur at a specific level of organisation (at least, for compositions in which 'level of organisation' is meaningful).

Non-motion is more than just the absence of motion: it is the category of all musical phenomena that deny the listener a connected path of change. Besides juxtaposition, non-motion can be achieved through *repetition*, *reinstantiation*, *randomness* and *stasis*. Repetition defeats motion by restating state A without a process of change and the anticipation of state B. Irregular repetition occurs when the interval of repetition cannot be anticipated. Reinstantiation is an extension of repetition in which the content of A is reconstituted without one version having precedence over another. Reinstantiation and repetition, especially irregular repetition, are important for modernist music and are typically combined with juxtapositions. Randomness defeats motion by denying the identification of a specific process of change from state A to state B. It is change without predictive organisation. *Stasis* represents no change at all, something that occurs musically only at higher levels of organisation.

When a listener perceives that motion and non-motion are both present in a musical passage, one is contained within the higher organisation level of the other. For example, in a random series of notes that lacks any overall melodic trajectory, the individual notes may instance motion, but they are contained within a higher-level organisation of non-motion. Or, in a passage of pattern or phase music that is based in slowly evolving repetition, there is local non-motion contained within the motion of higher-level organisation. This clarifies Smalley's concept of 'texture' that appears to be local motion within global non-motion. Varèse's concept of 'balance', which has a special importance and meaning for him, can be understood in similar terms, as the summation of diverse elements

that results in non-motion, one motion cancelling out and balancing another.²

2.5. Two examples of juxtaposition and non-motion in early modernist music

2.5.1. Stravinsky, *Symphony of Psalms*, *First Movement*, measures 1–14 (figure 5)

From one perspective these measures can be heard as a neoclassical reference to the opening tutti chords and contrasting arpeggiations that begin many classical works. How has Stravinsky transformed this historically situated idiom into a modernist context? Contrast has been converted to juxtaposition: the e minor tutti chords are juxtaposed with the following B-flat and G dominant-seventh arpeggiations. Despite being historically referential chords, they are maximally disjunct, not only in their pitch relationships, but also in their registration, their orchestration and their rhythmic character. The rhythmic organisation is typically early modernist: there is no encompassing metric pattern although there is a constant pulse. The irregular repetition within that pulse of the e minor chords and the arpeggiations defeats any rhythmic anticipation.

At the level of the passage as a whole there is non-motion by virtue of sequential juxtaposition. Embedded within this, there is non-motion by repetition of the e minor chords and by reinstantiation of the arpeggiations (figure 6). At the intermediate level, the arpeggiations have motion by virtue of their increase of pitch content and phrase length. This idea is akin to Stravinsky's technique of expanding melodic cells with successively longer phrases. The initial arpeggiations are balanced between upward and downward movement. Then, the balance tips toward downward movement only to be rebalanced at the end by the last rising arpeggiation. This deviation of structure right before the end signals the end of the section. The e minor chord at the end tells us that despite the final rising arpeggiation, nothing has structurally progressed.

2.5.2. Varèse, *Intégrals*, measures 1–13 (figure 7)

There are three broad ideas juxtaposed here: the rhythmic melody centred on A-sharp introduced by the E-flat clarinet, the broad, sustained chords in woodwinds and brass, and the percussion that itself contains rhythmic parts and sustained parts. The passage introduces these ideas sequentially and then sustains them in simultaneous juxtaposition. The melody is reiterated with irregular rhythmic variations

²The use of the terms 'motion' and 'non-motion' in this discussion is similar to Jonathan Kramer's use of the terms 'linearity' and 'non-linearity.' So, for example, when Kramer refers to 'nondirected linearity' (Kramer 1988: 39), he is also essentially referring to motion contained within non-motion.

Figure 5. Stravinsky, *Symphony of Psalms*, First Movement, measures 1–14. © Copyright 1931 by Hawkes & Son (London) Ltd. Copyright renewed. Revised version © Copyright 1948 by Hawkes & Son (London) Ltd. Copyright renewed. Reprinted by permission of Boosey & Hawkes, Inc.

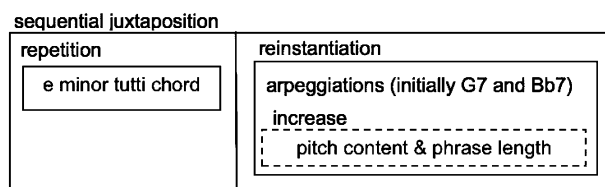


Figure 6. Representation of the relationship of motion and non-motion embedded within the Stravinsky excerpt. Here all processes are non-motion except for the increase of pitch content and phrase length.

and some elaborative pitch content added in a similar manner to the cellular expansion in Stravinsky. It undergoes repeated timbre changes moving among the E-flat clarinet, muted C trumpet and oboe, changes that also shift the spatial location of the sound. The sustained chords maintain a constant orchestration and also undergo constant rhythmic variation with the woodwinds and the brass each grouped together. The A-sharp melody and the sustained chord tones taken together present the same harmonic content throughout. Varèse is clearly not composing with historically referential chords, and in contrast to Stravinsky, octave equivalences are avoided. Pitch is a space for frequencies from low to high. The percussion is utilised in an entirely different way. While there are both sustained sounds and irregular rhythms in the percussion, there is nothing held constant throughout. The percussion appears to be much more of a field of activities than a play of forms, much more discursive than delineated.

While this passage as a whole manifests non-motion harmonically and rhythmically, dynamics play a large role in manifesting motion at the local level (figure 8). The sustained woodwinds are generally in diminuendo with occasional crescendo-diminuendo. The brass have many sforzando attacks with crescendo-decrescendo patterns. All of these patterns are reinstatiated, and while the orchestration might be constant, the timbre varies considerably with the extreme changes of dynamics. These patterns in the dynamics are mirrored in the A-sharp melody and in the percussion. *Intégrals* sustains the juxtaposition of the three layers shown here from the beginning through measure 27.

3. POÈME ÉLECTRONIQUE

3.1. Background

As an early classic of electroacoustic music, Edgard Varèse's *Poème électronique* is a particularly striking example of a composition that is rich in juxtapositions, especially sequential juxtapositions. Robert Cogan describes the work as having 'oppositional poetics' and goes on to say that its 'sonic juxtapositions . . . have electrified, mystified, or antagonised listeners for more than half a century' (Cogan 1991: 23). Juxtaposition has always been an important part of Varèse's language, though its use in *Poème électronique* may be more intense than in any other work. By examining *Poème électronique* through the lens of juxtaposition and non-motion, we bring it into focus as a modernist work.

The musical score for measures 1-13 of Varèse's *Intégrals* is presented in a multi-staff format. The top staff is for the B♭ Clarinet, starting with a forte (*f*) dynamic and a *poco dim.* instruction. Below it are staves for High winds and Low Brass, with dynamics ranging from *f* to *sf* and *ff*. The percussion section includes Suspended cymbal, Snare Drum, Tenor Drum, Castanets, Cymbals, Sleighbells, Chains, Tambourine, Gong, Tam-tam, Twings, and Bass Drum. The score is marked with various dynamics and performance instructions such as *poco rallent*, *a tempo*, and *morendo*.

Figure 7. Varèse, *Intégrals*, measures 1–13. © BMG Ricordi Mus. Pub. Spa (Casa Ricordi) (SIAE). All rights for the world on behalf of BMG Ricordi Mus. Pub. Spa (Casa Ricordi) (SIAE) administered by Careers-BMG Music Publishing (BMI).

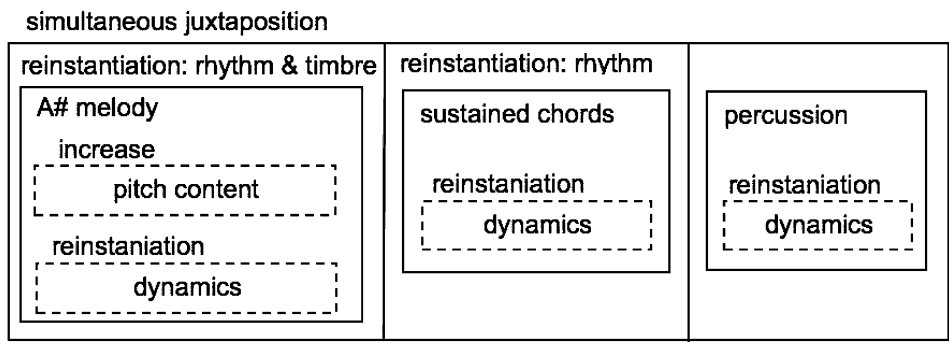


Figure 8. Representation of the relationship of motion and non-motion embedded within the Varèse excerpt. All three juxtaposed groups contain local motion in dynamics.

Despite their parallel standing as pillars of modernism, Le Corbusier and Varèse might seem surprising collaborators for the Phillips Pavilion project. We know that Le Corbusier had met with Varèse during a visit to New York in 1936 and that he appears not to have had any dealing with Varèse since that time (Trieb 1996: 168). But in 1956 at his very first meeting with representatives from Phillips, Le Corbusier expressed his strong desire to have Varèse create the music for the

project (*ibid.*: 3). We must imagine that Varèse had made a very strong impression on Le Corbusier back in 1936. The two men, only two years apart in age, had a great deal of cultural experience and many friends in common. Most importantly, Varèse must have impressed Le Corbusier as having a very compatible artistic vision. Le Corbusier went on to exercise varying degrees of control over the Phillips project and the work of his various collaborators. The most control was

devoted to the cinematic components created by Philippe Agostini with Jean Petit and the least control was reserved for the music. In the beginning, Le Corbusier had told Varèse that there would be script for the entire project with timing information and he also told Phillips that he would work in close collaboration with Varèse (Stimson 1991: 14). That was changed by June of 1957 when Le Corbusier sent a twenty-seven-page scenario to Varèse (Treib 1996: 172), and at the same time told him ‘your music is free, my script is free . . . each on its own runway’ (Stimson 1991: 14). The main sections of the scenario and their timing were:

- Genesis, 0" to 60"
- Matter and spirit, 61" to 120"
- From darkness to dawn, 121" to 204"
- Man-made gods, 205" to 240"
- How time moulds civilisation, 241" to 300"
- Harmony, 301" to 360"
- To all mankind, 361" to 480"
- (Treib 1996: 119–20)

Comparing the content of Varèse’s *Poème* with these timings does not reveal any consistent linkages.³ (The only analysis that correlates with these timings is that of Richard Felciano [*ibid.*: 212–3]). Varèse’s music would simply start and end in synchronisation with the visual components.

The more interesting question is the extent to which Varèse’s choice of sound objects reflects the influence of Le Corbusier’s scenario with its detailed description of the cinematic images. It would appear that Varèse is able to grasp enough of Le Corbusier’s broad concepts for both of them to feel comfortable in their collaboration. Without any comments from Varèse himself, we may never know the extent to which the sound objects had referential meaning for him. Interestingly, Lawrence Ferrara in his phenomenological analysis of *Poème électronique* catalogued impressions invoked by the work that can be easily related to Le Corbusier’s scenario: ‘time’, ‘primitivism’, ‘technology’, ‘religion’, ‘human existence’, etc. (Ferrara 1984: 168–9). The reactions to the Pavilion recorded by the various members of the professional press (Treib 1996: 215–28) seem largely focused on their experience of being overwhelmed or on their reactions to the concept of the project as a whole, not on its specific content. There is little to no evidence that visitors in 1958 related the music directly to the visuals.

Varèse arrived at the Phillips facility at Eindhoven and started work on *Poème électronique* in early

September of 1957. He worked for many months building and rebuilding the individual sections of *Poème électronique*. He created many written sketches of which a few have survived, but these are difficult to match to the completed work, though the sketch of the closing section is a near match (Dobson, Fitch, Tazelaar, Valle and Lombardo 2005: 31). What the sketches do reveal is something about the process and the level of detail with which Varèse attempted to convey and specify the sound materials that ended up on tape. One can easily imagine that Varèse arrived at Eindhoven with some sketches in hand. Most likely the sketches would be instrumental because Varèse could hardly anticipate the electronic material until he had experienced working at the Phillips’ facility. This conjecture seems supported by the letter written to Le Corbusier by the Phillips liaison Louis Kalff on 29 November:

It appears that more and more Mr. Varèse is concentrating on *musique concrète* and that he is thus avoiding all the traditional instruments and their compositions. This is just the thing that we are trying to avoid. (Treib 1997: 171)

If Varèse was turning increasingly toward *concrète* sounds after starting with more traditional instruments (possibly percussion), one wonders if this turn was motivated by the imagery of Le Corbusier’s scenario or the pure sonic demands of the piece. It seems to have taken Varèse a long time to come to grips with the facilities at Eindhoven, even though in 1954 he had already visited the studios of Radiodiffusion Française at the invitation of Pierre Schaeffer and created the tape interludes of organised sound for his instrumental work *Déserts* (*ibid.* 1996: 176). Here Varèse sat with Pierre Henry as Henry assembled the music more or less under Varèse’s direction (Teruggi 2005). *Musique concrète* may have been a natural direction for Varèse to pursue at that point in time, especially after exposure to the work of Schaeffer and Henry. How Varèse thought about the use of concrete sound can in part be inferred from his 1917 reaction to the work of Russolo and the Futurist: ‘Why, Italian futurist, have you slavishly reproduced only what is commonplace and boring in the bustle of our daily lives’ (Bernard 1987: 23). For Varèse, the use of *concrète* sounds had to go beyond extrinsic reference and partake of the abstract play of form and space consistent with his own compositional perspective. Varèse wanted ‘entirely new combinations of sound’ ‘creating new emotions’ (*ibid.*: 24). In *Poème électronique*, Varèse must surely have been inspired by his time with Schaeffer and Henry to more fully achieve his own unique approach to using *concrète* sound. For all the attention that has been paid to Varèse’s use of sirens in his scores, it is never about sirens; it is about form and design with the best materials at hand.

It also appears that amid the frequent starts, stops, discards and revisions, Varèse worked from the

³In reviewing the project correspondence in the Phillips Archive, Stimson says that there was ‘a conscious decision to abandon a close collaboration with the exception of the two seconds of silence at ambience No 19’, a point in the scenario that corresponds to 3’23” in the music (Stimson 1991: 14). Treib indicates that even this correspondence was abandoned (Treib 1996: 174).

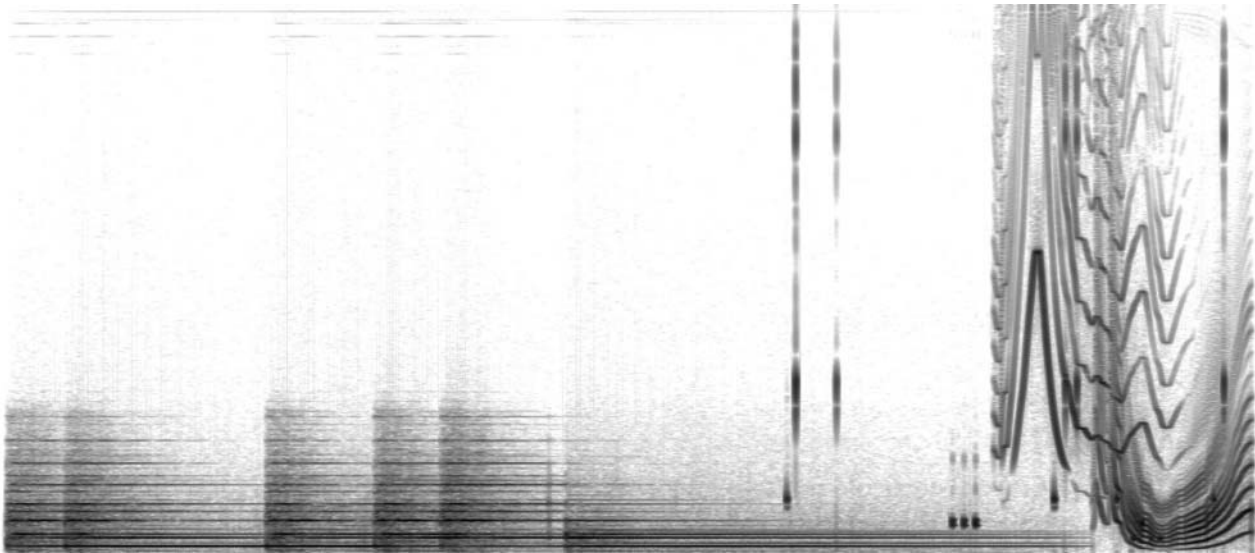


Figure 9. Sonogram of the first 27 seconds of *Poème électronique*.

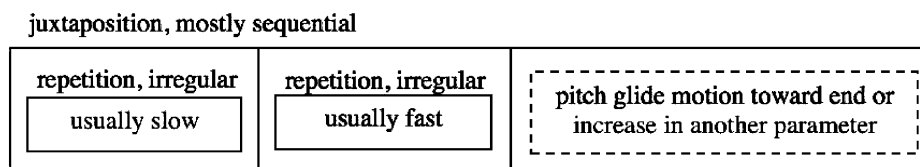


Figure 10. Representation of the three-group pattern of juxtaposition.

beginning of *Poème électronique* toward the end. He told Xénakis on 30 November that he was about to reach the 241st second. (Ouellette 1966: 198). Another source says that after four months of work, Varèse had only produced two minutes (Treib 1997: 183). The process of putting the composition together involved recording each sound onto one of three separate monophonic tape recorders that had to be played back simultaneously. Some of the sounds from these three tapes were moved onto a fourth stereo tape along with reverberation and other effects. This led to a total of four tape machines with five channels of sound, all of which had to be manually started together in order to produce the sound of the work as a whole (Dobson *et al.* 2005: 30). Because the tape machines could not possibly run at exactly the same speed, some amount of desynchronisation had to accumulate during the playback process. Given these technical considerations, one might imagine that *Poème électronique* would have been designed with layers of overlapping sounds. Quite the opposite, *Poème électronique* has many clear section boundaries and is organised very sequentially. Clearly, Varèse's creative intentions prevailed over pure technical ease.

3.2. Analytical observations

3.2.1. 0''–27''

There are essentially three groups of sounds presented in the opening 27 seconds of *Poème électronique* (figure 9).⁴ The opening large bell is presented in repetition with slow irregular rhythm, a very typically modernist construction. The bell sound does not change except for the last strike that is less accented, darker, and helps to signify the close. This first group of bell sounds instantiates non-motion through its irregular repetition. The second group of sounds shares with the first the properties of percussive attacks and irregular rhythm but is highly differentiated by its quick changes of pitch height that mimic the acoustic percussion writing in other works of Varèse. This second group of sounds also instantiates non-motion through its irregular repetition. The second group overlaps into the third group, a group that contrasts with the first two in almost every way.

⁴Sonograms were produced with Amadeus II software by Martin Hairer from a stereo-to-mono mixdown of *Poème électronique* on the CD 'His Master's Noise', BV-Haast CD 06/0701, reconstructed from original tapes by Kees Tazelaar at the Institute of Sonology, Royal Conservatoire, The Hague, The Netherlands. Frequency axes are linear from 0 to 5,512 Hz and intensity is logarithmic.

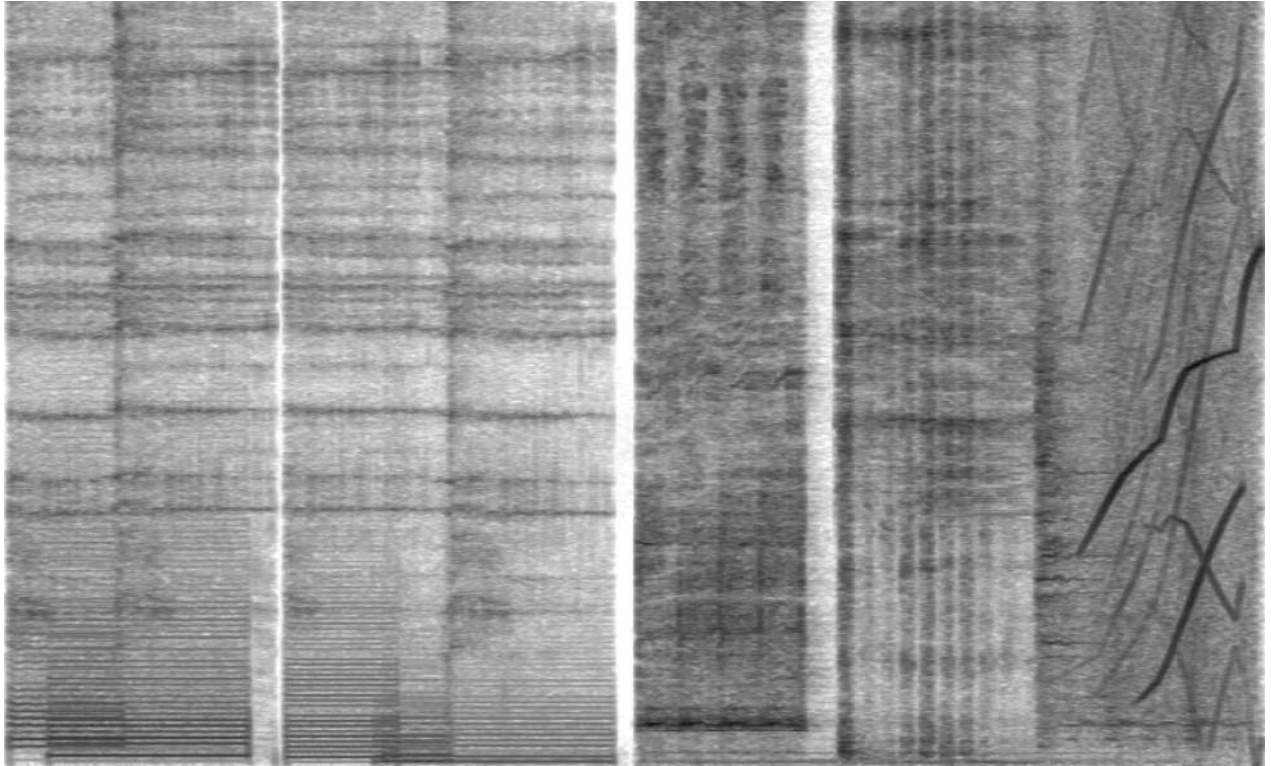


Figure 11. Sonogram of 1'10'' to 1'30''.

Here are two overlapping rapid and somewhat irregular pitch glides, the first up and down and the second down and up. The combination creates a kind of complementary balance, but the extension of the second at the end of the excerpt delineates a clear rising motion, a motion that unmistakably contrasts with the non-motion of the first two groups. There is no attempt to bridge the differences among these three groups of sounds or to make transitions from one to the other. They are maximally differentiated and there is no connecting pathway. How do we make sense out of this combination of three radically different groups of sounds? The combination makes far more sense as a clear statement of sequential juxtaposition than, say, as a weak embodiment of a morphological model.

3.2.2. Reinstantiations of the three-group pattern

This essential three-group pattern (figure 10) is repeated six times in a row at the beginning of *Poème électronique* (followed by a seventh variant). The rhythm of the first two groups is not always slow then fast and the motion of the glissando may be transformed or transferred, but the idea of three juxtaposed groups is retained. This successive reinvention of the pattern is the essence of reinstantiation. For example, a passage similar to the opening occurs from 1'10'' to 1'30'' (figure 11). The first group of sounds presents a slow irregular rhythm (with two sequences of three sounds); the second group

presents a fast irregular rhythm (a sequence of two repetitions of sounds, each at a different speed). The second group overlaps and continues on into the third group that presents a rapid upward glissando.

The glissando motion at the end of the pattern is a distinctive feature that Varèse links to closings. This is demonstrated at the very end of *Poème électronique* (starting at 7'28'') where dramatic glissandi close the piece (figure 12). The glissandi motions that occur in each of the initial six sections are different every time. The passage from 0'42'' to 1'10'' is concluded by three repetitions in irregular rhythm of a slow, narrow glissando. This same material is used again in the first two groups of the passage from 1'30'' to 2'03'' where the closing glissando is combined with a tape echo effect. The glissando is transferred to a crescendo in the passage from 27'' to 42'' (and from 5'39'' to 6'24''). *Poème électronique* may be the one composition in which Varèse is finally able to use glissandi in the way he imagines them without the limitations of devices like the sirens!

For Varèse, the genesis of thinking in terms of three groups may have arisen out of the technical limitation of organising material onto three independent tape recorders.⁵ After these initial sections, the three tapes seem to

⁵This point cannot be taken too far. The simplest presentation of the three original tapes is likely captured on 'The Varese Album' (Columbia MG 31078), but even here, the tapes appear to have a more complex organisation, even at the very beginning.

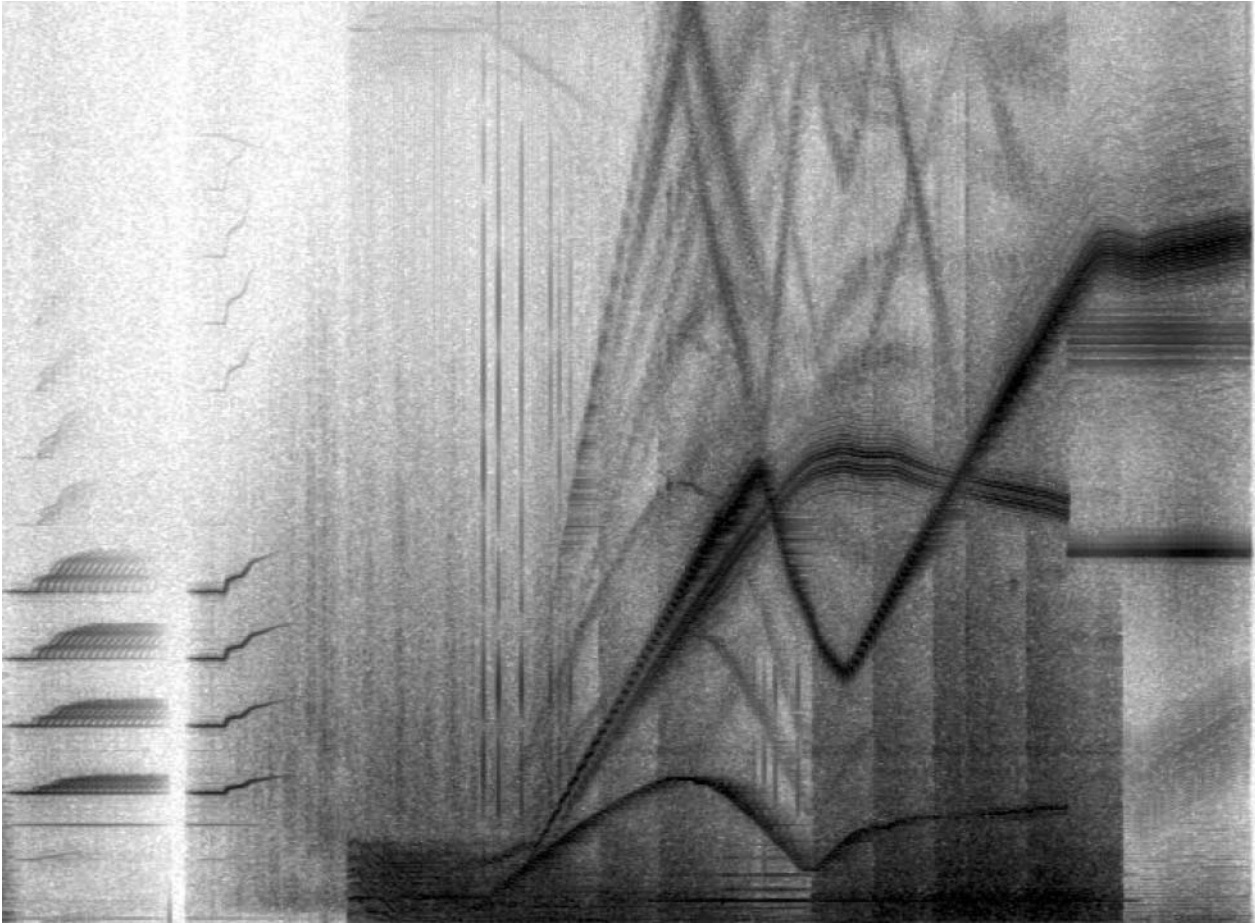


Figure 12. Sonogram of the ending of *Poème électronique* starting at 7'28".

present less and less of a limitation as more complex overlapping is created. For example, the reinstantiation that occurs from 2'03" to 2'32" is more complex. There are two groups of irregular rhythms, one acoustic and one synthetic, and the juxtaposition switches back and forth. A glissando starts in the middle of the passage and another moves up and then forcefully down at the end. At the end of the section the percussion is still active and the timpani repeats the rhythm from the very beginning of the passage. This passage is the sixth occurrence of the pattern, both the one that is most active and the one with the most simultaneous juxtapositions. While these differences help to signify an end to the initial series, there is also a ticking sound that overlaps and links this passage to the return of the large bell sound. The following section from 2'32" to 3'25" begins with the large bell and then initiates another reinstantiation of the three-group pattern (with the glissando again transferred to a crescendo that resembles a reversed bell and gives a rather palindromic rounding to the passage). This passage, the seventh, appears to both signify a change in organisation even while holding onto the three-group pattern.

3.2.3. 3'26" to the end

The passage from 3'26" to 4'15" is the first instance of a new pattern, one that focuses on a binary juxtaposition. Here we have two sequential juxtapositions of two groups, one percussive and one vocal. The percussive group itself contains both acoustic and synthetic sounds. It is juxtaposed with the female voice that itself has a free and unpredictable rhythm. This is followed by the section from 4'15" to 4'39" that starts with a loud, bell-like sound containing both percussive and vocal qualities and then continues a binary juxtaposition between the percussion and voice, both now with a more predictable pulse. This pattern of a loud sound followed by a binary juxtaposition is repeated almost exactly in the next passage from 4'40" to 5'39" where the pace is slowed and the length extended. Here, the percussion is replaced by a slow, rhythmic walking and the voice is lowered by tape manipulation. There is also a third group of sounds, an overlay of faster sounds that share both percussive and vocal qualities. These passages appear to zero in on binary opposition even though the sounds could be categorised into three groups, and so

the distinction between these and the three-group pattern is one more of emphasis. The passage from 5'39" to 6'24" brings back the three-group pattern, this time opened and closed by sustained synthetic bell-like sounds and juxtaposed with both synthetic and acoustic irregular percussive rhythms. This could also be said of the passage from 6'24" to 6'44" where the sound of the jet plane takes the role of the glissandi. There is a link to the next section (like the ticking from around 2'31"), this time an acoustic cymbal roll.

From 6'46" to the end there are three sections. The first from 6'46" to 7'07" presents first female and then male vocal sounds in sequential juxtaposition. The second from 7'07" to 7'28" presents a rapid alternation between organ (played percussively) and percussive sounds that include both acoustic and synthetic sources. The three sections appear to form a three-group pattern in which the first two groups embed binary juxtapositions. The third group contains a build up of three different glissandi motions starting with the narrow glissando (first heard at 0'56"), followed by a jet plane and ending with wide glissandi reminiscent of the opening sections. There is a final dynamic tone that briefly sustains the energy and then ends. The three glissandi motions in a row provide a strong signal that the piece is concluded.

3.3. *Poème électronique* considered as a whole

Poème électronique is assembled with many individual, contrasting sounds and has inspired a wide range of formal interpretations. Six published analyses of *Poème électronique*, each of which provides its own unique parsing of the composition, can be compared and summarised as follows:

- 2-part form divided at 2'40" with coda at 7'0" – Robert Cogan (Cogan 1991: 27)
- 2-part form divided at 2'36" – Roger Kamien (Kamien 1976: 30)
- 3-part "inverse" rondo with sections at 2'32" and 5'45" – David Cope (Cope 1984: 171–4)
- 2-part form divided at 3'23" – Ann Stimson (Stimson 1991)
- 10-section form – Lawrence Ferrara (Ferrara 1984)
- 4-part form in two-minute segments – Richard Felciano (Treib 1996)

The timings vary slightly, probably due to starting the clock at different places, but most authors agree on the division at 2:36 (+/– 4). David Cope concludes that several types of rondo forms may be heard, though he is most convinced by the 'inverse' rondo, with the additional possibility of a simple three-part form (table 1). Roger Kamien favours a two-part form with subdivisions (table 2).

The analytic observations presented in section 3.2 on the organisation of juxtaposed groups are summarised in table 3. This representation attempts to avoid the suggestion that *Poème électronique* is organised hierarchically. The individual passages, grounded as they are in non-motion, are sufficiently independent of each other to be arranged like different shaped pieces of tile into an overall design. Some of these pieces have pivotal positions in the articulation of this design like the passages at 2'32" and 6'46". The opening sections through 2'32" present many variants of a single shape and the section from 3'25" through to 6'46" explores greater variations in shape. The closing

Table 1. Summary of analysis by David Cope.

Rondo:	B A C	B A D	B A D
Three-part form:	A	B	C
Timings:	0"/29"/52"	2'32"/2'43"/3'38"	5'49"/6'11"/6'45"

Table 2. Summary from analysis by Roger Kamien.

Two-part form:	1	2
Sections:	a / b / c / d	a / b / c / d / e
Timings:	0"/43"/1'11"/1'40"	2'36"/3'41"/4'17"/5'47"/6'47"

Table 3. Organisation of juxtaposed groups in *Poème électronique*. 'A' represents the three-group pattern and 'B' the binary juxtaposition.

A A A A A	A'	B B' B' A A	A
0"/27"/42"/1'10"/1'30"/2'3"	2'32"	3'25"/4'15"/4'39"/5'39"/6'24"	B B – 6'46"/7'7"/7'28"

from 6'46" to the end mirrors the shape of the initial pieces on a larger scale and brings closure. In some ways, the self-sufficiency of the individual sections within *Poème électronique* is reminiscent of moment form, though a sense of formal balance and design among the various parts is also quite important. *Poème électronique* most resembles a sculptural mobile with groups of sounds suspended in time and hanging by a single line from the ceiling.

4. CONCLUSION

When we listen to *Poème électronique* today, we reconstitute it as music of our time, the time in which we are currently experiencing it. Understanding the particular artistic aesthetic of juxtaposition and non-motion that emerged in the early modernist period provides us with a lens that can refocus our experience of the work today, but only to the extent that it is meaningful for us now. Clearly listeners today can have meaningful experiences of *Poème électronique* through the lens of extrinsic association or through the rhythm and accent of the sound montage. The variety of published analyses suggests a variety of lenses. Then too, of course, *Poème électronique* can also be experienced through the lens of spectromorphology and in that way an old work is viewed through a new lens.

Assuming that we have some capacity to make the choice, how shall we choose a lens through which to experience the work of art? It must minimally be a lens that helps us to relate the work to our own contemporary experience, and the works of art that we choose to re-experience are precisely those that are most relevant to us. *Poème électronique* is such a work, and it is because of our need to make sense of our aesthetic experience today that observations about *Poème électronique* and its history are most valuable to us. The particular lens that has been explored here is relevant, not only because of its connection to early modernism, but because juxtaposition and non-motion are phenomena of our time manifesting in many electroacoustic works today. In this way our discussion of *Poème électronique* may aid us in experiencing new works of electroacoustic music through an old lens.

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