The Later Music of Elliott Carter

A Study in Music Theory and Analysis

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Any composer's writings form an important source for the critical study of his music: they must nevertheless be used with care. Carter's writings are considered as part of a tradition in American music. His musical development up to 1959 is briefly sketched, with particular reference to those elements which with hindsight can be seen to have been most significant in the evolution of a mature musical language - various experimental and non-western musical traditions, influences from other domains of art, and the philosophy of A. N. Whitehead.

In order to avoid the spectre of 'merely technical analysis' of atonal music, we need an analytical approach which can describe the way in which the characteristic properties of a musical surface (principally pitch register and duration;

secondarily dynamic and timbre) act to create larger structures in time. Pitch-class Set Theory is rejected as embodying an unacceptable level of abstraction, and failing to account for the dynamic, developmental aspects of musical structure. Instead, a more flexible and sensitive method is developed, drawing on an alternative analytical tradition for twentieth-century music. Precedents and justifications for this method are sought in contemporary accounts of structure in general, and parallels and distinctions are drawn between the hierarchic structures of tonal music, atonal music, and language. This context-sensitive analytical approach is then applied to three of Carter's most characteristic works: the String Quartet no.2 (1959); the Double Concerto for Harpsichord, Piano, and Two Chamber Orchestras (1961); and the Concerto for Orchestra (1969).

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Part I: Text

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Preface

In the last twenty-five years, Elliot Carter has emerged as a leading composer, one of the most prominent and influential in the second half of the twentieth century. Although apparently well served by books and articles, his music has (until now) not been subjected to the extended critical analysis which is the purpose of this thesis. The complexity of the music has made it necessary to restrict the scope of this examination. The project, which started life as an ambitious survey of the entire mature output, has instead become a study of three of Carter's most celebrated (and most characteristic) works: the Second String Quartet (1959), the Double Concerto for Harpsichord, Piano, and Two Chamber Orchestras (1961), and the Concerto for Orchestra (1969). The extent of some of the analytical examples has made it impractical to include extracts from the scores of these works: it is assumed that the reader is familiar with the music, and that he has scores to hand.

Although it will become clear that I do not regard Set-theory and its associated analytical techniques as adequate for analysis of Carter's music, certain notational aspects of the system have proved useful. Allen Forte's

'directory' of pitch-class set forms, and his names for these, have been used in the chapters on the Second String Quartet and the Double Concerto. They are distinguished from Carter's own set-numbering system by the prefix 'f', sets numbered by Carter himself (the numbering followed in the analysis of the Concerto for Orchestra)identified by a prefix 'c'. (Hence f3-1/c3-1).

Among those who have been generous with their advice and encouragement in the writing of this thesis, I would like to thank the following in particular: Professor Arnold Whittall, for his patient and perceptive supervision of the project; Bayan Northcott, for many hours of stimulating conversation on (and around) the music; Dr. Bojan Bujic, who supervised my work in its early stages; Dawn Beard, for helping me tame a large and sometimes stubborn word-processor at the Faculty of Letters, University of Reading; and lastly (but necessarily first and foremost), my wife and children, to whom this thesis is dedicated, with love.

Chapter 1: Introduction - Carter the Empiricist

Elliott Carter has the reputation of being a difficult, 'intellectual' composer. The motivation for this view stems initially from his music itself: complex multi-layered textures, elaborate rhythmic counterpoints, precisely-measured changes of tempo, an uncompromising (and for many, essentially American) 'toughness' in the angular lines; all these are characteristics of Carter's music which make a strong impression. This reputation for intellectualism is supported to a certain extent by the composer's own writings on his music:[1] while there is an evident concern with expression and cultural context, talk of giant polyrhythms and metrical modulations, and charts of chords, intervals and tempi, can all be somewhat daunting. Yet closer examination reveals that this view of Carter is far from accurate. If we are not simply to ignore Carter's writings on his music, then these writings must be examined critically, both in the light of a strong tradition in the U.S.A. of the composer as commentator/critic/theorist, and with regard to the music itself, to ascertain just how much is revealed in the writings about compositional process.

Any consideration of the writings of American composers in general must start with an assessment of the literary output of Charles Ives. The general character of Ives' writing is anecdotal: in the context of individual works, as in many of the writings collected and published as the Memos,[2] the information imparted is usually concerned with biographical reminiscence, frequently in conjunction with aesthetic and phïlosophical speculation, to be sure, but even these are thoughts around the music, which often in Ives' writings seems to serve merely as a pretext for divigations of this kind, particularly in the (rightly) renowned Essays before a Sonata and the Postface to his edition of 113 songs.[3] The strongly personal, even eccentric character of Ives' writings, and his attitude towards composition and music in general, did surprisingly little to influence in a direct way the thought and style of later composers in their writings - only the experimental tradition headed by John Cage seems to approach Ives' combination of humour, personality and philosophical depth.

Two other experimentalists made small but important contributions to the literary tradition in American music. Henry Cowell's New Musical Resources,[4] published in 1930 yet substantially complete by 1919, attempts a

systematization of rhythmic and tempo relationships through proportions based on the harmonic series, and also discusses properties of chromatic chords of various kinds. Harry Partch's Genesis of a Music[5] is in certain respects even more revolutionary, describing a microtonal musical system based on pure intervals, and exploring relationships within this system to an extent governed by Partch's compositional vision. Of the two, only Cowell's book had any significant impact on the development of musical thought in America, although even this was not extensive: although some of the principles expounded are certainly ahead of their time, their limited realisation in the course of the book and in Cowell's music may have prevented their full potential from being recognized. Partch's work stands as an impressive, yet isolated statement of a singular compositional ideal.

The populist movement in the arts in the U.S.A. in the 1930s can be regarded as a principal cause of the frankly educational activity of many American composers at this time, and also accounts for the prominence of such figures as Aaron Copland, Virgil Thomson, Arthur Berger, and Carter himself, as music critics and reviewers. Stemming from a growing social and political conscience on the part of artists in the face of the hardships of the

Great Depression, the movement which led to the adoption of jazz and other vernacular styles in art music found its counterpart in lectures and writings which were largely aimed at bringing the experience of music, both new and old, to larger sections of the population.[6]

A more serious strain of thought about music had meanwhile been developing with the growth of the universities in the U.S.A. The advent of the Second World War brought an unexpected stimulus to the academic study of music, as to many other fields. Among the many refugees from Germany, Austria and elsewhere in Europe, musicians of all types arrived - among them the composers Schoenberg, Stravinsky, Bartok, Hindemith. Less conspicuous than the influx of composers, but no less important in its effect on American musical life, was the arrival of a number of musicians who had studied with Heinrich Schenker in Vienna. These pupils, once established in the U.S.A., began the process of disseminating Schenker's radical ideas on tonal music theory and analysis. Previously to this, Schenker's theories had had only a limited influence outside the small band of disciples in Vienna, although this is not to say that his theories were completely unknown in America. Roger Sessions, for example, became aware of Schenker's ideas through his many

visits to Europe in the 1920s and 30s, providing a critique of these by way of obituary in 1935, and reviewing the first edition of Der freie Satz in 1938.[7]

The presence of Schenker's pupils in the U.S.A. helped create and sustain an academic climate favourable to analytical and theoretical endeavour. Although it would be impossible to claim a direct influence of Schenkerian thought on the concepts in atonal music theory developed later by such figures as Milton Babbitt and Allen Forte, it is clear that the presence of Felix Salzer, Oswald Jonas, Adele Katz, Adolf Weisse and others stimulated the growth of the discipline of music theory in all its manifestations - analytical and compositional.

The American activities of Schoenberg were also to have an important influence on post-war music in the U.S.A., although it is one of the ironies of twentieth-century music that the principal figure in the development of serial composition in the U.S.A. did not encounter Schoenberg directly as a teacher. The writings of Milton Babbitt are essentially concerned with compositional, rather than analytical, theory. The originality and later influence of his approach lies in his formalisation of relationships possible within the twelve-note system in mathematical terms, drawing on a pure number theory

dealing with order and invariance relationships within a modulo 12 system. These issues were first explored by Babbitt in the 1940s, and resulted in an unpublished paper[8] and a series of influential articles[9]. This approach to compositional theory was soon extended and developed in various ways, all indebted to Babbitt's formalisation of pitch relationships in terms of mathematical properties: Princeton University, where Babbitt had taught from 1938, became a centre for this type of research. Donald Martino, a pupil of Babbitt, proposed a theory of 'aggregates' which, building on Babbitt's application of the principle of combinatoriality to the domain of twelve-note music, generates the relational properties of smaller pitch collections within the twelve-note set. Others, most notably Allen Forte, have used the integer model for pitch relationships as an analytical tool for examining the pre-serial atonal music of Schoenberg, Berg and Webern.

The theoretical tradition represented by Babbitt, Martino and Forte has been a potent influence on compositional practice in the U.S.A. from the early 1960s. It is easy to see how this current of theoretical thought might have influenced Carter, at a time when his own compositional style had reached maturity. Serial theory's concerns with 'global' rather than 'processive'

relationships are mirrored by a corresponding (and at least apparently global) organisation in terms of intervals and sets in such works by Carter as the Double Concerto (1961), Piano Concerto (1965), and particularly the Concerto for Orchestra (1969). Moreover, this 'global' aspect of pitch organisation is all that Carter does describe when writing about pitch organisation in these works, furnishing charts of 'chords' and 'pitch relationships'. One might go as far as considering the more technical of Carter's writings as being produced in response to a view, widely held at the time but only rarely articulated, that compositional credibility rested on at least some measure of theoretical consistency. Yet it is obvious that Carter did not share the inclination of such composers as Babbitt, Martino and George Perle towards systematic theoretical speculation; it will become clear in the course of the following chapters that Carter's pre-compositional organisation serves a very different purpose, providing a set of materials which are limited within a work according to the context of a particular instrument or ensemble, section in a form, or expressive character. These materials are then used with varying degrees of strictness, sometimes according to a referential sonority or intervallic relation, sometimes spun out in flights of elaborate and virtuosic

compositional freedom.

Hence 'Carter the Empiricist'. In recent years, he has distanced himself still further from the post-war theoretical tradition, which in any case is now less pervasive. David Schiff writes that "Carter's harmonic procedures consist of neither system nor general method. They are inseperable from the expressive and musical needs of the work in which they appear. (Hence Carter's great resistance to merely technical analysis of his music)".[11] Further support for this view comes from the extent to which Carter sketches a work - there are over two thousand pages of sketches for the Second String Quartet alone,[12] suggesting a long process of experimentation and rejection, of 'play' with a work's materials, until the result 'sounds right'. Finally, such a view is supported by the music: even in cases where pitch and chord charts are provided, these can be seen to account for very little in the actual textures of a work.

Given the empirical, ultimately instinctive nature of what I have surmised to be Carter's compositional technique, how best should an analysis of his music proceed? How are we to avoid the irrelevancies of 'merely technical' analysis? Carter's evident concern that the expressive,

communicative aspects of his music should not be undervalued may appear strange in a composer whose music has often been criticised for being cerebral and over-organised (as I have suggested, this in itself is a misconception). An analysis which, taking the rhythmically and registrally defined musical surface as its object, goes at least some way towards accounting for perceived qualities of continuity and contrast, overcomes the problems inherent in abstracting pitch-class relationships from the musical texture; such an analysis would be justified in claiming that it did indeed address expressive issues in the music, however technical it might sometimes appear, as it would at least attempt to consider the relationship between work and hearer.

It is the purpose of the second part of this thesis (from Chapter 4) to provide an outline of such an analytical method. This method is explored in its application to three of Carter's mature compositions: the Second String Quartet, the Double Concerto for Piano, Harpsichord, and Two Chamber Orchestras, and the Concerto for Orchestra. As a preamble to this analytical consideration of Carter's mature style, the first part of this thesis consists of a brief sketch of the development of Carter's compositional thought up to the 1950s, the emphasis being on the influences of ideas of both musical continuity

and aesthetic unity on this development.

Chapter 2

Carter's musical and intellectual development has been wide-ranging, leading him from an early and enthusiastic response to radical modernism in the arts, through a period of restraint which represents something of a return to more traditional principles of order and clarity, into a realm of musical expression which once again faces some of the issues raised by modernism's prime movers. Throughout his life, he has been remarkably receptive towards ideas and stimuli from other branches of the arts, sciences, and philosophy -his first notable success as a composer was the ballet score Pocahontas, based on an American Indian story which is reworked in a section of Hart Crane's epic poem The Bridge, and it is significant that each of his later and most characteristic works, from, say, the First String Quartet (1951) onwards, involves some kind and degree of extra-musical association in its conception of form and musical character. Moreover, Carter himself has related the change in his compositional style and aesthetic which occurred during the 1940s and 50s to factors which include a reappraisal of Freud's ideas on the innate self-destructive impulses of the human psyche.[1]

This reorientation in Carter's compositional outlook has been described by Arnold Whittall as a movement from neoclassicism to an aesthetic tellingly identified as 'neo-expressionism'.[2] It is clear that the combined influences of Freud and the Second World War did much to make Carter realise the futility of an aesthetic position which, in the circumstances, could be regarded as projecting an artificial clarity, illusory order, and deceptive rationality: however, the sources of both his disenchantment with the aesthetic of neoclassicism and his move towards a style which, although clearly different from that of Schoenberg and his pre-World War I contemporaries in Vienna, nevertheless shares some of its expressive premises and even compositional techniques, can be linked to Carter's earliest experiences of twentieth-century music and writing. In this respect, the re-encounter with Freud can be thought of as nothing more (or less) than a catalyst, serving to precipitate a radical change that was nevertheless prepared by the earlier developments of Carter's musical thought.

The musical influences cited by Carter as being significant in the formation of his mature compositional style and technique in the late 1940s are varied and numerous. Broadly speaking, they can be divided into three

categories. Firstly, an exploration of non-western musical traditions, particularly in their rhythmic aspects:

> I had taken up again an interest in Indian talas, the Arabic durub, the "tempi" of Balinese gamelans (especially the accelerating Gangsar and Rangkep), and studied the newer recordings of African music, that of the Watusi in particular.[3]

Secondly, rhythmically innovative European and American music and ideas on music:

> ...the music of the quattrocentro, of Scriabin, Ives, and the techniques described in Cowell's New Musical Resources also furnished me with many ideas.[4]

The result of these considerations was:

> ...a way of evolving rhythms and rhythmic continuities, sometimes called "metric modulation", worked out during the composition of the Cello Sonata...[5]

The third category of influence is related to the previous two in its consideration of continuity as an element of musical discourse, but goes beyond them to establish process, change and evolution as central to the musical argument. Carter cites "certain older works, particularly those of Debussy"[6] in suggesting these ideas; elsewhere he links these concepts with philosophical and aesthetic ideas on the experience of time.[7] Ultimately, these

ideas, in their formulation by Carter as primary elements in musical discourse, can be seen to stem from his encounter at Harvard with the speculative metaphysical thought of the philosopher A.N. Whitehead.

Most strikingly in their musical manifestations, these influences strongly recall Carter's earliest experiences of modern music. Important first contacts in the years before he commenced his study at Harvard were Stravinsky (The Rite of Spring, in 1925), Varèse (Octandre, first performed in New York, 1924, Intégrales the following year), Ives (Concord sonata, songs), Skryabin (the late piano music, Poème d'extase), Bartok, and the Second Viennese School.[8] At this time Carter seems to have been particularly attracted to the music of Skryabin with which he first became acquainted at the Sunday 'salon' of Katherine Heyman, an enterprising American pianist whose programmes included music by Skryabin, Ives, Ravel, Griffes, Schoenberg, and other contemporaries. The mystical philosophy of Skryabin, freely aired in the discussions which seem to have been an important part of Katherine Heyman's sessions, evidently affected Carter, still a teenager, and drew him towards the music of other mystically inclined composers, that of Dane Rudhyar, for example.[9] Carter recalls "practicing late Scriabin for hours

on end"[10], and, moreover, attempting to analyse some of these works.

Carter's early experience of non-Western music appears to have been quite extensive. The presence in the U.S.A. of a large number of different musical traditions, a natural consequence of the country's diversity of racial groups, has affected numerous composers in different (and not only musical) ways - one thinks of Cowell, Cage, Hovhaness. In Carter's case the interest was pursued with characteristic thoroughness in his pre-Harvard days, through his friendship with the composer and authority on Balinese music Colin McPhee, through attending performances of Indian classical music, even through the first-hand experience of transcribing Arab music directly from performance in Tunisia.[11]

It seems that Carter first started composing in 1925, the year in which he first heard The Rite of Spring. Before commencing his studies at Harvard in 1926 he had attempted to write "a very 'advanced' piano sonata, as well as some simpler settings of Joyce's Chamber Music"[12]. No doubt these first works were influenced in some way by the radical nature of Carter's experiences of new music up to that time; he admits that "after all, I had my own sort of very early 'Expressionist' or avant-garde period, against which I

reacted at the time of the depression, and to which I have since returned, in a certain sense."[13] The effective extent of this influence on these early works is likely to have been severely limited, however, by the general lack of insight into the technical bases of contemporary musical styles at that time in the U.S.A.; concerning the analysis of late Scriabin mentioned above, Carter recalls understanding that "this music used different chords, but I was concerned then with making the music fit into the familiar tonal harmony-book patterns with added notes."[14] Furthermore, whilst it was clearly "easy in the twenties to distinguish between Schoenberg, Stravinsky, Bartok and Varèse, . . . it was very hard to put your finger on what it was that made each so different."[15]

Carter's studies at Harvard could hardly improve matters for him in this respect:

> When I got there, though, I began to have annoying experiences of enrolling in music courses only to discover that the professors involved couldn't stand one single thing about contemporary music and considered Koussevitsky's modernist activities at the Boston Symphony an outright scandal.[16]

As a result of this, and in common with a number of like-minded contemporaries, Carter chose to abandon music as an undergraduate study,

concentrating instead on English literature and reserving work in music for his graduate years.

Carter studied at Harvard from 1926 to 1932, receiving a B.A. in 1930 and an M.A. in music two years later, having studied with Walter Piston and Gustav Holst, the latter a visiting lecturer at Harvard at that time. During these and his following years in Paris, his thoughts on music and his own compositional outlook underwent something of a change. Whilst still associating with progressive ideas in art and music, influences which may be thought of as fundamentally neoclassical in spirit began to shape the progress of his musical development, a progress hastened by his studies in Paris with Nadia Boulanger.

The movement away from radical modernism towards a more ordered approach to artistic activity was undertaken by many composers, artists and writers in the U.S.A. during the 1920s and 30s, in response to a variety of influences. In the aftermath of the First World War, the ideal of a new order replacing the previous unstable state of affairs became increasingly attractive. Expressionism in the arts came to be regarded as symptomatic of the continuing political instability in Europe - to quote Carter, " . . . the whole

Expressionist point of view had come, at a certain point, to seem as if it were part of the madness that led to Hitler."[17] Although still appreciative of the achievements of Schoenberg, Berg and Webern, and of modernism in artistic ideas in general, Carter felt (although he adds perhaps not rightly) "that the whole German cult of hypertrophic emotion could have been responsible for the disaster we were witnessing in front of our noses . . . This is why . . . many of us became interested for a time in neoclassicism as a way of 'returning to reason' and to a more moderate point of view . . ."[18] The 'call to order' in the arts in post-World War I America found its most influential spokesman in the literary critic Irving Babbitt, in such books as The New Laokoon and Rousseau and Romanticism, in which "his condemnation of 'mixed media' . . . and of many other excesses of the moderns left a sense of certain limits beyond which art could not go without destroying itself and becoming meaningless."[19]

This tendency towards new order through neoclassicism was encouraged in the musical domain by the growing links between Paris and the U.S.A.. Aaron Copland, Nadia Boulanger's first American pupil, had studied there with her from 1920 to 1924; his experiences (and subsequent success) encouraged others to travel to Paris to study with her, this soon becoming a veritable

institution in American music. Virgil Thomson and Walter Piston were among the next generation of Boulanger pupils; Piston returned from Paris to teach at Harvard in 1926, the first year of Carter's study there. The extent of Carter's respect for Piston can be gathered from his comments in Flawed Words and Stubborn Sounds: "Up to that time . . . the only person on the faculty really interested in modern music was Walter Piston, who was very sympathetic"[20], and from his extended article on Piston's life and music which appeared in 1946.[21]

Carter's first years at Harvard also saw the beginnings of an interest in the music of Copland and of Roger Sessions. Copland, the more flamboyant and public figure of the two, was growing in reputation both as a composer and as a promoter of new music. His works of the 1920s reflect his studies with Boulanger, and already show the preoccupation with the expression of Americanism in music that was to lead to the overtly American ballet scores of the late 1930s and early 1940s.

From 1925 to 1933 Sessions lived mainly in Europe, on various artistic fellowships. Largely from Europe, he collaborated with Copland in presenting the famous Copland-Sessions Concerts of New Music, in New York and

elsewhere (1928-31). The repertoire of these concerts consisted of a wide range of works by composers of both North and South America; Copland's own tastes and experiences resulted in the fact that of the composers represented, "the majority were Americans between twenty-five and thirty-five years of age who had spent some time studying in France (often under Boulanger), and most were just beginning to establish their reputations."[22] This is in striking contrast to the (largely west-coast) activities of Henry Cowell's New Music, and the League of Composers, under Varèse, in whose concerts the works presented reflected attitudes both more cosmopolitan and more radical.

Of Sessions' own works presented at these concerts, the First Piano Sonata perhaps attracted the most attention. Copland's comments after its later performance at the 1931 I.S.C.M. festival, held in London and Oxford, give an impression of the nature of the response to the work: " . . . to know the work well is to have the firm conviction that Sessions has presented us with a cornerstone upon which to base an American music."[23] Carter singles this work out for mention in Flawed Words[24]; in remarking on its rhythmic characteristics, describing the texture as one of "cross-accented counterpoint" in a context of irregular groupings of equal rhythmic values, he makes clear

his own debt to Sessions, particularly in his own Piano Sonata (1945-46).

Also important for Carter at this time, as mentioned above, were the lectures and writings of Alfred North Whitehead, who occupied a chair in Philosophy at Harvard from 1924. Carter recalls that "Process and Reality came out while I was a student, and what I could and can understand of it, along with Science and the Modern World, Adventures of Ideas, and his other works, with their stress on organic patterns, have molded my thinking - not only about music."[25] Central to Whitehead's metaphysical thought was the 'philosophy of organism':

> This general view of larger units in nature as systems of smaller units with their own inner structure is called "the philosophy of organism". This notion of organism had already been defined in The Principles of Knowledge (p.3) as 'the concept of unities functioning and with spatio-temporal extensions', a notion which it is said cannot be expressed in terms of a material distribution at an instant.[26]

As with so many factors in Carter's development, these ideas become important in his music only later; the suggestive possibilities of Whitehead's ideas for a conception of musical process were fully realised only in the 1960s and subsequently, in works which depend on growth and relation rather than repetition for their unity, and in which the idea of 'spatio-temporal extension',

involving the evolution of musical material in time, is so significant.

During this period, then, Carter was becoming increasingly involved with music somewhat different from that which had fired his adolescent enthusiasm in the years before 1926. Given the growing sense in the U.S.A. of a need for some sort of 'return to order', and the strong European connections of Copland, Sessions and Piston, and given also, perhaps, a growing awareness on Carter's part of the need to develop his own compositional craft, it was only natural that he should follow in the footsteps of Copland, Piston and many others, and make the journey to Paris to study with Nadia Boulanger. His recollections of studying with Boulanger reflect her general approach to teaching 'composition'; harmony, strict counterpoint (in up to twelve parts), combined with analysis and performance of a variety of music. Bach's cantatas were particularly important in her programme during Carter's three years in Paris, to such an extent that, for Carter, "the Bach cantatas have remained for me a kind of 'central musical experience'."[27] At that time, Boulanger had come to dislike the music of most contemporary German and Austrian composers, her analysis of twentieth-century music resting firmly on the works of Fauré and Stravinsky. The physical presence of Stravinsky was a

powerful influence, particularly for a young composer like Carter, already strongly disposed towards a neoclassical aesthetic. "By the time I studied with Mlle. Boulanger . . . composers like Scriabin and Debussy had ceased to interest me very much."[28] Carter might easily have added the name of Charles Ives to these two; at this stage in his development he must have been at his furthest from Ives style and approach to composition. Carter's 'rehabilitation' of Ives was an extended process, coinciding with his ultimate rejection of neoclassicism, and leading through phases of rejection and renewed appreciation before Ives' music again became important for him.[29]

Carter's return to the United States in 1935 coincided with the beginning of the worst years of the economic depression in America. As a result of the widespread hardship and as part of a growing social concern at all levels, artists had come to feel uncomfortable with the predominantly elitist nature of artistic and intellectual activity of the previous decades. In addition to this overriding social pressure, elements within the arts were, as we have seen, already moving in the direction of clarity, rationality and order, notwithstanding Copland's brief but fruitful involvement in a more abstract musical style in certain works of the early 1930s, notably the Variations for

piano (1930). As tension in Europe mounted, and the internal economic situation worsened,

> ...intellectuals who had formerly been escapist became aware of politics and economics. Liberalism as a means to social recovery became a central topic of discussion among intellectuals. It was important to come out of the shell, to think of the plight of the people...[30]

Carter's response to the populist and overtly Americanist tendencies in the arts at this time resulted in a number of works, all fundamentally neoclassical in idiom, which nevertheless prefigure certain characteristics of his later music. Symptomatic of his Parisian experience, and of his exposure to the music of Stravinsky, his first major work now acknowledged was a ballet, Pocahontas (1938), which arose from his position as music director of Ballet Caravan, a company founded in 1937 by Lincoln Kerstein, who had been a contemporary and associate of Carter's at Harvard. The Americanness of Pocahontas resides in the subject of the ballet rather than the music itself, the scenario taking as its point of departure the section of Hart Crane's The Bridge which deals with the arrival of the first European settlers in America, and the disastrous effect on the indigenous population. This is expressed allegorically through the relationship between the pioneer John Smith and

Pocahontas, daughter of the legendary Indian chief Powhatan. The music clearly owes much to Stravinsky and Hindemith in its rhythmic and melodic style; it is sometimes rendered tonally obscure through the use of bitonal constructions, for example in the first chord of the work, which superimposes major triads on C and D^{b} (example 2.1).

Three aspects of the music of Pocahontas become progressively more important in later works: the stratification of texture by means of differentiations in rhythm, tempo and timbre; the presence of continuously evolving melodic lines which give the impression of being 'self-generating', depending on rhythmic and intervallic character for their extension, rather than on the use of thematic fragments or motives; and the structural use of keys and pitch centres a semitone apart.

The first of these is most evident in John Smith in the Forest, the second movement of the orchestral suite extracted from the ballet score. Example 2.2 is prophetic of Carter's later music in its presentation of two 'planes' of progression, differentiated harmonically as well as rhythmically.

The continuously evolving line is a characteristic of American music of this period - notable instances occur in the music of Sessions (Violin Concerto,

1935) and Roy Harris (Third Symphony, 1939). This typically American feature, all too easily associated with "a vision of empty distances . . . the sense of growth and endeavour . . . man alone in the praries"[31] becomes transmuted in Carter's transitional and mature works into a more abstract yet musically more cogent aspect of compositional technique, in developing the idea, inherent in the concept, of characterisation and textural differentiation (such a line becomes a Hauptstimme, strongly differentiated from whatever else is happening in the overall texture at that point). Carter's use of the device in Pocahontas is limited to the second movement of the suite, in the passage already cited as an example of textural stratification (examples 2.2 and 2.3).

Conflict of tonal centres a semitone apart is characteristic of many of Carter's early and transitional works. In Pocahontas it is expressed clearly in the opening sonority, and is further developed in the Overture in the reharmonisation of the opening melodic idea (b.4-5) over a pedal C (b.10-13), as opposed to the C# of the initial presentation. The last chord of the ballet, a major triad on C♭, reasserts a sense of key whilst maintaining the semitonal conflict, C/C♭ spanning the entire work.

These elements of style and technique are present to some degree in all

of Carter's neoclassical and Americanist scores, and, in the case of textural stratification and linear evolution, can be seen as prefiguring some of the most characteristic features of his later compositions. Textural differentiation reaches its earliest extensive manifestation in the ostensibly populist Holiday Overture of 1944, although occasional passages in the first and last movements of the First Symphony (1942, revised 1954, and not succeeded by a second or subsequent) show a stratification of the musical argument in this way. In the Holiday Overture, however, the technique is more central to the work's purpose, alternating with more traditionally fugal and contrapuntal textures; the distinctions maintained between the participating lines in the stratified textures are sufficiently marked to justify a view of their relationship as of between two different speeds, or rates of progression (example 2.4). The 'cross-accented counterpoint' which is such a marked feature of this score represents a response by Carter to English contrapuntal styles of the late sixteenth century[32], although the rhythmic aspect of Sessions' music is also clearly an influence here.

The 'long line' style of melodic writing is the basis of the two short pieces for viola and piano, Pastoral (1940) and Elegy (1946), and is most

impressively developed in the first movement of the Piano Sonata (1945-46). In the sonata, an important concern of Carter's later music appears for the first time, namely the direct association of the musical materials of a work with instrumental characteristics and the performing situation. Both the characteristic harmony and the elaborate figuration of the first movement grow from the overtone series of the work's first pitches, and their conflict with fifth-cycles based on the same pitches, B and $A^{\#}$, thus developing the texture from the particular resonances of the instrument itself. These two pitches also serve as the focal points in the tonal conflict central to the sonata, between B and $B^{\flat}$. Beyond this, the work can be considered Carter's last extended essay in musical Americanism, the first movement's complex succession of unequal rhythmic groupings recalling Sessions' fluid lines, the 'hymn' which frames the second movement's fugue suggesting Copland at his grandest and most rhetorical.

Chapter 3

Carter's output during the years 1945-55, a period which we may be justified in regarding as transitional, shows, understandably, the greatest variety of any body of works from his career. Scores which bear witness to his move away from the neoclassical and Americanist approaches, and which reflect his many different preoccupations at this time, coexist for a while with compositions which revert to characteristics of his earlier style, most notably in the ballet The Minotaur (1947) and the Wind Quintet (1948). Indeed, these conflicting tendencies can be seen to operate within single works, even one such as the Cello Sonata (1948) which breaks so much new ground in terms of expression and compositional procedure.

Within the more progressive group of compositions two types are apparent: short experimental 'studies', usually exploiting a severely limited range of materials, and larger works, still occasionally experimental in their materials and processes, but integrating these and other elements to produce more extended musical arguments. To the first of these groups belong the two sets of pieces which Carter completed in 1950, Eight Etudes and a Fantasy for

woodwind quartet, and a group of six pieces for four timpani (two being added in 1966, and the others revised, to form the Eight Pieces for Four Timpani). The Cello Sonata marks the start of the latter tendency, rapidly fulfilled in the First String Quartet (1950-51) and further developed in the Sonata for Flute, Oboe, Cello and Harpsichord (1952) and the Variations for Orchestra (1955). With these works, Carter reached the threshold of his mature style and technique, although the textures and compositional procedures of both the 'Harpsichord Sonata' and the Variations seem to stand apart from the developments in these areas initiated by the Cello Sonata and First Quartet. This may be due to the nature of the commissions for the two later works (and conversely to the fact that the quartet was written for personal reasons, and had not been commissioned[1]). The Sonata was requested by the Harpsichord Quartet of New York, an ensemble more accustomed to playing Baroque than twentieth-century music. This led Carter to simplify his rhythmic procedures, particularly in the first and second movements, a simplification further emphasised by textures which are - for Carter -surprisingly non-contrapuntal. As in the Cello Sonata, the expressive shape of the Harpsichord sonata is dictated by the nature of the ensemble, the flute, oboe and cello colouring and

contrasting with a 'concertante' harpsichord: " . . . the whole range of musical expression, details of shape, phrasing, rhythm, and texture, as well as the large form . . . were all determined by and grew out of a desire to explore the many colorful possibilities of the modern harpsichord, with the other three instruments serving as a frame to set this off in best relief, and with their 'behaviour' conditioned by this aim."[2]

The Variations for Orchestra were commissioned by the Louisville Orchestra, whose special restrictions at that time included a smaller-than-average string section. Moreover, this was Carter's first attempt at an orchestral work in his 'new style', and he was doubtless concerned with problems of ensemble, performance difficulty and performer reaction: " . . . the built-in problem of players' reflexes in a large instrumental grouping, which requires the composer - at least a more advanced one - to simplify his rhythmic vocabulary to a degree, though this can be compensated by the density factor not available in chamber music."[3] These problems arise from, and are perpetuated by, the very nature of the modern symphony orchestra, in which instrumental families are seated together, wind and brass instruments grouped in the threes and fours required by the triads and seventh chords of

tonal harmony. Although the compositional procedures of the Variations are by no means traditional, the nature of the material, and the simple three-part textural differentiation of strings, woodwind and brass, lend the work a traditional aspect, through an emphasis on often extended melodic gestures, to which other figuration in the orchestra becomes accompaniment or interpolation. This is in marked contrast to the Cello Sonata and First Quartet, in which the textural counterpoint is more consistently sustained, and to the Harpsichord Sonata, whose texture acquires a unity of purpose through the instruments' 'colouring' of the harpsichord's gestures. It contrasts also with later works, in which the principle of textural discontinuity becomes more important.

The compositional techniques of the Variations for Orchestra make the work individual, something of an unique phenomenon in Carter's output. The principal theme extends to seventy-two notes: portions of this are extracted and treated in ways which suggest serial procedures in the course of the work. The two 'ritornello' themes also serve as sources for melodic material used in this way, in addition to fulfilling their structural role as refrain material between the variations, the first stated at a faster tempo at each appearance,

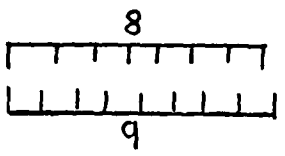
the second, slower.

Rather than examine either the Harpsichord Sonata or the Variations for Orchestra in detail, or the First Quartet (which in its thematicism is a precursor of the more extended thematic and motivic organisation in the Variations), I shall now present a critical and analytical study of the Cello Sonata, a composition which is central to an understanding of Carter's subsequent development.

As mentioned in the previous chapter, Carter's musical interests at this time were serving to fuel a reassessment of techniques of rhythm and continuity in his music. The sources on which he drew were, firstly, the rhythmic means of various non-western musical cultures, and secondly, rhythmically and formally innovative music within the Western tradition. It is hard to see how many of the non-Western musics cited by Carter in his notes on the Cello Sonata could have directly influenced his compositional procedures. For example, the Indian and Arabic rhythmic systems, tala and durub, both operate in a monophonic context, and cannot give rise to the notion of superimposed yet metrically distinct lines characteristic of Carter's rhythmic techniques, although the organisation of duration into larger periodic

units entailed by both of these systems might possibly have been an influence on the development of the 'giant polyrhythm', an idea important in Carter's music from the 1960s on. The same considerations arise in connection with Carter's experiences of gamelan music: the patterns gangsar and rangkep, as described by Colin McPhee[4], are less rhythmic types than tempo 'zones', two of the three appropriate to the form gending ageng. The particular feature of these is that they allow for accelerations, in the transition from gangsar to rangkep, or at the end of a composition, within rangkep. On the whole Carter's interest in these must be regarded as symptomatic of a general interest at this time in non-traditional rhythmic organisation: it would be futile to search for instances of direct influence from particular features of non-Western music in Carter's works. This said, the African music cited by Carter may be a more significant influence, in that the music of the Watusi's 'Royal Drums' does feature metrical polyphony, albeit in a simple form: one drum maintains a rhythmic ostinato of regularly grouped durations, the other weaving around this rigid pattern a line of flexible metre using more varied time values[5].

Metrical combinations of a more complicated nature had been described by Henry Cowell in New Musical Resources[6]. In the section of the book

devoted to considerations of rhythm and tempo, Cowell attempts to rationalise simultaneous combinations of different durational values, metres (e.g. eight bars of 9/4 against nine of 8/4), and tempi, in terms of proportions derived from the harmonic series, all this strikingly anticipating Stockhausen's compositional thought in the 1950s, regarding pitch and duration as a continuum of 'cycles', and using a logarithmic 'scale' of tempi as an analogue to the equal-temperament chromatic scale in the domain of pitch. Cowell's speculations can all be regarded as describing aspects of a single rhythmic treatment, operating on different scales and in different contexts (a large cycle of 9/4 against 8/4, as suggested above, can also operate on a smaller scale as a polyrhythm: 

. This in turn may be expressed as a combination of two suitably related tempi, say m.m.160:m.m.180). It should be stressed that Carter took from Cowell's speculations no more than the idea of a more systematic approach to rhythm, metre and tempo, with no thought of tying the techniques to pitch organisation through the analogies suggested by Cowell and, later, Stockhausen.

Cowell's ideas of relation in the domain of temporal considerations alone are important in considering the rational aspects of Carter's so-called

'metrical modulation', in which the proportional relationships between tempi become audible, controllable, and hence potentially structural. Equally striking are the similarities between the two composers in the concept of superimposition of different tempi, this being a feature central to Carter's music from the time of the composition of the Cello Sonata. These considerations define the extent of Carter's developments in the field of tempo and rhythmic relationships, to which could be added only his superimposition of different types of rhythmic change - accelerando, ritardando, free rubato, constant pulse. 'Metrical modulation' itself is the aspect of Carter's compositional technique which first attracted attention, in such works as the Cello Sonata and First Quartet. As an instance of the structural use of tempo relationships (as opposed to the use of contrasts which may be merely affective, when, for example, a slow movement might follow a fast one, or a light and rapid sonata-allegro might succeed a portentious and weighty slow introduction) it has a number of historical precedents, recounted by Carter in Flawed words and Stubborn Sounds[7]: the music of late fourteenth-century France; the rhythmic device of hemiola, especially in fifteenth- and sixteenth-century music; the variations of Elizabethan and Jacobean

composers, which establish tempo relations between their sections (a tradition maintained in the history of variation forms, extending to Beethoven in Op.111); Stravinsky, in his Symphonies of Wind Instruments and Les Noces; and the later music of Webern (no examples of Webern's use of tempo in this way are given by Carter: the most striking is perhaps in the Variations for Orchestra, Op.30, where 160 and 112 are the only metronome indications throughout, excepting the obvious misprint at b.96). To these might be added some further examples from the twentieth century: the first movement of Stravinsky's Concerto for Two Pianos, in which the motoric pulse which runs throughout the movement is articulated in groups of four in the outer sections and six in the central one; and the Piano Sonata no.1 by Roger Sessions, a work already shown to have been important to Carter (example 3.1). In fact, this structural use of tempo makes explicit something that is often only implied in much music from the eighteenth and nineteenth centuries, in which the rate of harmonic change provides an index for 'tempo' which is highly important in distinguishing the structural role of individual sections of the music within the overall form. Occasionally in this repertoire this feature becomes explicit, as in the first movement of Beethoven's Piano Sonata Op.109. It is interesting to

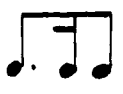
note that Carter's thoughts on tempo and structure were reinforced in 1943 through reading an article by Rudolf Kolisch on aspects of tempo in Beethoven's music[8].

The Caneries from the pieces for four timpani provides a concise example of Carter's structural use of tempo: its tempo relations are summarised in example 3.2. Here Carter establishes a base tempo, ♩.=90, which is associated with the movement's principal thematic material. This forms the 'refrain' of an A-B-A-C-A outline, the first move away from ♩.=90 relatively short, preparing for the more extended metrical excursion of the second 'episode'. This commences with the same metrical modulations did the first, before moving on to a celebrated passage in which one pair of drums maintains a steady pulse, the other accelerating.

Another writer who may have influenced Carter in the formulation of his ideas in this area was Joseph Schillinger (1895-1943), a Ukrainian-born composer and teacher who had emigrated to the U.S.A. in 1928. His most important theoretical work, The Schillinger System of Musical Composition, was published posthumously in 1946, and reviewed by Carter in Modern Music. The 'mechanistic approach' which Carter discerned behind the quasi-scientific

approach of Schillinger in his work did not appeal, yet the review does appear to praise certain aspects and conclusions of the book, most notably in describing

> ...the novel idea of deriving temporal divisions and irregularities by combining two regular patterns, such as three notes against four, into one line. The whole chapter is systematized on the claim that all rhythms are portions and groupings of such 'resultants' of the 'interference' of one set of regular beats by another.[10]

This clearly prefigures certain rhythmic characteristics of Carter's mature music: lines produced by the combination of unequal divisions of a metrical unit are found in the Cello Sonata (III b.22-24) and the First Quartet (example 3.3); an 'analytical' use of the concept is an important feature of the last movement of the Sonata for Flute, Oboe, Cello and Harpsichord, where the characteristic forlana rhythm  is interpreted as a combination of  and  (ex.3.4); and the whole is strongly predictive of Carter's use, in the 1960s and 70s, of polyrhythmic configurations on very large scales.

Schillinger's harmonic classification may also have influenced Carter in the formulation of his own Harmony Book in the 1960s. Carter comments that Schillinger's 'Special Theory of Harmony'

> ...treats triadic harmonies and their sequences in an unusual way, tabulating at tremendous length each type of bass motion and each

> possible type of combination. The 'General Theory of Harmony (Strata Harmony)' constitutes perhaps the most elaborate treatment of modern dissonant harmony to appear . . . so far, with its lists of different chords and their progressions.[11]

This comprehensiveness is certainly reflected in the Harmony Book, which lists all possible pitch-class sets ('chords' in Carter's terminology) of up to eight elements, with numerous combinations of subsets, in various spacings and registrations.

The ambivalence of Carter's feelings towards Ives' music has already been touched upon. The intuitive and often seemingly irrational way in which tempi are combined in certain scores by Ives may have appeared unacceptable to Carter's more ordered sensibility: now provided with concrete means for controlling this sort of texture as a result of his encounter with the writings of Cowell and Schillinger, he was in a position to reassess Ives' style and technique, incorporating aspects of these into his own, more rational procedures.

In two articles, "The Time Dimension in Music" and "Music and the Time Screen"[12], Carter sets out his ideas on the philosophical problem of the experience of time, particularly as embodied in music. As usual, he mentions particular writers who have interested and influenced him, although as with

any composer's writings the problem remains of disentangling hindsight from memory: one can never be entirely sure that the ideas mentioned in connection with a work were in fact the most important factors in its composition as it appeared at the time, or that these ideas have not undergone modification since the composition of the work in question. The principal sources for Carter's ideas on time and music are the articles "Le Temps et la Musique" by Charles Koechlin and "La Notion du Temps et de la Musique" by Pierre Suvchinsky, and a later book by Suzanne Langer, Feeling and Form[13].

Koechlin's article, building on Bergson's idea that time as 'pure duration' can only be known intuitively, without the participation of the senses or intellect, sets forward four categories of experienced time, in a passage quoted in full by Carter, and summarised here[14]:

(i) Pure duration - Bergson's intuitively experienced 'real time'.

(ii) Psychological time - the impression we have of the above, according to our perception and the events of our existence.

(iii) Chronological time - measured in mathematical terms and distinguished by periodicity.

(iv) Musical time - the closest we come to experiencing pure

duration. Some analogy with spatial concepts is possible, as this time is 'divisible' by ear, although this is to be understood differently from Bergson's spatialization of time.

Suvchinsky's article, also rooted in Bergsonian metaphysics, draws a distinction between 'chronometric' and 'chrono-ametric' time in music: the former, in which the sense of progress of time in a work is in equilibrium with that work's musical processes, ontological time (one presumes Bergson's 'real time') evolving uniformly with musical duration, exemplified in the music of Haydn, Mozart, and latterly Stravinsky; the latter, 'chrono-ametric' time, showing a less straightforward relationship between elapsed time and the psychological time evoked, characterised by the music of the Romantic era, above all Wagner.

Suzanne Langer's theory of temporal experience in music, developed in the seventh chapter, 'The Image of Time', of Feeling and Form, is altogether more flexible: after assesing Koechlin's four categories in the passage already cited, and having examined the role of Bergson's thought in modern philosophies of time, Langer reaches the conclusion that music is experienced as an image of time, symbolizing in its different levels of tension and

resolution our own experiences of stesses and relaxations that make up, for each of us, the multidimensional impression of time passing. As such, she clearly envisages musical time as an image of Koechlin's 'psychological time', rather than, as Koechlin intimates, of 'real time' or pure duration. In its 'measured' or divisible aspect, Koechlin's characterisation of musical time would also seem to have links with his third category, chronological time. For Koechlin's somewhat confused description, Langer substitutes a more unitary explanation, in which chronological time, or Suvchinsky's 'chronometric' time, takes its place precisely as a rather special category of experienced time. This points up the inadequacy of Suvchinsky's distinction (as philosophy - this is not to say that the idea could not have been subsequently appropriated and used creatively by a subsequent composer) and the examples with which he illustrates it. The 'multidimensional', many-levelled characteristic is encountered in all but the very simplest music. Analytical theory supports this observation, most obviously in the ideas of implication and realisation developed by Leonard Meyer and others in the field of Information Theory, but also within Schenkerian theory, in the interaction of goals of harmonic and melodic closure on different structural levels.

The Cello Sonata was composed in 1948, directly after the Wind Quintet, with which it shares some features of musical material and treatment. More specifically, the use of elements of popular music in the second movement of the Quintet is echoed in the Sonata's second movement (the first to be composed) and finale; the form of both is governed to a large extent by thematic recurrence; the use of tonality as a structural principle is equally complicated, yet equally important, in both. The second movement of the Sonata is, as might be imagined, closest in atmosphere to the Quintet. The evolution of style over the course of the four movements (the first movement being the last to be composed) indicates the rapidity with which Carter's reconsideration of technical and expressive means bore fruit.

Carter has claimed that the second movement, which is his last to use a key signature, "verges on a parody of some Americanizing colleagues of the time"[15]; this might, however, be thought true only within the overall stylistic context of the Sonata, as a result of the evolution of the musical language during the composition of the work. While it is clear that the Wind Quintet is manifestly a 'backward glance', recalling a particularly French tradition of chamber music for wind instruments, it should not be overlooked that Carter

had responded positively to the Americanist movement, which even influenced works which were not overtly populist in intention - the Piano Sonata, for example, at the beginning of its second movement. Moreover, the impassioned recitative of the Cello Sonata's third movement recalls another tradition in American music (as does the equally rhetorical 'third movement' of the Concerto for Orchestra), with its roots in the music of Copland and Roy Harris.

The four-movement plan of the Cello Sonata reflects, in its alternation of slow and fast movements, baroque rather than classical models. The individual movements possess outwardly simple structures, with the first three displaying ternary forms, the last being a free rondo, again denying the Sonata associations with classical sonata procedures. Against the four-movement plan is set a cyclical design: the music of the opening of the first movement returns in a modified form at the close of the work, and the first bars of the third and fourth movements are 'predicted' in the conclusions of the second and third respectively (ex.3.5).

It clearly takes more than a recapitulation of opening material at the end of a work to make it truly 'circular' in the manner that Carter appears to

intend - he draws an analogy with Joyce's Finnegan's wake. In the last movement of the Sonata, however, the tempo of the first movement's opening is approached through a series of metrical modulations, the return of this speed marking the climax of the movement and of the work as a whole (ex.3.6). Moreover, the links between the second, third and fourth movements, as described above, effectively generate a linked tempo structure for the entire Sonata, the first movement related across the intervening music to the conclusion of the last. David Schiff has suggested that the end of the first movement is in fact the true conclusion of the sonata, noting that the first movement quotes material from the other three[16]. This is a view which accords with the chronology of the work's composition, but which overlooks the cogent linear formal pattern produced by the arrangement of the movements, one of dissociation followed by a process of convergence and eventual return. This mode of organisation is not entirely without precedent , the most striking earlier example being Beethoven's Quartet in C♯ minor, Op.131, in which both the overall tonal and stylistic developments are structured in precisely this way.

The opening of the Cello Sonata presents two distinct types of music,

related, according to Carter, to the ideas of temporal characterisation developed by Suvchinsky in the article described earlier in the chapter: the piano's durationally regular, 'ticking' line presenting 'chronometric' time, the cello's expressive notated rubato embodying 'chrono-ametric' time. These distinctions, which constitute Carter's most advanced essay in rhythmic differentiation up to that time, are maintained in the movement's outer sections only, the central part in contrast bringing the two instruments together, a characteristic emphasised by passages of literal imitation between the instruments in b.90 and b.95. Dependence and independence of the instrumental parts is therefore used in a structural way, a feature of Carter's later works, where it is applied in more complex ways than here.

Within the piano part itself in the first part of the movement, distinct rhythmic strata are sometimes presented, expressed in a succession of equal time values over a steadily maintained pulse of ♩ =112, for example at b.55 (ex.3.7). The piano part from b.19 shows a feature much used by Carter in his later music, in which a notated ritardando and accelerando conflict with a steady pulse (ex.3.8). A degree of rhythmic interchange between cello and piano is apparent in b.51-52, where, momentarily, the piano part has a line as

rhythmically varied as anything in the cello part, whilst the cello plays a succession of equal durations (ex.3.9).

Pitch organisation in the Cello Sonata reflects both a residual tonal functionality, with its roots in the music of Hindemith and Stravinsky, and a more characteristically twentieth-century 'motivic' technique, where linear pitch-relations arising from qualities of interval and line usurp the role of functional tonality. Again, Carter's evolving approach can be traced through the Sonata's four movements in their order of composition, with the proviso that, although the role of tonality diminishes and that of the motive increases, both operate to an extent in all four movements.

In tonal terms, the second movement is the most straightforward, and is comparable to some of Carter's earlier music in its use of scale and mode. The movement's opposition of tonalities on B and B^{b} recalls the use of the same keys in the Piano Sonata and Wind Quintet. This opposition, at first stated successively, soon engenders passages of fully-fledged bitonality (for example, b.15-25). More often, the shifts between the two principal forms these keys take, B major and B^{b} minor, are engineered through the large number of pitch-classes common to both scales, resulting in a texture which is only rarely

harmonically unequivocal, usually being capable of interpretation in the context of both tonalities, and in which, as a corollary, 'key' is usually only definable as a property of the scalar relationships of the pitches present at any given moment, rather than as a function of harmonic relation.

Paradoxically, this traditional harmonic root function operates more frequently in the other movements of the Sonata, but on a small scale: in these movements the motivic aspect of pitch organisation becomes more important. The Cello Sonata was Carter's first work to feature a 'key-chord', a pitch-class set which could serve either as a referential sonority or as a source for intervallic and pitch relations in a less obvious way. The principal chord of the Cello Sonata is the work's first chord, a four-note sonority articulated by register into an interval pair, i.c.3 + i.c.7 ((X) in ex.3.10). The music which immediately follows this features a transposed statement of the six-note set formed by the contents of the first bar; it also introduces an important secondary motive ((z) in ex.3.10) which, although not a subset of (X), is related to it through a similarity of intervallic structure, in that it consists of a superimposition of i.c.1 and i.c.3. The two three-note subsets of (X), designated as (a) and (b) in example 3.10, together with (z), occur consistently

in the first movement and in the more chromatic sections of the remaining three movements, accounting for the harmonic consistency of the work by means of their frequent appearance and association. Example 3.11 gives some instances of their use. Moreover, the interval classes of (X), when regrouped at different relative transpositions, give rise to a collection of four-note chords which are all used in the harmony of the Sonata (ex.3.12).

The three-part form of the first movement is articulated by both textural and thematic contrasts and recurrences. The cello reintroduces its opening line at b.105, partially transposed, and with the rhythmic values slightly altered. A rhythmic redisposition of the cello's music in b.6-14 produces the line in b.22-31. A similar procedure on a smaller scale occurs in the piano part, b.3-5/5-7 (ex.3.13).

Although in the outer sections of the movement the two instruments are clearly differentiated in terms of material and manner of presentation, there are connections between the music that each plays. The theme which appears in b.19-21 in the piano echoes a line rising through a major third in the cello, b.16-19. More importantly, the motivic considerations outlined above involve both instruments, denying the work the degree of instrumental

differentiation and textural discontinuity associated with Carter's later compositions.

The overall organisation of these motivic details in the first movement is achieved in a way which will serve, at least in part, as a basis for the analytical and theoretical considerations of the following chapter. In those sections of the music which are not unambiguously tonal, an impression of pitch-centricity is nevertheless generally present, sometimes combined with a vestige of tonal function. This is the case in the very first bar, in which the pitch-class b is emphasised through its presentation in double octaves, marking the registal extremes of the bar, and at the peak of a crescendo. B is also approached through an 'arpeggiation' of the triad of B major from the F♯ of the work's key chord, endowing this essentially atonal collection with a (metaphorical) dominant function (ex. 3.14). An analysis of the first movement in terms of its articulated tonal centres is possible, generating a succession of pitches which we might be justified in regarding, in some sense at least, as 'background' and 'middleground' structures (ex. 3.15).

The opening gesture, and its transposed reappearance towards the end of the movement, suggest 'cadences' on B and D♯ respectively, as described

above. Between these points, although the motivic organisation of pitch results in a highly chromatic texture in which focal pitches sometimes appear only fleetingly, the pitch-class C occurs so frequently and prominently (in double octaves in the piano part at b.27, 31, 98-99; as a chord bass, generally sustained beneath other figuration, as at b.84-87) that it can be considered a centre for the surrounding tonal expansion. The centrality of C is sustained through neighbour-note and fifth relationships, common to traditional tonal function - hence G at the close of the first section of the ternary form, and the $C^{\#}$ and $G^{\#}$ progressions important in the central section. The large-scale succession of focal pitches is B-C-$D^{\#}$, a pattern familiar as one of the three-note subsets of the work's 'key-chord', (X). This interaction of motive and overall structure is reflected on a lower level by the frequent participation of these focal pitches in motivic configurations involving this subset or the other three-note sets important to the movement's motivic continuity, as at b.85 (where the sustained C in the piano underpins a prominent statement of subset (b) in the cello) and b.98 (whose pitches comprise subset (a)).

The use of the four-note chord (X) in the Cello Sonata prefigures the similar use of the all-interval tetrachord (0,1,4,6) in the First String Quartet.

In both works, the respective set features as a 'key-chord', a characteristic sonority used principally at important points in the structure: in both, the set is used as a source of smaller sets and intervallic relationships. The intervallic constitution of the Cello Sonata's tetrachord, (0,1,4,5), is clearly articulated in the work's opening bar, and the first bars of the last movement also make this construction strikingly clear, inverting i.c.7 at the bottom of the chord into i.c.5 (ex. 3.16). Emphasis on i.c.3, primarily as a result of this interval's presence in the three-note groups that feature so persistently, is a characteristic of all four movements of the sonata. Its use in the first has already been described: in the second, the music is frequently punctuated by configurations such as the one reproduced in example 3.17. Although less in evidence in the third movement, the interval is prominent in the cello's opening thematic idea, and is also important in the harmony of some passages, for example b.12-16 (these bars use subset (a) in an overlapping sequence in a similar way to the end of the first movement). The third movement might be thought of rather as emphasising the qualities of the complementary interval of the 'key-chord' (X), expressed as i.c.5 rather than i.c.7. The piano's line in double octaves accompanying the cello at the opening of the movement

ilustrates this, as does the static harmony of b.22-26 (ex. 3.18).

In connection with his treatment of musical time in the Cello Sonata, Carter cites the article by Suvchinsky discussed in the first part of this chapter. He goes on to suggest, "Such thinking (which I am not sure I agree with) led me to the opening of the Cello Sonata, in which the piano, so to speak, presents 'chronometric' time, whilst the cello plays in 'chrono-ametric' time."[17] Quite apart from the applicability of these concepts to older music (is this perhaps what Carter is not sure he agrees with?), runnning the risk of dangerously oversimplifying our experience of Haydn, Mozart, et al., the music of the piano at the beginning of the sonata could not be said to embody 'chronometric' time except in a very simple sense, in that its rhythm (but its rhythm alone) is 'clock-like'. As mentioned previously, it would appear that this particular aspect of temporal characterisation is only possible in the simplest of contexts - an ostinato, perhaps, or a monotone, as (according to Langer) it is a necessary characteristic of music that it represent in a symbolic sense the 'dimensionality' of temporal experience. Varied pitch-content, especially in the context of a motivically-enhanced extended

tonality such as is found in the Cello Sonata, most definitely does charge the music with tensions, the resolutions of which can perforce only rarely correspond to the progress of 'real time' in the work. Moreover, the contrast, in terms of texture and rhythmic character, between the music played by the individual instruments, is in itself 'charged': while we can appreciate the (metaphorical) characterisation of the individual lines in mutual opposition at the opening of the sonata, the psychological whole is provided by the interaction of the two parts, this being nothing if not intensely 'chrono-ametric'.

Exactly how far the movement might be said to symbolise the contrast between Suvchinsky's hypothetical categories of temporal experience in music is a question that could be considered in the light of Suzanne Langer's ideas on the subject of musical time - not forgetting that Feeling and Form was published five years after the composition of the Cello Sonata. However, it is hard to see exactly how Langer's insights can be used to formulate an independent analytical approach which could be applied to any given situation, the problem residing in the need for quantification and qualification of music's various tensions and ambiguities in terms of the temporal metaphor. Such

features are, as it were, built in to certain analytical theories - notably those of Schenker and, latterly, Meyer - and make these more sensitive to the larger contexts of movement and relation in music than other, more reductive techniques, such as semiotics and, in the atonal repertoire, set theory.

Many factors contribute to the character of the Cello Sonata: of the work's various innovations, the more fully attempted textural differentiation of instrumental parts, together with the use of intervals and small sets to generate a spontaneous and ever-varied line, are the most significant in view of Carter's later development. The combination of influences - a motivic technique which recalls the early atonal music of the Second Viennese School combined with a neoclassically-derived approach to thematicism and tonality which owes more (in this work) to Hindemith than Stravinsky, and a self-conscious Americanism, evident to a certain extent in all the movements of the sonata except the first - these confirm the transitional position of the Cello Sonata in Carter's output. (It is interesting to note that, in an interview in 1980, Carter described the sonata as a "neo-classical score"[18], rather than dwelling on its more radical aspects. Certainly, as his first 'motivic' work, it is remarkably accomplished.) While the ideas on time outlined in the earlier

part of this chapter undoubtedly did lead to certain features of the work, there is clearly more to the Cello Sonata than this, both in itself and as a portent of Carter's later compositional preoccupations.

Chapter 4: Sketch of an Analytical Method

In the late 1960s and early 70s it appeared to many people that musical analysis had developed to the extent of being capable of considering a repertoire of complicated and hitherto intransigent works, those composed (roughly) between 1908 and 1924 by Schoenberg and his former students. In a series of articles published throughout the decade, Allen Forte refined the technique and theory of analysis in terms of unordered sets of pitch-classes, a theory which received its fullest exposition with the publication, in 1973, of The Structure of Atonal Music[1]. In broadening the scope of his analytical inquiry to include discussion of works by other composers of the period, such a Stravinsky, Skryabin and Ives, Forte appeared to be substantiating the not unreasonable assumption that, in their search for new principles of musical organisation, these composers shared more than simply an aesthetic. Furthermore, in introducing the concept of the set into the analysis of pre-serial atonal music, Forte suggested a cogent historical continuity, a link between, on the one hand, the increasingly motivic music of the early years of the century, and on the other, the achievement of serial technique in the early

1920s - indeed, the form and terminology of Forte's theories might be considered as largely arising from Milton Babbitt's explorations of the formal properties of serialism.

Set theory is certainly the most consistent and methodologically rigorous means developed to date in response to the analytical problems posed by atonal music, and has become established as an analytical orthodoxy in much the same way (although admittedly to a lesser extent) as has Schenkerian analysis with respect to tonal music. At its best, it can produce analyses which, in their possible clarification of compositional techniques employed, show a considerable depth and comprehensiveness[2]: yet its shortcomings are such that much of even the best must often be seen as being, in a literal sense, musically meaningless. Criticisms of various kinds have appeared in reviews[3] and in analytical articles[4] by various authors: the main areas of dissent are summarised below.

Firstly, and most significantly, it is claimed that a pitch-class set analysis of a composition represents an unacceptable level of abstraction of a musical texture. Register and linear connections are considered only tacitly in so far as they give rise to possible segmentations of the music into pitch-class

sets: without this proviso (which is not considered in the canonical literature of set theory, as far as I am aware) a set analysis could serve as a basis for the reconstruction, from the registrally undefined object of that analysis, of an infinite number of musical surfaces: conversely, imagine a work such as Erwartung performed in a version which restricts all the pitches to a single i.c.11 span.

Secondly, premises for the segmentation of the musical surface have been questioned. Forte himself distinguishes between primary segments, which are those articulated by the surface features of the composition; composite segments, formed by combining primary or other segments; and sets derived through the process of imbrication, a mechanical means of producing a comprehensive account of the set contents of a line or chord[5]. The last technique, it is acknowledged, "may often produce units that are of no consequence with respect to structure, and . . . editing may be required"[6]. However, all that Forte offers in terms of criteria for such 'editing' is the untenable (and hardly comprehensive) assertion that "as a rule a composite segment will not extend over a vertical rest - that is, a silence in all parts"[7], and the contextual suggestion that "if a particular segment forms a set that is

represented elsewhere in the music, it is probably a legitimate structural component"[8]. However, Forte adds that "on the other hand, a segment that forms a set that occurs only once may have its own raison d'être"[9]. Among a number of attempts to improve on these criteria for segmentation, those of Peter Johnson (in an analysis of Webern's Op.10 no.4[10]) and William Benjamin (on Op.10 no.1[11]) are notable, drawing respectively on a reduced repertoire of pitch-class sets which are inherently symmetrical, and on factors such as register and symmetries underlying larger-scale linear structures in the (registrally defined) surface of the music.

Thirdly, the appropriateness of the concept of the 'set-complex' has been questioned. Even Forte himself no longer appears to place as strong an emphasis on this notion as previously, preferring to characterise set relationships more simply in terms of inclusion in a recent analysis of Schoenberg's Klavierstuck Op.11 no.1[12], although the consequent necessity to establish six pairs of complementary hexachords as source sets is hardly a gesture towards analytical economy or elegance. Benjamin has observed that, while the notion of the set-complex may be valuable in ascribing a particular kind of homogenity (or lack of it) to a musical surface, it clearly cannot be

said to be a model of a pitch or pitch-class syntax for a piece: "The dynamics of an entire community are not at all explained by a map which shows where the members of various families live".[13] The system organised by this concept in set theory is indeed rich and complex, but this complexity is not necessarily that of the music which the theory ostensibly addresses.

Benjamin's article 'Ideas of Order in Motivic Music'[14] is an important document in the literature of atonal analysis after Forte, in its sensitivity to the evolution of relationships in the domain of registrally-defined pitch rather than simply pitch-class. The work of Benjamin and others in this field, while it cannot yet be construed as a sustained critique of set theory, is at least unified by a common consideration of functional order-relationships, in whatever terms these are defined by individual analysts. This said, this particular tradition could not have arisen without the stimulus of Forte's work: early and isolated forays into the systematic analysis of twentieth-century music, by Forte himself, Adele Katz, Roy Travis and Felix Salzer[15] are all limited in the style of the works examined, and are further constrained by an sometimes inappropriate application of Schenkerian concepts. Viewed in this light, Forte's achievement has been the provision of an adequate terminology

for pitch and pitch-class representation and for describing a range of relationships between pitch-class sets which, under certain circumstances, may be considered structural. Forte by no means exhausts the possibilities of pitch relationships in his consideration of pitch-class sets and their properties: by confining his theory to relationships defined by a static, non-transformational mathematical model, he denies it the possibility of attempting to account for the more immediately 'musical' aspects of pitch-relation. These are potentially more significant than a hypothetical underlying network of pitch-class set relationships in the assignment of structure to a piece by the listener, and include factors influenced by line, by durational and presentational 'weighting' of pitches, contour, perceived segmentation, and so on. The goal of this latter type of analysis is presented by Benjamin with characteristic vigour and clarity:

> Too many analyses do little more than demonstrate that certain pieces can be viewed as being enormously intricate; it is as if the mere density of relationships attested to with respect to a given work were some measure of it as artistic achievement. . . . The central object of our preoccupation with motivic music ought to be to come up with those broad strokes which unify individual works, those underlying conceptions in terms of which the intricacies of the surface either take on added meaning or recede into insignificance. It is of the essence of such an underlying conception that it be based on certain modes of continuity in a straightforward, almost single-minded way, for how else could it emerge from the tangled thicket of the

surface to impose its order on the latter.[16]

Other attempts have been made at defining and explaining these 'broad strokes' in recent years. Benjamin's own work on Schoenberg explores the concept of 'polyvalent harmony', a stratification of tonal function in a complex texture suggested in part by certain passages in Schoenberg's Harmonielehre.[17] Christopher Hasty, in a series of important articles, has examined criteria for the perceptual segmentation of a musical surface, going on to consider the way in which different (and sometimes opposed) segmentations need not be mutually exclusive. Hasty has also examined more general aspects of continuity in a musical texture, attempting to redefine with some accuracy the notions of phrase, closure and process with respect to atonal music.[18] Jonathan Bernard, in analyses of music by Varèse and Carter, has to a certain extent rejected the notions of pitch-class and interval-class as defined by Forte, in developing a graphic analytical presentation which embodies absolute notions of pitch and interval, and which describes pitch and interval relationships in terms of spatial transformations of symmetry and process.[19] Finally, Josef Straus has analysed linear patterns in Stravinsky's music in terms of the completion of motivic patterns, in an attempt to

demonstrate 'voice-leading' principles in this music.[20] All of these (and more!) have influenced the development of my own ideas in analysis, and will be cited where appropriate in the exposition which follows.

The aim of the rest of this chapter is to respond to William Benjamin's appeal for an analytical approach which might identify "those broad strokes which unify individual works", and to explore types of relationship between these and the musical surfaces so supported. In the larger context, the application of this approach to selected works by Elliott Carter by no means represents a random choice of an analytical subject: Carter's music, even at its most complex, is generally held to be 'unified' in just this way, this being a characteristic which links his music with a European and American 'mainstream' whose major twentieth-century representative is Schoenberg. It will have become clear by this stage that this analytical endeavour is to be rooted in the potentialities of the act of perception, as a consideration of the types of structure which a listener might reasonably ascribe to a musical surface. In this respect I follow the characterisation proposed by Lerdahl and Jackendoff, of 'naive', 'experienced' and 'perfect' listeners, with the

experienced listener taken as a norm.[21] Whilst assuming that an experienced listener is well-versed in the style of the works being considered, and that it would not be unnatural to expect such a subject to reflect on music he has heard (perhaps even to the extent of studying a score!), and that this reflection is an essential part of the process of coming to a structural understanding, however intuitive, of a piece, the techniques developed will also take into account the nature of the experience of music 'in time', reflecting the provisionality of structural judgements made in a hearing in progress.[22]

Premises

1. The structures assigned to a musical surface by an experienced listener are hierarchical in nature. As a statement about mental processes, this is to be assumed for atonal as well as tonal music, although there may be marked differences in the relative depths and precise structural constitution of the perceivable hierarchies in the two domains.

2. In atonal music, at least that which uses precisely notated pitch, pitch relationships are the principal defining and articulating factors in the perception of structure, notwithstanding this

century's advances in the compositional control of rhythmic, dynamic, textural and timbral elements.

3. On the musical surface, certain pitches may be heard as 'weighted' in a local sense. This occurs through the operation of a number of factors defined both by context and by presentational characteristics of the pitch in question, all of which affect the relative strengths and qualities of the percieved relationships.

4. Given that pitches can acquire structural weight in local contexts, we might reasonably propose the existence of hierarchic or processive relationships between structurally weighted pitches and configurations of pitches.

Local Structural Weighting

A large number of factors influence the perception of local structural weight: moreover, these factors may be mutually supportive or mutually contradictory, generating ambiguities and conflicts of structural

interpretation. The qualities of a sounding note which articulate and define its structural weight relative to others are the following:

(i) **Framing** - weighting according to a pitch's position in a line.

(ii) **Duration**

(iii) **Repetition**

(iv) **Metrical Stress**

(v) **Accentual Stress**

(vi) **Intervallic function**

It is difficult to provide a clear indication of the extent of segments dominated by locally weighted pitches. Larger articulated segments can generally be considered as subsuming smaller units: beyond the arbitrary procedure of enumerating relationships between single pitches, intuitive notions of local segmentation are possibly the most useful criteria to apply. Christopher Hasty, in an analysis of the opening of the String Quartet by Stefan Wolpe[23], presents six alternative segmentations of the first bar (itself a segment, articulated by the following silence, and by the durational consistency of its attack-points): two of these are reproduced as example 4.1. As many factors as possible are examined to support (+) or contradict (-) each

proposed segmentation, providing a clear demonstration of the attention to context required to make such decisions. Hasty's segmentation 6, while acceptable from the point of view of isolating fragments which may become 'thematic' in later passages, does not account for every element of the texture - it is in fact a derived segmentation, stemming from segmentation 5. An important principle for segmentation with respect to local structural weight and perceived hierarchy is that it should not be selective in this way. Given the registral disposition of pitches in the music of ex.4.1, segmentation 6 represents a tripartition of the texture, demonstrating the simpler 'polyphony' which lies behind the actual distribution of pitches in the instrumental parts (ex.4.2). Lerdahl and Jackendoff discuss at considerable length the perceptual bases of segmentation (their term is grouping) in tonal music [24], and their restriction on the size of segments, embodied in a preference rule, makes a general claim about the minimum size for groups: "Avoid analyses with very small groups - the smaller, the less preferable".[25]

Conditions for Local Structural Weighting of Pitches

(i) **Framing** is the tendency of pitches to acquire special prominence in a

line by virtue of their position in that line, which, if not counteracted by other factors acting more strongly, can weight these pitches relative to the others in the segment. The first and last pitches in a segment may be highlighted in this way; similarly, pitches which border rests within the segment (although given the size of the segments being considered, this latter case is rare: rests at this level generally articulate segments). In addition to this 'order-context' weighting, pitches can also become weighted by virtue of 'register-context', the extremes of register of a segment becoming similarly marked for perception. Another function of register-context weighting places emphasis on pitches which serve as turning points in the contour of a line. Framing of this last type is the principal factor in associating non-contiguous pitches from a single line to produce a polyphonic structure expressed by that line, an obvious feature of Bach's unaccompanied instrumental music, but equally true of works by contemporary composers whose styles are characterised by disjunct lines: Boulez and Carter are two names which spring to mind.

(ii) **Duration.** A single pitch emphasised by greater duration than other pitches in a line is thereby weighted, again in the absence of other factors

acting more forcefully.

(iii) **Repetition.** This can be a particularly strong means of structurally weighting pitches. Two distinct types may be considered:

(a) simple repetition, with no intervening pitches.

(b) pitches repeated within a segment, but seperated by intervening pitches.

Both (a) and (b) are susceptible of many degrees of emphasis, from a pitch repeated just once in the course of a segment to repeated groups and ostinato patterns. In a larger context, (b) can play an important part in creating the intervallic relationships discussed under (vi).

(iv) **Metrical Stress.** Adequate analysis of metrical structure on higher levels remains a problem in all music, tonal and atonal, although the issues involved have recently been clarified by Lerdahl and Jackendoff in their distinction between (low level) metrical structure and (high level) grouping structure. Their observation that "metrical structure is a relatively local phenomenon " in tonal music[26] should dissuade us from seeking too earnestly for metrical pattern in atonal music, as in much of this repertoire regular

patterning is rare even at the lowest level. It should also remind us that this lack of metre is not necessarily the great drawback to perception that it is sometimes claimed to be - although metre is important in tonal music as a 'carrier' of harmonic functions, context in atonal music provides at least as much information, if in different ways.

However, metre may function in atonal music by 'association' in certain styles. The opening bars of Schoenberg's Op.11 no.1 (ex.4.3) are clearly metrical, although the 'meaning' of the metre might be considered as being gestural - the music 'goes through the motions' of a slow waltz - rather than necessarily functional. Moreover, the effect is local, the notated metre being contradicted through displacement of the motivic material in the immediately following bars. More complex accounts of the function of rhythm and metre in atonal and serial music have been attempted by Forte[27] and by Martha Hyde,[28] both of whom appear to define 'metre' in terms of the articulation of underlying set structures. This approach commits the error of regarding metre as 'given', or 'carried', by pitch relationships, whereas metre, if understood in the strict sense of a recursive hierarchy of pulses, in themselves durationless, equally spaced on each level, is prior to pitch - indeed, in this sense it is to be

regarded as a mental construct, applied to any sequence of events on a particular time-scale which embodies at least some regularity at more than one level. Forte and Hyde are essentially describing criteria for relating grouping, or segmentation, to set structure, rather than developing a theory of metre, and even this is pursued in a way which begs the usual questions as to the applicability of an abstract, and abstracted, analytical theory such as set theory as a phenomenologically relevant analytical procedure.

In the light of the considerations outlined above, we can assert that metre clearly is able to project pitch structure at a local level in the same way as it does in tonal music. In the absence of other factors, then, one might therefore assign structural weight to a pitch which occupies a relatively accented position in a metrical structure.

(v) **Accentual Stress.** A pitch differentiated from its context by means of a dynamic accent will receive structural weight, again, in the absence of other, stronger factors. It is possible, although rare, for timbre to be used to accent pitches in this way: such 'timbral' stress tends to dissociate pitches from their contexts, producing polyphony rather than a configuration in which a single

pitch is heard as relating to others in a single context.

The roles of the five qualities outlined above in projecting structural distinctions between pitches has not passed entirely unrecognised in the analytical literature, although the precise structural functions of such weighted pitches has hitherto not been examined. The clearest precedent for a more detailed study of these 'subliminal' means whereby pitches are heard as structurally weighted relative to their contexts is provided by George Perle, describing the first scene of Berg's Wozzeck:

> In the first scene of the opera, c♯/d♭ is unequivocally established as a tone centre by 'other means besides functional ones'. . . . [In the first bars of the opera] the priority of c♯/d♭ is established by its exposed position in the melodic contour (highest and lowest note), its exposed temporal position (last note), repetition (not only is it the only reiterated pitch class, but also the only one which appears in more than one octave position), and durational preponderance.[30]

These considerations of local structural weighting on the lowest level, achieved through the interaction of the various presentational characteristics of individual notes, are important in the formation of intervallic relationships. These can create larger contexts, and modify smaller ones, in conformance with a small number of characteristic types of relationship.

(vi) **Intervallic functions.** These emphasise particular pitches through the intervallic relationships presented by a context, and as such represent a higher-level relationship which may require a longer time-span for the contextual factors outlined previously to develop.

In the discussion of metre, attention was drawn to the associative power of metrical and rhythmic configurations in certain styles. Turning again to the opening of Schoenberg's Op.11 no.1, we may now broaden the description of the function of the metrical pattern to include the influence of equally traditional elements of gesture and line which, acting in collusion with the durational component of the passage in question, suggest a characteristic hint of the 'alter Duft' of tonal function. In particular, the basic configuration of b.2 (without the échappée a^1), appearing unadorned in sequence in b.3, draws on the relative metrical positions of g^1 and f^1 (f^1 and e^1 in b.3), their rhythm (), and the rhythmic presentation of the 'accompanying' harmonies (silent first crotchet followed by a chord on the second) in a gestural paradigm of suspension-resolution, which, however metaphorically we may wish to interpret the terms in the absence of tonal concepts of consonance and dissonance, bears directly on the qualities of the relationships

perceived in the line. The line's descent through i.c.2 and 1 respectively, and the characterisation of these intervals as embodying movement 'by step' (as opposed to the 'leap' of any larger interval class), are important in assigning structural weight first to f^1, then to e^1, as notes of 'resolution': if altered, as in example 4.4, the opening is to be understood quite differently. Also in terms of line and gesture, f^1, taking its place between two adjacent pitches, is heard as a passing note, subordinate to its note of departure (g^1) and arrival (e^1).

In addition to this stylistic context of interval quality (whereby, to take another instance, a descending i.c.7 in the lowest register of a texture might, in certain circumstances, suggest a cadence) there exists also a level of contextual intervallic relation, which is determined with respect to the internal structure of an individual composition rather than by external, stylistic perceptions. Interval is the basis of musical relation: a single pitch is meaningless unless placed in an intervallic context with other pitches. Between two pitches, there is one relationship; between three, three; in a configuration of four pitches, six; and so on, in an expansion governed by the formula $r=n(n+1)/2$ where r is the number of intervals in a context, and n the number of pitches.

This plethora of potential intervallic information is edited in the act of perception in the light of the context. Defining the criteria for establishing 'preferred' modes of intervallic progression with any degree of systematic rigour would appear to be a theoretical and analytical project on the largest scale: all that will be offered here is a preliminary and provisional set of observations which will provide a 'working model' for the production of analyses, and for the eventual development of an analytical theory.

In atonal music, the semitone, as the generative interval of the set of twelve pitch-classes, might be thought to possess a certain degree of primacy. This fact appears to have been recognised, if tacitly, in analyses of certain compositions, notably those of Webern (for example, in articles by Pousseur, with the significant title 'Anton Webern's Organic Chromaticism'[31], and by Whittall)[32], where the often remarked 'syntactic goal' represented by the exhaustion of the twelve-pitch-class total chromatic is frequently approached through the semitonal accretion of pitches and pitch-classes.

The generation of the twelve-note set by i.c.1 involves replication of that interval class at each new level established by the previous operation of replication. This notion of embedded repetition, a primary relational construct

(not only in music), is carried over into the textures of musical surfaces, where it produces three important classes of relation: symmetry; process; and interval association. The symmetrical relation is self-evident, and has long been recognised as an important resource in atonal composition.[33] Process is simply the linear extension of intervallic replication: the last quaver of b.12 of Schoenberg's Op.11 no.1 (ex.4.3) features just such a process, in i.c.13, on a small scale, followed by a less obvious ascent in i.c.1 in the next two bars ($E^{\flat}/c^{\#}$-d/$E^{\natural}$-$d^{\#}$/F). The notion of process is also discussed briefly by Hasty in the analysis of the Quartet by Wolpe cited previously.[34] Interval association can be considered as the minimal intervallic relation, whereby single pitches or intervals in the texture are related to other single pitches or intervals through an interval of association which, although not necessarily participating in processive or symmetrical relationships, may nevertheless be prominent in the pitch relationships projected elsewhere in the texture. This is only partially equivalent to the sense in which Hasty discusses the concept: "The intervals which a single pitch forms with other pitches in a given context I will call simply the intervallic associations of that pitch."[35] Hasty appears to have in mind a specific and complete enumeration of the intervallic relations of a

given pitch, to produce, perhaps, an 'association vector', similar to an interval vector, for any pitch in any set. In the analyses which follow, my own use of the term is both more specific, in that not all relationships of pitches to other pitches are considered, and broader, in that context on both large and small scales might determine which class of interval associations might be considered primary within those contexts.

If atonal music is to be perceptually valid, then it is necessary to ascribe to it the potential for at least some degree of hierarchical organisation by the listener. This contention rests on a view of the mind's procedures for structuring any group of (initially) uninterpreted elements in any domain as inherently hierarchical in nature, a view first elaborated in linguistics in the 1950s by Noam Chomsky, and since applied to numerous other fields, such as anthropology (primarily in the work of Claude Levi-Strauss), psychology (Jacques Lacan) and history (Michel Foucault) in an ideological movement which has come to be associated with the term 'structuralism'. Indeed, structuralism as a 'movement' in the human sciences may be considered as an overriding theory of mind for which evidence is drawn from the whole range of

human activity, on the understanding that anything produced by the mind, either individually or collectively, must embody the essence of its own means for producing and interpreting structure. Jacques Lacan has gone as far as claiming that "the unconscious is structured like a language"[36], a statement which may be interpreted either as an assertion of the mind's inherent tendencies towards hierarchical organisation, reflected in the domains of language, myth, music (this is the view of Chomsky, Levi-Strauss and numerous others), or as a statement of the priority of verbal language itself, to which the unconscious submits in the process of acquiring language (this appears to be Lacan's interpretation).

In what sense, then, may we claim that atonal music is hierarchically structured? And how, and to what degree, can we ascribe hierarchical structure to such music? Finally, how does it compare with the structures of other perceptual domains, particularly, perhaps, with that of tonal music? Theorists and analysts have not yet considered this problem to any great extent, except in somewhat negative terms.[37] However, instead of dwelling simply on the differences between tonal and atonal music, as many others have done, examining each in the light of other structured systems offers an

approach which, although inherently metaphorical in its terms of reference, seems more positive. The similarities between Schenker's conception of musical structure, involving progressive and (essentially) recursive elaborations of a simple, structure-defining 'background' through various 'middleground' stages to the 'foreground' and to the musical surface itself, and Chomsky's notions of 'deep' and 'surface' structure in sentences has frequently been noted. Yet the differences are equally significant, if not more so: the Schenkerian Ursatz is an acceptable though trivial tonal composition, while Chomsky's deep structures are not acceptable sentences; the tonal hierarchy as formalised by Schenker is (at least notionally) indefinitely recursive, an entire movement being subsumed under a single Ursatz, whereas linguistic hierarchies as defined by Chomsky apply only to the level of the sentence, not that of the entire discourse or narrative; sentences are differentiated at the level of deep structure, while tonal compositions can draw on only three different forms of the Ursatz, differentiation occurring at higher levels.[38]

At the level of discourse or narrative, linguistic structure may still be hierarchical, but not in the same way as at the level of the sentence.[39] This indicates a discontinuity in the total structure, a level beyond which different

rules of hierarchical elaboration apply: in narrative, the notions of sequence, action, plot, and reference to both internal and external codes.[40] In terms of the different modes of organisation, narrative embodies two partial hierarchies. Tonal compositions (according to the Schenkerian model) are completely hierarchic. Yet certain aspects of tonal music (most notably thematic and 'motivic' structure) are not structured in this way: the elements of a thematic 'argument' might be dispersed throughout a movement just as a connected sequence of actions might be dispersed throughout a novel. Moreover, certain genres of tonal composition (suite, variation) embody hierarchic tonal organisation only at the level of individual sections. Above this level structure is articulated by differently-based notions of contrast and convention which are clearly not an extension of the individual movements' internal hierarchic structures. These genres might, therefore, be considered as representing partial hierarchies in the musical domain.

We are now in a position to make the first of two analogies which define the hierarchic structure of atonal music with respect both to tonal musical and to narrative structures. **Tonal music is indeed singular in the depth of its unitary hierarchic organisation - indeed, this must be considered one of**

its greatest achievements. However, atonal music has the potential for more closely resembling extended forms of linguistic structure in a combination of two or more hierarchic systems, each recursive only within particular limits, but which together structure the whole. This leaves open the question as to the nature of the larger hierarchy (the metaphorical level of 'narrative' rather than 'sentence') which, understood as above, will not be amenable to analysis in terms of the structural weight assigned at lower levels. Beyond the description of larger segments in terms of tessitura, density, dynamic, etc., establishing a paradigmatic account of the contrasts projected by a work, and the assignation of conventional functional meaning to segments by means of gestural characteristics (ascent = instigation, descent = closure, etc.), it is hard to see at present how functions on this higher level could be defined.

A second analogy suggests itself. If, on the other hand, we compare the unfolding of a tonal structure in time with the development of 'plot' in narrative, or 'argument' in discourse, then atonal music may be thought of as abandon ing plot for a more contextual and 'open' means of structural expression in much the same way as occurred in the literature of the twentieth century, in the works of such writers as Joyce, Robbe-Grillet, Pynchon. Here,

we can no longer speak of the meaning of a text, only 'meanings': "We know now that a text [elsewhere Barthes distinguishes between 'work' and 'text', the latter embracing the new order of structure] is not a line of words releasing a single 'theological' meaning (the 'message' of the Author-God) but a multi-dimensional space in which a variety of meanings, none of them original, clash."[41] Examples of literature may, of course, combine qualities of work and text, just as certain pieces of music may offer both a relatively stable tonal structure and yet be contextually very rich in motivic 'meanings'. Considered in this way, one 'meaning' of an atonal composition resides in the interrelationships of segments with respect both to presented intervallic content and to relationships between structurally weighted configurations: an exploration of these is the purpose of the four short analyses which follow.

The analytical notation employed in these allows for the demonstration of pitch-weighting through the stemming of note-heads in the reductions (relative lengths of stems indicating relative structural weight), and of intervallic relationships through the use of slurs and brackets of various kinds. The dotted slur invariably indicates a retained pitch: the simple slur usually identifies a semitonal relationship. Square and curved brackets identify

particular interval classes of association: numerals placed near these clarify their intervallic meaning in their contexts.

Varèse: Density 21.5, b.1-9

(Score reproduced as example 4.5)[42]

Example 4.6(a) is a reduction of the first nine bars of Varèse's Density 21.5 illustrating the clear process in i.c.3 which the passage embodies, from the first segment's g^1 to the $d^{\flat 2}$ reached on the downbeat of bar 9. Example 4.6(b) interprets this process still further, assigning structural priority to g^1 and $d^{\flat 2}$ over e^1 and $b^{\flat 1}$ by virtue of duration and dynamic. Given this ascent and the means by which it is carried out, the ambiguities of the first segment are clarified and placed in an unequivocal context. In terms of the criteria for local pitch weighting, ex.4.7(a) is the preferred 'background' to this segment: when the larger intervallic context is taken into account (in particular, the presentation of the identical set of five pitches in the second segment) the latent symmetry of the configuration is apparent (see ex.4.7(b)). Moreover, the regularity of the ascent to $d^{\flat 2}$ is underlined, each i.c.3 of the process being divided by a 'passing note' in the same way: e^1-$f^{\#1}$-g^1; g^1-a^1-$b^{\flat 1}$;

$b^{\flat 1}$-c^2-$d^{\flat 2}$. The two i.c.3 of the first segment, forming its symmetrical substructure, are differentiated on the surface by an opposition of articulation: $c^{\#1}/e^1$ is left empty, functioning as a pure intervallic space (and as such resumed in the 'key-tap' section, b.24-25), whereas e^1/g^1 is filled chromatically, generating the linear progressions which instigate the ascent to $d^{\flat 2}$.

Schoenberg: Klavierstuck Op.11 no.1

Example 4.8(a) presents an interpretation of intervallic relationships in the first twelve bars of Schoenberg's Op.11 no.1. The roles of metre and intervallic function in assigning structural weight to the pitches g^1 and e^1 in the opening six-note melody have already been described. The registral consistency of this line is matched by that of the lowest strand in the texture, the 'bass' moving from the pitch $G^{\flat}$ through i.c.4 to $B^{\flat}$, then returning in a process of i.c.2 through $G^{\#}$, before a semitonal association produces G. The descending i.c.4 which follows (G-$E^{\flat}$) inverts the opening interval of the bass line, producing the lowest pitch of the piece so far. This is the first appearance of the pitch-class $e^{\flat}$ which, given its prominence here (marking a

change of texture after the first clearly-defined section which it effectively 'cadences', through its descent by leap, a paradigm of 'closure' in the lower registers; and in its appearance in a line without accompanying 'harmonies' suddenly highlighting linear pitch relationships) and its persistence throughout the piece in this register, becomes a focal pitch-class, in its function as a marker of closure in the lower registers. The association of the two i.c.4 in this register at the beginning of Op.11 no.1 (G^{b}/B^{b} - G/E^{b}) produces overlapping statements of the set (0,1,4), whose presence in the passage is further demonstrated by examples 4.8 (b) and (c). Each of the pitches identified as structurally weighted participates in the formation of at least one large-scale instance of this trichord.

Beneath the associations of the upper part, at first sight concerned with i.c.3 and 1 in b.1-8, the lower and inner parts develop independent associations, largely in i.c.2 and 4. This sub-text of associations becomes manifest in the upper part in b.9-11, where the contour of the opening line is presented using these intervals linearly, rather than the i.c.3 and 1 of the first presentation. The phrase in b.9-11 embodies a descending process in i.c.4 ($f^{\#}{}^{1}\text{-}d^{1}\text{-}b^{b}$). This change in intervallic emphasis may in turn influence our

structural perception of the opening phrase itself (ex.4.9), the association of i.c.4 through i.c.2 which can also be extracted from the line being a symptom of a more abstract derivation of the (registrally defined) set through an association of i.c.4 through i.c.2 and 1. The sequence of association i.c.2-i.c.1 occurs twice in the melody of the opening phrase, the first time in retrograde ($g\#^1$-g^1-f^1; g^1-f^1-e^1), and has important consequences in the later parts of the piece (Ex.4.9(b), (c); ex.4.10).

The registral consistency displayed by the first phrase is mirrored in larger-scale registral connections within the movement. The persistence of the pitch-class $e^{\flat}$ ($E^{\flat}$ and particularly $E^{\flat}{}_1$) as a focal pitch in the bass register has already been noted. Another instance of a lower-register process occurs in b.25-32, where a process in i.c.4 develops, interrupted in b.29-31 by activity in a higher register (ex.4.11(a)). In the upper part, the three highest pitches of the piece are related through a process in i.c.1, the immediate relation of $b^{\flat\,3}$ and a^3 (b.39), attained by means of a development of the register-breaking flourish of b.12, resumed by $g^{\sharp\,3}$ in b.50, the start of a climactic statement of the opening line (in a varied form) before the return in b.53 of its original form (ex.4.11(b)).

Boulez: Le Marteau sans Maître: I avant 'l'artisanat furieux', b.1-10

(Score reproduced as example 4.12)

The analysis of this brief extract illustrates the roles of interval association and process, and also demonstrates the establishment of focal pitches through repetition. The compositional basis of the passage is the 'multiplication' of series segments first described by Boulez in the article 'Eventuellement . . .'[43] and further elaborated on by Lev Koblyakov in his analysis of the work's serial procedures.[44] The serial operation results in a group of five matrices, each of which constitutes a harmonic 'domain' in the work, individual sections of movements in Marteau drawing (largely) on the resources of single domains. Each matrix consists of twenty-five (5 x 5) sets of various sizes, through which Boulez selects a 'path' (or more than one, in counterpoint) from one set to the next. From each derived set, a number of pitch-classes (not necessarily all of them) are chosen and deployed. Example 4.13 attempts to illustrate some possible criteria for Boulez's choices in terms of the intervallic consistency of the texture which results in the first ten bars of 'avant "l'artisanat furieux"', itself based on a single harmonic domain.

The section is characterised overall by a preponderance of i.c.3 and 5.

These are adumbrated in the first bar, the alto flute's initial i.c.3 (e^3/g^3) prominent in the upper register, the guitar playing a symmetrical configuration of i.c.5. The two interval classes combine in the vibraphone's segment which follows immediately, where the registral articulation isolates first i.c.5, then i.c.3 in the upper register ($b^{\flat}\,1$-$e^{\flat}\,2$; $e^{\flat}\,2$-c^2), and i.c.3, then i.c.5 in a 'middle voice' (b^1-d^2; d^2-a^1). Example 4.14 demonstrates the equivalence of the resultant configurations in both registers, which form (0,2,5) trichords in identical spacings, and introduces further an association of i.c.2 which arises in the middle voice' (b^1-a^1) and is paralleled in the upper register ($b^{\flat}\,2$-$a^{\flat}\,2$). This association reflects the linear i.c.2 in the alto flute's segment in b.1, in the 'ornamental' pitches d^2-e^2.

Certain large-scale aspects of the passage are initiated by these three entries. The trichord (0,1,3), presented twice in the alto flute's opening configuration in a segmentation clearly delimited by the opposition of 'normal' and 'ornamental' pitches, occurs intermittently throughout, always in wide spacings. The alto flute's initial pitch, e^3, is retained as an upper pitch in the texture, reappearing in the vibraphone's music in bars 4 and 6 before returning to the alto flute in b.9. In b.9, e^3 is the upper pitch of an i.c.3 statement

(e^3-$c\#^3$) which mirrors the alto flute's opening interval (e^3-g^3), creating a consistency in intervallic character in the upper register and reflecting, over the whole passage, the associations of i.c.3 which become particularly prominent in the middle register in the last four bars (in particular, the symmetrical assocations involving $f\#^1$, a^1 and c^2).

The opening establishes the middle-register (0,2,5) trichord ($a^1/b^1/d^2$) as another stable element in the texture. At the registral level a^1, the pitch-class a is the only one confined to a single octave position in the section; the whole trichord appears in the viola part in b.4; the i.c.2 a^1/b^1 is retained between viola and vibraphone in b.4-6; and the i.c.5 a^1/d^2 receives a prominent statement by the vibraphone in b.7. In b.9-10, a^1 and d^2 are still active in the texture: however, a^1 is now associated through i.c.3 with c^2. Taking the three pitches together, one element of the 'progression' of the first ten bars of 'avant "l'artisanat furieux"' might be identified a the 'resolution' of the pitch b^1 in the middle register (0,2,5) trichord of b.1-2 to c^2 in b.9-10, producing an inverted form of the (0,2,5) trichord occupying the same registral space ($a^1/c^2/d^2$). This shift might in turn be thought of as being 'generated' by the lower i.c.3 association of a^1, $f\#^1$, which occurs in b.2 and is conspicuous

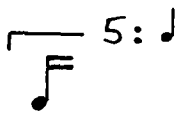
in the symmetrical structures involving i.c.3 in b.7-10. This is summarised in example 4.15 which also presents the large-scale upper register association in i.c.3. The sense in which this is to be understood as a 'background' to the music of these bars is that of one possible reading of interval assocations on a larger scale in the passage, supported by contextual features on lower levels. This 'background' supports intuitions as to the character of the music at this point: stable, yet 'suspended', floating in some sense. The three principal analytical justifications of this impression are the stability of the upper register; the importance of retained pitches at all levels in the passage, but in particular the large-scale retention of e^3, d^2 and a^1; and the absence of any clearly directed large-scale associations in lower registers (whilst lower pitches are in play, their significance is felt to be local, dependent on the more continuous structures developing in the middle and upper registers.

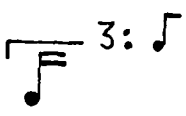
Carter: 'O Breath' (from A Mirror on Which to Dwell)

The analysis of song raises important questions concerning both perceptual primacy (the vocal line as Hauptstimme) and structural priority (is the music composed for, or against, the poem?). In 'O Breath' the vocal part is

differentiated from the instrumental texture not only through timbre, but also through greater rhythmic activity and different intervallic emphasis, growing largely from linear associations of i.c.1, 3, 4, 8, 9 and 11, the instrumental parts confined almost exclusively to sustained and superimposed instances of i.c.7 and 10.

The instrumental parts are governed by a polyrhythm in three 'voices':

37 x 

65 x 

43 x 

In addition, at the opening of the song a fourth line is present, in values of 22 x  : this soon drops out of the texture. The disposition of the polyrhythm in the instrumental parts, and its 'clothing' in sound, result in a texture which strongly evokes the idea of breathing, embodied in the poem in the typographical division of each line into two parts, inhalation and exhalation:

Beneath that loved and celebrated breast,

silent, bored really blindly veined,

grieves, maybe lives and lets

live, passes bets,

The textural organisation of the instrumental parts results in a sequence of 23 largely discrete segments or phrases, whose individual dynamic and density contours reflect the shape of the poem's individual lines. The variations in the number of pitches presented in each phrase result in an overall variation in harmonic density which approximately follows the fluctuations in length of the lines of the poem.

The principles of harmonic and melodic continuity in 'O Breath' are similar to those in other works by Carter. Both parameters are selective in their use of interval: particular pitches serve as temporary foci in both line and harmony, often serving to link adjacent harmonic groups as demonstrated in example 4.16. The vocal settings of the poem's title ('O Breath', b.5-8) and the lines enclosed in parentheses ("see the thin flying . . . on your own breath", b.19-32) are differentiated in intervallic characteristics from the setting of the rest of the poem. Perhaps more significantly, the tendency in both these passages towards emphasis on particular pitches contrasts strikingly with the more fluid linear relationships presented elsewhere in the vocal line. This

feature of the setting can be related to the function of these portions of the text within the poem: the title is set as a formal introduction, the parenthetical lines also standing out from the main line of thought of the poem, interrupting it for an extended moment of acute and intimate observation.

In the vocal setting of the title (ex.4.17) the initial pitch a^1 is the focal pitch of the line. This pitch is reiterated, the line returning to a^1 twice within the setting of the title itself, and again shortly after the start of the setting of the poem itself. The octave above, a^2, marks the highest point in the melisma. Symmetrical relationships also point to the centrality of a^1, and a process in i.c.3 underlies the registral elaboration between a^2 and a^1.

In the parenthetical lines, set in b.19-32, $c^{\#2}$ is clearly emphasised by virtue of repetition and duration. The extent of this passage enables intervallic relationships to develop around the structurally weighted $c^{\#2}$: b^1 and $e^{\flat 2}$ often serve as secondary pitch centres, the return to $c^{\#2}$ occurring four times through the pitches $e^{\flat 2}$-d^2-$c^{\#2}$. Again, symmetrical relationships are present, reinforcing the status of $c^{\#2}$ as a focal pitch (ex.4.18).

Pitch-weighting in the rest of the vocal line operates on a more local

basis, emphasis on a particular pitch seldom extending for more than a bar or two. The two points in the setting at which the highest pitch in the line appears both show tendencies for pitches to acquire structural weight. In the first of these, in b.16-17, $f^{\#2}/g^{\flat 2}$ serves to anchor a semitonal motion of the highest pitch, b^2, to $b^{\flat 2}$: in the second, b.37-38, b^2 is retained as a structural pitch, reinforced by the repetition of g^2 below (ex.4.19).

In addition to the local retention of pitches and intervals between successive segments of the instrumental parts, relationships between phrases covering longer spans appear: these can be examined in terms of three areas of register, upper, middle, and lower. Example 4.20 shows the focal pitches of each phrase in terms of this distinction.

The highest pitches in each phrase, and sometimes the second highest also, are limited for much of the song to members of two (pitch-class) equivalent three-note sets: (A) $d^{\#1}/f^{\#1}/a^1$; (B) $d^1/f^1/b^1$. These are introduced successively, (A) accounting for the pitches in the upper part of the first four phrases (b.1-7), an overlap occuring in phrase 5 (b.8-9), and (B) governing upper voice pitches in phrases 6 to 9 (b.10-16). Thereafter, elements of (A) and (B) interpenetrate, 'foreign' pitches appearing only in phrases 15 and

23, and in the climactic phrase 20. Above the last instrumental phrase, the vocal line incorporates all three pitches from (B), resulting in the only melodic tritone of the song.

The middle register is concerned with the decoration of a single pitch, g♯. This pitch, and the pitches decorating it, form a set derived from a semitonal association of i.c.3 (ex.4.21).

The lowest part is not as restricted in pitch as either upper or middle registers appear to be. It is nevertheless notably static at points, particularly in b.19-33, where C underpins much of the harmony: b.35-38, where the semitonally-associated C♯ provides the bass for the climax of the song: and b.39-44, where G_1 and G are the lowest pitches.

It should be stressed that these partial analyses are concerned only with perceived continuity in the domain of pitch, in the terms outlined in the earlier part of the chapter. They do not constitute an explication of the composers' techniques, but rather of the phenomenological result of the application of those techniques. A work's pre-compositional premises are

indeed important in this respect: yet working from an established pitch ordering in a series, for example, or a set of preferred transpositional relationships, or a group of intervals and chords, this type of analysis might enable us to say something about why a composer should choose a particular register for a particular pitch, or space a chord in a certain way, or assign to a line a particular rhythmic profile. For Carter, this promises to be a more authentic means of approaching an understanding of the music than an attempt based in the more abstract domains of set theory and serialism: it is with this conviction that the analyses of the following chapters have been undertaken.

Chapter 5: String Quartet no.2

Carter's Second String Quartet, completed in 1959 and first performed in March 1960, interrupted work on the Double Concerto, with which it shares a number of compositional features. These works are "as far advanced beyond the Variations as the First Quartet had been beyond The Minotaur"[1], although this new-found maturity has expressive and technical roots in the earlier music, particularly the works of c.1950 - the Cello Sonata, First Quartet, and Sonata for Flute, Oboe, Cello and Harpsichord. What links these compositions with the Second Quartet is the characteristic feature, in the earlier works, of generating harmonic and melodic material through the multiple associations of particular intervals, combining, for example, the two major thirds of the Cello Sonata's opening chord in various relative transpositions, thus giving rise to a small group of sets related by their potential for orderings expressing their similar intervallic constitution[2]. (See example 5.1, reproduced from Chapter 3, ex.3.12).

In the Second Quartet, Carter returns to the all-interval tetrachords as a means of organisation. (All-interval tetrachord is hereafter abbreviated as

AIT). The First Quartet had made use of only one of these, the set (0,1,4,6), which I shall identify as the A-type AIT. The other AIT, (0,1,3,7), type B, may have appeared at the time too tonally suggestive to Carter, containing as it does a tonal triad as a subset. In the First Quartet, (0,1,4,6) functions primarily as a referential sonority, a 'key' chord, pitch organisation in the work depending at least as much upon the network of themes presented by the composition, not all of which demonstrate AIT relationships. Harmony in the Harpsichord Sonata is largely derived from the opening bars in a way similar to that found in the Cello Sonata, by association of intervals as well as by deriving sets more directly from the chord as subsets. The Variations for Orchestra stand outside Carter's mainstream of development of technique (as it now appears) in that, drawing on the experience of the First Quartet, the thematic organisation predominates, developing that aspect of the quartet to a higher degree of complexity.

Whilst it would not be entirely accurate to claim that the Second Quartet dispenses entirely with a 'traditional' thematicism, it will become clear in the course of the following analysis that the music arises more directly from a systematic exploitation of the work's source material, the two

AITs. In consideration of this, it would seem wise to examine possibilities of relation based on these (Ex.5.2, 5.3).

Example 5.2 presents the chart of relationships supplied by Carter in connection with the Double Concerto, which is also important for the Second Quartet. It will be seen that AITs are combined in pairs to form eight-note sets, the remaining four notes of the aggregate, 'residue' tetrachords, sharing the property of axial symmetry. These four-note sets have a potentially coordinative function, as each eight-note collection can be partitioned into two AITs in two distinct ways.

Example 5.3 shows a different type of relationship, not described by Carter. Listed here are the five- and six-note sets which can be exhaustively defined in terms of two overlapping AIT statements, i.e. these AITs share a two- or three-note subset. The properties of the hexachords in terms of complementation are particularly interesting. Four of these, f6-z13, f6-z23, f6-z49 and f6-z50, can be partitioned in four different ways into pairs of AITs; A+A, B+B, and A+B(twice). The complements and z-relatives of these four hexachords contain no AITs as four-note subsets, although they are used in the two works based on AITs, either to complete twelve-note statements or, on

occasion, independently. Conversely, the hexachords which combine two equivalent AITs form a mutually complementary group. The hexachords which combine only A and B tetrachords are not z-related, i.e. they are self-complementary.

Any discussion of form and process in Carter's Second Quartet must of necessity start with the notion of 'scenario'. In the composer's own words,

> I usually have at first a very specific plan of evolution for the whole of the work, with many details of the local events only generally in mind. That is, I usually start with an idea of the sound, the musical character, and the dramatic development of these, similar to the plot - or subject - outline of a novel, or the scenario of a movie.[3]

And, concerning the Second Quartet in particular,

> . . . the principal idea is a sort of generalised programme concerned with one aspect of the formal structure, whereby the trajectory of the whole piece, its progression or rise and fall of tension in time, from its beginning to its end, is produced by the contributory elements.[4]

The second quotation describes a scenario in general terms, as little more than a formal outline for a work. The element of characterisation implicit in the first extract is not wholly new in American music, the two most notable precedents both occurring within the string quartet genre. The second movement of Charles Ives' Second Quartet pits the second violin, in the character of the hapless 'Rollo', against the fury of the other instruments, and

gives a particularly clear example of the differentiation of musical characters which occurs, to an extent, throughout the work - the anthropomorphic intentions of the quartet's conception are further indicated by the titles given by Ives to each of the three movements, 'Four Men Have Discussions, Conversations', 'Arguments and Fight', 'Contemplation'[5], and by the note added to the first page of the manuscript of the work; "S Q for 4 men - who converse, discuss, argue (in re 'politick'), fight, shake hands, shut up - then walk up the mountain-side to view the firmament."[6] The first movement of Ruth Crawford Seeger's String Quartet (1931) opposes distinct musical 'characters' in a free contrapuntal texture, although here the characters have a more thematic role, tending to migrate between parts.

In Carter's Second Quartet, the ideas of musical characterisation, drawing on his earlier experiments in the Cello Sonata and First Quartet, are developed to a far greater degree. The instruments are given distinctive character patterns which govern the tempo and texture of their individual parts, and are also apportioned particular intervals (see example 5.4 - the adjectives are all Carter's). Carter writes: "In a sense each instrument is like a character in an opera made up primarily of 'quartets'"[7], and "the individuals

of this group are related to each other in what might be metaphorically termed three forms of responsiveness: discipleship, companionship, and confrontation."[8] Each of the four main sections is led by a particular instrument, the others tending progressively towards 'discipleship' through the course of the work, imitating the the gestures of the leader in terms of their own intervallic and expressive repertoire: this is prominent in the 'conversational' texture of the first movement, and forms the basis of the whole of the third, in which phrases (mostly) initiated by the viola are imitated in contour, but not in precise intervallic or rhythmic configuration, by the other instruments. Between the four principal movements are three cadenzas, for viola, cello and first violin in turn. In these the expressivity of the solo instrument is directly opposed by the others: the viola's sentimental lyricism answered by outbursts of "anger or ridicule", the cello's rubato by regular rhythmic patterning, and the first violin's virtuosic display by silence. To complete the scheme, the Introduction and Conclusion present the intervallic and expressive patterns of the individual instruments in 'companionate' manner. This scheme is graphically summarised in example 5.5, which offers for comparison an outline of the movement structure of Berg's Lyric Suite , an

expanding sequence of tempo and character differences not uninfluential, perhaps, on Carter's scheme.

The scenario - the operatic metaphor, perhaps - can be regarded as a rather elaborate type of programme. Indeed, in some later works based on poetry, such as the Concerto for Orchestra and A Symphony of Three Orchestras, music which appears to illustrate aspects of the respective texts quite closely can be found. However, by means of the intervallic scheme presented in the relationships between the various instruments, the scenario might be thought of as controlling the musical processes of the work to a greater extent than would a conventional programme.

The AITs have two distinct, but occasionally overlapping, roles in the Second Quartet: as referential sonorities and as means of coordinating pairs of intervals presented by different instruments. The first of these recalls Carter's use of the A-type AIT as a 'key-chord' in the First Quartet. In the Second Quartet, many points of rhythmic and textural articulation and climax are marked by prominent use of AITs. Some examples, presented in ex.5.6, are: b.174 - the first, fleeting chord of II; b.369-373 - 'suspensions' at the end of III; b.447-448 - the true beginning of IV, in a 'cadence' marking the end of the first

violin's cadenza; and b.630-634, the last bars of the quartet, in which both AITs are stated. In example 5.7, the widely spaced chords of bars 547-49 are shown to consist of AITs, and a further, more complex example of their use in a more involved harmonic context is presented, pitches and intervals in the music of b.527-29 retained between chords to create a less obviously related texture. This referential use of AITs can be developed into the notion of a relational 'frame', which I shall discuss in the following pages in connection with the formal organisation of the quartet.

Sometimes this primary use of AITs is combined with the other important aspect of their function, that of coordinating interval statements. Example 5.2 demonstrated the possible interval pairings available from the two AITs. Example 5.8 shows instances of this use of AITs in the quartet. The closing bars of I articulate interval pairs in this way; another use occurs at the end of the first violin's cadenza, the other instruments building a chain of AITs linked by retained intervals. This coordinating function is at its most prominent in the introduction and conclusion, where the texture consists primarily of such interval pairs. Moreover, the conclusion also makes use of the 'residue' tetrachords presented in ex.5.2 (ex.5.9).

One way in which AIT relationships can operate through larger spans of music can be demonstrated in the cadenza for cello, b.243-85. Here, an eight-note group consisting of two A-type AITs symmetrically disposed forms a relational 'frame'. The configuration is stated by both violins and viola in b.243-44, before the cello's first phrase, and reappears, transposed, after that phrase (b.248). It appears again, in a further transposition, at b.268, and fixes the registers of these eight pitches for the remainder of the section, eighteen bars in all. These last bars explore the AIT relationships possible within this restricted pitch scheme: the last four bars twice articulate, in interval pair combinations, the source A-type AITs. The four-note residual set appears twice in these bars, in the cello, b.268-70, and first violin, b.273-74. (Ex.5.10).

The AITs are significantly less prominent in the intervening bars, and are frequently not present at all. They can be found in places, buried in the more mobile texture of the passage, but here they are clearly not structural in the way the larger groups are. Their presence might even be thought of as accidental, arising from the combinations presented in the intervallic dispositions of the individual parts.

The AIT configurations at the opening and close of the cello cadenza

form a temporal frame, a referential sonority enclosing the intervening music. They might also be considered as constituting a relational 'background', a norm to which other pitch relationships in the passage might relate, or from which they might attempt to free themselves, in this case setting up a more spontaneous (one might almost say intuitive) mode of pitch relationship. Certainly the rhythmic confrontation here, between the cello's rubato and the regular patterning in the violins, finds a counterpart in the pitch scheme, the cello's music becoming 'trapped' in the fixed registers of the last eighteen bars.

Carter's formal designs are frequently cited as examples of his unique and innovative imagination: the Second Quartet demonstrates this aspect of Carter's style in all its richness and complexity. The overall formal scheme has already been discussed in connection with example 5.5; one of the most intriguing aspects of this design is its use of a traditional four-movement pattern - allegro, scherzo, adagio, finale - to articulate a texture and a musical argument both composed consciously against the traditions of the string quartet genre. Also important is the overall progression towards homogenity of texture and 'purpose' that is particularly evident in the last two

movements. This is strikingly illustrated by the abandonment of rigid intervallic and gestural differentiations in the last movement, and also by the fact that the movement's principal 'themes' are formed by the combined lines of two or more instruments.

On the level of individual movements and sections within movements, however, formal principles are less easy to define: it is at this level that Carter's imagination is at its most inventive with respect to form, generating structures that often suggest interpretation (even if only partial interpretation) according to a number of different schemata simultaneously.

The use of the term 'schemata' should not be taken to imply that Carter somehow pre-arranges his smaller forms according to rigid designs - it might in many cases be more accurate to assume the reverse, i.e. that process (operations on the restricted range of source intervals and chords) generates material, which in turn creates form through the extension of the original processes. Formal divisions, based on differentiations of materials and textures, may often be indistinct because of the gradual nature of the unfolding and always developing interactions between processes and the source materials.

The referential role of AIT relationships in the quartet has already been mentioned, and an example given of a passsage in which an AIT complex might be assigned a 'framing' function. The nature of the quartet medium, coupled with the easy and characteristic division of AITs into interval pairs, leads to the establishment of a referential texture, textural articulation in pairs of intervals reinforcing whatever perception we might have of the AIT relationships themselves. In the first main movement, Allegro fantastico, this type of texture recurs throughout, alternating with and thus framing other formal processes in the manner illustrated by example 5.11. One of these alternatives is a distinct 'theme', a combination of the first violin's characteristic i.c. 3 and 14 which appears in a recognisable form at several points in the movement, and in the first violin's cadenza (ex.5.12).

The second movement, Presto scherzando, combines two formal strategies, one obvious, the other less so. The cello articulates the movement as a two-part structure with its long accelerando lines of b.200-207 and 236-42, the second of these leading directly into the cello's cadenza. This double division of the form is reinforced by other aspects of the texture at these points, notably the first violin's tremolando/double-stopped statements

of (0,1,4) trichords at both junctures. Both passages culminate in a metric modulation, and the first leads to a thematic reference which forms part of the second formally articulative system.

Just as in the first movement, intervals from the leading instrument's repertoire (here the second violin) are associated in a way which becomes a 'theme' for the movement. In this case, it is the configuration of b.171-72 which plays this role (ex.5.14). This reappears in b.180 and b.190 only minimally altered, the first time at its original pitch level, the second time transposed (t7, commencing on a). Although these are the only (more or less) literal recurrences of the motive, the theme itself generates a powerful intervallic association on what might be termed a middleground level of structure, one which is developed in the bars immediately following the first statement of the theme, exploiting the interval of association, i.c.2 (ex.5.15). This association governs much of the immediate pitch-relational behaviour of the second violin's music in this movement, even though i.c.2 is not part of the instrument's repertoire of interval classes: when extended to a succession of three or more intervals linked in this way, we may be justified in regarding the resulting configuration as a 'thematic' statement, these occurring at b.177-78,

b.207-10, and b.233-35, in ever expanded and decorated formulations (ex.5.16).

The imitative texture of the third main movement, Andante espressivo, is itself form-generating, in a sense - twenty-six phrases of between two and ten pitches are each first stated (generally) by the viola and then imitated in contour by the other instruments. The continuity of the texture is interrupted, however, in bars 319-21 and again in b.326, by the type of interval-pair articulation of AIT relationships which played an important framing role in the first movement. The extended use of AIT relationships at the close of III has already been demonstrated (ex.5.6b). This passage constitutes the relational closure of the third movement, the opening of which grows from the eight-note AIT-derived fixed register scheme at the end of the cello's cadenza, by means of symmetrical and linear associations (ex.5.17). This movement is therefore similar to the first in the 'refrain' function of the framing AITs, although texturally it follows an opposite course: each appearance of the AITs as a frame (end of cello cadenza, mid-point interval-pair texture, and closing bars) utilises a different texture, whilst the intervening music, growing steadily to a climax in bars 358-63, is remarkably homogenous. Again, as in the case of the cello cadenza, AITs appear less systematically in the course

of the music between the framing statements, although at certain points the harmony is closely governed by them or their six-note composites (ex.5.18, showing b.309-14 and b.330-31). The movement's first six pitches present one of these, f6-9, in a way which conceals, rather than clarifies, the relationship with the AITs (see ex.5.17).

Example 5.19 shows the formal outline of the fourth (and last) main movement, and the alternation of the five types of material on which it is based. The movement's tempi form a large-scale two-part design, with the succession of ♩. =140, ♩ =105, ♩ =90 repeated. Across this independent tempo structure the material develops its own formal tendencies. Bars 421-49 expose each type of texture in a basic manifestation; b.450-67 are largely concerned with building composite themes, hidden lines and counterpoints to which all four instruments may contribute, with less extended references to other types of material. These have a short section to themselves, b.472-97, after which polyrhythmic textures predominate, again with references to other types. Finally, from b.563, a long accelerando, led by the cello but soon joined by the other instruments, leads to the rapid polyrhythmic textures of b.588-95, a passage which, in its culmination, also embodies one of the movement's two

composite themes.

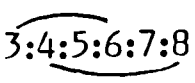
A case could be made for regarding this movement as a combined variation and ritornello form, similar to the last movement of the First Quartet and, on a larger scale, the Variations for Orchestra. The cello 'leads' this movement, at least nominally, and the passages which feature its characteristic accelerating lines might be thought of as fulfilling one ritornello function. Accelerandi 'frame' the expository bars 421-48, and appear prominently at b.472-89, separating the 'episodic' composite theme and polyrhythm sections. Moreover, as in the second movement, the cello's accelerating lines are related by association to the tempo structure, the accelerandi at both b.472 and b.563 marked by metrical modulations to ♩ =90.

Aspects of the 'cadence' texture in this movement have already been discussed (see ex.5.6c, 5.7b), and the types defined by cello accelerandi and by rapid linear figuration are in many ways self-explanatory. The prominence of the two other texture types (polyrhythmic textures and composite themes) suggests a relationship to the musical resources of the quartet as a whole. Example 5.20 presents the occurrences of the two main composite themes of the the fourth movement (the example does not show the enigmatic single-line

composite theme at b.520, which I am so far unable to relate to any of the structures of ex.5.20). The two composite themes are generated by combinations of a pair of lines at different relative intervallic distances. These individual lines are adumbrated individually in the movement, at b.435, 442, 445, and 450, before being combined in two ways: firstly at b.458, in which the initial interval is i.c.4, and secondly at b.462, the lines slightly altered, the initial interval here being i.c.7. The first of these produces AIT B as the first four pitches, and I have accordingly identified it as composite B; the second generates an A-type AIT in its first pair of intervals, hence composite A. Each of these composite themes, in its fullest statement, is a twelve-note aggregate, and each articulates AIT derived hexachords and their relationships in a striking way, in that the lines that constitute each consist of z-related hexachords, one of which (line 1 in each case) is of the 'multivalent' type richest in AIT subsets, the other of which, as discussed previously, has no AIT subsets at all. Moreover, composite B can be segmented 'vertically' into two sets of three intervals, to give a pair of sets equivalent to those produced by the 'horizontal' segmentation, while composite A treated in this fashion yields a pair of complementary and equivalent sets, the set form of which is

also AIT derived. Finally, each composite theme contains a number of contiguous statements of the AITs themselves. The hexachordal relationships displayed by these themes suggest, on Carter's part, a more-than-casual acquaintance with combinatorial principles of serial composition more usually associated with Babbitt and Schoenberg; however, it is significant that, in Carter's music, such ideas do not serve as a starting-point for the compositional organisation. Instead, they exist as parts of a broader and less strictly-defined compositional process, formalised and therefore in a sense consummative occurrences of relationships which, whilst frequent in the music to the point of being pervasive, are generally more freely applied.[9]

The polyrhythmic textures of movement IV make prominent use of the proportional relations 3:4:5:7, often varied by subdividing 3 and/or 4 to give values of 6 and 8. These alternatives might be expressed in this fashion:



Within the movement these relations are used in two different ways; as multiples of a small value (usually the semiquaver) to produce lines moving in

equal but mutually distinct durations of, say, 3,4,5 and 7 semiquavers (b.511) or 4,5,6 and 7 semiquavers (b.522); or by applying the proportions as rational subdivisions of a larger beat (b.588ff.), The latter represents a much accelerated version of the former, in that the proportional relationships of the individual lines' equal durations remains the same; the fourth movement demonstrates this by attaining the latter stage at the climax of the long and continuous acceleration of b.563-87.

Elsewhere in the quartet parts of this ratio are used to characterise particular sections. Such proportions appear sporadically in the first movement, but feature more prominently in the cadenza for viola, where the 'outbursts' of the accompanying instruments use the ratio 3:4:5, expressed as subdivisions of a larger value. At the opening of II, 4:5 is the basis of the metrical distinction between the second violin and the other instruments, and in the cello cadenza, the two violins maintain a 2:3 (=4:6) polyrhythm. In addition to these 'surface' expressions of the ratio, most of the metrical modulations involve ratios drawn from this scheme (example 5.21a tabulates the tempo ratios in the Introduction, I, II and IV). Finally, all the tempi of the quartet can be related in a network embodying these proportions (see

ex.5.21b).[10]

The concluding part of this chapter presents an attempt to arrive at a more comprehensive account of the pitch relationships in the first sixty bars of the quartet, comprising the introduction and part of the first movement, considering not only the use of AITs and other sets, but also linear relations arising, in the first instance, more directly from the registrally defined surface of the music. Example 5.22 gives an interpretation of these bars, (approximately) aligned with a running score, from which the further reductions (ex.5.23ff.) are in turn derived: these examples should be studied closely and in conjunction. The justification for the analytical procedure demonstrated in the two lowest staves in particular has already been considered (in Chapter 4); it is hoped that, in themselves, these analyses should be largely self-explanatory, as a close commentary on them would prove laborious for both analyst and reader. However, it is important for the sake of the theory to justify criteria for structural decisions in the contexts of individual works, and it is this type of decision that the following account will attempt to clarify.

Of the five analytical staves, the upper three deal with aspects of set relations, the lower two with linear interval and pitch relations. The upper system displays 'foreground sets', and resembles to a certain extent a traditional (if partial) set-theory analysis of the music. Sets demonstrated here are the two AITs, their five and six-note compounds, AIT subsets when significant over a number of bars in a connective or associative way, and the occasional recurrent set not related to the AITs, for example the cello's opening f5-7. Certain structurally important AIT combinations not included in this system are presented in the 'AIT frame' system, which shows occurrences of the prominent AIT-derived interval-pair texture, the first movement's 'frame', also found in the Introduction. The system designated 'middleground sets' shows AITs and their compounds operating on a higher structural level, as collections of reiterated focal pitches and intervals (b.10-17) or in prominent but non-immediate linear statements (b.19-31, in the cello's lowest register). It also displays the sets derived from regular intervallic processes (in this case of the type (0,3,6,9)) which govern the extent and direction of some of the first violin's lines in the first movement (b.35ff.), this latter feature derived from the linear and registral articulation of pitches and lines demonstrated on

the fourth stave. This fourth system presents a low-level interpretation of the characteristic events of the music's surface, in terms of associations of pitches and intervals in various ways, whilst the fifth system, 'symmetry', presents a special class of this foreground association, namely configurations involving a symmetrical relation of linearly stated intervals on a small scale.

The Introduction presents a clear A-B-A' form, articulated by both texture and register. Bars 1-18 use only pitches within the restricted range $b^{\flat}$ -$c^{\#}2$. Bars 18-27 activate a more extreme registral contrast, with a rhythmically more animated texture, while b.28-35 return to a restricted middle-register scheme, the intervals used, with one exception, confined within the range g-$d^{\flat}2$. Example 5.23 establishes a 'high level' structure for the Introduction, drawing attention to the fact that both A and A' sections are restricted in range, and related through the retention of the upper pitch of A, $c^{\#}2$, in A'. In general terms, this middle register pitch area serves as a musical metaphor for the scenario's notion of 'companionship'; it is a range easily shared by each of the four instruments, so enabling a high degree of pitch interaction through registral proximity of stated pitches and intervals. Such middle-range ensembles appear throughout the work, most consistently in

the course of the last movement (particularly in the composite themes and cadence textures), culminating in the polyrhythms of b.595-98, a fixed-register twelve-note configuration bounded by the pitches g and b$^{\flat}$1. Significantly, perhaps, this is an exact transposition of the range of the quartet's opening bars - this transposition is adumbrated in the A' section of the Introduction by the g which serves as the lowest pitch of its registral scheme, and further connected by the relationship between the boundary interval of the register (i.c.15, 12+3, i.e. a 'compound' minor third) and the interval of association (i.c.3).

In the section identified as B (b.18-27) the notion of registral extremes as structural determinants is replaced by that of a focal pitch reiterated in the middle of a more active and expansive texture. The pitch in question, b, is presented initially by the second violin in b.20, then by first violin in b.23, leaving its highest register to make this prominent gesture, the lowest element of the texture at this point. Its third and final appearance in the section is in b.27, in the second violin once more, as c$^{\flat}$1, a notation which associates it particularly strongly with the b$^{\flat}$ which follows in the same part almost immediately, and which reinforces its structural role as a large scale

semitonal association with the lower registral extreme of the A section. The A' section commences by regaining the $b^{\flat}$ of the initial section, this time however associated with a lower pitch still, g. This is the lowest pitch of a twelve-note fixed register scheme, the highest pitch of which, as has been pointed out already, is the $d^{\flat 2}$ retained from the A section. The i.c.3 $g/b^{\flat}$ at this point can be derived through association from the first violin's $g^{\#}/b$ of b.23. Overall, the section A' shows a symmetrical pitch process, $d^{\flat 2}$-b^{1} in the upper voice mirrored by g-a in the lower register, a symmetry which becomes more obvious in the opening motive of the Allegro fantastico, in which each of the final pitches of the Introduction becomes an element in a statement of i.c.3.

This particular interval class seems to be particularly important in the music examined so far, both as a local interval of association and on a larger scale, possibly over the whole quartet. One more instance of its use in a structural relation occurs in b.19-21, where two eight-note AIT-pair configurations are related by a transposition factor of 9 semitones, although this is a pitch-class transposition, rather than one in which the registral shapes of the two configurations are preserved. Finally, to conclude this overall view

of the Introduction, it should also be noted that the linear set produced by the succession of the three structurally weighted pitches in A, B and A', $b^{\flat}$ -b-g, is a subset of the A-type AIT.

Considering the music in more detail, we may see how the structural pitches generate, through associations, more complicated structures in the A section. The highest pitch, $c^{\#2}$, is approached only slowly, finally appearing in bar 7 following an ascent by semitones from a^{1}, the work's first pitch. The lowest pitch of the section, $b^{\flat}$, is present in the cello's first statement, and subsequently becomes the basis for an AIT statement extended and elaborated upon, on the surface, by repetition of pitches and intervals and through subsidiary linear associations in b.11-17. The combination of the two intervals which constitute this AIT brings $b^{\flat}$ and $b^{\natural}$ into close proximity, foreshadowing the structural role of the latter pitch in the B section of the Introduction. The upper pitch of the interval on b, g^{1}, generates by a symmetrical semitonal association a pair of i.c.7, one of which brings back into circulation the section's upper registral limit, $d^{\flat 2}$, the other of which is associated with the AIT's other interval, $b^{\flat}/f^{1}$, by i.c.3. This relationship is appropriate to the intervallic repertoire of the first violin, which duly presents

this association in its part. Moreover, this second i.c.7 also combines with the interval b/g^1 to form another instance of AIT A.

In the second section (B) intervallic relations are less consistently defined in relation to the structural constant, here the pitch b. Rather, various types of process and association create a much more fleeting and mobile texture, the elements of which, for clarity, are summarised in example 5.24. Of particular importance is the way in which, by intervallic articulation and by registral isolation, the cello presents linear statements of two AIT compounds, the second of which is completed in section A' by the only interval which leaves the predominant register. Within this section, process and association elaborate the symmetrical structure described above, as demonstrated in examples 5.22 and 5.23.

Example 5.22 interprets the foreground structures presented by the music, and as such needs little further comment in connection with the Introduction. One aspect of the music's relationships, concerning possible connections between the different types of organisational means, is illustrated by the first notes of the quartet, the cello's opening phrase. Although this is an instance of a set which is not related to AITs in any obvious way, the set does

recur, in b.5 and b.9. More important, however, than the identity of p.c.set is the way in which each instance is presented as an association of i.c.'s 5 and 1, and it is this factor rather than the coincidence of set types which provides the structural justification for the music at this point. Indeed, the opening phrase can be regarded as paradigmatic of the linear processes on which the music of the quartet will continue to draw, demonstrating process (the 'chained' i.c.5s), association (two i.c.5s related through i.c.1) and symmetry (the sustained interval $d^{\flat 1}/g^{\flat 1}$, symmetrically located with respect to the two registrally extreme i.c.5s of the first set, and further developed by the first interval played by the first violin, d^1/f^1, 'inside' this i.c.5). It also indicates that the music need not be 'coherent' in terms of both types of organisation simultaneously -one might expect to encounter both sections which are strongly determined by linear considerations and only secondarily, if at all, by set structures, and sections which employ sets with little evidence of regular linear patterning. The latter case might be thought somewhat less likely in that the music's surface will always present a degree of registrally articulated linear structure which may, however tenuously at some points, be described in terms of intervallic associations and processes. This is not to say

that the two types of structure will never, or only rarely, interact; in the Introduction alone, the first section's 'middleground' AIT also participates in the AIT 'frame', whilst in the second section the intervals that result from the processes of the individual lines combine in many ways to form AITs.

The remainder of example 5.22 should require little further comment. Example 5.25 presents an interpretation of the violin line of b.50-54 according to a principle of a middleground process, here a chain of i.c.7s from d^2 to a^2 and on to e^3, progressively decorated and embellished by additional symmetrical configurations. A similar, if simpler, mode of organisation appears in the first violin's line in b.57-58, the analysis of which is incorporated into the 'middleground sets' system in ex.5.22.

A result of the linear associational technique demonstrated by Carter in his Second Quartet is the appearance, in the interval-derived lines of the individual instruments, of a large, potentially exhaustive, number of distinct p.c.sets. This once more suggests the difficulty of using set-theoretical principles of analysis to account for the music's characteristic features, because, although sets are often important on a large scale of structure as

'framing' elements, the more immediate levels of continuity depend more on the less tangible elements of interval association and process. This, as we shall see, is true even of such works as the Concerto for Orchestra, which is ostensibly based on a systematic partitioning of all the available three, four, five and seven-note sets: even here interval is a more primary determinant, the intervals assigned to each 'movement' generating the characteristic registral presentations of the larger sets.[11] Before considering this later phase of the development in Carter's compositional thought, however, I shall examine a work that is in many ways a 'companion-piece' to the Second Quartet, the Double Concerto.

Chapter 6: Double Concerto

Carter's Double Concerto for Harpsichord, Piano, and Two Chamber Orchestras is the result of a somewhat unusual commission from Ralph Kirkpatrick, which was subsequently funded by the Fromm Foundation. Kirkpatrick's original wish seems to have been for a duo for harpsichord and piano[1]; this idea was expanded at an early stage in the work's composition, producing the carefully reasoned disposition of instruments in the score. Each ensemble both complements the soloist with which it is grouped (for example, three of the four brass instruments are given to the harpsichord's ensemble, compensating for that instrument's lack of volume), and creates particular associations of timbre which identify and demarcate the ensembles, the percussion playing an important role in this respect[2].

The date of completion which appears on the published score of the Double Concerto, August 1961, presumably refers to a late pre-performance revision, as the first performance took place on the 6th September that year. The Second Quartet interrupted Carter's work on the Double Concerto; to this extent, as works written contemporary to each other, they share many

compositional features, and can be considered companion-pieces, as suggested in the previous chapter. However, as with all inter-opus relationships of this kind, the differences are just as significant as the similarities, if not more so. In the present case, these differences can be seen to stem both from the necessary differences in approach engendered by the particular characteristics of the two differrent mediums, and from a more abstract development of the compositional possibilities suggested by the earlier work. Such is the integration of technique, form and expression in the Double Concerto that it is sometimes difficult to decide which of these is responsible for a particular feature of the work; it seems possible, however, to assign the more extensive use of AIT relationships involving residue tetrachords to the necessity to coordinate the two ensembles, differentiated as they are by the almost exclusive use of one or other of the two AITs, whilst the more systematic association of intervals with particular speeds can be seen as a rationalisation of the less rigid tempo relationships of the Second Quartet. This development of the earlier work's technique generates the important new notion of a "giant polyrhythm". In addition to this, and aside from the more obvious features of the newer work (the idea of interval partitioning, however closely bound in this

case to the pair of ensembles employed, stems from the Quartet), we encounter an entirely new feature, the "twelve-note tonic" or referential chord, embodying particular intervallic relationships as well as serving as a recurring sonority, and the consequential idea of "tonic" registral positions for each of the eleven interval classes[3].

Example 6.1 reproduces Carter's chart of speed/interval associations for the Double Concerto[4]. These are generally latent rather than actualised in the textures of the work, except at certain notable points in the structure: these include the introduction, making the clearest association between intervals and their pulse speeds, and the cadenzas for the two solo instruments, which likewise exploit the characteristic repertoires of each ensemble (see in particular the piano's second cadenza, b.567-70, constructed from a polyrhythm in which all five of the piano ensemble's intervals move at their associated speeds[5]). Tempo, interval and ensemble interact in a more elaborate way in the use of multiples of these base tempo values, which provide a large field of tempi some of which can be associated with more than one interval class (ex.6.2). It is therefore no surprise to find a notated metrical pulse of ♩.=105 at the start of the piano-ensemble dominated Allegro

scherzando; of this tempo's three base rate factors, two (m.m.35 and 21) are associated with prominent interval classes in the music at this point (i.c's 4 and 9 respectively). Moreover, the two percussionists of the piano's ensemble, playing in the 5:3 ratio particularly associated with orchestra II, produce tempi of m.m.131$\frac{1}{4}$ (perc.3) and 63 (perc.4) through the internally regular accentuation of their lines. M.m.131$\frac{1}{4}$ is a multiple of 21 7/8, associated with i.c.11, whilst m.m.63 is a multiple of both 31$\frac{1}{2}$ and 21, giving rise to a double association of i.c's 5 and 9, both piano intervals. Looking ahead, the notated metre and tempo of the Presto, $\frac{2}{4}$ =87$\frac{1}{2}$, can be related to m.m.29 1/6 (i.c.6), 21 7/8 (i.c.11), and 17$\frac{1}{2}$ (i.c.10) - again, two of these three intervals suggested by the tempo association are appropriate to the ensemble carrying the weight of the musical argument. This said, Carter's rhythmic technique is so flexible that the notated metrical pulse is often contradicted by more complex subdivisions of the metre, making possible the deployment of many different tempi at once. The polyrhythms of the Introduction are a good example of this, although these are on such a large scale as to be expressed in terms of common shorter durations variously grouped (see ex. 6.3, 6.4). Finally, the situation is further complicated both by exceptions to the scheme and by

approximations to some of the tempi. An example of the former was cited in footnote 5; another example occurs at b.248 where, in spite of the 5:7 polyrhythm, both ensembles play at speeds uniquely asssociated with the harpsichord ensemble's intervals, $73\frac{1}{2}$ ($24\frac{1}{2}$ x 3) and $52\frac{1}{2}$ ($17\frac{1}{2}$ x 3). An example of the latter, approximation to a base rate multiple, occurs in b.203-4, a brief tour-de-force of rhythmic ingenuity (ex.6.5).

Published accounts of the form of the Double Concerto make much of the poetic associations of the work. Carter has spoken of the suggestive nature of certain passages from Lucretius' De Rerum Natura and Pope's Dunciad in relation to the overall design[6]; David Schiff goes still further by prefacing each part of his discussion of the work's individual sections with a passage from one or the other source[7]. It can not be doubted that these poems are at least in some measure responsible for certain characteristics of the Double Concerto, nor can it be doubted that the associations made by Schiff are very suggestive even of some of the more abstract procedures of the score. A detailed account of this is not, however, the purpose of the present study, which constitutes an attempt to disclose bases of musical coherence in these

works. Moreover, to claim that these frankly programmatic elements are direct causes of the musical language in Carter's compositions would be as extreme as claiming, for example, that Berlioz's infatuation with Harriet Smithson was responsible for the structural characteristics of the tonal language of the Symphonie Fantastique; in both Carter and Berlioz, and all other composers who may be considered "programmatic" in any degree, the nature of the musical style, its possibilities for relation and generation of structural coherence, its flexibility, all these are given factors which may interact in various ways with the external and essentially partial determinants which constitute a programme.

The larger sectional design of the Double Concerto appears to be symmetrical:

Introduction - cadenza for harpsichord - Allegro scherzando - Adagio - Presto - cadenzas for piano - Conclusion

The sections of the Concerto are symmetrically arranged. The brilliant Allegro scherzando and the Presto each feature one of the two solo instruments, the piano in the former, the harpsichord in the latter; in each movement, the featured instrument and its orchestra are frequently interrupted by the other instrument and its orchestra playing at a dynamic level opposite to that of the main group. In the Adagio the "choreography" changes: the entire wind section, in center stage (although still divided into groups), plays slow music, while in the

background the two soloists, strings, and four percussionists surround the winds with accelerating and decelerating patterns that alternately move clockwise and counter-clockwise.

The introduction and Coda also form a fundamentally symmetrical pair. The Introduction "breaks the silence" and gradually piles up two-by-two, polyrhythmically, the ten speeds and associated tone colours and musical intervals used in the entire work. The Coda begins with a crash and then, like a large gong, dies away over many measures in wave-like patterns, with many diverse tone-colours fading out and returning - each time slightly different, each time with less energy - until the work subsides to a quiet close.[8]

In terms of proportions, the earlier sections are longer, to the extent that the beginning of the Adagio marks, roughly, the half-way point in the work. On the analogy of a universe first created and then 'un-created', one might observe that civilisation 'peaks' rather late in the day (in the Adagio), followed by a briefer descent through instability (Presto) into chaos (conclusion). In purely musical terms, this off-set symmetry creates tension in the more rapid succession of shorter sections in the latter part of the work. A notable feature of the Presto is the 'defection' of the instruments of the piano's ensemble to accompany the harpsichord, leading to a tutti climax emphasising the harpsichord ensemble's minor intervals (b.554-556), and allowing the piano's two cadenzas to grow from that instrument's isolated interjections earlier in the movement.

The two movements which are particularly significant for Carter's output in terms of their internal formal design are the Allegro scherzando and the Conclusion. It seems inadequate to speak of 'form' in the Introduction, where the notion of 'process', here embodied in the polyrhythmic construction, usurps the role of a more traditionally conceived sectional form. The Adagio, for all its breathtaking use of superimposition and of lines that move in space as well as time, is formally straightforward, whilst the Presto is a smaller-scale version of the Allegro scherzando. The textural and dynamic climaxes of the Conclusion are generated by a polyrhythm on an even larger scale than that of the Introduction, involving values of 5  and 35  in orchestra I and 7  and 35  in orchestra II. This forms a numerical proportion of 3:4:5:7 (already encountered on a smaller scale in the Second Quartet), divided between the ensembles to represent each one's primary rhythmic proportion, 7:4 in I, 5:3 in II. It generates a closed cycle of attacks over b.619-654, beginning and ending in a coincidence of all four durational lines. From b.654 to b.689 the large rhythmic pattern is repeated: the music for these bars is a 'double' of the music of the previous cycle, reduced in density and dynamic, but very closely based on the original bars.

The Allegro scherzando is the first extended example in Carter's output of a collage-type formal construction.[9] Ex.6.6 shows a sectional outline of the movement, with sections assigned letters for reference. The basic idea of the piano ensemble's music being interrupted by contrasting fragments played by the harpsichord and its instruments is elaborated firstly by the frequent overlaps and anticipations which occur between both groups, and secondly by the fact that the orchestras tend towards equality as the movement progresses, although this is finally achieved only in the Adagio. Within the piano ensemble's individual sections, various distinct types of material are juxtaposed, these demonstrated in ex.6.7. No two sections combine the same types of material in the same way, and of course the music is subjected to continual variation within each textural type. Another progressive feature of the movement is the tendency for each individual type of material to become more clearly defined, leading to sections later in the movement based on one type only. The technique here is somewhat different from that employed by Carter in the two later works which feature 'collage' construction most prominently, the Third Quartet (1971) and A Symphony of Three Orchestras (1976), where distinct materials are never juxtaposed and combined in the

course of a section, as here, but form the bases of individual sections in their own right, and where the principle of superimposition of different types of music is more rigorously applied.

Example 5.2, from the previous chapter, consisted of Carter's chart of AIT relationships used in the Double Concerto. To begin a consideration of pitch organisation in the work, I shall discuss passages which relate most clearly to the chart. The most sustained example of these relationships in the music occurstowards the end of the Presto movement, b.512-524, in one of the piano's more extended interpolations (ex.6.8). Individual AITs act in terms of a 'double function' of relationships to other AITs and residue tetrachords, forming a connected chain of four-note groups successively completing twelve-note aggregates. In addition, the coordinative function of the residual tetrachords is emphasised, linking harmonic statements of AITs at the beginning and end of the example as demonstrated.

AIT relationships presented as clearly as this are, however, rare in the course of the Double Concerto. This might imply a concept of a relational 'background', most prominently articulated at important points in the music's structure in a 'framing' context, the appearances of these relationships in

overtly 'thematic' forms taking on the nature of resolution, closure, or other types of structural articulation. Such usage occurs in the first part of the Adagio (ex.6.9(a)), a passage which opens and closes with clearly articulated AIT/residue partitio ned twelve-note statements, these enclosing music not obviously based on AIT groupings, and whose compositional organisation is in fact somewhat different, based on a series of interval classes unfolding in time through prime and retrograde statements generating small-scale symmetries, and working within a fixed register scheme of eleven pitches(ex.6.9(b)).

This 'framing' idea is present in the work's most evident large-scale compositional feature, the twelve-note chord designated as 'tonic' by Carter. This appears at various stages in the music, most notably in the Introduction (b.39, and again at b.147-155) and just before the Conclusion (b.615), and also near the end of the Allegro scherzando (b.326-328, piano). Carter has described this type of organisational principle in these terms:

> In both this work and in my later Piano Concerto there is an underlying twelve-note chord formed of smaller harmonic components; in the case of the Double Concerto, all the intervals are situated in their assigned registers, a pattern which in this piece is built up slowly . . . over the first forty measures. This chord locates each interval in respect to the others, and is treated as the resolved state of all its components. . . . The tendency of pitches to push towards this chordal relationship is carried beyond the twelve-note chordal point to sections

> of almost totally undifferentiated pitch saturation in the Piano Concerto and in the Double Concerto this leads to pitchless percussion sounds. In both works large trends of this sort determine the overall form.[10]

> I've tried to reenergize the tensions of the notes, the qualities of the individual pitches as they are heard in contexts. In order to do this, I have used the techniques I described. . . . the establishment of fixed or 'tonic' positions (pitch and octave locations) for each of the intervals from which they migrate and to which they return or 'resolve', there being secondary 'resolutions' when they return to the relationships with each other first established, but transposed.[11]

These suggestive statements might be thought to imply a rather rigid approach to intervallic relations, were it not for the modest disclaimer which follows:

> However, I do not think consciously of grammar and syntax as such when I compose; these are 'habits' as they are in our use of language. I do, however, feel that I am constantly inventing special and uniquely suitable turns of musical phrase, with interesting grammatical or syntactical usages, as a good writer or speaker must do, without giving thought to the mechanics of language, but trusting to his habit.[12].

This reinforces the view of Carter as a largely empirical composer, and should prepare us to adopt an analytical procedure sensitive to the potentially multivalent associations of pitches and intervals in specific registers over immediate and longer spans, within a context defined (perhaps) by a set of pre-determined, 'global' relationships, these not necessarily present at all stages of the work (as they would be, for example, in a completely determined

serial pitch-organisational scheme), but only intermittently, as the relational 'frames' already described. This said, particular chords important in the Double Concerto can be drawn from the intervallic combinations adumbrated by the ten 'tonic' intervals, although I can find no particularly strong evidence to suggest that the registral dispositions of these sets as presented in the combinations of 'tonic' intervals are given the priority in the music suggested by Carter in the second of the above quotations. Example 6.10 shows the twelve-note 'tonic' chord, contrasting it with the Double Concerto's other structural twelve-note chord, the sonority which opens the coda. It is significant that it is this latter chord, constructed from a regular vertical alternation of perfect fifths and tritones, that for Carter represents an undifferentiated and 'chaotic' state, its homogenous structure contrasting with the heterogenous composition of the work's primary twelve-note chord. Example 6.11 presents derivations of smaller chords from the intervals of the 'tonic' configuration (here including the 'tonic' registral locations of i.c.1 and i.c.2, the first two intervals to be heard in the Double Concerto, which are omitted from the subsequent statements of the twelve-note 'tonic' itself).

We turn now to a consideration of linear pitch structuring in the Double

Concerto, and its interaction with the organisation of AITs and their various relations and composites. The six pages of ex.6.12 present reductions of b.11-39 in terms of both sets and linear relations. These bars expose the 'tonic' intervals of the work and their associated speeds, building these up in a 'giant polyrhythm', which reaches its climax with the near-coincidence of the pulses of the two independent polyrhythmic cycles in b.46-47. In terms of pitch structure, the music moves from the A-type AIT of b.11 to a statement of the work's twelve-note 'tonic' in b.38-39, by way of a chord in b.23 which consists primarily of 'tonic' position intervals. There are three principal textures: piano solo (with accompaniment from its ensemble), harpsichord solo (likewise accompanied), and tutti (usually without the soloists, but including them at b.38-39). The soloists alternate in sections generally increasing in length and complexity, whilst the tutti both articulates the twelve-note 'tonic' in b.38-39 and its precursor in b.23, and also prefigures the music of the Adagio's wind chorale (b.25-26, with the first presentation of the characteristically contoured lines in both horns: and ). Two further predictions of Adagio material occur in these bars, in b.27 (viola) and b.30-35 (flute).

Given the sectional division of the music in these bars, the following commentary will consider the passage in six distinct phases before considering larger overall relationships: (1) b.11-23; (2) b.23-27; (3) b.27-29; (4) b.29-30; (5) b.30-35; (6) b.35-39. The first phase presents an initial statement of an A-type AIT, this forming a basis for AIT statements up to b.16, intervals from this original chord forming AITs with new intervals subsequently stated. Pitches and intervals retained in this way frequently pass between chordal statements of the two distinct ensembles, this being an important aspect of the Double Concerto's immediate continuity. Significantly, this sort of relationship is the same as that which generates the AIT composites used both here and in the Second Quartet, suggesting a type of interrelationship between the vertical, 'harmonic' dimension, and the linear concerns of chord relation, a kind of 'voice-leading'.

The music of the piano's first entry, b.16-17, is less obviously derived from AIT relationships. Ex.6.13 considers these bars in an attempt to articulate these and other characteristics. In (a) a provisional 'background' is established, a symmetrical 'neighbour-note' configuration complicated by retention of the original intervals and by a registral displacement of the upper

line's second interval. Ex.6.13(b), (c) and (d) present AIT configurations extracted from the texture of b.16: (b) in terms of relations to the intervals which seem contextually the most prominent at this point, d^1/b^1 and $e/e^{\flat 1}$; (c) in terms of intervallic cross-relations between the two four-note groups articulated at the beginning of the bar; (d) in terms of the registral disposition of the pitches present. It will be seen that all pitches except f^1 participate in AITs with one or other of the two principal intervals; that the superimposed i.c.6s of the second four-note group complete AITs with the intervals d^1/f^1 and d^1/b^1 of the first; and that a single pitch, d^1, disrupts the vertical regularity of a structure based on two overlapping AITs with a single pitch in common.

Ex.6.13(e) considers the eight-note chord of b.16 in relation to the work's 'tonic' intervallic positions; it is perhaps significant that the 'tonic' pitches in the configuration form an AIT, whilst those which are non-tonic do not. Of these latter pitches, a, d^1, f^1, b^1, two are present in the harpsichord ensemble's chord of b.14 (d^1, f^1; the first of these is itself retained from a previous AIT occurrence in b.12).

Ex.6.13(f) presents the registral disposition of pitches in b.17, an almost

symmetrical construction of overlapping AITs, missing only a single pitch, g^1, to complete both the twelve-note aggregate and perfect symmetry - this pitch appears in the harpsichord's subsequent entry. Ex.6.13(g) shows the pitches sustained from this eleven-note configuration in the piano, forming the composite hexachord f6-z50.

To return to ex.6.12: in b.17 the harpsichord entry presents the hexachord complementary to the piano's f6-z50, f6-z29, together with a single pitch retained from the piano's music, f^1. Were it not for this shared pitch, the harpsichord would be unable to articulate any AIT, as f6-z29 has no AIT subsets. As it is, its presence embeds a B-type AIT in the texture. The next phrase of the harpsichord ensemble presents a more complex association of i.c.'s 3 and 6, in the context of what might tentatively be described as a 'prolongational' voice-leading (an intervallically coherent process leading away from, and then back to, an element in the texture, here the interval $d^1/a^{\flat}1$). Although the scale of this process is small in this instance, one might expect to find such processes on a larger scale in Carter's music, in the light of some of his statements quoted above. At the end of the bar, the harpsichord sustains the pitches of the composite f5-28 (see (b) in ex.6.12). The pitches in flute and

horn at the start of b.18 are a clear reference to the AIT which instigated the process of intervallic growth which we are now examining, a 'resonance', as it were, of the chord in b.11.

The next bar, 19, presents a more comprehensive statement of the piano ensemble's harmonic resources. At the core of this is an eight-note set played by the piano which consists of two A-type AITs articulated in the intervallic partitioning 3/6, the instruments doubling some of these pitches and adding three others to form an 11-note group. In addition, however, the intervals stated in the tremolandi of the individual instruments' lines, together with the intervals of the piano's chord, are related in a mutually reciprocal complex of AIT completions, not limited to the piano ensemble's characteristic A-type AIT.

The harpsichord's entry at the end of b.19 presents an eight-note chord which 'clears' into a statement of the B-type AIT (11,10,8,4); the eight-note chord is in fact a composite of two B-type AITs, and as such instigates the first co-ordinating use of residue tetrachords in the work, in that the four-note residual set follows immediately in the piano L.H.. The piano R.H. presents the B-type AIT (2,3,5,9) not articulated in the chord on the last

quaver of b.19.

The chord sounded by the piano on the second crotchet of b.21 is a residue tetrachord, completing a twelve-note aggregate with the harpsichord's music of the same bar (I take the L.H. $b^{\flat}$ of the score, doubling $b^{\flat 1}$ in R.H., to be a misprint for $b^{\natural}$). As happened in b.19, the two AITs in the harpsichord's music are not clearly projected in this eight-note statement, although they are differentiated to a certain extent here as a moving line (11,10,8,4) against a sustained chord (6,7,9,1). The small network of relations which follows adds the tritone $d^1/g^{\#1}$ to the AIT on $f^{\#}$, forming the six-note composite f6-z23.

Throughout these bars we have been approaching a textural and dynamic climax, which arrives at b.23 through a near-coincidence of the slow-moving pulses of the giant polyrhythm. The texture of b.22 reverts to rhythmically undecorated statements of bare intervals, momentarily bringing the underlying rhythmic pattern into perceptual prominence. Not surprisingly, these intervals are strongly interrelated in terms of set completion. The tritones and minor thirds in ensemble I combine to form AITs and the larger composite f6-z38, while the intervals in the piano's ensemble, although not

forming AITs in any individual combinations, together comprise f6-z23. Other relationships can be uncovered, suggesting a more-or-less schematic process of associating intervals through common pitches: thus the minor thirds in ensemble II form (0,3,6) trichords with the tritones of ensemble I. Moreover, intervals are related in a linear sense in this way, both within and between the ensembles: $g^{\#1}$ and $f^{\#}$ are the outer pitches of an intervallic exchange, both pitches having originated in the texture of ensemble I's music. The a of the i.c.11 below $g^{\#1}$ then serves as the basis for the tritone $a/e^{\flat 1}$ in ensemble I, $e^{\flat 1}$ giving the $d^{\#1}$ for ensemble II's i.c.9, $f^{\#}/d^{\#1}$. Some of these pitches are held into the first part of b.23, where they are incorporated into another 11-note chord, made up largely of 'tonic' position intervals.

This point is heard as a 'structural downbeat', although it later transpires that this is, in a sense, provisional, and preparatory to the fuller and weightier statement of the twelve-note 'tonic' in b.39. It is clearly a point of articulation, of structural arrival and departure on a level higher than that of the immediate note-to-note, bar-to-bar relationships we have been considering up to now. Why should it be felt as such? And how is it possible to create and exploit such a characteristic in a context which remains

(polyrhythmic constructions notwithstanding) fundamentally ametrical, and at least nominally ungoverned by harmony construed in its traditional sense? The means used to achieve this sense of large-scale articulation are various. Firstly, as mentioned above, b.23 contains a near-coincidence of the rhythmic lines in the polyrhythmic structure; although this structure is consistently decorated to create the texture of the music, enough accent remains on at least some of the intervals falling on the scheme's pulses to make us aware of the nature of the construction, and to endow the fact of coincidence or non-coincidence of pulses with a certain immediate aural reality.

Furthermore, the new interval class introduced here, i.c.7 in it's 'tonic' location f^2/c^3, introduces the highest pitch heard up to this point, approached in a way sufficiently schematic to allow us to consider it the result of a process (see (a) in ex.6.12, in particular the abstracted associations of i.c.'s 10 and 3 in the line g^1-f^2-d^2-c^3). In terms of a traditional view of intervallic qualities, the resonant i.c.7 is the first pure consonance to appear as a bare interval presented in the polyrhythmic scheme of the introduction, affecting to a considerable degree the sonorous characteristics of the harmony after this point (and playing an important role in the piano's music in the rest of the

extract under consideration here). Finally, the spacing, scoring and dynamic level of the chord all contribute to the effect, not merely reinforcing a sense of harmonic arrival but, as in much atonal music, actually helping to create it.

Following this point of articulation, the second phase of the introduction, b.23-27, is largely taken up with a solo passage for the piano, composed around the occurrences in the polyrhythmic scheme of the interval class just introduced, i.c.7. The linear development of this interval is summarised in (g) on the third page of ex.6.12, the interval moving through an association of i.c. 1 and 3. The latter interval class becomes associated with i.c.7 in a harmonic sense, forming a (0,2,5) trichord which, together with (0,2,6) and their composite (0,2,5,8), colour much of the music of this phase. The piano's figuration in b.23 can be derived from a six-note chord (2,1,0,10,8,5) not represented as an AIT composite, but which can be derived from the chord of b.23 through a complex of symmetrical and linear relations (d). Three elements of this set, (2,5,8), form a subset which is associated with the presentation of pitches in the original chord by i.c.1, an exact, registrally congruent transposition, which subsequently appears prominently in the new configuration at the start of b.25. The pitch $d^{\flat 1}$ is simultaneously a part of an

associative process of i.c.7 linking $f^{\#}$ to the $a^{\flat 1}$ of the following bar, and the starting point for a series of associations through i.c.2 which provide a lower part to the piano ensemble's music. Meanwhile, this pitch becomes the upper element of a statement of i.c.3 in ensemble I, this interval generating associations of its own in this register. On the third page of ex.6.12, (e) gives an account of the piano ensemble's music of b.24-25 in terms of pitch and interval relation; the piano's sustained chord in b.25 is an AIT composite, f6-z49. Bars 25-26, still highly connected in terms of linear relations between their elements, also present a complex of AIT relationships in both ensembles, in which the lines played by the two horns, predicting the music of the Adagio, are prominent. Ensemble I's line combines with the flute's tremolando $d^{\#1}/f^{\#1}$ in b.25 to present the composite f6-z49, whilst ensemble II has a more straightforward linear statement of an A-type AIT. Pitches and intervals added by other instruments combine to form numerous AITs in both ensembles.

In b.26 the interval $G/B^{\flat}$ in the harpsichord ensemble's double bass returns i.c.3 to its 'tonic' location, which is somewhat outside the main area of registral activity in these bars. The boundary pitches in ensemble I in b.26 are $a^{\flat}/c^{2}$: the semitonally adjacent interval $a/d^{\flat 2}$ is the basis for ther following

section, phase 3, featuring the harpsichord. In b.27 and the first part of b.28 the harpsichord is confined to a twelve-note fixed register scheme encompassed by the pitches a/d$^{\flat 2}$. Double bass and viola move outside this register, the former reiterating its 'tonic' i.c.3, G/B$^{\flat}$, the latter colouring the harpsichord's L.H. line, registered with 4' and 8' stops, with occasional upper octaves (here, as elsewhere, I am taking the notated pitches in the harpsichord part as the sounding ones, regardless of added stops; of course, if the 4' or 16' stops are used alone, then the transposition is taken into account). With the trichord f^1/b^1/e^2 the harpsichord abandons the fixed register scheme, the upper e^2 associating with the previous top-voice d$^{\flat 2}$ through i.c.3. The lowest part moves in parallel, with c^1 reached after a brief move into a lower register occupied by another i.c.3 (c$^{\#}$/e, b.29). Both lines then return immediately to the original registral limits in a configuration consisting of two B-type AITs.

The fourth phase, returning to the piano and its ensemble, features i.c.7 in much the same way as the second: ex.6.12(h) presents a reduction of the associations of this interval in these bars, statements of i.c.7 related through a process involving i.c.3, as before, and i.c.4. The i.c.7 d$^{\flat 2}$/a$^{\flat 2}$ relates

symmetrically to the structural $b^{\flat 1}/f^2$ of b.29, completing a symmetrical relation initiated by the octave-related intervals e^1/b^1 and e^2/b^2 of b.26 (see (i)). The association of $b^{\flat 1}/f^2$ and d^2/a^2, ascending through i.c.4, reflects the descending association of f^2/c^2 and $d^{\flat 2}/a^{\flat 2}$ in phase 2, with e^2/b^2 in b.26 dividing the association and so increasing intervallic possibilities, and also serving as the starting point for the symmetrical associations discussed above. This information is expressed in ex.6.14, an overview of linear and intervallic relations through the six phases of the introduction being considered here. The prominent $c^{\#1}$, the lowest pitch in the texture for the first part of b.29, is retained from phase 2's $d^{\flat 1}$, although in phase 4 its intervallic associations are less clearly defined.

Further subsidiary associations and set configurations are indicated in ex.6.12. The interval $f^{\#}/e^{\#1}$, introduced by the cello in b.29, strengthens its position as a secondary registral location for i.c.11, previous appearances in b.17 and 21 having been made in close proximity to the 'tonic' $e/d^{\#1}$. I.c.5 becomes important in the texture of b.30, a good example (among many) of a texture controlled by an interval which does not form part of an ensemble's referential and constructional resources as defined by Carter.

The fifth phase, overlapping with the fourth, opens with a presentation of the AIT composite f5-28 in the harpsichord ensemble's wind instruments. This sustained texture prepares for another anticipation of the music of the Adagio, in flute (b.31-32): its line embeds an A-type AIT in a linear statement of the composite f6-z6. Bar 32 abounds in local AIT-forming interval pairings, the i.c.6 in the flute part combining with the instances of i.c.3 which form the basis of the combined line of viola and double bass. This line itself forms the AIT composite f6-z26. Two new elements of the twelve-note 'tonic' are introduced in this section: the lowest interval, A_1/G in the double bass, and a member of the highest, d^3, in the harpsichord. This presentation of a single pitch from the tonic registral location of i.c.4 creates a top-voice structure, ultimately extending over b.18-36, which outlines the A-type AIT formed by the upper pair of intervals from the twelve-note 'tonic'.

Phase six introduces the last two intervals of the twelve-note 'tonic', i.c.9 in its primary registral location, G/e, and i.c.4, $d^3/f\#^3$. I.c.9 had appeared as early as b.16 in association with its characteristic pulse speed, but never yet in its 'tonic' position; the lowest element of the 'tonic' i.c.4, d^3, was prefigured in phase five. The sixth phase continues by bringing together all the

other intervals in their 'tonic' registers for the tutti of b.39. The 'tonic' i.c.7, f^2/c^3, is initially embedded in a mobile texture in which the interval class plays an important part. Once again, $d^{\flat}1$ is prominent at the start of the section, and, as in phase two, is developed through associations of i.c.2. Increasing rhythmic animation belies a texture which, through the accumulation of 'tonic' intervals, becomes progressively more static as the structural downbeat of b.39 approaches. This chord is itself as much a point of departure as of arrival: it is notable that, although this must be regarded as the culmination of the pitch tendencies of the music up to this point, the polyrhythmic structure, out of phase with the pitch progression, pulls the music forward to a second climax at the coincidences which occur in b.45 and b.46. The pitches at this point have moved well beyond the bounds of the twelve-note 'tonic', recalling the observation by Carter cited previously concerning the tendencies of intervals to move beyond their 'resolved state'.

The way in which AIT relationships permeate the music of these bars on a small scale has already been suggested; that is, through a generative harmonic process stemming from the chord of b.11, forming pitch and interval 'chains' which generally articulate the 5- and 6-note AIT composite sets. In

addition, the outer-voice structure presents a higher-level counterpoint of lines articulating AIT and larger, related sets. Ex.6.14 attempts to clarify this structure, and also to demonstrate the pitch and interval relationships which operate between phases, both in relating music played by the two distinct ensembles, and in connecting the music of each ensemble's individual phases across the music which separates them. Within the context of AIT and other intervallic relationships expressed linearly, or rather so intimately associated that the three are mutually interdependent, the presentation of interval lines in the metrical scheme, the 'giant polyrhythm', plays an important role, both in associating particular intervals, 'tonic' or not, with the larger harmonic and structural design, and in sustaining further relationships of a different order. Ex.6.15 follows the appearances of members of two interval classes, 9 and 11, through the texture to b.22: adjacent intervals of each class form different tetrachords related by their common possession of a (0,3,6) trichord as a subset. In this context one might describe (0,3,6) as an associational set, limiting the possible mutual relationships of the intervals it governs. The structural association of pitch and rhythm allows, for example, the pitch f^2 of b.18 to be heard as 'prolonged' into the chord at b.23 (ex.6.14); more obviously,

it establishes individual intervals as focal dyads, enabling the analysis to make a distinction, if only a provisional one, between the musical surface and deeper structural levels.

The harpsichord's music of b.18 was cited above as an example of 'prolongational voice-leading' in an atonal context, through the association of the particular intervals which formed the basis for the texture at this point. The following example, ex.6.16, is an analysis in these terms of a textural elaboration from the beginning of the harpsichord's cadenza. The principal interval class of b.103-106 is i.c.1, and the reduction demonstrates how, within a more active and 'figurational' texture, this interval, its linear projection in specific registers, and its association with particular pitch configurations, might be considered as informing the music with a very distinct sense of process, to the extent of emphasising a particular pitch-class representation of the i.c. in question. The sequential association of AITs between the last part of b.103 and b.104 establishes a 'mode of progression' for i.c.1, in this case the simplest possible, a chromatic juxtaposition resulting from an association of i.c.2. To look ahead, this i.c. relates the prominent intervallic statements of b.105 and b.106 (in the lowest register), here, however, as a

'boundary relation' rather than a direct transpositional factor. These three intervals ($G/A^{\flat}$, $C^{\#}/D$, E/F) together form the AIT composite f6-z13. The pitch classes of this symmetrical relation of three intervals are, in fact, identical to those of the f6-z13 presented at the start of b.105, where it is followed by its literal complement and z-relative, f6-z42, completing a twelve-note statement. The second hexachord contains no AIT subsets, f6-z13 being one of the four 'multivalent' composite hexachords expressible in AIT combinations of A+A, B+B and A+B; relatedness is maintained in the texture through the segmentation of f6-z42 into (0,1,6) trichords, these being a prominent feature of the presentation of f6-z13 at the beginning of the bar. The upper pair of (0,1,6) trichords are registrally equivalent, and are related by a transposition factor of i.c.2, maintaining the transpositional relationship of the previous AIT appearances. Individual lines extracted from the texture of these bars and demonstrated in ex.6.16 either tend towards chromatic completion of a small interval filled by stepwise movement in i.c.1, or, in the case of the lowest part, articulate an intervallic partitioning of one of the AIT composite hexachords. The lines mostly converge on the dyad e/f of b.106 (this interval being presented in three octave registers, which becomes five

taking into account the 4' and 16' stops in use at this point). I.c.3 is an important non-immediate constituent of the texture of b.105, the presentation of $b^{\flat}/d^{\flat}1$ and $d^{\#}/f^{\#}$ in the last two crotchets prefigured by the less apparent d/f in the first. In addition, it is the associative interval class which relates the three appearances of i.c.1 in the partitioning of f6-z13 in the lowest part. I.c.3 is the principal interval class exploited in the following section of the cadenza. Two elements of the texture do not 'resolve' into the dyad e/f; the interval $b^{\flat}/d^{\flat}1$, which prefigures the statement of that particular dyad at a lower octave in b.106, and the pitch c which appears towards the close of b.105. This and its associated B might be thought of as resolving symmetrically inte the $B^{\flat}/d^{\flat}$ of b.106 in a retrograde of the process whereby $d^{\#}/f^{\#}$ move onto e/f.

Examples 6.17 and 6.18 return to a consideration of pitch relationships on a larger scale, here in the first thirty bars of the piano-ensemble-led Allegro scherzando. The six pages of ex.6.17present an analysis of surface relationships in some detail, whilst ex.6.18 demonstrates connections between and across the individual sections in the formal pattern.

Section A, b.157-165, can itself be divided into smaller sections on the

basis of textural characteristics. A_1, b.157-8, features the piano ensemble's instruments articulating both an A-type AIT and the AIT composite f6-16, at the same time prefiguring the intervallic theme presented by the piano in A_2 (b.158-9). This is designated in the analysis by the interval class succession of its first appearance, 2-9-4: this is followed by two permutations, 4-9-2 and 9-4-2. A notable feature of the organisation of form and material in the Allegro Scherzando, the combination in varying patterns of a small number of fundamental texture-types, is thus reflected in the free reordering of the intervallic elements which constitute this 'theme'. The intervals themselves, in the first two statements (2-9-4 and 4-9-2), combine to form a twelve-note aggregate generated by inversionally related instances of the set f6-21, a set not particularly linked to AITs or their composites, although the four lowest pitches of the entire twelve-note configuration form an A-type AIT. The third statement, 9-4-2, presents f6-z42, the complement and z-relative of f6-z13, which thus contains no AIT subsets. The first two intervals combine with the instrumental parts at this point to form the composite f5-28.

A_3 (b.159-161) features single-line and contrapuntal textures in the piano, the lines of which draw on characteristic intervals of ensemble II. The

section starts with pitches retained from the last configuration of A_2, moving away from these through associations involving i.c.'s 4 and 7. The pitches $g^{\#1}/c^2$, b.159-60, combine with the statements of i.c.4 in the presentations of 2-9-4 and its variants to complete a linear presentation of an A-type AIT, 6-5-2-0, over bars 158-60. This type of linear relation continues to involve many of the structurally weighted pitches in the upper register of section A, as indicated in the reduction in the lower part of the example. Within A_3, AITs are formed in combinations of many of the elements of the fleeting texture, and six-note composites are also important, notably f6-z13 in the instrumental parts as a sustained harmony, and f6-z50 in the piano's music at the end of b.191. Both of these involve the retained pitches which are prominent at this point, the upper part's $d^{\#2}/e^{\#2}$(in both sets) and $g^{\#2}$(f6-z50), and the lower part's $b^{\flat}$(f6-z13).

The instrumental interpolation at b.162-3 constitutes A_4, and presents material already familiar from the prefigurations of Adagio music in the introduction: the characteristic melodic shape appears in the oboe, its highest pitch reinforcing the structural $g^{\#2}$ attained in the previous bar. Once again, AIT composites which include retained pitches are in evidence. Note in

particular the way in which a statement of f6-26 grows from a three-note subset sustained from the previously stated f6-z13, and the way in which two of the pitches in the second set are retained in the following f6-z48. Individual AITs appear in the texture, linking the first three pitches of the oboe's line to the upper-part $d^{\#2}$, and linking the upper interval in the wind instruments' music of b.163 with the piano's entry on $e^{\flat 1}/g^{1}$ in the same bar, initiating A_5(b.163-5). The pitches of the instruments' presentation of f6-z48 are incorporated into the piano's music of b.164, embedded in a B-type AIT statement which again articulates the retained structural pitches $b^{\flat}$ and $g^{\#2}$. The lowest of these, $b^{\flat}$, becomes the basis for a regular structure in i.c.7, $b^{\flat}-f^{1}-c^{2}-g^{2}-d^{3}$, further subdivided into i.c.3 and 4 and elaborated by the retention of f6-z48 as described. The upper pitch, $g^{\#2}$, is linked to the g^{2} of the i.c.7 structure through a direct semitonal association, and to the highest pitch d^{3} by a linear statement of an A-type AIT, (2,1,10,8), the interval $b^{\flat 2}/d^{\flat 3}$ (10-1) itself forming part of another AIT in b.165. The pitch d^{3} is retained from the 'tonic' i.c.4 of b.158, $d^{3}/f^{\#3}$, regaining the register presented at the beginning of the section but largely abandoned since then.

The interruption by ensemble I which follows (section [a]), is an extreme

contrast - texture, tessitura, speed and dynamic (in addition to tone colour) are all changed. Example 6.18 offers a reduction in terms of presented pitch and interval relations, an interpretation according to AITs formed by the intervals present in the texture, and two models of pitch-class progression, both involving relations of i.c.1. Pitches presented in $\not{a}^2_3$ prove to be starting-points for further elaborations in later sections featuring the harpsichord and its ensemble.

The structure of i.c.7s articulated in the lowest part of section A, and most prominent at the end of that section, is retained as an intervallic framework in ensemble II's next section, B (b.169-171), extended into a higher register with the addition of a^3, and emphasised by its presentation in a line of equal durational values, 7 ♩. This constitutes an 'incorrect' association of tempo and interval, as the pulse tempo this line produces (m.m.74) is an approximation to multiples of the base-rates m.m.24½(i.c.1, ensemble I) and m.m.25(i.c.2, ensemble II), making it clear that, here at least, the scheme associating intervals with particular tempi is not a primary structural determinant. Once again, AITs and their composites can be found in the texture, although they are less prominent than in section A. The AIT (9,10,1,3),

presented by the piano (R.H.) in b.169, is a partially octave-transposed version of the last AIT of section A - the last bar of A and the first of B are also linked by the retention of the pitches c^2/d^3, connecting the two sections in a particularly strong way over the discontinuity of the harpsichord ensemble's interpolation. The structural framework of section B relies not on linear presentations of AITs over relatively large spans, as did section A, but on relations to the 'grid' of i.c.7 and the derived dyad 9-1 (i.c.4), which appears in three different registers.

Ensemble I's[b]section overlaps with B, the double bass's F_1 of b.170 arising in the register of the lowest pitch of [a], from which it is derived through a semitonal association, and its next pitch, E^b, participating in a parallel association of i.c.2 with ensemble I's upper part. This generates c^1 from the upper d^1 of [a]. After a complex of local associations producing the figurations of b.171, the AIT composite f5-19 is stated. This forms the basis for a short passage of Klangfarbenmelodie, in which extracted subsets (including the two AITs) are heard in both ensembles.

The pitches of this statement of f5-19 become the point of departure for the following section, C (piano ensemble, b.173-85), the longest section so

far, and the most complex in terms of internal structuring and variety of texture. A prominent feature of C_1 (b.173-4) is the configuration formed by two overlapping, registrally equivalent forms of an A-type AIT. The two i.c.7's from this configuration combine to form the overlapping (0,1,6) trichords important in the piano part of the following section. In addition, the upper interval, $f^{\#2}/c^{\#3}$, is projected downwards to form the i.c.7-derived chord in the instrumental parts at the start of b.176, i.c.4 providing a new upper pitch, a ^{2}. In b.174-5, between C_1 and C_2, ensemble I makes a brief interpolation which presents a B-type AIT and relates to the registral configurations of ϕb^{2}_{3}.

C_2 itself (b.175-8) is notable for an unusual degree of mirror symmetry in the sustained AIT configuration of b.176-8, based on inversionally equivalent forms of AIT A and ultimately involving both the piano and its instruments. The following interruption, a single twelve-note chord played by the harpsichord and its ensemble, is somewhat difficult to explain. One might relate the lowest pitch, E, to the registral area already exploited by ensemble I's double bass; possible, too, is a justification of the chords three uppermost pitches, which form a (0,1,4) trichord, as an interpretation of the piano ensemble's characteristic upper register i.c.4's in terms of the harpsichord

ensemble's own interval classes 3 and 1.

The opening bars of C_3 (b.178-83) are closely governed by AIT relationships in the piano part, after which the texture develops a more exclusive reliance on associative patterns generated largely by i.c.4. The closing gesture in the piano part (b.182) projects an A-type AIT in a registral disposition which emphasises the upper register i.c.4, a reference to the music of section A. This interval class in this register is a prominent feature of the music of the Allegro scherzando up to this point; some of the relationships between instances of i.c.4 in different sections are summarised in ex.6.18, from which it is apparent that associations of i.c.1 and relations involving retained pitches are important, with subsidiary associations of i.c.2.

The interpolation featuring the piano ensemble's own instruments in b.183 presents a striking linear AIT statement, in the same intervallic partitioning as that at the end of the piano's music in the previous bar (in violin, 3-10-4-0, i.c.'s 7 and 4 separated by a rest in the linear presentation). Two AIT composites are also present, in a texture of some complexity - linear associations and processes abound, but I can find no immediate justification in intervallic or set-theoretic terms for the isolation of certain pitches as a

Hauptstimme. C_4 follows a similar pattern to C_3, moving from an AIT-governed texture to one in which linear processes are more important, here by way of a symmetrical ten-note chord (b.185) built from pitches retained from the AIT configurations of the previous bar. This chord can be broken into a sequence of overlapping and adjacent (0,1,4) trichords, which group to form a symmetrical structure of two instances of the AIT composite f6-z49. In the last part of b.185, (0,1,5) trichords colour the music locally.

By this stage, and as a summary of the larger linear relationships over the extract considered, example 6.18 should be largely self-explanatory. This reduction might be compared with the reduction of Stravinsky's Symphonies of Wind Instruments presented by E.T. Cone in the article referred to in footnote 7. The extent to which Cone's analysis can be said to have more than empirical value in its representation of details is debatable, as is the precise significance of his terms stratification, interlock and synthesis, let alone the possibility of transferring these concepts uncritically to the analysis of such stylistically different music as Carter's. Nevertheless, one might regard Cone's analysis as strongly suggestive of a type of musical organisation explored on a compositional basis in some of Carter's works, starting (as a conscious

compositional technique) with the Double Concerto.

Chapter 7: Concerto for Orchestra

The Concerto for Orchestra is Carter's richest and most complex work to date in every respect. A complete account of its materials, techniques, and their realisation in the textures of the work is beyond the scope of the present study; indeed, it may be doubted that such a project is at all feasible, given the size of the work, the density of the orchestral writing, the richness of the harmonic elaborations generated by Carter's intervallic techniques of composition, and the limitations of analysis at the present time. The Concerto for Orchestra marks a peak in Carter's output, developing characteristics of the earlier orchestral works of his maturity, the Variations for Orchestra, Double Concerto, and Piano Concerto. The conception of the orchestra encountered in A Symphony of Three Orchestras (1976) is somewhat different, tending towards a chamber orchestral ideal in its division of the orchestral body into three distinct smaller groups. Whilst the later work still retains the sense of consistency within the medium of the orchestra (avoiding the overt chamber-music aspect of, say, Stravinsky's late orchestral works), it is the Concerto for Orchestra which demonstrates most powerfully this aspect of

Carter's orchestral technique.

Eight years separate the Concerto for Orchestra (completed in 1969) from the Double Concerto (1961). The only work composed in the interim, the Piano Concerto (1964/65), may be considered to bridge the gap between the compositional preoccupations of the two other concertos although, as will be seen, the Concerto for Orchestra might be thought to have more in common with the intervallic techniques of the Second Quartet and Double Concerto than with the chordal techniques adumbrated by the Piano Concerto.

In the Double Concerto a twelve-note chord is established as a referential feature, also ostensibly controlling linear interval/register relationships on a larger scale. Intervals themselves are the principal compositional units, the 'primitives' upon which lines, harmonies and textures are based, the sonorous characteristics of individual intervals being associated with tone-colours drawn from either of the two ensembles. Coordinating relationships both between and within the two ensembles are governed by the two all-interval tetrachords, these also serving to generate other harmonic groups, and lines on a larger scale. In the Piano Concerto, two twelve-note chords, one for the orchestra, the other for the piano and its "concertino",

provide "tonic" locations for the basic elements of the musical structure, as did the twelve-note chord of the Double Concerto. Here, though, instead of intervals, three-note sets (trichords) are established as the compositional 'primitives'. Example 7.1 reproduces Carter's chart of the twelve-note chords and their constituent triads and intervals in the Piano Concerto[1]. The chart presents principal and subsidiary registers and spacings for each trichord and interval, and assigns to each one, two or three tempi. Furthermore, each trichord is assigned a "mode of behaviour", which governs its rhythmic, dynamic and textural elaboration: "Each triad has its associated character, and hence its own kind of continuity. Triad III, for instance, is constantly superimposed on itself in a way which leads to the large tone clusters in the strings, which become thicker and more frequent as the work proceeds."[2]. This is clearly very similar to the procedure of the Double Concerto. However, whilst the twelve-note chords comprise the 'tonic' locations for individual trichords, they are not referential in the sense of that of the Double Concerto, in that they are not recurring elements of the texture. Each trichord is introduced by a statement at its 'tonic' registral location: ex.7.2(a) shows the opening bars of the work, superimpositions and intervallic associations leading

away from, and then back to, statements of c3-7 in its primary register and spacing in a small-scale adumbration of the movement's overall formal process, and ex.7.2(b) presents the orchestra's first entry, with c3-8 in b. 18-22. Here the interval in common between the concertino's trichord c3-7 and the orchestra's c3-8, the tritone, establishes c3-8 at a 'non-tonic' register ($b\text{-}f^1\text{-}g^1$) before a simple transposition of the trichord onto itself at g^1 ($g^1\text{-}d^{b1}\text{-}f^2$) produces the "tonic" statement. Full statements of the two twelve-note chords are withheld until the end of the first movement, establishing a 'resolved state' for the trichords before movement II, starting from these chords, moves beyond this state to ever-denser superimpositions of trichords in the orchestra. The reduction of ex.7.3 shows how the twelve-note chord in the concertino arises from its immediate surroundings, and how this process relates to the orchestra's already achieved twelve-note 'tonic'.

The latter appears partially in b.334, before receiving more complete statements in b.340-42 and b.344-48, these two presentations interrupting and following the processes which form the twelve-note 'tonic' of the piano and concertino in its definitive appearance in b.343. The persistence of the orchestra's chord is in sharp contrast with the fleeting textures and

configurations of the rest of the movement, reinforcing the sense of structural arrival at this point. Against the orchestra's music, the concertino produces its twelve-note chord as a response: although not reiterated, it is the textural and dynamic climax of the concertino's music in these bars. Moreover, as ex.7.3 demonstrates, pitches and intervals in this chord are attained by means of numerous interlocking processes, which produce statements of some of the concertino's characteristis trichords in their principal spacings.

The music of b.339 arises from an interlocking pair of systems generated by superimpositions of i.c.5, the two systems associated through i.c.1. This produces statements of c3-5 within each system, and multiple statements of c3-7 through the association of the two systems. The flute's linear statement of another concertino trichord, c3-10, in b.339-40, provides the highest pitch of the configuration, and associates the three trichords in play (c3-5, 7 and 10) through their common interval, i.c.5. The other element of this linear statement of c3-10, i.c.3, forms the basis for an association involving c3-5, transposed up through this interval in b.340, over the dyad g-c^{1}, an element of the i.c.5 systems of b.339. This dyad is followed by a-$d^{\#1}$, which, with the previously stated dyad, both presents a spatially appropriate

statement of c3-10 (g-a-c^1) and reinforces the function of i.c.3 as an associative interval (c^1-$d^{\#1}$).

I.c.3 is prominent in the relationship of the orchestra's music of b.340-42 to the concertino's music which it interrupts. The interval $d^{\flat 2}$-c^3 of b.340, in violins and violas, is linked to the immediately preceding music by a semitonal association (b^2-c^3) and by one involving i.c.3 ($b^{\flat 1}$ of b.339 to $d^{\flat 2}$ in b.340, parallel with the association of the two instances of c3-5 associated by i.c.3). Similarly, the $a^{\#}$ on which the timpani enters is associated through i.c.3 with the concertino cello's g, and the intervening a, in addition to its role in producing a trichord statement described above, fulfills a less structural function as a 'passing note', elaborating a rather regular association by i.c.3 of two seven-note sets constructed from superimposed i.c.5's.

Overall, the orchestra's music of b.340-342 is concerned with stating the appropriate "tonic" chord. In addition, associations of various sorts arise within this chordal statement: an intervallic scheme based on i.c.11 frames these bars, initiated by $d^{\flat 2}$-c^3 in b.340 and concluding with $e^{\flat}$-d^1-$c^{\#2}$ in b.342. These enclose music which firstly takes over the associative interval i.c.3 from b.339-340 in timpani, then, with the appearance of the 'tonic's'

lowest interval, E_1-B_1 in b.341, plays on i.c.7. This interval is a prominent feature of the lower part of the orchestra's 'tonic' chord, and this bar stresses the intervallic complementarity which is an important element in the differentiation of concertino and orchestra, following the concertino's music based on i.c.5 in b.339-40. The lower element, a^3, of the "tonic's" highest interval, a^3-$f^{\#4}$, can be related to the last of the i.c.5 structures of b.340 by regular extension of that structure.

Symmetrical associations of i.c.3 generate the concertino's first chord of b.342, a complex of trichords c3-7 in their secondary registral articulation (cf. b.339), constructed from superimpositions of the characteristic intervals i.c.5 and 6. This chord is a starting point for a series of associations in which i.c.5 and 10 feature prominently, and which generate the concertino's twelve-note 'tonic' in b.343. The interval $g^{\#2}$-e^3, retained from the concertino's final trichord in b.340, is transposed onto itself to produce e^3-d^4, the highest interval of the chord; the lowest pitches arise from an inversion of this i.c.10 association, generating A_1 from the low G of b.342. F arises from a symmetrical association involving i.c.8, the A_1 of the double-bass and piano, and $c^{\#}$, this latter pitch itself arising from both a semitonal association of

i.c.5 ($c^{\#}$-$f^{\#}$/g-c^{1}), producing the 'tonic' locations for c3-7 familiar from the opening of the concerto) and from a combination of symmetrical and process-derived associations of i.c.3, again stemming from b.342's G.

Jonathan Bernard has indicated the importance of trichords in their 'primary' spacings in the pitch-stucture of the Piano Concerto, observing also that these 'spatial sets' are less evident in the Concerto for Orchestra, where intervals are again the principal elements in the textures of the work[3]. Notwithstanding Carter's elaborate plan of the work's materials, outlining repertoires of 3, 4, 5, and 7-note sets for the individual movement types in the chart reproduced as ex.7.4, it is the source intervals for each movement-type that generate the larger sets in their characteristic spacings. In the passages of the concerto to be examined it will become apparent that interval is of primary importance, sometimes overriding considerations of propriety of larger sets where the intervals concerned are generating lines, chords and textures.

There is nevertheless a certain more abstract appropriateness in Carter's choices of sets for the individual movements of the Concerto for Orchestra. Ex.7.5 presents a consideration of the 5 and 7-note chordal

repertoires in terms of interval vector[4]. The totals of these vectors for each of the four movements gives a precise indication of the intervallic potentialities of the entire repertoire of sets for that movement, to be understood as the possibility of extracting particular interval classes from the collection of unordered, non-registrally defined sets. It can be seen that the highest count for each interval class occurs in the repertoire of a movement particularly associated with that interval class (remembering that interval classes in this context are considered equivalent under inversion, i.e. interval class 2 = i.c. 10, i.c.3 = i.c. 9, etc.), and that the three maxima for each movement (with the sole exception of movement III's i.c.5) present the three interval classes associated with that movement. (Movement IV's total for i.c.6 appears low, but this is due to that interval class's unique self-complementary property, remaining unaltered under the operation of intervallic inversion. To compare the total with those of other interval classes, it should be doubled). While sets from one movement's repertoire could be (and sometimes are) registrally ordered to produce the characteristic intervals of another movement's, this examination of the total interval content of the repertoires of sets indicates that there is an overall appropriateness to this division of the

material.

Carter himself has pointed out differences in technique between the Piano Concerto and the Concerto for Orchestra, suggesting that the detailed and exact treatment of three-note sets on a small scale in the former is compensated for by a certain freedom in the overall formal design of the work, whilst the small-scale freedoms of the later concerto find their complement in a more rigidly controlled formal plan[5]. The first movement of the Piano Concerto is perhaps even anti-formal in its conception, with small scale associations of intervals and trichords generating textures "from within", the rapid interplay of soloist, concertino and orchestra projecting the volatile instability of the movement's formal characteristics. In the second movement the notion of form arising as a large process from the interaction of the smallest elements of the texture is applied in a more directed way. The single large gesture of the movement as a whole constitutes in itself the formal process, the orchestra progressively drowning the soloist in ever denser textures, becoming louder and more animated at the climax before the piano, in a quiet and meditative coda, has the last word. In both movements of the Piano Concerto, but particularly the second, the influence of the European

avant-garde is evident, stemming in part from Carter's experience of Ligeti's Atmosphères as a member of the ISCM jury in 1961[6].

The overall formal plan of the Concerto for Orchestra, on the other hand, is governed by a 'giant polyrhythm', a type of construction first used by Carter in the coda of the Double Concerto (see Chapter 6), here expanded to cover the entire duration of the work, some twenty-five minutes. This polyrhythm determines the principal appearances of music from each of the four movement-types of the work, and the placing of the five tutti passages which form the textural climaxes of the concerto (ex.7.6). On this large scale it is to be doubted whether this scheme could ever be claimed to be heard for what it is: apart from the difficulties encountered in comparing and assessing durations of more than c.12 seconds[7], the spans between the beats of the polyrhythm are not empty, but are filled with music whose various (and varying) speeds and densities work against a sense of precisely measured duration, this after all being a central concern of Carter's in his music from the late 1940s. Moreover, entrances of material from the various movement-types are not confined to the principal beats of the polyrhythm: the scheme is thus elaborated upon considerably. Rather than producing the clearly

perceived interfering cycles of the Double Concerto's coda, here the application of the polyrhythmic principle to what might be termed the highest level of durational control in a composition produces a framework rather than a structure, which although undoubtedly acting to support the elaboration of the work in all its details, is largely obscured in this process.

Carter has stressed the "multi-layered" aspect of the Concerto for Orchestra in describing the way in which the four movement-types are frequently cross-cut and superimposed, enlarging upon the experience of the Double Concerto's Allegro scherzando and the contrasts of the first movement of the Piano Concerto:

> The music . . . has four main characters, and, while hints of all four are being referred to constantly, the Concerto picks out one facet after another to dwell on at some length, subordinating the others. Thus, while there can be said to be four main movements, these are almost constantly heard in combination.[8]

Another view of the overall scheme of the concerto, mentioned briefly by Carter but played down at the expense of the less traditional formal ideas at work, is of four large and relatively self-contained movements, each including prestatements and echoes of other movements' material. These four movements are individually characterised by their interval and set repertoire,

by instrumentation, register, texture, tempo, and gestural features (see ex.7.5 for most of this information incorporated by Carter into his own chart of the concerto's materials). In addition, each movement is linked by Carter to specific passages in St. John Perse's Whitmanesque prose-poem Vents, an epic vision of an America swept by the winds of spiritual progress and renewal. The following lines are quoted by Carter in the score of the Concerto for Orchestra in connection with the first movement:

> And having exposed to the air the attrition and drought in the hearts of men in office,
> Behold, they produce this taste of straw and spices, in all the squares of our cities . . .
>
> * * * *
>
> And divinity ebbed from the great works of the spirit,
>
> * * * *
>
> For a whole century was rustling in the dry sound of its straw, amid strange desinences at the tips of husks of pods, at the tips of trembling things . .
>
> (from Canto I)[9]

The onomatopoeic exactitude with which Carter recreates the images of the "dry sound of straw" and the rattling of seed-pods reminds us of his substantial experience with ballet: however, neither this nor the equally vivid sonorous associations of A Symphony of Three Orchestras, likewise based on a poetic epic of America, should persuade us into considering Carter in any way

a composer of 'programme music' in the traditional sense, as these images become the basis for an intrinsically musical elaboration in terms of the materials and textures of the works concerned. These have no necessary connection with the structure or sequence of the poems which 'inspired' them. Carter may indeed use non-musical art forms as a source for appropriate images, even sometimes for formal procedures (the 'circular' scheme of both the Cello Sonata and the First String Quartet being suggested by Finnegan's Wake and by Cocteau's film Le Sang d'un Poète - this circularity is also an element of the plan of the Concerto for Orchestra), just as the music of other composers may suggest formal and technical procedures and even provide material for elaboration (for example, in the Cello Sonata, whose cyclic theme recalls that of Ives' Concord Sonata, and in the Ives and Nancarrow quotations in the First String Quartet). In all of these cases, the 'objet/idée trouvé', if it can be so designated, only serves as a point of departure or correspondence in a typically complex chain of associations and developments which take place simply in relation to its musical potential, expressive or structural.

The presence of four distinct movements in a large-scale orchestral composition inevitably suggests a 'symphonic' conception. The four movements

can, indeed, be characterised as 'symphonic allegro', 'scherzo', 'slow movement', and 'finale'; while this view of the work is clearly limited, it does provide a welcome critical orientation in the face of music of such complexity, and also suggests a relation to a genre in the same way that the four-movement scheme of the Second Quartet does. Of course, the Concerto for Orchestra is not a symphony; nevertheless, it may be considered to stand in a similar relation to Carter's 'symphonic tradition' (the most notable composers of which are Stravinsky and Sessions) as La Mer does to Debussy's.[10]

The main body of the Concerto for Orchestra is framed by a short introduction and a somewhat more extended coda. In their formal outlines, the four principal sections or movements are contrasted in significant ways, while admitting of an association of I with III and II with IV on the basis of particular formal principles. I and III rely on the contrast of numerous short sections to build collage-like structures similar to that encountered in the Allegro scherzando of the Double Concerto. II and IV are constructed from more homogenous material presented in a succession of cycles, these cycles sharing textural and large articulative properties within the movements in question.

The formal outline of movement I is presented in ex.7.7, which divides the movement into short sections on the basis of texture and instrumentation. From this outline it is clear that a large formal idea is at work, making the second part of the movement (b.60-141) an enlarged 'double' of the first (b.16-59), at least in terms of the types of material presented. This recalls the similar procedure of the Double Concerto's coda, although in the Concerto for Orchestra the variation is less rigidly dependent on the model, expanding the scheme considerably. A larger scale precedent for the structure is Varèse's Amériques, in which the material of the opening section is developed by 'projection' in the second part of the work. The formal outline derives from the expanding pulses of the resultant pattern formed by the overall polyrhythm; indeed, the first movement constitutes the closest association between the large durational plan and formal relationships on the level of individual movements. Later in the concerto, the polyrhythmic scheme is subjected to more prolific elaboration, and ultimately moves 'out of phase' with the music's surface structural division into four large movements.

In movement I tempo and metre assist in creating large scale formal associations. The crotchet pulse of b.16-26 is m.m.84, inherited from the

introduction. This tempo is regained at b.47, persisting until b.60. The piano solo at this point recalls strongly that of b.24-28, and the metrical modulation, involving septuplet division of a larger metrical unit (here the semibreve) is related to that of the earlier solo (where the metrical unit divided into seven is the dotted minim). It is characteristic of Carter's compositional involvement with the practicalities of performance that the elaborate metrical modulations of this movement are all carried by the piano part, which establishes a continuity to which the other performers can relate. In addition, this characteristic gives the piano sonority a special role in the movement, particularly in its more soloistic passages, creating a powerful referential association between the movement's formal processes and instrumental colour[11].

In his chart of materials for the Concerto for Orchestra, Carter defines the tempo characteristic of the material of movement II as "constant ritardando: grows slower from beginning to end of work" (see ex.7.4). While this is clearly true in a statistical sense of the overall tendency of the material, a literal application of the principle would be unrealistic, particularly in the continuous presentation of the material in b.141-285. This

movement is in fact organised as a series of ten cycles, each of which embodies an overall ritardando, the cycles themselves each starting from a slower point. Example 7.8 summarises this information, presenting details of tempi for each cycle and appearances of material of the other movement-types. In conjunction with the ritardando of each cycle, a decrease in dynamic level and textural density is also evident, providing a group of characteristics by which the extents of individual cycles may be determined aurally. A maximum of textural density and dynamic occurs near the beginning of each cycle: in cycles 1, 3, 4, 5, 6, and 7, this takes the form of a twelve-note chord or succession of twelve-note chords.

Movement III (ex.7.9) is less elaborate in its formal outline than movement I, appearing to be built on a more limited number of types and oppositions of material. The distinction between chordal (harmonic) and linear (melodic) elements is rigidly maintained for most of the movement, the former reaching its culmination in the three appearances of music which might be designated 'chorale' (b.299-302, b.365-368, and b.381-386), the latter in the solo and tutti lines and counterpoints which give the movement its rhetorical character (stemming, perhaps, from St. John Perse's lines "Let the Poet speak,

and let him guide the judgement!"[12]). The introductory passage (b.287-299) and concluding tutti (b.287-299) combine and juxtapose linear and chordal elements in a dynamic and mobile counterpoint, which is opposed within the movement by the static texture of b.348-354, sustaining a single twelve-note chord. The influence of this passage extends beyond the boundaries of movement II, as it marks the centre point of the entire work, the point at which the opposing tempo characteristics of II and IV meet and exchange: compare the statements of both movements' material before (IV, b.307; II, b.337) and after (IV, b.368; II, b.386) these bars. A similar passage in which opposing characteristics meet and are 'neutralised' occurs in the Variations for Orchestra, where the tempo tendencies of the two 'ritornello' themes, meeting and cancelling in variation 5, form the model for Carter's treatment of the idea here. As in movement I, a basic governing tempo is established as a starting point and goal for a scheme of metrical modulations; here, this scheme seems to be less strongly linked to the formal plan of the movement.

As mentioned above, movement IV shares with movement III the property of a formal organisation in cycles (see ex. 7.10). In IV, the cycles have characteristics opposed to those in II, as here each cycle embodies a

large-scale acceleration, with each cycle in turn starting from a faster point. Moreover, whereas in II dense textures, often involving twelve-note chords in one way or another, marked the openings of individual cycles, in IV these textural climaxes are reserved for the ends of the cycles (e.g. b.434-35, b.465, and b.506-7, the last of these, closing cycle 7, a 24-note chord constructed from twelve non-equivalent i.c.3s).

The tutti passage from which movement IV emerges (b.420) does not consist of superimpositions of music of all four movement-types, as had been the case with the transitions I/II and II/III. From this point onwards, in fact, the 'surface' division of the work's major sections is out of phase with the underlying durational structure, the multi-layered tutti marking the near-convergence of the terms of the concerto's 'giant polyrhythm' arriving only in the course of cycle 5 of IV (b.488f.). Insofar as one can sectionalise the work in these terms, the coda opens in b.518 not with a tutti but with a fragmentary texture drawing on elements of all four movement-types, which gradually builds in dynamic and texture to the maelstrom of b.550-58, marking the final coincidence of the giant polyrhythm. The emergence of the piano and wood percussion sounds from this passage associates this point with the start

of the first principal movement, which appears in a similar fashion from the chords of the introduction.

The variety and scope of the compositional practice in the Concerto for Orchestra, in the domain of pitch alone, are voluminous. In this work more than any other by Carter (and perhaps by anyone else) we are justified in regarding the compositional elaborations of the music's basic materials as 'transcendental'. There is no series, 'theme' or other such primitive to which the surface aspects of the music can be conveniently related; rather, the lines, chords and intervals are manipulated in a large number of ways to produce the textures of the concerto. The following pages will present what must remain only a partial account of characteristics of pitch organisation in the Concerto for Orchestra, considered also in the light of the primacy of intervals and the cogency of their linear associations and derived processes.

Example 7.11 presents a reduction of the passage in which the characteristic intervals and associated articulative gestures of the first movement emerge, b.16-23. Certain pitches in the rapid interplay of piano, harp and marimba are lightly doubled in woodwind, brass and string parts as

indicated: one element of the texture, a line in equal values of 7 quavers, continues a process from the previous bars and is not directly concerned with the passage in question. These pitches are identified in ex.7.11 by stems with left-pointing arrows.

This passage is framed by a pair of twelve-note chords, the first (in b.16-17) presented by the piano's rapid figurations, the second (b.23) a more rhythmically defined statement in the orchestra (this second twelve-note chord is examined in detail in ex.7.13). This articulative function of the aggregate was encountered in the Double Concerto, both as here, in a 'framing' function, and as the tendency for sets in the texture to combine to form twelve-note groups. Both usages are apparent in the Concerto for Orchestra.

Considering the music of b.16-23 from the point of view of set structure, a number of aspects of Carter's treatment of intervals in the context of sets become clear. On a local level, the movement's principal intervals (i.c.s 8, 9, 11) closely determine the presentational order of the pitches in the three-note, four-note and larger sets articulated by the lines. So, for example, c3-11 as a three-note line segment, usually occurs with the BIP 9-8 or 11-8, although other spacings occur[13]. Neither of these BIPs occurs

in Carter's chart of the concerto's materials; the vertical spacing of the set given there (and elsewhere referred to as the most characteristic registral form of the set) is notably absent. Other spacings may continue to reflect the primary intervals in their overall range (e.g. the BIP 3-8, where the 'compound' interval of the set's presentation is i.c.11) or not (e.g. the BIP 9-4^{+}, in the piano part of b.21). (See ex. 7.12).

The concatenation of intervals and three-note sets in the instrumental lines may produce statements of appropriate larger sets in segments of four, five, and seven pitches, although this is by no means always the case. In addition, the sets articulated in this way are generally not presented in their primary spacings. These larger sets arise from the association of intervals, in the first instance, and of the four-note sets produced by this generative association of interval pairs, not all are members of the assigned set repertoire of movement I. Occasionally, also, sets are presented as chords which, although consisting of a movement's appropriate intervals in a widely-spaced setting, are not members of that movement's repertoire of larger sets.[14] Such, for example, is the presentation of c4-14 in the string parts towards the end of b.22.

It is characteristic of the larger sets presented in lines to be articulated in appropriate subsets. See, for example, the segmentation of c5-10 into four overlapping three-note subsets in the harp's figuration, b.22. An important determinant of pitch order in set statements of seven pitches is the possibility of including, as a contiguous five-element subset, a transposed, or inverted and transposed, complement. So, in the statement of c7-26 formed by piano and harp parts in b.17-18, c5-26 appears as a five-note segment in in the piano (made possible by the presence of two registrally distinct instances of the pitch-class g). Likewise in the combination of harp and piano parts in both b.20 and b.21, in each case producing c7-21 with c5-21 as a subset. The most elaborate example of embedded complementation in this passage occurs in b.22-23, where c7-21 ($\overline{4,5,1,0,9}$) at the end of b.22 and c5-21 (5,4,1,0,9) at the beginning of b.23 combine to form the twelve-note aggregate, the first c7-21 also including c5-21 as a chordal subset (2,3,6,7,10), the c5-21 of b.23 itself incorporated into a new c7-21 as the bar proceeds, with the addition in the figuration of two pitches, $f^{\#1}$ and $g^{\#1}$ (c7-21: ($\overline{3,2,11,10,7}$)). Embedded complementation, arising in simple contexts of set statement (as in b.17/18), or in more elaborate structures involving literal complementation and

aggregate formation (as in b.22/23), is characteristic of Carter's treatment of sets throughout the Concerto for Orchestra.

Ex.7.13 presents the twelve-note aggregate which effectively 'punctuates' the texture in b.23, setting apart the previous interplay of piano, harp and marimba from the more extended piano solo which follows. The chord has a well-defined rhythmic and contrapuntal articulation, missing from the twelve-note chord of b.16 which is stated in the piano's less assertive figuration. The upper line, in a triplet subdivision of the notated metre, consists of inversionally related statements of c3-11 (the outer parts in the configuration associated through i.c.11), the lower in semiquavers, consists of a line doubled in i.c.11 itself. All but one of the consecutive pairings of elements from the two lines (the exception being b+d) produce appropriate five-note set statements, in consequence of which the other three elements produce an appropriate seven-note set as complement. The two framing twelve-note chords are strongly contrasted in their presentations - in articulation, texture, and instrumentation. In terms of their intervallic constitution, they appear to have little in common also, although the three upper members of each complex are transpositionally equivalent. The chord in

b.16 is a source for appropriate trichords in the piano's figuration; the consistent alternation of i.c.s 8 and 3 in the vertical sequence of intervals produces overlapping statements of c3-11. The chord of b.23, arising as it does from a more linear association of intervals and trichords, does not function in this way.

The contrasts in the passage examined in ex.7.11, between rapid and mobile figuration in the piano part and more sustained set statements in repeated notes and tremolandi in harp and marimba, are sufficiently pronounced to suggest a hearing of the chords played by harp and marimba as somehow 'cadencing' the piano's phrases. This idea is elaborated in ex.7.14, which considers associative and processive relationships between the sets played by the harp. A particularly notable feature of the succession of chords so formed is the fact that only the last one, c5-10, is presented in its primary spacing as defined by Carter (see ex.7.4). The chord's wide spacing, using exclusively two of movement I's characteristic intervals, its high register, associating the chord with the two framing twelve-note complexes, its full doubling in the other instrumental parts, and its segmentation by the harp into appropriate trichords, combine to make this chord appear, in a sense, the 'goal'

of the passage.

The lowest register of the succession presents a descending process in i.c.5, linking the first, second, fourth and fifth chords. I.c.3 is involved in a strong inner-part process which connects all but the registrally displaced fifth chord: $d^{\#1}$ - $f^{\#1}$ - $a^1/c^2/d^{\#2}$ - $f^{\#2}$ - a^3, the last ascending i.c.3 displaced by an octave. Of course, neither i.c.3 or 5 are 'appropriate' to movement I, although both appear in 'close' positions of movement I's trichords. Neither are i.c.1 or 2, both of which feature in the chord-to-chord associations of this passage.

Larger intervals also play an important part in the associations arising in this sequence of chords. The 'compound' i.c.3 (3^+) $f^{\#2}$-a^3 has already been mentioned: this is paralleled by an association of i.c.3^+ in the lowest register, also linking a previous chord to the passage's climactic c5-10 (E-g). In fact, if the two penultimate chords are combined, five of their pitches, including the contextually important registral extremes, form an exact transposition of the concluding c5-10, associated through i.c.3^+ (ex.7.14(b)). As this five-note set is presented in a symmetrical spacing, this relationship can also be considered as an inversion followed by a transposition, or 'rotation', about an axis $f^{\#1}/g^1$.

This symmetry has important consequences for the succession, as other pitches can be incorporated into the symmetrical configuration about this axis, in particular f and $g^{\#2}$ (fourth and fifth chords' registral extremes) and the lowest register's process in i.c.5, $d^{\#1}$ -$a^{\#}$ - f, mirrored in the upper parts of the third and fourth chords (b^{b1} - $d^{\#2}$ - $g^{\#2}$). Ex.7.14(d) presents the symmetrical associations generated by the harp's first trichord, c3-1, linking the upper part's succession of pitches with a reflection in an inner part. Further symmetrical associations, with i.c.4 prominent, connect the last two chords in the sequence. Finally, i.c.13 (1^{+}) emerges as an important agent in the apparent registral discontinuities between certain chords in the passage, the association g^{2}-$f^{\#1}$ linking the upper parts of the first two chords predicting two subsequent associations, $g^{\#2}$-a^{3} and f-E, which arise from the symmetrical relation about the axis $f^{\#1}/g^{1}$ described above.

It remains to discuss the relationship of this passage to the contextually important 'frame' formed by the twelve-note chords of b.16 and b.23. Ex.7.15(a) also includes the chords played by piano, marimba and strings in b.22/23, between the harp's c5-20 and the second of the twelve-note chords. The most striking aspects of the passage considered here are the large-scale

associations in the highest and lowest registers. In the latter, the pitch-class e is presented successively at three distinct registral levels (E_1, E, e). The highest register links the two twelve-note chords and b.22's c5-10 through a symmetrical association of i.c.2, applied to two members of each chord forming i.c.11 (ex.7.15(b)). In fact, the upper three pitches of the twelve-note chord of b.16 are transposed through i.c.2 to produce those of b.23's twelve-note chord: the presentation of c5-10 does not share this feature. Ex.7.15(c) relates the c5-10 of b.22 to the first five-note element of the twelve-note aggregate in b.23 (a+c in ex.7.13): these are linked by a retained pitch ($b^{\flat}2$) which also appears in the other instruments' chords of b.22/23, and by registrally equivalent forms of c3-9 as the lowest trichord segment of each, associated through i.c.3.

Somewhat more complicated than the procedures in the extract just considered are those governing the first appearances of material of movement-type II in the course of the first fifty bars of I. Ex.7.16 presents a consideration of this music in terms of the sets employed (dashed barlines identify the overall metrical pulse for ease of reference). Various aspects of Carter's set technique are demonstrated. The association of sets through

retained common pitches features in b.34: essentially these bars expose some of the subsets of firstly c5-23 (2,1,11,9,6) and then c5-37 (2,3,6,8,10), these two sets related through their common interval d^3-$f^{\#3}$. Bars 44 (third ♩) to 45 (end) present a striking instance of the elaboration of technique common throughout the work. Firstly, two lines, one doubled at i.c.7, the other in parallel trichords c3-5, moving more or less consistently in contrary motion, produce a succession of 5-note chords appropriate to the repertoire of movement II. In b.45, a third line is added, doubled in i.c.10, to produce appropriate seven-note chords in an interlocking succession of six different types over the first three-quarters of the bar: (a), c7-25; (b), c7-28; (c), c7-37; (d), c7-4; (e) c7-25; (f); c7-4. These bars express a particular relation between these sets, each of which can be partitioned into three elements, i.c.7 and 10, and c3-5, combined in different transpositional and inversional relationships in each chord. This is of course true of the five-note chords of b.44-45 also, the elements in the partitioning here simply i.c.7 and c3-5. Bars 46-49 present a textural exploitation of set properties frequently found in the work: a line in trichords moving against a sustained interval, producing appropriate five-note sets related through a common dyad subset.

Within these bars, however, there are chords expressing sets which are not appropriate to movement II. Their place in the texture must be explained in different ways. The statement of c4-10, 4th  of b.45, doubles individual pitches in the more rapid quintuplet figuration, and thus can be considered as a 'resultant' of the texture, as well as expressing movement II's characteristic i.c.7. c5-13 in b.46 and c5-31 in b.58 are clearly related to the five-note sets which surround them by an equivalent partitioning into an appropriate trichord and interval: moreover, c5-31 in b.48 'resolves' to an appropriate five-note set when the upper line of the texture moves to a new trichord in the following beat. c3-5 in b.46 restates, as its upper interval, the dyad g^3-d^4, previously sustained in b.43, the upper pitch of which is the highest between b.43 and the first half of b.46. To assess the potential significance of this, we must consider large-scale associations in the highest register over these bars.

Ex.7.17 presents such an overview. The reduction omits the details of associations at the local level in b.12-15 and over b.41-50 to concentrate on the contextually important registral extremes operating over longer spans of the music. Of particular importance are associations of i.c.2 and 4, by means of which the music regains in b.38 the f^4 of b.15. the process in i.c.2 through

which this pitch is reached ($c^{\#4}$-$d^{\#4}$-f^4) is paralleled by a similarly ascending process in the lowest register, c^2-d^2-e^2), linking the fragments of b.30 and b.38. Hereafter, the uppermost part carries the structural line of associations, the lower pitches in b.45 arising in the texture from the denser writing for strings and from the local associations not shown in ex.7.17. The upper line of b.45, a^3-$b^{\flat 3}$-b^3, present in the rapid texture as the upper pitch of the first chord of each quintuplet group, is doubled in the upper part of the sustained string chords of the bar. The semitonal association of two i.c.7, $a^{\flat 3}$-$e^{\flat 4}$/g^3-d^4, b.42-43, governs the i.c.2 associations of the following bars, with d^4 in particular serving as a source and focus for many such associations.

Ex.7.18 and 7.19 present set content and associations respectively for b.142-151, the first bars of movement II's principal appearance. One encounters again chords not appropriate to the material, in terms of Carter's chart, identified in ex.7.18 with asterisks, and various other aspects of Carter's set technique. In b.146 successive chords are generated from previous chords by changing one pitch at a time, producing a chain of five-note chords each pair of which is linked by a registrally invariant four-note subset common to both elements. In this bar and the previous one, small-scale symmetrical

dispositions of chord-types appear fleetingly: 34,23,9,23,34 and 37,6,9,6,37.

Clearly the most striking feature of b.145-146, however, is the stability of the pitches e^3 and $f^{\#4}$, the registral boundaries of all the chords up to b.147. Associative relations stemming from registral articulation and weighting of pitches are demonstrated in ex.7.19(a), whilst 7.19(b) extracts a large symmetrical process from these bars, underlining the consistency in register of the music at this point.

So far, only passages exemplifying the music of single movement-types have been examined. While these often present the essence of Carter's harmonic practice and (perhaps unconscious) associative characteristics, it is necessary to consider also those passages in which the overall effect of the music stems from a more elaborate superimposition of different types of material. For Carter, as for his German namesake Wagner[15], music is an art of transition. Even in a composition as stringently sectional and collage-structured as the Third Quartet, Carter draws attention to

> . . . the possibility of contrasts between the 'unmotivated', abrupt changes from one movement fragment to another with the 'motivated' continuities within the movements in which one thing clearly grows out of another.[16]

Our attention now turns to those parts of the Concerto for Orchestra in which

the textures and materials of individual movements coalesce and disintegrate.

The first nine bars of the Introduction present a single twelve-note chord, articulated in four trichords, each in a specific register and heard in a particular scoring (ex.7.20). These trichords, registers and instrumentations form the basis of the material of the four movement-types of the work. In b.9, the chord changes: the new chord is also a twelve-note chord, largely articulated in appropriate trichords (the instruments of I are given the inappropriate c3-4, although this is registrally disposed to emphasise the appropriate i.c.11, whilst the instruments of IV have, momentarily, an extra pitch),

certain pitches being retained, others exchanging registers. The harmony changes ever more rapidly to the beginning of b.12, each new chord (with the exception of the fifth, b.10 , which has only ten pitches) a twelve-note chord in an appropriate trichordal registral segmentation.

In b.12, the four registrally-defined layers of trichords suddenly become mobile, tracing broadly sweeping paths through the entire range of the orchestra in lines of faster time-values: this is one of Carter's most elaborately conceived textures (ex.7.21). The streams of trichords are

differentiated harmonically, each consisting only of appropriate trichords, and in rhythmic articulation, the lines using different subdivisions of the overall notated metre to move at different rates. The highest and lowest streams of the original texture, movement-types II and III respectively, change places in the course of these bars. Music from II reaches a low-point of $F^{\#}_{2}$, associated through a semitone with the $E^{\#}_{2}$ of the line from III at the beginning of b.12, while III ascends through c^{4} (the upper pitch of II's second chord in b.12) and f^{4} in a process involving i.c.5 to $b^{\flat 4}$. As the texture becomes less dense in b.13-14, the characteristic instrumental gestures of movement I material emerge (piano, pizzicato strings, wood percussion) against a background of linear associations in the music of the other three movement-types. Music from movement IV, linking its trichords largely through retained pitches and semitonal associations, is rounded off in b.15-16 with a complex of associations of i.c.3, one of its appropriate intervals. Movement III, having regained its initial lower pitch $E^{\#}_{2}$ at the beginning of b.14, moves in a less connected way, a characteristic ritardando fragmenting its texture. Music from movement II also slows over the course of this passage, yet moves much more consistently in associations of two of its primary intervals, i.c.4 and 7.

Pitches from each of these three strands in the texture are incorporated into the music of the dominant movement I: c^2 (III, b.16) is a pitch in the piano's music of that bar (although not particularly prominent); $e^2/g^{\#2}$ (II, b.16) appear more obviously in the marimba, combining with $d^{\#2}$ ($e^{\flat 2}$, IV, b.16), to form the characteristic I trichord c3-11. Also in IV, $e^{\flat 1}$ (b.17) is stated as $d^{\#1}$ in the piano. Material from II, III and IV is thus 'absorbed' into the music of the emergent principal movement at this point, I.

The relationships presented in movement II's material over these bars is significant for the further elaboration of this movement-type in its fragmentary appearances in the first fifty bars of I. The overall upper register association between g^4 and f^4 (b.12-15) establishes a register for this movement-type, presents an interval of association which becomes important in the music (i.c.2), and provides a pitch (f^4) which is ultimately re-attained at b.38 (see ex.7.17).

Example 7.22 considers the transitional passage between movements I and II (b.134-142). In the bars immediately preceding this extract (b.115ff.) the texture has become progressively more fragmented, small segments of music from movement-types II, III and IV appearing, while music proper to I itself has

degenerated into short bursts of figuration in piano and percussion. Initially, the most striking aspect of the passage in question is the way in which the fragmented, almost pointillist texture of b.128-32 becomes chordal in b.133-139; three five-note chords from the repertoire of I are stated in their primary spacings, in conditions which, recalling the emergence of movement I material from the Introduction in b.16-23, imply a 'cadential' function with reference to the piano's more rapid figuration. These chords (c5-21, c5-27, c5-8) and their linear interrelationships are displayed in the lower part of the example: with the addition of two pitches, the last of these (c5-8, b.138) becomes c7-21. These two pitches, $d^{\#3}/b^{3}$, regain the register of the violins' g^{3}, b.128-29, to which they are related through a symmetrical association of i.c.4. The association of the lower trichords of c5-21 and c5-27 through i.c.2 forms part of a more extensive network of relationships involving this interval, in an organisation of pitch which might almost be considered sequential. Certainly, the way in which the process in i.c.2 over b.134-36 ($c^{\#2}$-e^{b2}-f^{2}) is restated as a whole at a transposition of i.c.2 in b.137-38 ($d^{\#2}$-f^{2}-g^{2}) accounts for much of the sense of cogency and directed motion of this passage. Also notable is the rhythmic diminution: the second process occurs

over a shorter time-span than the first, producing in effect an accelerando towards the climactic c7-21 of b.138, even though there is no actual reduction in the notated rhythmic values.

The following bars present another example of the articulative function of twelve-note chords noted previously in connection with b.16-23. Here, the rhythmic and registral articulation, with a partitioning of the aggregate resulting in four lines of trichords, recalls the Introduction's 'explosion' of b.12-14: in fact, this point marks the first near-coincidence of the concerto's 'giant polyrhythm'. Throughout b.140 and the first part of b.141, the component trichords, with the exception of two appearances of c3-6, belong to the repertoire of movement I: c3-1, c3-9, c3-11. Following this in b.141, the four registral strands assume independent and appropriate trichordal repertoires, once again reflecting the primary registral location of each of the four movement-types established in the introduction. C3-5, the most prominent and characteristic of movement II's trichords, is its sole representative in this bar, the last statement ($f^{\#2}/c^{\#3}/g^{\#3}$) becoming in the following bar the starting point for movement II's main appearance.

The maintainance of twelve-note harmony through the cross-rhythms of

the individual lines of trichords is demonstrated in the chart below the example: this embodies in a compositional realisation the properties of hexachords in various trichordal partitionings (for example, the hexachord formed by the pair of superimposed c3-11, 4th ♩ of b.140, produces a complementary hexachord which is expressed in a trichordal partitioning firstly of c3-6 + c3-1, then of c3-1 + c3-9.

Example 7.23, the final example of the chapter, presents an analysis of the tenth 'cycle' of movement II and the commencement of the tutti transition to III (b.266-85). Cycle 10 itself consists of 25 superimposed and overlapping statements of short fragments of characteristic material, against which material from the other movement-types is heard, at first also in fragments (III, b.270; I, b.277; IV, b.278), but growing into more continuous statements as the multilayered tutti of b.284ff. approaches. This 'collage' construction hardly needs identifying as a primary element of Carter's compositional technique: as we have seen, it is used extensively in all four movements of the Concerto for Orchestra, if not as systematically as in some subsequent works. In movement II the elements of the 'collage' are not as sharply distinguished in scoring, texture and gesture as in I, producing an effect of overlapping repetitions of

similar, rather than contrasted units. In cycle 10 of II, these units are very much shorter than previously in the movement: the brevity of these superimposed sections results in a fragmentary texture which signals the end of the second main movement, just as an equivalent fragmentation of the texture had done in the first. It should also be noted that that in the overall ritardando through this cycle, the procession of fragments establishes a microcosm of the formal organisation and tempo structure of II as a whole.

Example 7.23 shows the principal connections in pitch and register between the individual fragments of cycle 10. The interval $e^2/g\#^2$ is of particular importance in b.266-70, one or both pitches being structurally prominent in each of the fragments a - e, as indicated. This interval arises in a semitonal association in b.264-65 (f^2/a^2 - $e^2/g\#^2$).

In b.278-82, initially isolated statements of movement IV's trichord c3-8 coalesce into a more sustained line. All these statements participate in a cogent series of associations involving largely i.c.2 and 3 as intervals of association: these are also the vertical interval classes present in the primary spacing of this particular trichord (ex.7.23(3), lower stave, showing the

The lower strings initiate a final statement of movement II material in b.283. This starts at a markedly faster speed than the immediately preceding fragments of cycle 10, and might perhaps be regarded as the start of a hypothetical 'cycle 11'. The ascent of this line of four- and three-note chords incorporates two pitches from cycle 10's fragment (x), a $^{b\,3}/_{c^3}$, in b.284, absorbing them in a more rapid figuration which slows in the following bars' textural superimposition in a characteristic ritardando. This tutti (b.284-87) is less ordered than those of the Introduction and b.140-41. Rather than producing trichordally-based twelve-note harmony, here the four textural strata which are constituted by the four superimposed movement-types are more spread, and less mutually dependent. The instruments of movement I play a complex polyrhythm, the chordal basis of which is demonstrated in ex.7.23(4). In addition, pitches from the other movement-types' strands are incorporated into the instrumental parts of movement I's texture at this point, lending the total texture at least some degree of coherence.

Chapter 8: Conclusion

The unity of musical space demands an absolute and unitary perception. In this space . . . there is no absolute down, no right or left, forward or backward. Every musical configuration, every movement of tones has to be comprehended primarily as a mutual relation of sounds, of oscillatory vibrations, appearing at different places and times. To the imaginative and creative faculty, relations in the musical sphere are as independent from directions and planes as material objects are, in their sphere, to our perceptive faculties. Just as our mind always recognizes, for instance, a knife, a bottle or a watch, regardless of its position, even so a musical creator's can operate subconsciously with a row of tones, regardless of direction, regardless of the way in which a mirror might show the mutual relations, which remain a given quality.[1]

Schoenberg's familiar advocacy of the relative nature of atonal musical space stands in need of a certain amount of qualification: one only has to imagine any of the serial works played in a retrograde or inverted form.[2] While his emphatic recognition of the invariance of intervallic qualities under operations which change order and direction and his (only apparent) relegation of the importance of register in music have formed the basis of much subsequent compositional and analytical theory, Schoenberg's stress on the perceptual qualities of such relationships has been largely ignored. In this respect, a more generous interpretation of interval class (as an absolute measure of 'distance' in musical 'space', defined in size but not necessarily in

terms of precise pitch identity) is the basis of all musical relationship: its perceptual concreteness (a quality which cannot be ascribed to Forte's more abstract notion of interval class) surviving in both successive and simultaneous statements of its constituent pitches.

Elliott Carter composes with intervals in combination. Certain configurations of intervals may serve as referential sonorities or as referential modes of relationship in a composition: generally speaking, this is the limited extent of pre-composition of pitch material in Carter's music. One means of characterising textures in analysis is to describe intervallic relationships between their elements, such intervallic associations providing some measure of a particular consistency which, moreover, posesses a real perceptual identity. The notions of linear interval relation (symmetry, process) enable judgements to be made concerning progressions and goals, teleological means and ends, in atonal music.

Carter's compositional premises do not represent a break with tradition. His music evolves 'in time', using this characteristic perhaps more deliberately than any previous composer, but by no means in a totally new or unprecedented way. He is a composer of the main stream, the 'great tradition'

in Western music: his conception of a work, and of its overall continuity, associates him with Mahler, Schoenberg, Stravinsky, Bartok, Hindemith, even Lutoslawski (whose technique and immediate expressive ends could hardly be more different from Carter's). This overarching unity of process is apparent even in the mature works, where discontinuity is such an important aspect of local levels of structure.

As demonstrated in the first chapters of this study, many elements contributed to this characteristic continuity in Carter's music. Although some of these reflect evident concerns with the music of other composers (the 'long line' in American music; Hindemith's music rather than Stravinsky's as a model for neo-classicism; Schoenberg as a source of a 'neo-expressionist' aesthetic), it is notable that since the early 1950s the development of style and technique in Carter's music has taken place from within, with very little of importance that can be described in terms of the external influence of the work of other composers. Thus the notion of 'process' becomes applicable not only to the evolution of materials and their relationships in individual works, but also to the output as a whole.

Although the analytical procedures described in Chapter 4 were

conceived with particular reference to Carter's music, the brief discussions of music by Schoenberg, Varèse and Boulez demonstrate that these procedures are amenable to generalisation: they form the basis of a 'listeners' guide to atonal music' which, while by no means ignoring the possibly systematic elements of compositional practice in the music under examination, searches for structure in the very acts of perception and mental representation. This view of structure reasserts the absolute in its definition of musical space, however tentatively, as a basis for the relative equivalence of horizontal and vertical: intervallic processes (both in themselves, and as metaphors for the evolution in time of emotions, actions, consequences) are inherently irreversible: 'up' and 'down' take on opposed meanings in the gestural language of a piece which might not prove ultimately contextual.

Notes to Chapter 1

1. Collected, with a wide selection of other material, in The Writings of Elliott Carter, Ed. K. and E. Stone (Bloomington, 1977)[Writings].

2. C. Ives, Memos, ed. J. Kirkpatrick (Nem York, 1972).

3. Reprinted in C. Ives, Essays before a Sonata, ed. H Boatwright (New York, 1961)

4. H. Cowell, New Musical Resources (New York, 1930).

5. H. Partch, Genesis of a Music (1949: 2/New York, 1974).

6. Lectures of this sort form the basis of Copland's first book, What to Listen For in Music (New York, 1939). See E.T. Cone, 'Conversation with Aaron Copland', PNM 6/i (1968), p.65.

7. R. Sessions, 'Heinrich Schenker's Contribution', in Roger Sessions on Music: Collected Essays, ed. E.T. Cone (Princeton, 1979), p.231-240; 'Escape by Theory', ibid., p.256-262.

8. M. Babbitt, 'The Function of Set Structure in the Twelve-tone System' (unpublished: 1946).

9. M. Babbitt, 'Some Aspects of Twelve-tone Composition', The Score 12 (1955), p.53-61; 'Twelve-tone Invariants as Compositional Determinants', MQ xlvi (1960), p. 246-259; 'Set Structure as a Compositional Determinant', JMT

5/i (1961), p.72-94.

10. D. Martino, 'The Source Set and its Aggregate Formations', JMT 5/ii (1961), p.224-273).

11. D. Schiff, 'In Sleep, In Thunder: Elliott Carter's Portrait of Robert Lowell', Tempo 142 (September 1982), p.8.

12. See M. Steinberg, Introduction to Elliott Carter: Sketches and Scores in Manuscript (New York, 1973), p.8.

Notes to Chapter 2

1. A.Edwards, Flawed Words and Stubborn Sounds (New York, 1971) [FW], p.61.

2. A. Whittall, 'Elliott Carter', First American Music Conference (Keele, 1975), p.82-98.

3. Writings p.270.

4. Ibid.

5. Ibid.

6. Ibid.

7. Writings p.343.

8. FW pp.41, 43-45, 99.

9. Writings p.333.

10. FW p.40.

11. FW p.41.

12. FW p.45. One of these settings of Joyce is appaently still extant: "a setting of Joyce in 5/8 time submitted to New Music Edition . . . and neither published

nor returned until a few years ago when Henry Cowell turned it up among his old papers." Writings p.333.

13. FW p.61.

14. FW p.44.

15. Ibid.

16. FW p.45.

17. FW p.60.

18. FW p.61.

19. FW p.47.

20. FW p.46.

21. MQ xxxii (1946), reprinted in Writings, p.121.

22. C.J. Oja, 'The Copland-Sessions Concerts and Their Reception in the Contemporary Press', MQ lxv (1979), p.121.

23. A. Copland, 'Contemporaries at Oxford', MM ix (1931-32), p.23.

24. FW p.64.

25. FW p.47.

26. D.M. Emmet, 'Whitehead, Alfred North', in The Encyclopedia of Philosophy (New York, 1965) vol.8, p.291.

27. FW p.49.

28. FW p.56.

29. See, for example, 'The Case of Mr. Ives' (1938), Writings p.48; 'Ives Today: His Vision and Challenge' (1944), Writings p.98; 'An American Destiny' (1946), Writings p.143; 'Charles Ives Remembered' (1974), Writings p.258; 'Documents of a Frienship with Ives' (1975), Writings p.331.

30. A. Berger, Aaron Copland (New York, 1953), p.29.

31. W. Mellers, Music in a New Found Land (London, 1964), p.74.

32. See FW p.55.

Notes to Chapter 3

1. "The First Quartet was 'written largely for my own satisfaction and grew out of an effort to understand myself', as the late Joseph Wood Crutch (a neighbor during the 1950-51 year of this quartet) wrote of his book The Modern Temper." Writings p.275.

2. FW p.69.

3. FW p.74.

4. C. McPhee, Music in Bali (Yale, 1966). Carter read the manuscript of this extended study, which was published shortly after McPhee's death. See FW p.41.

5. See R. Brandel, The Music of Central Africa (The Hague, 1961), p.152, 157, for transcribed examples of Watusi drumming.

6. H. Cowell, New Musical Resources (New York, 1930).

7. FW p.91-92n.

8. D. Schiff, The Music of Elliott Carter (London, 1983) [MEC], p.50n.

9. 'Fallacy of the Mechanistic Approach', Writings p.118.

10. Ibid., p.120.

11. Ibid..

12. 'The Time Dimension in Music', Writings p.243; 'Music and the Time Screen', Writings p.343.

13. C. Koechlin, 'Le Temps et la Musique', La Revue Musicale, January 1926, p.45-62; P. Suvchinsky, 'La Notion du Temps et de la Musique', La Revue Musicale, May-June 1939, p.70-80. S.K. Langer, Feeling and Form (New York, 1953).

14. Writings p.344-345.

15. Writings p.271.

16. MEC p.138.

17. Writings p.349.

18. C. Gagne and T. Caras, Soundpieces: Interviews with American Composers (New York, 1980), p.88.

Notes to Chapter 4

1. 'Context and Continuity in an Atonal Work: A Set-theoretic Appproach', PNM 1/ii (1963), p.72-82; 'A Theory of Set-complexes for Music', JMT 8/ii (1964), p.136-183; 'Sets and Nonsets in Schoenberg's Atonal Music' PNM 11/i (1972), p.43-64; The Structure of Atonal Music (New Haven, 1973).

2. See, for example, J. Baker, 'Coherence in Webern's Six Pieces for Orchestra Op.6', Music Theory Spectrum 4 (1982), p.1-27.

3. W. Benjamin, review of A.Forte: The Structure of Atonal Music, PNM 13/i (1974), p.170-190.

4. P. Johnson, 'Symmetrical Sets in Webern's Op.10 no.4', PNM 17/i (1978) p.219-229.

5.A.Forte, The Structure of Atonal Music, p.83-92.

6. Ibid., p.90.

7. Ibid..

8. Ibid., p.91.

9. Ibid..

10. P.Johnson, 'Symmetrical Sets'.

11. W.Benjamin, 'Ideas of Order in Motivic Music', Music Theory Spectrum 4 (1982), p.1-27.

12. A.Forte, 'The Magical Kaleidoscope: Schoenberg's First Atonal Masterwork, Op.11, no.1' Journal of the Arnold Schoenberg Institute 5/ii (1981), p.127-168.

13. W.Benjamin, review of Forte Structure, p.189.

14. See note 11.

15. A.Katz, Challenge to Musical Tradition (New York, 1945); F.Salzer, Structural Hearing (New York, 1952); A.Forte, Contemporary Tone-Structures (New York, 1955); R.Travis, 'Towards a New Concept of Tonality', JMT 3/ii (1959), p.257-284. For a resume of Schenkerian analysis and twentieth-century music, see J.Baker, 'Schenkerian Analysis and Post-Tonal Music', in Aspects of Schenkerian Theory, ed. D.Beach (New Haven, 1983).

16. W. Benjamin, 'Ideas of Order', p.33.

17. W. Benjamin, 'Erwartung and the Drawers of the Mind: Expectations and Rewards in Analysis'. Paper presented to the University of Oxford Faculty of Music Seminar in Analysis, 1st June 1983.

18. C.F.Hasty: 'Rhythm in Post-Tonal Music: Preliminary Questions of Duration and Motion', JMT 25/ii (1981), p.183-216; 'Segmentation and Process in Post-Tonal Music', Music Theory Spectrum 3 (1981), p.54-73; 'Phrase

Formation in Post-Tonal Music', JMT 28/ii (1984), p.167-190.

19. J. Bernard, 'Pitch/Register in the Music of Edgard Varese', Music Theory Spectrum 3 (1981), p.1-25; 'Spatial Sets in Recent Music of Elliott Carter', Music Analysis 2/i (1983), p.5-34.

20. J. Straus, 'A Principle of Voice-leading in the Music of Stravinsky', Music Theory Spectrum 4 (1982), p.106-124.

21. F. Lerdahl and R. Jackendoff, A Generative Theory of Tonal Music (Cambridge, Mass., 1983), p.3.

22. To this extent the ideas developed here resemble the implication/realisation model of musical progression of, among others, Leonard B. Meyer.

23. Hasty, 'Segmentation and Process', p.55-63.

24. Lerdahl and Jackendoff, A Generative Theory, chapters 2, 3 (p.13-68).

25. Ibid., p.43.

26. Ibid., p.21.

27. A. Forte, 'Foreground Rhythm in Early Twentieth Century Music', Music Analysis 2/iii (1983), p.239-268.

28. M.M. Hyde, 'A Theory of Twelve-Tone Metre', Music Theory Spectrum 6 (1984), p.14-51.

29. D. Epstein, Beyond Orpheus: Studies in Musical Structure (Cambridge, Mass., 1979), p.2of b.18 are a clear reference to the AIT which instigated th01.

30. G. Perle, The Operas of Alban Berg: Volume 1; Wozzeck (Los Angeles, 1980), p.131.

31. H. Pousseur, 'Anton Webern's Organic Chromaticism', Die Reihe 2 (1955/English translation 1958), p.51-60.

32. A. Whittall, 'Webern and Atonality: The path from the old aesthetic', MT cxxiv(December 1983), p.733-37.

33. See G. Perle, Serial Composition and Atonality (5/Los Angeles, 1981), p.26-27.

34. Hasty, 'Segmentation and Process', ex. 4d, p.62.

35. Ibid., p.55.

36. Quoted by M. Bowie in 'Jacques Lacan', in Structuralism and Since, ed. J. Sturrock (Oxford, 1979), p.125.

37. See, for example, Lerdahl and Jackendoff, A Generative Theory, p.296-301; Whittall, 'Webern and Atonality'.

38. See J. Sloboda, The Musical Mind: The Cognitive Psychology of Music (Oxford 1985), p.11-17.

39. See R. Barthes, 'Introduction to the Structural Analysis of Narratives' in Image, Music, Text (essays selected and translated by S. Heath: London, 1977)

40. See R. Barthes, S/Z (Paris, 1970: trans. R. Miller, New York, 1974), for an extended example of an analysis of this type.

41. R. Barthes, 'The Death of the Author' in Image, Music, Text, p.146.

42. See also the analyses by M. Wilkinson, in 'An Introduction to the Music of Edgard Varese', The Score 19/v (March 1957), p.5-14, and J.-J. Nattiez, 'Varese's "Density 21.5": A Study in Semiological Analysis', Music Analysis 1/iii (1982), p.243-340.

43. P. Boulez, 'Eventually . . . ', in Notes of an Apprenticeship, tr. H. Weinstock (New York, 1968), p.167-169.

44. L. Koblyakov, 'P. Boulez "Le Marteau sans Maître": Analysis of Pitch Structure', Zeitschrift fur Musiktheorie 8/i (1977), p.24-39.

Notes to Chapter 5

1. MEC p.191.

2. This is a feature of linear intervallic patterning rather than a direct consequence of a set's interval vector; the chords thus derived can be, and frequently are, deployed in such a fashion as to conceal their obvious intervallic derivation.

3. FW p.104.

4. FW p.101.

5. Charles Ives, Memos, ed. J. Kirkpatrick, (New York, 1972), p.75.

6. Notes by R.P. Morgan to the Nonesuch recording (H-71306) of the Ives quartets. The sleeve illustration includes a photograph of the first page of Ives' manuscript of the Second Quartet, in which the annotations are quite clear.

7. Writings p.278.

8. Ibid.

9. See also MEC p.200. Without discussing the complex pitch-relationships exhibited by these themes, Schiff suggests that they embody the principal tempo relationships of the work. This seems true only up to a point - relative

to themselves the durations in the composite themes produce a line with the proportions 6:6:3:7:4, missing the value 5 which is important in the proportional tempo relationships of the quartet.

10. A problem exists in these cases as to which metrical unit to take as the determining value when calculating tempo proportions between sections; the smallest value expressed as a succession of equal durations, or the larger, notated metrical pulse. I have consistently used the latter, for two principal reasons. Firstly, the notated metre is generally an expression of a uniformity between lines using separate rational subdivisions of that pulse - this is a strong sense in which one might claim that notated pulse and metre <u>are</u> structurally important in music which could be considered polymetrical, or ametrical in a larger sense. Secondly, and arising from this, at many points there are a number of lines each employing a different rational subdivision of the metre, and one faces the difficulty, if using the small pulse as a standard, of deciding which to choose as the 'main' tempo of a section.

11. See J. Bernard, 'Spatial Sets in Recent Music of Elliott Carter', <u>Music Analysis</u> 2.1, 1983, p.5-34.

Notes to Chapter 6

1. Writings p.326.

2. See MEC p.205ff. for a more extended discussion of the work's instrumentation.

3. This notion is new in music only in the extent to which Carter coordinates the referential and relational aspects of such a chord. One can draw parallels between Carter's practice and that of certain earlier composers, notably Berg and, perhaps, Skryabin, in establishing a collection of pitches at a referential registral position. One might also suggest a relationship with twelve-note serial composition, in that a particular transpositional level of a series, perhaps with characteristic registral features, might function in a similar way. Schiff is mistaken in calling the referential chord a "sixteen-note, all-interval tonic" (MEC p.211) - the part of the total group of 'tonic' intervals used in this way contains only twelve distinct pitches, and does not yield an all-interval series in its vertical disposition. See ex.6.10.

4. Writings p.328-29.

5. But see also b.488f., harpsichord, where i.c.5 is presented at a pulse of m.m.100, 6. See Writings p.292, 296, 329.

7. MEC p.213-226.a tempo impossible to relate to that interval's 'proper' speed, m.m.28.

8. Writings p.328-329.

9. This type of construction was perhaps suggested by E.T. Cone's lectures and writings on Stravinsky, particularly on the Symphonies of Wind Instruments. See Writings p.303, and E.T. Cone, 'Stravinsky: The Progress of a Method', PNM 1/i (1962), p.18-26.

10. B. Boretz, 'Conversation with Elliott Carter', PNM 8/ii (1970), p.8.

11. Ibid, p.9.

12. Ibid..

Notes to Chapter 7.

1. Writings p.298.

2. Writings p.299.

3. J. Bernard, 'Spatial Sets in Recent Music of Elliott Carter', Music Analysis 2/i (1983), p.5-34.

4. Interval Vector (IV) is a numerical representation of the total interval class content of a set (in this context inversionally equivalent interval classes are considered equivalent. For example, i.c. 2 and i.c.10 are both instances of i.c.2). The vector is arrived at through a simple enumeration of all the possible dyad subsets of the set, so, for example, given a three-note set (a,b,c), the interval classes represented in the IV are given by /a-b/, /a-c/, /b-c/. The six digits of the IV represent the numbers of instances of i.c.1,2,3,4,5,6 respectively. See A. Forte, The Structure of Atonal Music (New Haven, 1973), p.13-24.

5. Composer's seminar and private communication, 1984 Glasgow Musica Nova festival.

6. 'Sixty Staves to Read', Writings p.197.

7. A phenomenon well documented in the literature of musical psychology, reviewed in C.F.Hasty, 'Phrase Formation in Post-tonal Music', JMT 28/2 (1984), p.169-171: see also J.Cott, Stockhausen: Conversations with the

composer (London, 1974), p.31.

8. Writings p.357.

9. Concerto for Orchestra, Full Score, p.iii. Extract from St. John Perse, Vents, translated by Hugh Chisholm.

10. David Schiff has drawn attention to the relationship of the Concerto for Orchestra to Debussy's La Mer. See MEC p.246.

11. The piano writing is also a tribute to the abilities of the New York Philharmonic Orchestra's pianist, the late Paul Jacobs. See MEC p.247.

12. Concerto for Orchestra, Full Score, p.iv.

13. BIP (Basic Interval Pattern) is a means of representing the linear intervallic relationships presented by an ordered statement of a set, as ex.7.12 makes clear. See A.Forte, The Structure of Atonal Music, p.60-73.

14. A pair of equivalent intervals associated through a third interval may be considered as a four-note set (where they are associated through an i.c. other than 0). Some instances of this set-generative interval association produce appropriate sets (for example, i.c.8 associated through i.c.9 generates c4-13, a chord appropriate to the first movement produced by a relationship between appropriate interval classes), others not (i.c.9, associated through i.c.11, generating c4-9). In the Concerto for Orchestra, the intervals in lines and their linear associations appear to be more important than the resultant sets.

15. First noted by A. Whittall: 'Elliott Carter', 1st American Music Conference (Keele, 1975), p.82.

16. Writings p.322.

Notes to Chapter 8

1. A. Schoenberg, 'Composition with Twelve Tones'. in Style and Idea (London, 1975), p.223.

2. A conceit explored by E.T. Cone in 'Beyond Analysis', PNM 6/i (1967)p.33-51.

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