The Unique Aesthetic Character of the Music of Roger Reynolds

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Introduction

When we consider the amount of music Reynolds has created since the middle of the Sixties, we can only admire the vast and fascinating musical landscape that unfolds before us. The diversity of the genres — music for soloists, chamber music, orchestral music, with or without electronics, music for solo voices or for choir, electroacoustic music, live electronics, computer music, musical theatre, stage music, mixed media, dance, video, DVD's, etc., and above all the way in which they have been tackled: these all demonstrate a hunger for exploring new modes of sonic expression, of going "beyond the edge of known orders[1]".

For Reynolds, musical composition is above all experimentation (from the standpoint of objectives, hypotheses, research, conceptualization and assessment) which means that risk taking is inevitable, since the reception of music is first and foremost experience (sensory, cognitive, emotional, aesthetic, and philosophical). An approach of this sort demands of the composer that he create his own methods and his own tools in order to achieve his aesthetic goals. On the part of the listener, it requires active listening and an open mind.

According to Reynolds, the contemporary artist must use the materials and methods of his time. This means that the composer will have made his own the heritage of serialism and experimental music while at the same time maintaining the necessary critical state of mind needed if he is to be genuinely original. Reynolds' aesthetics are rooted in a double origin: European, because his teachers are Ross Lee Finney (a pupil of Berg) and Roberto Gerhard (a pupil of Schoenberg), and American because of his commitment to experimental musical movements in the Sixties. In addition to this double musical citizenship, mention must be made of his fascination with Japanese culture, in which he has discovered a particular form of consciousness as regards the duration and flow of time, as well as a sense of ritual readiness (an essential quality for the tea ceremony, sumo wrestling or calligraphy) all qualities that are absent in Western culture. His double training — musical and scientific — has led him to use models from mathematics or from the chaos theory, and has also meant that he very early on acquired mastery of computer skills and technology, whether for sound synthesis, sound processing, re-ordering of temporal relations or spatialization of sound.

Reynolds is certainly one of the composers of his generation who has done the most to put his thought and aesthetics into formal shape in numerous published texts in book form *(Mind Models,* 1975*; A Searcher's Path: A Composer's Way,* 1987*; Form and Method,* 2002) or articles (*It(')s time,* 1968*; Thoughts on sound movement and meaning,* 1978*; A perspective on form and experience,* 1987*; Par-delà les dimensions connues, [Beyond the edge of known orders]* 1991*,* etc.). The great diversity of his fields of research concern not only aesthetic and historical problems, but also more methodological issues regarding form and time in music, or electronic music practice (synthesis, time processing, spatialization, etc). Nevertheless, the main — and constant — thread running through his writings is concerned with musical perception. *The Angel*

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[1]   This is the title of an article by R. Reynolds, translated as "Par-delà les dimensions connues," in J.-B. Barrière (Ed.), *Le timbre, métaphore pour la composition*, Paris, Christian Bourgois/IRCAM, 1991, pp. 467-484.

of Death, the object of the present article, is very representative of highly developed thinking on the subject of perception.

We have attempted to tease out his main aesthetic characteristics, using his written texts, as well as examples drawn from his catalogue. We will begin by examining how the serial heritage was integrated into his work and then transcended, and how his particular personal approach to the series serves his aesthetic goals. We will then go on to an investigation of how he managed to forge a compositional code of ethics starting from experimental music in the Sixties, using experimental techniques (in the scientific sense of the word) as well as a conception of the act of listening as "experience" (in the phenomenological sense of the term). Nevertheless, this methodological rigor, far from locking him into rigid formalism, has allowed him to develop a particular kind of musical expression, a particular mode of being and aesthetics that belong uniquely to him.

We have chosen to approach his work via three aesthetic avenues that to us appeared essential to his approach, namely: language and the voice; the spatialization of sound; musical time and form. Finally, we will examine to what extent psychoacoustics and the cognitive sciences, most particularly the question of the perception of time, have influenced Reynolds' compositional procedures, and what influence they have had on his aesthetics.

1. The Serial Heritage

From the outset, Reynolds adopted serial writing techniques without going through a tonal or neo-tonal phase. It was through the teaching of Ross Lee Finney and Roberto Gerhard, from 1957 to 1961, that Reynolds discovered these techniques. Ross Lee Finney lectured in composition at the University of Michigan. His doctoral thesis program for composition later became a model for similar programs in other universities. Even though his own music was rather traditional (based on popular melodies) his teaching opened up for his students a large range of styles and techniques.[2] However, it was the teaching of Roberto Gerhard[3] that had the profoundest influence on Reynolds. The musical language of Gerhard was extremely personal. Far from following the precepts of his teacher Schoenberg, he developed new directions, new ways of using the series, adapting it to his own needs in each one of his works. He even took a pioneering approach in his attempts to achieve a certain degree of isomorphic relationships between the pitch and duration series. His approach to the manipulation of musical material was highly exploratory, and this is what had the profoundest effect on Reynolds. The way he played with the material, and its sonic properties, using them as articulations to shape local or global events, the way he made chord-timbre structures take on a thematic function, all left their mark on Reynolds' early works[4]. But in the end, the influence of Gerhard was less syntactic or methodological than it was ethical: "He always spoke about the importance of total involvement of the composer — intellectual, emotional, human, empathic — that you needed to put everything that you had into every piece, and that, of course, that didn't assure quality, but it at least assured that it would be a representation, with some fidelity, of your current state".[5]

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[2]   Ross Lee Finney's courses were like a forum in which the students listened to and discussed their compositions. He invited such composers as L. Dallapiccola, K. Stockhausen, E. Carter, R. Gerhard, and others, to give lectures.

[3]   Roberto Gerhard visited to the USA in the early Sixties. He taught at the University of Michigan (Ann Arbor) and at Berkshire Music Center (Tanglewood). His music began to be published and recorded at around this time.

[4]   An example is *Fantasy for Pianist*, a 1964 composition.

[5]   R. Reynolds, "Interview: Reynolds/Sollberger", in *Profile of a Composer*, London, New York, Frankfurt, C.F. Peters Corporation, 1982, p. 24.

Fig.1. R. Gerhard and his students (*Profile of a Composer*, © C. F. Peters Corp., used with permission)

One of his earliest works, *Ambages* (1965) for flute, reveals a way of using the series that, while preserving the influence of Gerhard's teaching in the connection between pitch order and time proportion, became more personal. As is shown in the figure below, the base series of the composition is obtained by permuting the chromatic order (1, 2, 5, 6, 7 – 9, 10, 12 – 11, 3, 4). The latter is divided into two groups of six sounds or into three groups of six and two times three sounds. Adding the numbers of each group gives the proportions that are to be applied to various levels of the work (9:10:6 and 3:5) on both the micro and macro structural levels.[6] The series is approached both from an ordinal and a cardinal angle. Not only does it serve to organize pitch, but it also helps in quantizing and governing musical proportion.[7]

Fig 2. Numerical relationships of the series and the formal structure in *Ambages*.

At the same time, Reynolds was moving in the direction of another type of pitch structure. In *Archipelago* (1982-83) for orchestra and magnetic tape, pitch structures were created using techniques of derivation and proliferation. Starting from a base series of 12 tones, which had undergone various transformations (transposition, inversion, retrograding), Reynolds strove to create a pitch row that would be divided into a certain number of groups. The latter are intended to create pitch sets connected in various ways. By placing the sets that had common final notes back to back, the composer obtained a continuous row of 111 notes, from C3 to C#5, divided into 13 groups each having between three and 14 notes. Some groups enjoyed inclusive relationships, others did not. This network of relationships between cells that possess varying degrees of affinity succeeds in creating ambiguous similarities and differences that have a powerful influence on the work's thematic identity. The figure below shows the first five groups (10, 6, 14, 9, 4) of the pitch row in *Archipelago*.

Fig 3. The first five groups in the pitch row in *Archipelago*

This kind of "derived generation" became one of Reynolds' basic techniques and was adapted to a greater or lesser extent for each new work, in order to engender harmonic, melodic and ornamental material. This approach made it possible for him to create pitch structures, which, when associated with melodic contours, with density and texture profiles etc., gave the thematic material a particular character. At times, not one but several rows, derived from the same base series, gave rise to a specific kind of musical material as in *Symphony [Myths]* (1990) for orchestra.[8] In *Ariadne's Thread* (1994) for string quartet and computer-generated sounds, the pitch row indeed functions as a guiding thread. In unfolding, it metaphorically leads Theseus to the center of the labyrinth, and then in retrograde form, leads him back out again. In *The Angel of Death*, Reynolds, using a base 12-tone series, generates two types of series — containing neighboring or non-neighboring notes — which serve to give an identity to the semantic material. [Link to Rogers article: the pitch resources]. Thus the pitch rows possess a formal function —

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[6]   The proportions govern the number of sections and subsections as well as the tempos and the playing modes.
[7]   This kind of serial writing was first used by Stockhausen in the *Klavierstücke*.
[8]   The resources for this composition are on three levels, with the last row containing the two others: there is a 29-pitch row for the harmony, a 91-pitch row for melody, and a 180-pitch row for ornamentation.

when they weave a complex network, which is both continuous and broken, of note interval relationships — and an expressive function for thematic identity. This way of using the series, a far cry from the Darmstadt school or the techniques used by Babbitt, is extremely original and above all harmonizes with both of the paradigms — the spiral and the mosaic — that are found not only in his techniques for elaborating forms, but also in his algorithmic time restructuring procedures. The fragmentation and the restructuring in the form of a continuous line or of independent cells are comparable to the two editing algorithms SPIRLZ and SPLITZ, used in the composer's electronic music. [Lien vers article Dramaturgie et temporalité de l'électronique, chapitre : les paradigmes de la spirale et de la mosaïque]

Far from simply feeding off the heritage of serialism, and following the path laid out by his two teachers Ross Lee Finney and Roberto Gerhard, the composer took hold of the serial paradigm and made it his own, in keeping with his own aesthetic demands. However, Reynolds' musical language does not stop at a particular use of the series. He also draws from the heritage of American experimental music and nourishes himself on the need to experiment. [clearly derives creative energy from his hunger for experimentation] [SMc remark: I would have translated this "nourishes (or feeds) himself on the need to experiment", it's the idea of feeding on need that is strong in the original sentence].

2. Experimental music versus experimentation

It cannot be denied that Reynolds inherited from the great American experimenters, such as Ives, Cowell, Ruggles, Varèse (French-American), Nancarrow, and Cage, and that he was able to combine this heritage with that of European serialism. The composition by Charles Ives entitled *A Symphony: New England Holidays* (1913) for orchestra, one of the founding works in experimental aesthetics, is surely representative of the attitude of experimentalists in their approach to sound. Ives was less concerned with depicting a national holiday in musical terms than with "representing" uncontrolled acoustic events. This was a true case of sound phenomenology: the work gives us sound, and the universe of sound, for its own sake. During a famous interview, conducted in 1961 during the ONCE Festival,[9] Reynolds asked John Cage the following question: "What is an experimental act and what is its relationship to experimental music?"[10] The latter replied: "there are many definitions of experimental music, but I use the word experimental to define an action as a result of that which was unforeseen".[11] Naturally, the search for unpredictability — indeterminacy, openness, mobility — was not the exclusive property of American experimental music, but was a phenomenon common to avant-garde aesthetics at the end of the Second World War. "More about the unexpected: creation only happens when the unforeseeable becomes necessity" exclaimed Boulez in 1952.[12] Nevertheless, for most European composers, the intrusive use of random chance was nothing more than the consequence of the dead-end in which integral serialism found itself, and a means of escaping it. Thus, the formal permutations of the *Third Sonata* (1956-57) by Boulez not only called into question the closed art

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[9]   Reynolds co-founded with Gordon Mumma and Robert Ashley the ONCE group/festival in Ann Arbor, Michigan.

[10]   John Cage and Roger Reynolds, "John Cage: Interview with Roger Reynolds" (1962), *Contemporary Composers on Contemporary Music*, Eds. Schwartz and Childs, Holt, Rinehart & Winston, New York, 1967; p. 335-348. In French: John Cage and Roger Reynolds, "Entretien (1961)", in *Revue d'esthétique*, "John Cage", n°13-14-15, 1987-88.

[11]   Ibid.

[12]   Pierre Boulez, "Eventuellement", in *Relevés d'Apprenti*, Pauline Thévenin, ed., Paris, Editions du Seuil, 1966, p. 174.

forms, but also represented an extension of techniques for permuting the musical material. The influence of the law of probabilities on the creation of materials for *Pithoprakta* (1955-56) by Xenakis, while representing a way to repudiate serialism, was also a way to stamp out randomness. For Cage, and other American experimentalists, chance techniques possessed a rather different meaning. They constituted powerful tools for the task of building systems in which human decision-making was reduced to a minimum, and above all they allowed an aesthetic openness meant to be free of all historical or cultural prejudice.

If Cage's aesthetic viewpoint had any influence on Reynolds, it was certainly unconnected to his desire for a non-intentional approach: the absence of compositional decisions and a refusal to allow subjective elements. Rather, it was through openness, the spirit of discovery and the inclusion of Cageian thinking. At the time when Reynolds was writing his first compositions in the early Sixties, the power of attraction of Cage's aesthetics, as well as the new aesthetic contributed by Fluxus, was strongly present, notably in the United States. The new nonacademic tools for producing music — improvisation, graphic or verbal scores, live electronics, performances, mixed media, slide projections, etc. — challenged traditional notions of the fields of compositional activity. Reynolds used almost all of these techniques in the Sixties and early Seventies. However, he never composed a totally indeterminate piece (the most "open" of them was *I/O, a ritual for 23 performers,* 1970).

The piece entitled *Compass* (1972-73) for tenor, bass, cello and double bass, all amplified and accompanied by a four-track tape, is typical of the experimental approach taken by Reynolds in the Seventies. The piece possesses a scenic quality that is present in many compositions of the time (for example *The Emperor of Ice Cream*, 1961-62; revised 1974, or *Blind Men*, 1966). *Compass*, which combines visual and sonic media (including the projection of slides), is a reflection of the poetry of Borges, at once cultivated and surrealistic. As Figure 4 illustrates, the score contains notation that is relatively free from fixed durations, allowing for a certain independence of the parts while maintaining coherence of the time axis by means of fixed points. The four parts call for highly extended and developed playing and vocal techniques.

Fig 4. *Compass*, p. 51

From the Seventies on, Reynolds progressively abandoned indeterminate techniques, direct sound processing, and scenic elements, in favor of a specifically musical approach, with intensive control over all aspects of composition. It was less a case of producing experimental music than of experimenting — in other words, generating hypotheses, observing, studying, analyzing — all for the purpose of pushing back the limits of creation and perception.

For Reynolds, there are two fundamental attitudes in the approach to musical creation: that of the "maker" and that of the "searcher". The former draws from a pool of existing conventions that are recognized and familiar to everybody. His goal, communicating personal sentiments, prohibits him from straying too far from the relatively commonplace emotions, on pain of losing touch with his public. The latter (the "searcher") also draws from a pool or reservoir, but not a conventional one. Such a pool or reservoir does not contain rhythmic formulae or melodic phrases, neither does it contain harmonic progressions or instrumental tricks that are more or less interchangeable, but rather compositional strategy, methods that in a manner of speaking act as a guarantee against any loss of aesthetic coherence and allow the intuitive faculties free rein. Such a stance, from the aesthetic standpoint, requires a new form of communication with the concert-going public: "The searcher, then, does not use music as language in the sense that I have

attributed to the maker. His effort is, rather, to reveal something not previously known, to put forward occasions for unfamiliar experience to any listener, even one who shares little in common with him".[13] This is not only equivalent to offering the listener a new musical experience, but also demands of him a particular form of listening, a faculty of auditory perception that has rid itself of traditional forms — in short, it requires the listener to take risks.

Experimenting with new possibilities in the domain of composition is undoubtedly a necessity for Reynolds [Link to the article by Roger: Perspectives on Experimental Music]. This attitude of mind, which obviously arises from the composer asking himself soul-searching questions about new tools of expression, cannot be satisfied unless confronting the unknown, and taking risks. "Any composition project," says Reynolds, "carries an element of danger. Otherwise, at least for me, the essential reward in the creative engagement would be missing."[14] No matter how innovative one may become and no matter how much writing and technological knowledge one may require, risk taking, as far as Reynolds is concerned, is imperative if one is not to sink into a comfortable routine of repetition or even worse, into academism. Thus the composition *Archipelago* (1982-83), for orchestra and magnetic tape, required an enormous experimental effort not only from the compositional point of view but also in the recording, re-synthesis, time restructuring and spatialization of the materials destined to be put on magnetic tape. The risk lay in how listeners would react to a work of such disconcerting complexity.[15] Conversely, the risk in *On the Balance of Things* (1996-98), a piece written for a Lucinda Childs' choreography, was that of "writing a piece that did not contain many elements habitually used in my music. *On the Balance of Things* does not have a climax, a guiding line, long phrases, or harmonic depth. The structure is very simple, very clear, very transparent in order to leave open space for the eye." [16]

For Reynolds, experimentation does not necessarily mean complexity. On the other hand it always relates to the aesthetics and the means of expression that the composer wants to use. The experimental nature of Reynolds' approach perforce embraces many compositional domains. However, we have chosen to present more particularly four fields of experiment: language, space, form, and the way music is perceived. Pourquoi ne pas traduire par « music perception » ?

3. Language and the Voice

Reynolds has been inspired by a large number of writers: Joyce, Borges, García Márquez, Issa, Melville, Ashbery, Stevens, Kundera, not to mention the Greek tragic playwrights — mainly Aeschylus and Euripides — in the composition of his more recent pieces. However, he is not interested in the traditional technique of setting a text to music, nor does he seek to engage in pure sound-play. Thus his use of language is very different from that of Berio in his 1958 tape piece *Tema - Omaggio a Joyce* (1958) in which language, so to speak, is dissolved and divested of meaning in favor of pure sound. Even though the language is often fragmented, stretched, not

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[13]   R. Reynolds, "A perspective on form and experience", *Contemporary Music Review*, 2(1), 1987, p. 280.

[14]   R. Reynolds, "Réaliser une expérience musicale" *[Making a musical experiment]* in *Quoi? Quand? Comment? La recherche musicale, [What? When? How? Musical Research]* Tod Machover, ed., Paris, IRCAM/Christian Bourgois, 1985, p. 242.

[15]   The premier of *Archipelago* on 15 February 1983 in IRCAM's *Espace De Projection,* performed by the *Ensemble InterContemporain* conducted by Peter Eötvös, ended a weeklong program dedicated to "Concept of Research in Music". *Zeitlauf* by Philippe Manoury and *Désintégrations* by Tristan Murail were premiered at the same concert. The critics did not fail to compare the three compositions, mostly to the detriment of *Archipelago,* which was greatly misunderstood.

[16]   Unpublished interview with R. Reynolds by Philippe Lalitte.

to say contorted, by unusual vocal techniques or computer processing, it seeks nevertheless to bring out fragments of meaning and images that will set the listener's imagination going. "My primary excitement in music is the experience of exploration and the emergence from moment to moment of special kinds of images on the basis of which life and later experience can be understood in a larger way" said Reynolds in an interview.[17] He is sensitive to the metaphorical quality of images whether they come from literary, visual or auditory sources.

Still (1975) for 4-track magnetic tape, the earliest piece in the *VOICESPACE* cycle, constitutes a particularly appropriate example of this way of treating voice and language. The piece is a soliloquy drawn from *The Wanderings of Cain* by S. T. Coleridge. The text, which is broken into bits of phrases, is read slowly in an almost inaudible voice. Vocal sounds produced in the throat — cracklings, croaks, vocal fry, clicks and so on — provide a continuous, framework that never stops changing frequencies and duration, never stops moving in space. Pre-recorded whistling and breathing — recorded by The Extended Vocal Techniques Ensemble — add to this stark twilight landscape.[18] Although the approach here is experimental, Reynolds does not waive the right to be expressive. The composition which in some ways is reminiscent of Pierre Henry's *Variations pour une porte et un soupir,* reaches out above and beyond the virtuosity of the tape editing and spatialization, to embrace the meaning contained in Coleridge's text. Contrary to the piece by Pierre Henry that by comparison appears rather formalist, Reynolds' composition radiates a quality that seems to lie somewhere between expressionism and Noh theater.

In Reynolds' music, sound and sense are not separate entities, and neither prevails over the other. Several vocal compositions, and even instrumental ones, use language in its sonic and semantic aspects as a structuring tool.

Quick Are the Mouths of Earth (1964-65), for chamber orchestra[19] is a perfect illustration of this approach. The composer, with great originality, uses each word of the title as a formal phonological structural model. Each word is associated with a movement, giving it a specific character by virtue of its grammatical function and meaning. Thus for example, the third movement *"the"* has an *attacca* relationship with the fourth movement "*Mouths",* analogous to the relationship of the words themselves (definite article and noun). It possesses two kinds of musical material, which serve as a basis for the six variations of the fourth movement. Each variation corresponds to one of the six letters of *"mouths".* All the variations are in two asymmetrical parts. The *"ou"* and the *"th"* are given a double variation treatment. The proportionate durations of movements and sections are derived from the "average" duration of each phoneme.[20] The durations of each of the words, with the consonant durations added, are 44, 34, 14, 60, 19 and 29 milliseconds. These values are analogous to the duration modules for each movement. For example, the first movement, which totals 112 bars, is segmented as follows: 8 : 28 : 48 : 28 = 2 :7 :12 :7. Here, language serves as a model for the form, for the proportions, for the way the music is articulated from movement to movement, and the manner in which the latter are given expressive characterization.

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[17]   *Yearbook for Intermedia Musical Research* XI (1975), p. 158; quoted by Andrew Porter, "Roger Reynolds' Vocal Music", in *Roger Reynolds: Profile of a Composer*, New York, London, Frankfurt, C. F. Peters Corporation, 1982.

[18]   The piece has to be heard in total darkness and the spectators have to be as far apart as possible for acoustic and psychological reasons.

[19]   The title of the piece comes from a phrase from Thomas Wolf: "*Quick are the mouths of earth, quick the teeth that feed upon this loveliness".*

[20]   The phrase was read and recorded by the composer, and then the durations were timed. The average duration of each phoneme in seconds was as follows: *kwik* = 0.02/0.16/0.12/0.14 ; *ah er* = 0.17/0.17 ; *dh @* = 0.107 ; *m ow dhz* = 0.12/0.22/0.12/0.14 ; *@ f* = 0.07/0.12 ; *er th* = 0.17/0.12.

Figure 5. Quick Are the Mouths of Earth, p. 27

A comparison between *Quick Are the Mouths of Earth* and *Le son d'une voix* (1964) for chamber orchestra by French composer François-Bernard Mâche serves to illustrate the difference between the European and American ways of approaching a paradigm, that of grafting a phonological model onto an instrumental one. Mâche chose to focus on timbre[21] rather than on phoneme duration, on semantics or on the grammatical functions of the words. Whereas the French composer carried out an almost literal transcription of a sonogram of the Paul Eluard text, the American — in typical fashion — chose a double approach that combined signifier and signified.

Reynolds pushed the exploration of the relationship between language and sound even further in *Odyssey* (1989-93) for mezzo-soprano, bass baritone, 16 instruments and 8 channels computer-processed sounds and lightning. The piece is subtitled "An Opera in the Mind", and is a vast 70-minute panorama dedicated to the voice in space and the space in the voice. The Beckett text, taken from his poems and *Texts for Nothing,* is at times sung – in French by the mezzo-soprano, in English by the baritone – at times spoken in French or in English by a man and a woman who are both bilingual.

The setting of the text plays ceaselessly upon the tones and intonations of both languages in such a way that the same meaning in the written text lends itself to different "resonances" of perception. This ambiguity in perception is occasionally stressed by an ambiguity in timbre when the baritone climbs into a falsetto, intruding upon the mezzo-soprano's register. The text nevertheless remains intelligible, thanks to a sober, syllabic style of composition for the voice. As for the spoken text, it is in some places broken up into a few words loaded with metaphor — absence, instant, moment — whereas in others it takes the form of long rolling declamations. Here too, the composer leaves the door open to ambiguity: for example when the spoken voices swap languages in rapid succession (the speakers being bilingual), when they follow each other with slight delays, or when they search for each other in a dazzling spatial choreographic movement. The relationship between language and voice is thus explored in all its facets.

This relationship is further revealed by computer processing, which can break words up, only allowing small fragments of voice and meaning to come through, or it can stretch words into hugely long sounds that bring out the fundamentally vocal nature of spoken language. The spatial projection of the voice acts as a mirror: "each of the paired readings could be placed on spatial paths with elementary geometries, in such a way that the French and the English effectively mirrored one another in space and time"[22].

4. Spatialization of Sound

Playing upon the spatial aspect of sound is an essential aesthetic element in Reynolds' work. The composer hypothesizes that our nervous system is at its most sensitive when seeking to locate sounds (because this process has survival value). He argues that the perception of position and movement of sound is more acute than that of pitch. "Therefore" he goes on to say, "although our cultural upbringing predisposes us towards a certain degree of discernment between the twelve tones of even temperament over the octave, it might be possible to attain a

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[21]   Mâche made a musical transcription of the vocal formant fluctuations between the vowels, fluctuations observed by means of sonograms of 28 stanzas of an Eluard poem read aloud.

[22]   R. Reynolds, notes for the CD *The Paris Pieces*, NEUMA Records, 450-91.

more detailed perceptual structure when it comes to sound in space".[23] Phrase du texte original « Thus, although our cultural commitment has been to the more or less precise discriminations that can be made between the twelve evenly-tempered divisions of the pitch octave, it is possible that a rather *more* detailed structuring of spatial characteristics could be realized ». However, contrary to the domain of pitch, there is no such thing as a "syntax" of spatial relationships. Therefore, he had to dream up strategies that could compensate the lack of such a sound-space syntax. He examined the work of choreographer Rudolf Laban for example, in search of a "gestural" coherence in sound-space for the purpose of finding which position-sequences might be felt (and memorized) as being natural to the average listener. Reynolds' goal is not that of discovering some acoustic pseudo-reality, nor to produce extraordinary effects for their own sake, "but rather to arrive at convincing spatial illusions, that would be powerful and supple, for musical ends".[24] Reynolds's "spatial choreographies" are noted as precisely as possible via the use of diagrams (Fig. 7).

Reynolds first experimented in the Sixties with sound-space by moving the musicians around onstage in *The Emperor of Ice Cream* (1961-62). Another piece, *The Promises of Darkness* (1975), has eleven instrumentalists, laid out in four groups[25] (Fig. 6) with the task of projecting three simultaneous streams of sound, each with its own structural properties. These three independent currents come together ten times to form "knots", each knot employing its own instrumental combination. *Again* (1970) for 2 flutes, 2 sopranos, 2 trombones, 2 double basses, 2 percussionists and an electronics performer, possesses a panoramic dimension in which the instrumentalists and the singers move around in space at specific times. Instructions as to position and movement are set out precisely in the score and synchronized with the lighting.

Fig. 6. Layout of the instruments for *The Promises of Darkness*

At the end of the Seventies, computer-aided systems began to offer far greater precision in the space-sound domain (placing sound, creating distance, creating panoramic width, etc.) as well as making it possible to create much more complex sequences in spatial movement. Research on sound and space synthesis at Stanford University and at the University of California at San Diego (UCSD) resulted in the creation of a 5-piece cycle entitled *VOICESPACE,*[26] the aesthetic goal of which was to being together the poetic world of the voice with imaginary sonic spaces. *Eclipse* (*VOICESPACE III*) is made up of 4 sections, each approximately 4 minutes long. The text is a collage of fragments from Borges, Marquez, Issa, Joyce, Melville and Stevens.

The advantage of this kind of approach lies in the multi-textual possibilities, allowing the different literary and vocal styles (murmurs, declamation, psalmody, etc.), different speeds of diction, and different vocal timbres (men's and women's voices can be filtered and reverberated and so on) to run into each other, to dovetail and overlap. In the first section, made up exclusively of synthesized sounds and computer-processed voice sounds, the spatial sound locations remain static. In the second section, the sound locations change, but in a static way, except for three periodically repeated words that move along separate paths (Fig. 7). The voices may cross each

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[23]   R. Reynolds, "Thoughts on Sound Movement and Meaning", *Perspectives of New Music*, spring-summer, 1978, p. 183.

[24]   R. Reynolds, "Réaliser une expérience musicale", *op. cit.*, p. 250.

[25]   Group 1: flute, clarinet, violin; Group 2: trumpet, horn, violoncello; Group 3: piano, percussion; Group 4: trombone, bassoon, double bass. The piece is dedicated to the memory of R. Gerhard.

[26]   The five *VOICESPACE* compositions in chronological order: *Still* (1975), *A Merciful Coincidence* (1976), *Eclipse* (1979), *The Palace* (1978-80) and *The Vanity of Words* (1986).

other but are rarely simultaneous. Section III has space broken up into two zones: a rapidly declaiming woman's voice orbits around that of a man, which moves in a clockwise manner, each phrase at one of 7 stationary locations. The final section begins with the long stretched out sounds moving slowly. Then gradually, space comes to life. The various vocal layers begin to be simultaneous, and phrases move simultaneously at different speeds.

In the years following the *VOICESPACE* cycle, Reynolds continued his experiments in marrying space and the voice in three large-scale compositions: *Odyssey* (1989-93), *The Red Act Arias* (1997) and *JUSTICE* (1999).

Fig 7. Spatial movement in *Eclipse* (section II left, section III right)

In his spatialization work, Reynolds used programs developed at Ircam (S.F.P.) and at UCSD (SPACE[27] and TRAnSIT). The latter extends sound space projection. TRAnSIT makes it possible to distribute and to move sound sources through space using a computer in an interactive scenic environment. This technology not only means that spatialization can be performed in real-time, but also that all the listeners share common spatial perceptions of moving sound images. Listeners can perceive something very close to what the performer is experiencing, and may even be coming closer to what the composer heard in his own head. This program was used notably in *Watershed IV* (1995), in which percussion instruments undergo real-time spatialization.

The technology serves to draw the audience into the percussionist's world in order to blur the boundaries between listeners and performer. As Reynolds says in his vivid way: "It is rather as though one found oneself inside Lear's mouth during one of his revelatory outbursts"[28]. In *Watershed IV,* four instrumental families are grouped around the percussionist.[29] Each instrument requires from the instrumentalist a specific type of energy, posture, approach and stroke. The result is that the listener-spectator perceives the performer as being in a kind of choreography. The spatialization of the sound has the effect of widening this choreography out in such a way as to include the listener into the percussionist-dancer's world. It creates a new dimension — perhaps that fourth dimension so longed for by Varèse — a sound-path dynamic that makes our imagination open out into infinite space. Listeners, when plunged into this environment are indeed "moved", i.e. their virtual bodies are made to move.[30]

[*Watershed IV* video extract]

One of the major spin-offs of spatialization lies in the heightened differentiation between sound elements. For example, complex polyphony can be made more legible by separating the sound streams. The psychologist A. Bregman points out that spatial differences play a role in the analysis of sound scenes: "In general, they play a facilitating role, strongly enhancing segregation

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[27]   The space generator in EMUSIC.
[28]   *Watershed DVD booklet*, Mode 70, Mode Records, 1998.
[29]   The four percussion families are as follows: six drumskin instruments, eleven "oddities" (idiophones)**,** five metal and four wooden snare drums (in an elevated position). Each family has its own compositional style: the drumskin instruments are in strict rhythms, the oddities play in a parody of deformation, the metals are intuitive and supple with regard to time, and the wooden instruments interrupt and interject.
[30]   One current hypothesis from the neurosciences is that we actually have two bodies: one is of flesh and blood, the other is a "copy" in our brain. Berthoz says this phenomenon could be explained by an evolutionary leap that led primates and above all humans to "develop mechanisms that can mentally simulate all cognitive and motor functions without having to physically act upon their surrounding reality" [our translation]. (A. Berthoz, *La Décision [The Decision]*, Paris, Odile Jacob, 2003, p. 151)

based on other factors such as asynchrony, or differences in frequency and timbre."[31] It is clear that for a composer like Reynolds, who makes great use of simultaneous layering in his work on form, spatialization plays a considerable role in separating out event streams. Spatialization is at once a form of analysis, a commentary, and an extension of the instrumental or vocal material.

5. Method and form

It would appear that there are two fundamentally different ways of conceiving a musical work. Some people prefer to start from a nucleus that then changes, multiplies and proliferates. Others prefer to start out from an overall structure and then work their way down to detailed internal elements. Using an *inductive*[32] approach, the former play with the unpredictable, with change and error driving the act of writing. The latter, in the *deductive* approach, prefer to use the foreseeable and the predictable, in an abstract structure that will influence or decide all subsequent choices, even if later it ends up being discarded. To state it in other words, must the material give birth to the form, or must the form determine the material? In the opinion of Gérard Grisey: "Ideas *are* form, they come first; matter is born out of them; there is a continual back-and-forth movement".[33] And for Pierre Boulez, the paths of creation are to be found in the dialectics between the Idea and its Realization: "Ideas only rarely start out in a complete form: they can only be discovered in the clashes and the resistance encountered during the Realization phase, which, as I've mentioned, consequently becomes aware of itself, and often only rather sketchily, leaving plenty of possibilities for future confrontation".[34] So we might set up two main composing strategies, represented in the diagram below:

Fig. 8. **Deductive and inductive strategies in composition**

According to Reynolds, the success of a musical project is decided by the interaction between the material, the method, and the form. At the highest level we have form, based on the material, with method being in the middle (Fig. 9). In this approach to composition, the method acts as mediator between form and material, it represents the processes by which the composer generates the material in such a way that it gets properly integrated into the whole, so that form will not be alienated from the detail. In his search for unity and cohesion, Reynolds is close to Stockhausen's monistic outlook.[35] The latter looked to the notion of "groups" in order to organize

[31]   Albert Bregman, "Auditory scene analysis: Hearing in complex environments", in *Thinking in Sound: The Cognitive Psychology of Human Audition*, Oxford, Oxford University Press, 1993, p. 26. See also: Albert Bregman, *Auditory Scene Analysis. The Perceptual Organization of Sound*, Cambridge (MA), MIT Press, 1990, p. 73, passim.

[32]   The term *inductive* is used here in the sense of starting from a material nucleus and then achieving form, of starting from the local and getting to the overall structure. The term *deductive* designates the opposite approach. Categorizing the two approaches in this way is useful only as a pigeonholing exercise: in reality, composers usually employ both approaches.
[33]   Quoted by Madeleine Gagnard, *Le discours des compositeurs*, Paris, Van de Velde, 1990, p. 126.
[34]   Pierre Boulez, *Jalons (pour une décennie),* Paris, Christian Bourgois Éditeur, 1989, p. 68.
[35]   In his famous article "Wie de Zeit vergeht" ("How time passes", Die Reihe (American Edition, Theodore Presser, 3, pp. 10-44, 1959), Stockhausen states his belief in the existence of a pitch-duration-form continuum that can be organized into "octaves": there are 7 or 8 pitch octaves, 7 duration octaves and 7 form octaves (as soon as the duration exceeds 8 seconds, Stockhausen believes that the material in question has moved into the domain of form). From the Seventies on, Stockhausen composed each piece starting from a "formula" that potentially contained the entire work.

sounds, locally and globally, so that they would be linked to each other by affinities in their proportions. Nevertheless, the aesthetic goals, the methods and the processes of each of the two composers differ enormously. Stockhausen's concept of *Momentform*, to take one example, is completely foreign to Reynolds' aesthetic.

Fig 9. **Relationships between form, material and method.**

So it can be said that Reynolds prefers the *deductive* form, which starts out with an overall formal schema that will determine where the material is placed and what the duration proportions will be, on a local as well as on an overall level. "My expressive intentions seem almost always bound closely to an idea of or commitment to a formal shape. Indeed, until this shaping has become whole enough, my intuition resists any effort of the intellect to proceed at all"[36].

It is highly revealing that he believes that the emotions are already contained in the overall form and not in the material. This viewpoint would not have been possible in the Classical or Romantic periods – pre-set schemas at that time were there only as a mould into which expression would be poured by means of tonal functions and thematic play. In no way were formal schemas seen as containing expressive elements of their own accord. The abandonment of classical form in the latter half of the 20th century threw open the way time was organized, making it more idiosyncratic, and allowing for part of the expressive content to be shifted onto form. So the tools of expression available to contemporary composers have been greatly broadened by now being able to stretch expressivity over large time scales. For Reynolds, form is no longer simply a tool for organizing material, but a means of modeling our perception of time. This really is a case of "writing time and form". Consequently, adjusting material to form, and to the tools of realization that ensure the integrity of the way they interact, becomes a crucial matter: in our day, when historic conventions have mostly been discarded, integration of the various elements into a true whole is neither automatic nor spontaneous. Today, the composer has to create the coherence of each piece in its own right. To do this, he or she needs to employ specific strategies in the matter of form.

Reynolds does not however see the formal plan as a rigid framework that must be filled in, but rather as a conceptual structure that allows the intuitive and subjective impulses to be optimized: "In other words, one of the essential goals of particular methods — I call them methods when I have to talk about them — is to set the imagination free. Each composer sizes up the constraints according to their potential for stimulation rather than for suffocation. It seems to me that creative effort leads to the application of taste being optimized, and that this can be achieved on condition that not only the full force of the intellect but also the less rational resources are used."[37] No matter what the basic material is, or what the initial aesthetic intention might be, Reynolds generally builds up a plan using the same method: expanding numerical series are generated by lines drawn on a semi-logarithmic sheet of paper. The values in the series are used for determining the time co-ordinates and the durations of the various sound elements in the piece.

They also serve in structuring the various time layers. If the values are taken in their order, a form will be created whose elements move forward in a constant time progression. Mostly however, Reynolds switches them around so that the form-giving values are less linear in their

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[36]   R. Reynolds, *Form and Method: Composing Music*, New York and London, Routledge, 2002, p. 5.
[37]   R. Reynolds, "L'ajustement de la sensibilité à un ensemble de contraintes", *Inharmoniques*, "Musique, Recherche, Théorie", Paris, IRCAM-Centre Georges-Pompidou, n° 8-9, 1991, p.176.

progression, and thus less predictable, with alternating phases of expansion and contraction. Reynolds believes that the main advantage of this method is to be highly flexible while at the same time adhering to the expressive intentions inherent in any piece, all the while keeping a high degree of formal control.

Take the example of the formal plan for *Transfigured Wind II* (1984) for solo flute, orchestra and computer-generated quadraphonic sound, which is an extrapolation of that of *Archipelago* (1983). *Transfigured Wind II* is the first of a series of concerti. The idea is to build up a question-and-answer structure between the soloists, the orchestra and the electronics, spread out on several structural levels. The soloist material makes up the basis for that of the orchestra and the electronics (pitch, rhythm, and character). The duration values of the solo passages are determined by two logarithmic expansion series each having four terms (0.84, 1.39, 2.29, 3.78 for the flute solo; 1.39, 2.93, 6.22, 13.16 for the orchestra). The question-and-answer structure is created by the alternation of the two series (Fig. 10).

Fig. 10. Initial Plan for *Transfigured Wind II*

Starting from this skeletal structure, the layer containing the orchestra's responses gets subdivided in such a way that each response is in its turn dependent on a response (an "echo"). As shown in Figure 11, the first response, assigned to the woodwinds, lasts for 1.39' (it starts at 0.84' after the first solo passage). It broadens out into a series of four echoes in expanding durations (2.15', 2.57', 2.8', 2.93'). The second response (2.93', percussion instruments) generates 3 echoes (each echo being 2.93' long), the third response (6.21', brass) generates 2 echoes (4.89', 2.93') and the last response (6.2', strings) generates a single echo (13.16'). Instead of the 15 layers to be found in *Archipelago, Transfigured Wind II* has only five layers. However the way they react to each other is much more intense than in *Archipelago*.

Fig. 11. Final Plan for *Transfigured Wind II*

The composer has adapted his method to the question-and-answer aesthetic of the concerto. Although each work relates to preceding experiments, Reynolds' formal approach means that there is always room for new developments in each new project without radical ruptures. His constant goal is to develop a musical structure that will be appropriate to the needs of the expressive drive that initiated it, to the materials and to the methods of each new composition.

All Reynolds's formal schemas are designed to accommodate several simultaneous formal layers. This multidimensional aspect of the form can result in as many as fifteen layers, as we saw in *Archipelago*. The composer rejects the musical tradition of a single time-stream. As far as he is concerned, this is a tradition that runs contrary to everyday observation and experience, in which several more or less independent event-streams always co-exist, and in a more or less chaotic manner. Thus, he says, "As a result of this observation, I have tended to resist dependence upon mono-dimensional musical texture. I have focused more upon formal schemes that include a detectable interaction between coexistent layers of activity. I have tended, in other words, to value contrapuntal norms both on the local and also at the formal level: in my music there will normally be more than one thread or aspect of an overall argument proceeding at the same time, and the formal plan will foresee the pattern of this coordinated evolution"[38].

Multiple layers are of course not new in compositional technique; there were already

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[38]   R. Reynolds, *Form and Method*, New York and London, Routledge, 2002, p. 18.

examples in Ives, in the second movement of the *Fourth Symphony* or in *Three Places in New England.* Composers such as Nancarrow or Carter have made multiple layers a cornerstone of their writing techniques. However, never has there been the degree of control over the synchronization and independence between layers, or of the flexibility of duration values and the way the thematic elements are distributed, as in Reynolds' transformational mosaic-like structures.

From a perceptual standpoint, this formal approach has an extremely strong pull on the ear: "This formal design, then increases the degree of the listener's individual grappling with memory and attention. It layers and customizes the experience for him. [...] This is revelatory form, and it contrasts profoundly, I think with communicative forms. Revelatory formal design invites greater meaningful listener interaction, not on behalf of a common message intended for all, but in making maximal, individual use of an opportunity for aesthetic experience"[39]. This formal approach is more demanding on the composer too: he must take into account his listener's auditory capacities, as well as the laws of perception.

The difficulty of such an approach lies in balancing the various profiles. When do the different layers and the multiple trends in the music have to be made to diverge or converge, what should the proportions between duration values? If the composer does not handle them firmly enough, or if the superimposed simultaneous streams are too contradictory among themselves, the composition can turn into an impenetrable thicket. If a thematic element is lacking in sufficient musical identity, it will simply merge with the others, canceling any chance of the ear separating out the different layers. Reynolds, aware of the risks in such a formal approach, was one of the first composers to factor cognitive constraints into the compositional process.

6. Perception

Reynolds was certainly one of the first composers in the Sixties to have taken into account psychological studies concerning the perception of music. Initially interested in the way we perceive time, the composer broadened out his investigations to include the spatial movement of sound and the way we perceive timbre. Ideally, Reynolds would like to set up a system of musical organization that could act on the listener while at the same time circumventing the influence of culture, training and upbringing: "Since it is obvious that in the future, cultural homogeneity will grow ever weaker, we will need to call up the innate physiological and cognitive factors, we will need to call upon faculties that can be partly or totally independent from cultural conditioning, that could become constant, and that could serve as a stable foundation upon which to build new figures capable of generating associations."[40]

So in Reynolds' view, we must build on universal — or at least sufficiently widespread — perceptual givens that would be stable enough to ensure, as far as possible, perceptual viability. However, Reynolds rejects the notion of any standardizing application of psychological data. On the contrary, what he seeks as a creator is the broadening of our perceptual faculties. In the present text we are mainly concerned with how the written composition relates to the perception of time in Reynolds' aesthetic.

In a 1968 article entitled *It(')s Time*[41], the composer reviewed a number of questions that were then being examined by experimental psychologists, such as the influence of an internal clock (heartbeats and breathing); of an external clock (the gestures of a performer or an orchestral

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[39]   R. Reynolds, "A perspective on form and experience", *Contemporary Music Review*, Vol. 2 n°3, Part 1, 1987, p. 306.

[40]   R. Reynolds, "Fragments d'un discours utopique", *Les Cahiers de l'Ircam:* "Utopies", n°4, 1993, pp. 113-114.

[41]   R. Reynolds, "It(')s Time", *Electronic Music Review*, n°7, 1968, pp. 12-17.

conductor) upon the way we perceive large time spans; the temporal thresholds of auditory fatigue; the sensation of the passing of time as a function of sensory stimuli (white noise or silence); the influence of listening conditions (location of sound sources, acoustics, lighting, seating etc); the problems of divided attention, and so on.

At the end of the article, Reynolds defines three types of time: controlled segments, non-controlled segments, and transitions made up of single events whose duration is subject to natural limitations (for example the performer's breath, or the length of a resonance). The first two correspond to what Boulez defined in *Penser la musique aujourd'hui* (1963): striated time and smooth time. In striated time, duration structures are based on the "chronometric" pulse time unit, so as to set up regular or irregular temporal beaconing. Smooth time is also based on the chronometric pulse unit but only in a general sort of way. Durations are expressed in proportions that are part of a time framework. The third time type defined by Reynolds is non-timed and can vary according to the instrument and the player.

These three types were tried out in *Blind Men* (1966) for choir, brass and percussion ensemble, on a Herman Melville text. In the controlled segments, the conductor's beat and the rhythmic patterns supply indications as to how to measure the occurrence of events even though these durations are not at all obvious upon first listening (they last for more or less a minute). The controlled segments in fact focus attention on a local kind of perception. The mixed time type segments all have a precise duration of one minute, but no pulsated time. They possess a static texture, with a stable level of activity.

There is no feeling of "going from here to there". The listener's attention is thereby set free to seek out internal temporal relationships that bring about a global mode of perception. After hearing the first mixed segments, listeners should be able, consciously or unconsciously, to estimate their objective duration. At the same time however they will be aware that their apparent (or subjective) duration varies according to the quality of the auditory experience. The transition segments make the listeners experience time in a special way: duration may be variable to an undefinable degree, but may nevertheless be anticipated. The transition segments are as static as the "Timed Mixture" segments because they do not demand constant attention, but tend rather to generate a feeling of the passage of time.

Fig. 12. First page of the score of *Blind Men*

While visiting a bookshop in Hong-Kong, Reynolds came upon the famous Paul Fraisse book, *Psychologie du temps [Psychology of Time]*. This was to serve as a basis for his perception of time: "Students of time perception have uncovered a number of interesting factors that have elicited wide agreement and which are relevant in musical applications. The first, as I have mentioned, is that we are attuned to change. In order to remain for us at a constant level of loudness, for instance, the strength of a sound must be continuously increased; otherwise it appears to fade and eventually disappears (Mueller, 1965). A second datum regards the duration of what some experimenters have called the 'perceptual present', that is, the duration of a period of time within which we are aware of no past and no evolution, absorbed in the moment. This period stretches in rare cases to perhaps seven seconds*".*[42]

The perceptual present is one of the universal givens of perception and is therefore biologically inherent in all human faculties. Fraisse defines it as a unified mental act that is

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[42]   R. Reynolds, "A Perspective on form and Experience", *Contemporary Music Review*, Vol. 2 n°3, Part 1, 1987, p. 288.

indispensable to perceiving continuity: "We only perceive the world as being continuous because, within certain limits, we have the capacity for unified mental activity. This perceptual unity of continuity — the ticking of our clock — is what generates a perceived present that is not the mere evanescent trace of something not yet come into being fading away into something that no longer is."[43] Naturally, there is such a thing as a "relative" present that varies with the observer's scale of perception (i.e. the "present" could mean the current century or it could mean the current hour), but there is also a perceived present that can only posses the duration of what we see as a unified organization. The present cannot be reduced to an instantaneous moment, or to an atomized present having no psychological weight or reality.

In this present, there exists a form of simultaneity, which can be broken down into a certain number of elements and into intervals between those elements, which is dependent on the very unity of the act of perception. The perceived present cannot be defined in terms of mnemonic traces (experimental subjects to whom a series of ten numbers is read aloud only remember six or seven, and the numbers they *do* remember are not among the last ones read out). This is a perceptual phenomenon that can be said to be part neither of the sensory spectrum nor of functional memory.

Most of Reynolds' works, starting from *Again* (1970, revised 1974) for 2 sopranos, ensemble and 4-track tape, incorporate the flow of perceptual present time — 2 to 3 seconds on average — as a basic time unit that serves for the creation of the temporal materials and proportions of the form. In *Archipelago* (1982-83) for example, the duration of the "tiles", of the drones, of the ostinati, as well as the silences and the tempi are all derived from the 3-second unit. Figure 13 shows the duration proportions that govern the expansions and contractions of the "tiles" in *Archipelago.*

Even though Reynolds bases his work on objective psychological data, the latter are not meant to be perceived explicitly, but rather are intended as a means of giving coherence to the entire piece. The time proportions are meant to be perceived implicitly: "The awareness of form operates not at the level of precision, but as an evaluative, a comparative process that draws necessarily on memory (and potentially on anticipation as well). Proportion, thus, matters as it describes general or potential relationships of weight and succession, not in terms of precise and complex ratios or of durational measurements of unrealistically explicit resolution"[44].

Fig. 13. Duration values (in seconds) of the "tiles" in *Archipelago*[45]

Reynolds' ideas about time perception, which are shared by other composers to a certain extent – time expansion/contraction (Stockhausen), smooth time/striated time (Boulez), the accumulation and "disaccumulation" of time (Xenakis), simultaneous layers (Carter), periodicity and non-periodicity (Grisey) – are intended to set up a dialectic relationship between chronometric time and "lived-through" time. In a way, Reynolds' compositional processes are akin to the Aristotelian conception of time. Aristotle held that time cannot be perceived except as

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[43]   Paul Fraisse, *Psychologie du temps*, Paris, Presses Universitaires de France, 1957, p. 84.

[44]   R. Reynolds, *Form and Method*, New York and London, Routledge, 2002, p. 14.
[45]   The arrows represent the changes in duration (increasing, decreasing, or constant) for each of the series of "tiles". The numbers show the duration (in seconds). The gray squares show the themes (core elements), while the other squares show the variations. The two columns to the right give the total for each series and for each set of series. However, for compositional or aesthetic reasons, the composer occasionally had to make a compromise in that some of the squares are not multiples of 3 seconds.

movement or change. All the moments in time can be seen as points along a line: on one side they are the past, on the other they are the future, and the two are separated by the present *instant.*

In the framework of this conception, time cannot be dissociated from *space.* This means that the passage of time can be measured. Even though the measuring is based on perception and observation, it is nevertheless objectively quantifiable. The composer's formal schemas, where time is literally placed in little boxes, illustrates this spatial conception of time. Here time is measured and made objective by sets of proportions. From another standpoint, the way the compositions are perceived can be said to reflect an Augustinian conception of time. As far as Augustine is concerned, time does not labor under the obligation to be real.

The future and the past only possess reality insofar as they are related to the *present.* In contrast to the notion that it can be located in space, perception of the present, according to Augustine, only exists inside the human mind. Time can only be measured by perceiving the *moment* of its passing. In this respect, the time contractions and dilations shown in the formal schemas created by Reynolds are designed to be perceived subjectively, with no explicit calculation of duration values being carried out. Here, musical perception takes place through the window of the "perceptual present". The dialectic relationship between measured time and "lived" time is, in Reynolds' work, constituted by the synthesis of the Aristotelian *instant* and the Augustinian *present* ... the instant and the moment, two words that are constantly present throughout the long voyage of his composition *Odyssey.*

Conclusion

The various facets of Reynolds' aesthetics are the fruit of a mind ceaselessly searching and experimenting. Reynolds, in his own words, is not a "maker" but a "searcher". The composer-seeker has to generate hypotheses according to what his predefined aesthetic goals are, and has to choose the appropriate methods and tools for the creation of the material. The method and the tools used by Reynolds are those of his time. However, he never uses them in the state he finds them, but adapts them, forges them, so that they will answer to his compositional needs and to the aesthetic choices he has made.

In this way, serial techniques have been completely overhauled, and editorial algorithms have been invented that allow time to be recomposed. The methods and tools must be perfectly mastered by the composer. They have to become second nature so as not to hinder inspiration. A balance must constantly be sought between formalization and artistic freedom. In that respect, Reynolds can be said to be in the process of creating the ideal art-science so longed for by Varèse.

The essential goal of the composer-seeker is not communication (in the sense of communicating a message, an emotion or a moment of pleasure) but "revelation". In other words, to reveal something that was not previously known, to offer an unheard-of experience. It also requires that listeners bring to bear a high degree of attention, and rid themselves of traditional schemas. In short, it means taking a risk, the risk of going "beyond the edge of known orders". Reynolds' music first and foremost invites us to plunge into a world of metaphorical imagery. The latter can be generated by language, in the case of vocal music, but also by the sounds and the textures themselves.

This is certainly not program music that the listener is supposed to follow and to understand. Rather, language is used both as a semantic and sound tool that will bring forth inner

images and resonances. Reynolds' music also offers sonic images — whether vocal or instrumental — that move through space. The computer-controlled spatial movement of the sound sources reinforces the gestural and choreographic aspects. It gives the music greater transparency, and greater legibility of the various layers.

Finally, Reynolds' music proposes a multidimensional approach to time. This is made manifest by the use of forms whose proportions are precisely controlled by a basic number series, and made up of layers that contract and expand in time. The composer experiments with time via a kind of temporal kaleidoscope. Here, precise notation and formal diagrams lead to a veritable "writing of time".

In *The Angel of Death,* metaphoric worlds, moving sound imagery and multidimensional time also serve as aesthetic vectors. The archetypal images upon which the piece is built — death, fate, the fall, revival, the second chance, etc. — impregnate the spatialized sound imagery and lend their own character to the composition's "time-writing".

It all adds up to create a musical experience that has powerful expressiveness and unique form. Further, this is an exceptional event in the history of music and of the cognitive sciences in that a musical experiment is carried out in parallel with a set of psychological experiments in musical perception and observations concerning compositional strategy. For the composer, this involved the taking of additional risks: accepting the constraints imposed by scientific experiment, without waiving aesthetic goals or compromising artistic integrity. In a nutshell, a kind of "musical offering" to science.