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STYLE AND TRADITION IN STRING QUARTET PERFORMANCE: A STUDY OF 32 RECORDINGS OF BEETHOVEN'S OP. 131 QUARTET

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Volume 1

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Abstract

Thirty-two recordings of the Op. 131 string quartet by Beethoven, dating from 1924 to 1995, are compared to examine questions concerning changes and differences in the performance style of string quartets. The background and historical context of the ensembles involved are explored and discussed, and the recordings are analysed using a number of objective measurement techniques. Aspects of performance style including choice of tempo, tempo flexibility, portamento and vibrato are measured and subjected to statistical analysis in order to determine the existence of trends over time or other stylistic groupings. Current theories and assumptions concerning historical change and national styles of performance are tested in the light of this evidence. It is concluded that the aspects of performance style studied offer no support for theories of national style or the influence of teaching, and that historic trends can only be partially substantiated in the case of portamento and vibrato. The evidence as a whole suggests a wide diversity of performance style at all periods, and contrasts with the conclusions of previous studies in other musical genres including solo instrumental and orchestral. Consideration of this evidence against the background of performance philosophy and some sociological studies of string quartets leads to the conclusion that the string quartet ensemble is uniquely constituted to encourage a searching, co-operative and innovative approach to the development of a performance-oriented interpretation and to discourage the thoughtless ossification of a handed-down performance template.

Preface

The impetus for the research reported in this dissertation arose from an intense fascination with the experience of listening to chamber music, and in particular, string quartets. As this experience grew it appeared that the ever larger and increasingly available body of recorded quartet performances, both modern and historic, offered a rich and almost inexhaustible source of listening satisfaction to a greater extent than the similarly increasing plethora of recordings of other music genres. This experience did not seem to gel with some of the generalisations being made about the increasing uniformity and blandness of musical performance, and led to questions about the validity of these claims and speculation about the possibly special nature of quartet performance.

The developing discipline of performance studies set a context for some of this speculation. In particular the increasing availability and power of tools, often computer based, for the analysis of recorded performances offered the opportunity to test some of these hypotheses in a more objective manner. Such tools are capable of measuring time and pitch to an almost microscopic level of detail, and can therefore be adopted to examine questions of tempo, tempo flexibility, portamento and vibrato. The intention was therefore to identify a sample of performances from a number of different quartets with varying backgrounds and spanning as long a range of time as possible, and to subject these performances to a number of different types of measurement. Using this data, it might be possible to draw some conclusions about the validity of a number of common assumptions about the formative influences on performance styles, including both local or pedagogical traditions and more general historical trends. It might also be possible to distinguish between aspects of performance style which were subject to such influences and those which were not.

The growth in recent years of the discipline of performance studies has been matched by a comparable burgeoning of the philosophical investigation of musical performance. The outcome of this investigation has included the development of a number of conceptual models of musical performance which seem predicated on soloistic or individual performance (which includes the case of an orchestral conductor), and perhaps sit less happily with the realities of small ensemble performance. The research undertaken here therefore offered an opportunity to re-assess some of these models in the light of measurable aspects of performance and of the group dynamics involved in the development of an ensemble's interpretation and subsequent public performance of a string quartet.

While the purpose of the research was to examine quartet performance style without reference to any specific repertoire, it was clearly necessary to identify a sample of recordings of the same work (or set of works) which offered a suitable range of performance dates and nationalities of performers. This virtually automatically determined that the recordings would have to be of Beethoven quartets. Initially, the intention was to study performances of one early, one middle and one late quartet. However, the intensive and detailed nature of the measurement techniques involved rendered this approach unfeasible, and eventually only a single quartet, the C# minor Op. 131, was chosen for study.

The dissertation commences with a review of current thinking and literature on the development of quartet performance styles, focusing on the evidence for national or geographical schools of playing and on changes in style over time (which include most notably changing attitudes to the use of portamento and vibrato). This is followed by a chapter which examines the backgrounds and reputations of the quartets included in the study, and which attempts to group them according to the degree of shared pedagogical inheritance.

The main part of the dissertation presents the findings of a number of measurements of the recordings themselves and assesses the extent to which they support or refute claims for geographical schools of playing and changes over time. The first four of these chapters cover questions of timing, including the basic tempo chosen for each movement and flexibility of tempo at macro level (variability between movement sections) and micro level (rubato, as applied in a number of different contexts). A further three chapters analyse the extent and context of the use of portamento, and one chapter examines the use of vibrato.

A final conclusions chapter summarises the evidence presented previously, and discusses it in the context of current trends in the philosophy of musical performance and of sociological evidence concerning the dynamics of small co-operative work groups, of which the string quartet must be one of the most extreme examples.

Full sets of figures and diagrams for all thirty-two performances studied are included in a second volume.

An accompanying CD includes examples from the performances under study, and is referenced throughout the main body of the thesis.

Chapter 1: Tradition and Change in String Quartet Performance

A critical survey of received ideas

Introduction

A musical performance does not occur in a vacuum. Every aspect of its preparation and execution, including instrumental technique, use of expressive devices, shaping of the phrases and of the overall work, and even the performers' idea of the composer's intentions, is constrained by a number of factors. Every performance takes place in a historical and cultural context, however innovative or revolutionary it may appear. This chapter surveys some of the thinking, from the nineteenth century to the present day, on the factors which differentiate performance styles in both time and space, and considers them in relation to the conditions of string quartet performance in particular.

Recent work based on the study of recordings of single works, largely from the orchestral repertory, has examined differences and changes in performance style and in the concept of the work evinced by these individual performances. José Bowen, in an exploratory study of a number of works, considers these differences in terms of period style or historical trends, geographic style or national schools, performance tradition centred on the specific work, and individual innovation (Bowen, 1999). Elsewhere he defines musical performance tradition as 'the history of remembered innovation' (Bowen, 1993). In both of these papers, the constraints within which a performance takes place (the acquired training and the inherited national style of the performer, the fashionable style of the time, the concept of the specific work embodied by all its previous performances) are contrasted with the stylistic and interpretive innovations made by the individual performers. These innovations in turn, by a kind of process of natural selection, may become part of the tradition associated with the work, and will influence future performances.

National Schools and Geographical Style

The idea of national schools of violin playing is well entrenched; each national school so identified is normally associated with a technique of playing established by an influential violinist. Thus, the 'Russian school' is associated with Auer, the 'German school' with Joachim (even though Joachim was actually Hungarian), and the 'Franco-Belgian school' with Vieuxtemps. The survival of the style as a national or geographical style is largely dependent on the extent and influence of these violinists on their pupils; it is therefore hardly surprising that they are characterized by the technical aspects of instrumental performance which lend themselves to being passed from teacher to pupil, such as a method of holding the bow, or a technique of tone production.[1] Such techniques obviously affect tonal quality, and may incline their proponents to a tendency to use one kind of vibrato, or one kind of portamento over another, for example, but whether performance characteristics at a more abstract interpretive level can be attributed to such national schools is more open to question.

The effectiveness of the teacher in passing on a particular style of playing can also be called into question: the great Joseph Joachim is claimed as teacher by more than fifty violinists who subsequently became members of well established string quartets, as well as by numerous other violinists. Given Joachim's extremely active life as a concert violinist, chamber musician and academic administrator, it is hard to believe that he had the time to develop a deep and intensive teaching relationship with all of these pupils; indeed, much of the day-to-day teaching will have been performed by assistants.

Leopold Auer himself recognized that his style of playing was not preserved by his pupils: 'the excessive vibrato is a habit for which I have no tolerance, and I always fight against it when I observe [it] in my pupils - though often, I must admit, without success' (Auer, 1921: 40). This must be considered something of an understatement when one considers that Auer's pupils included Jascha Heifetz and Mischa Elman, both of whom

[1] 'The basic difference between these various schools is the point at which the index finger comes into contact with the stick and the resulting position of the bow arm; that is, lowest at the first joint for the German school, with a low bow arm (as practised by Joachim and his followers); higher in the second joint for the Franco-Belgian school (as demonstrated by the students of Massart and Vieuxtemps, notably Ysaÿe); and highest on the index finger, at the line separating the second and third joints (and subsequently the highest bow arm position) for the Russian school.' (Kosloski, 1993: 840)

were among the violinists in the early part of the century who established the continuous vibrato as a norm of violinistic technique.

Whether such concepts of national or geographical style can be translated from individual performers to string quartet ensembles is open to further question. In the second half of the nineteenth century and into the early years of recording there were admittedly a number of ensembles whose members had similar training and were from the same geographical area. The famous Joachim Quartet, for example, included a large number of Joachim pupils during the course of its existence, and was regarded as characteristic of a Germanic classical style. By contrast, the Flonzaley Quartet, some of whose Beethoven performances survive on record, included three pupils of César Thomson, himself a Vieuxtemps pupil,[2] and have been regarded as 'the modern world's first great Franco-Belgian string quartet ensemble' (Potter, 1994a).

However, the growing tendency in the second half of this century for string players early in their careers to seek tuition from a wide range of established international players and teachers would be expected to give rise to a breakdown of such national distinctions. This effect is likely to be magnified when the corporate style of a string quartet ensemble is considered rather than an individual performer: string quartets increasingly consist of members from a variety of teaching backgrounds, and the late twentieth century tendency of string quartet ensembles to attend master classes and to be coached by a wide variety of internationally established string quartets must further dilute regional distinctions.

String quartet players themselves seem to have divergent opinions on this topic. Gunter Pichler of the Alban Berg Quartet talks of an enormous and generic difference between German and American styles, far overshadowing the individual differences between specific German or American quartets.[3] Jonas Krejci, the cellist of the Skampa Quartet from the Czech Republic, interviewed by Joanne Talbot, puts forward a similar view, hinting at different European traditions as well as the basic European / American divide:

[2] Adolfo Betti, the first violinist, and Alfred Pochon, the second violinist, who stayed with the quartet for the whole of its life, and Ugo Ara, the ensemble's first violist.

[3] 'A German journalist compared, as an example, a Kolisch Quartet interpretation of a Mozart quartet with one by the Alban Berg Quartet, and though they were very different there is a common style. But if you compare with an American quartet, there is an enormous difference.' (Jolly, 1992)

'the Czech sound is perhaps a little rounder with a ring to the note, very much like the Viennese style. It's not as sharp and rhythmic as the articulation you hear from American ensembles' (Talbot, 1995). Taking this approach one step further, in a review of the Wihan Quartet, also from the Czech Republic, Tully Potter draws a distinction between the Bohemian and the Moravian sound.[4]

Samuel Rhodes, the violist of the Juilliard Quartet, maintains a contrary view: 'there's as much difference between our sound and the Guarneri, or Cleveland Quartets, as between us, the Amadeus and, say, the Alban Berg Quartet; I fail to see any generic difference between American and European - it's the personality of the group and how it developed, what influences it responded to within the group and all the diversity within that area' (Cowan, 1991).

Most of these distinctions between different geographical and national styles focus on the technical aspects of string playing and the resultant quality of sound. However, with quartets of the nineteenth and early twentieth century, there is evidence that geographical differences in performance style embraced wider considerations than the technical, and manifested themselves in a higher interpretative approach. For example, Robert Winter reports that the Hellmesberger Quartet, the foremost Viennese quartet of the second half of the nineteenth century, played in 'an unabashedly subjective and emotional manner' which was 'in strong contrast to the elegant French style', thereby enshrining in distinct traditions a difference between a Viennese and a French approach (Winter, 1994: 52).

Historical Trends

While not ignoring regional differences, some recent studies using early recordings as their source material have identified a number of seemingly pervasive historical trends in performance style since the beginning of the twentieth century. Robert Philip, a pioneer of such studies, has identified a number of features of pre-war performance style in a survey of early recordings of chamber and instrumental works by Beethoven (1994). The differences from post-war performances can be summarized as:

[4] 'Three of the players are Moravians, but only second violinist Jan Schulmeister has anything like the broad tone of the Moravian school [...] Trained by Antonin Kohout [...] the group is very much in the line of that ensemble [the Smetana Quartet] and the Talich and Panocha Quartets; whereas its contemporary the Škampa Quartet, with a similar pedigree but with a Moravian leader, has much more of the Brno sound.' (Potter, 1994b)

- a more sparing and variable use of vibrato (here he especially cites string quartet recordings by the Flonzaley, Capet, Rosé and original Budapest quartets)
- greater tempo differentiation between sections of movements or individual themes
- generally faster tempi
- a more casual attitude to rhythmic detail
- an especial tendency to 'over-dotting'
- a tendency to use rubato in a way which gives the melody rhythmic independence from the accompaniment
- an extensive use of string portamento, often apparently applied randomly

These characteristics are essentially the same as those he identified in a wider study of a large range of orchestral, chamber and instrumental recordings from the first half of the twentieth century (1992).

Many of these tendencies, especially the rise of a uniform and extensive use of vibrato, and the decline of the portamento over the first half of the century, are well known and easily heard from recordings. Taken together, they imply an increasing uniformity in interpretation and performance: many of the devices which lend individuality to a performance, such as unusual rhythmic articulation, portamento, the variable use of different kinds of vibrato, have all become taboo, or at least unfashionable. José Bowen remarks, in a study of a large number recorded performances of the standard orchestral repertoire: 'conductors from the first half of this century preserve a greater interpretive independence while conductors from the second half of the century sound more alike.' (1996a: 148)

This development goes hand in hand with an increasing respect for the Urtext and a scholarly approach to performance in which the main aim is to give voice to the composer's intentions - the rise of the authentic movement. To what extent this trend to greater uniformity has been accelerated by the 'authentistic' approach, and to what extent this approach is partly a symptom of a long established trend to greater uniformity is a complex question. Taruskin inclines to the latter view, and his central thesis is cited in Michael Chanan's survey of the impact of recording on musical performance:

> *Taruskin reports an investigation by another early-music enthusiast comparing recordings of a wide repertory of pieces from plainchant to Schubert. In each case a recording from the 1950s or 1960s was compared with a later and supposedly 'authentistic' performance. In every instance, the stylistic contrast between the earlier and the later was essentially the same. The earlier recording showed 'greater variation of dynamics, speed and timbre', it was more 'emotional' and 'personal'. The authenticist performance was 'characterised by relatively uniform tempo and dynamics, a 'clean' sound and at least an attempt to avoid interpretive gestures beyond those notated or documented as part of period performance practice'. These findings, says Taruskin, can be extended. If you compare recordings of the 1920s and 1930s with those of the 1950s and 1960s, the results would be substantially the same, as they would also be if you compared early 'electrics' with turn-of-the-century acoustic discs. In short, 'modern performance gets moderner and moderner, as Alice might say'.* (Chanan, 1995: 125)

This quote also introduces another factor which has been held partially responsible for the increasing uniformity of performances: the growth of the recording industry to the point where most people today experience performances through the medium of the CD or cassette rather than at live concert venues. A performer who knows that his performance will be listened to again and again by larger numbers of people than any concert venue can contain, and in many different circumstances, is likely to have a very different approach from one who is about to step out on a concert platform in front of an expectant audience for a once-only event. The pressures to take advantage of recording technology and its editing capabilities to ensure that the performance laid down is technically perfect are great; equally, there are pressures to avoid the kind of spontaneous interpretive nuance which may seem revelatory in a live performance, but become tedious or problematical on repeated hearing.

This gives rise to the paradox that on the one hand it is the invention of sound recording which has enabled for the first time an unambiguous study of performance traditions and their dynamics, based on actual performances rather than inferences from contemporary accounts or musical editions; on the other hand the prevalence of recorded music has contributed to a blurring and obfuscation of these precious distinctions. As Chanan expresses it:

The real problem is [...] the eventual loss of the tradition that governed the score's interpretation. The paradox is that recording has not, as one might at first suppose, detained this process, but seems instead to have accelerated it, reducing the idea of a traditional style of performance to a chimera. (Chanan, 1995: 11)

Innovation

Faced with this overwhelming evidence of an apparently unstoppable trend to greater uniformity and blandness in musical performance it is easy to forget the part played by individual innovation in deliberately breaking what can seem a stale performance tradition. The words of Leopold Auer might seem more apposite today than they were when he uttered them in 1921:

Tradition weighs down the living spirit of the present with the dead formalism of the past. For all these hard and fast ideas regarding interpretation of older classic works, their tempos, their nuances, their expression, have become formalisms, because the men whose individuality gave a living meaning have disappeared [...] Let them [the violinists of today] express themselves, and not fetter their playing with rules that have lost their meaning [...] Beauty we must have, tradition we can dispense with. (Auer, 1921: 176)

When we consider the changing conditions of string quartet performance over the last hundred years, a number of factors come to light which might lead one to expect that in the string quartet genre above all others, innovation is favoured at the expense of adherence to fashion or tradition.

Most famous string quartet ensembles active in the last part of the nineteenth century depended very largely on the larger than life artistic persona of their leader - truly a leader, and not just a first violinist - giving rise to the European tradition of the 'primarius'. The other members of the quartet would change frequently, and would be selected by the leader from orchestral colleagues, pupils or other associates. This is certainly the case with the Joachim and Hellmesberger Quartets, the foremost German and Viennese quartets of the period. Between 1849 and 1883, a total of twenty-six players other than Joseph Hellmesberger himself were members of the Hellmesberger Quartet; while the corresponding figure for the Joachim Quartet between 1869 and 1907 is fourteen (excluding the personnel of Joachim's London-based quartet). Neither quartet was a full-time ensemble, in the sense that their members were also active as orchestral or solo players or in teaching. In an earlier period, Louis Spohr performed quartets wherever he traveled with a 'pick-up' group of three local musicians.

In these circumstances there must have been little opportunity to develop a distinctive voice through constant interaction and long acquaintance. The performance must have been dominated by the musical personality of the leader, who would, however, have been inhibited from giving free rein to his interpretative insights by the need to maintain a sense of ensemble with his colleagues. Carl Flesch, who heard the Joachim Quartet on a number of occasions makes a similar observation: 'altogether, the quartet consisted of a solo violin with three instruments accompanying - a style which is diametrically opposed to the aims of our own time's quartet playing as first introduced by the Bohemian String Quartet' (1957: 30-34).

The Bohemian (or Czech) Quartet mentioned by Flesch is commonly considered to be the first ensemble exemplifying a new ideal: a permanent membership, and a dedication to the performance of string quartets to the exclusion of other activities. Such an environment offers fertile ground for innovation in interpretation. Just as the string quartet is often considered the most conversational of musical genres, so the conditions of its preparation and performance offer the most opportunity for discussion between the performers. Unlike the orchestral conductor or the solo instrumentalist, a string quartet has both the need and the opportunity to discuss, argue and agree on their approach to a work in both its entirety and its details. In the right circumstances, this must lead to a situation of almost continuous renewal.

A contemporary commentator, reacting to the phenomenon of the Bohemian Quartet for the first time, indicates how this new style of ensemble enabled them to develop their own interpretative approach:

> *Seeing that the members of the party have been in constant association almost from boyhood, it is easy to understand their perfect sympathy and wonderful unity of style, which extends even to a marked similarity in bowing form. Possessed of a technique which has made each member complete master of his instrument, they have been free to devote themselves to carrying out their interpretative ideals; and one must acknowledge that they seem to have come as near to the fulfilment of these as possible.* (Henderson, 1911: 334)

In more recent times, the number of such long-lived ensembles with few changes of personnel has increased: one thinks of the Amadeus and Smetana Quartets, for example. The importance of collective decision making in such conditions is emphasized by Norbert Brainin, the first violinist of the Amadeus Quartet, in an interview with Anne Inglis:

> *It is not enough just to form a quartet. If you don't know how to argue, then you must learn how to, or the counsel of this particular member will be lost and he will leave. Everything that happens has to be discussed and argued, and everything has to meet with the complete approval of each member. You must always try to convince the others of your point of view, and at the same time always be ready to be convinced of a superior argument. There are no compromises. Usually something emerges that is a lot better than any one opinion - but it is not a compromise.* (Inglis, 1988: 43)

This approach tends towards the individuation of a quartet's corporate style, but not towards its ossification: many modern day quartets recognize that this constant process of questioning, discussing and experimenting has caused their approach to change with time. The Guarneri, Juilliard and Melos Quartets, for example, have all remarked on differences between their early and later styles.[5]

The influence of recording on performance, cited above as a major cause of increasing uniformity of performance style, can also work in the opposite direction. The market place becomes increasingly crowded, and, as with any other market, overcrowding creates a drive for differentiation. A total of thirty-seven different recordings of the Beethoven Op.131 String Quartet were commercially released between 1970 and 1995. In order to stand a chance of commercial success in such circumstances, a recording must stand out in some way; the pressure on the performers is to come up with a different interpretation from any other, to find something new to say which has not been said before. It is no longer enough for a quartet to make a recording of a Beethoven quartet 'because it is there'; to attract critical attention, and therefore sales, the performance must either outshine all the competition technically (which becomes increasingly difficult in the crowded marketplace) or present a characteristic view of the work which can be sharply differentiated from other, competing, recordings.

[5] see Smith, 1992: 19 for the Guarneri; Cowan, 1991: 19 for the Juilliard; and Sainati, 1990: 208 for the Melos.

Conclusion

The foregoing discussion has identified two major areas where contradictory opinions have been expressed: firstly, the reality and importance of regional variation in performance style are the subject of some disagreement, especially where interpretative issues at a higher level than the technique of sound production are concerned; secondly, there are several reasons why in theory one might expect string quartet performance to be more resistant than other genres to the growing uniformity of performance and interpretation detected by many writers. The purpose of this study is to examine the evidence of recordings of performances of a single work, Beethoven's Op.131 String Quartet, for the light it may shed on these questions.

Chapter 2: The Quartets Studied in their Historical Context

Introduction

The choice of recordings for inclusion in this study was influenced by a number of factors. An immediate and practical constraint was imposed by the labour intensive methods of measurement and analysis employed, which made it impossible to include all available recordings (in excess of sixty have been issued commercially). A sample size of thirty-two was chosen for a number of reasons: to have attempted a significantly larger number would have made some of the resource-intensive analyses carried out impractical; also the number thirty-two is divisible by four, and therefore allows the performances to be split easily into quartiles so that they can be conveniently grouped by a variety of statistical measures.

There is a school of thought that studies such as this should take into account all available performances. It is suggested that this would be inappropriate in this instance. Leaving aside the consideration that the population of available recordings is in itself a very small subset of the performances which have been given (especially in the case of a work like Beethoven's Op. 131), the purpose of this study is not to attempt a detailed reception history of the work. Rather, general questions are addressed concerning the existence of historical trends and the influence of geographical traditions on quartet playing styles, based on the evidence available from a number of recordings of the same work. Beethoven's Op. 131 Quartet was chosen largely because of the opportunity it presented to consider such questions against a controlled sample of performances.

One of the objectives in the selection of recordings for study was to achieve an even spread of performances over time since the first available recording in 1924. Fig. 2.1 shows that this has been largely achieved, with an approximate frequency of four performances per decade from the 1920s onwards. This figure charts the dates of each quartet included, from its foundation to its demise, and marks the dates of the recordings studied by a red lozenge. The degree of shading of the bar for each quartet indicates the period during which the quartet consisted of the same four members as were responsible for the recording, with lighter shades as the number of members in common reduces.

This has meant that where two performances exist by the same quartet, but with different personnel, the quartets in question have been included more than once in the figure.

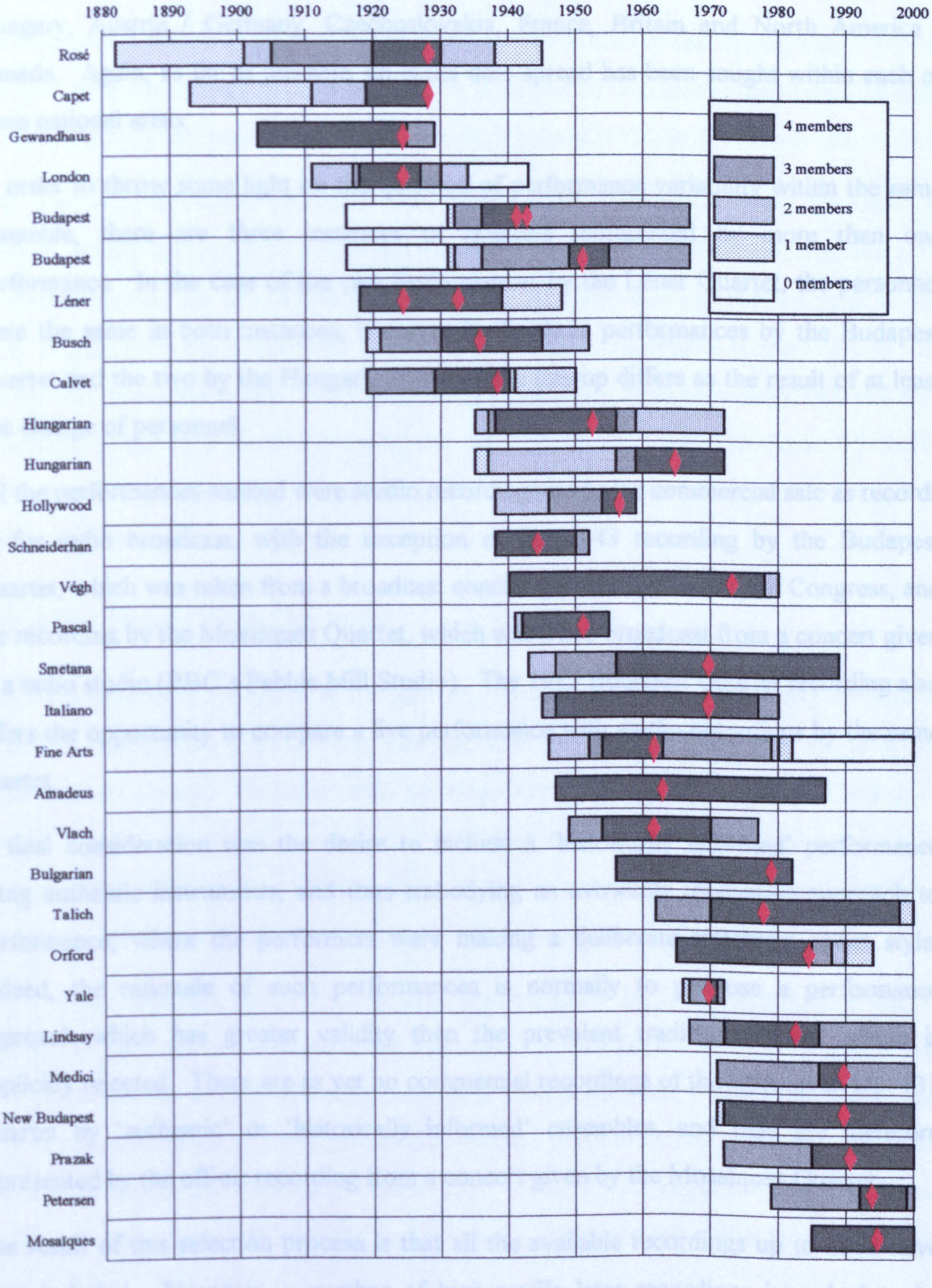

Fig. 2.1 – Life span of quartets included in this study, with dates of performances indicated by red lozenges.

A second objective was to have equal representation from each of the main geographical or national areas for which the existence of a school of string playing has been claimed. The sample therefore includes performances from at least three quartets from each of Hungary, Austria / Germany, Czechoslovakia, France, Britain and North America / Canada. Again, as far as possible, an equal date spread has been sought within each of these national areas.

In order to throw some light on the question of performance variability within the same ensemble, there are three instances of quartets represented by more than one performance. In the case of the two performances by the Léner Quartet, the personnel were the same in both instances; however in the three performances by the Budapest Quartet and the two by the Hungarian Quartet the line-up differs as the result of at least one change of personnel.

All the performances studied were studio recordings made for commercial sale as records or for radio broadcast, with the exception of the 1943 recording by the Budapest Quartet, which was taken from a broadcast concert given in the Library of Congress, and the recording by the Mosaïques Quartet, which was a live broadcast from a concert given in a radio studio (BBC's Pebble Mill Studio). The 1943 Budapest Quartet recording also offers the opportunity to compare a live performance with studio recordings by the same quartet.

A final consideration was the desire to include a 'historically informed' performance using authentic instruments, and thus embodying an avowedly innovative approach to performance, where the performers were making a deliberate statement about style. Indeed, the rationale of such performances is normally to propose a performance approach which has greater validity than the prevalent traditional norm, which is implicitly rejected. There are as yet no commercial recordings of the Beethoven Op. 131 Quartet by 'authentic' or 'historically informed' ensembles, and they are therefore represented by the off-air recording from a concert given by the Mosaïques Quartet.

The result of this selection process is that all the available recordings up to 1952 have been included. However, a number of high-profile later recordings have had to be excluded, such as those by the Alban Berg, Emerson, Guarneri, Juilliard, Melos and Vermeer Quartets. There is no specific rationale behind the exclusion of these quartets.

Within the constraints of evenness of distribution over time and geography discussed above, those recordings were included which first came to hand, and the exclusions are the accidental result of this process.

Discographical details of the recordings studied are provided in the Discography. Where the date of the recording is uncertain, this is indicated by a question mark, and the date given is normally the date of the first review found (usually that in *Gramophone*).

The rest of this chapter provides some background information about the quartets studied, setting them in their historical context and summarising their performance style as documented in the critical literature. First of all, those quartets formed prior to the First World War are considered (although the earliest recording is from 1924); the survey then proceeds by nationality, reviewing the quartets from each major national area (Hungary, Germany / Austria, France, the Czech lands, the New World and Britain). The chapter concludes with a summary grouping of the quartets based on the extent to which they share their pedagogical ancestry.

Pre-First World War Quartets

The **Rosé** Quartet is the oldest of the quartets represented in this study, being founded in 1882 by Arnold Rosé (1863-1946), the year after he was appointed solo violin to the Vienna Court Opera. He maintained his association with the orchestra until, being of Jewish descent, he was dismissed in 1938 following the Nazi Anschluss of Austria. During this time he led the orchestra under conductors such as Richter, Strauss, Mahler,[1] Toscanini, Schalk, Weingartner, Krauss, Knappertsbusch and Furtwängler.

Most of the members of the Quartet also held positions in the orchestra, and this, in addition to their teaching activities, left little time for the Quartet. Cobbett suggests that they played as few as thirty concerts per year in Vienna (Cobbett, 1929: i, 457), although their hundredth Viennese performance did not take place until 1897, which suggests an even lower frequency (Newman, 1999: 22). Tully Potter suggests that they never performed more than eight concerts in a season in Vienna itself.[2] Often they would give

[1] He was also Mahler's brother-in-law, having married Mahler's sister Justine in 1902.

[2] Personal communication from Tully Potter.

an afternoon quartet performance and be at their orchestra desks the same evening. However, they did also undertake a number of European tours as a quartet.

The Quartet also underwent a number of changes of personnel: disregarding the later, and somewhat ad-hoc, formations of the Quartet in London after 1938, there were five second violinists, six violists and five cellists. However, the formation at the time of the Op. 131 recording (1928) had been stable for a number of years, the second violinist, Paul Fischer (1876-1942), having been in place since 1905, the violist, Anton Ruzitzka (1871-1933), since 1901, and the cellist, Anton Walter (1883-1950), since 1920. Indeed, the playing of Ruzitzka in the Op. 131 recording (especially his first entry in the fugal first movement) betrays his physical infirmity, due to Parkinson's Disease, and it is said that Rosé kept him on in the quartet in recognition of his long-standing loyalty.[3]

The Quartet stands in a tradition of Viennese Quartets, mostly also associated with the Court Orchestra, and can be considered the successor to two generations of the Hellmesberger Quartet, which was active from 1849 to 1891 and is generally credited with reviving interest in Beethoven's late quartets in Vienna. Indeed Sigismund Bachrich (1841-1913), the second violinist of the Rosé Quartet from 1885 to 1894, Julius Egghard (1858-1935), the first second violinist (from 1882 to 1883), and Reinhold Hummer (1855-1912), the second cellist (from 1885 to 1901), had all previously played in the Hellmesberger Quartet. Rosé also took over from Hellmesberger his association with Brahms, and his quartet and its members were responsible for the premières of a number of Brahms' works, including the G major String Quintet Op. 111 (11 November 1890), and the revised version of the Op. 8 Piano Trio, with Brahms at the piano (22 February 1890). It is salutary to consider that the Quartet also gave the premières of a number of works of the Second Viennese School (Schoenberg's First Quartet and Webern's Five Movements, for example).

Rosé's playing, with very little vibrato (Potter refers to the 'merest hint of finger vibrato') acquired a reputation for being 'cold' (Potter, 1994c: 236). The Rosé Quartet was widely seen as the successor to the Joachim Quartet's 'classical' style after their demise in 1907 (Schwarz, 1983: 402), and by 1927 'no longer seen as champions of the

[3] Personal communication from Tully Potter

avant garde, the quartet had settled into a solid reputation as masters of the classic repertoire.' (Newman, 2000: 63)

Carl Flesch, in one of the many perceptive character sketches contained in his autobiography, described Rosé's playing as follows:

> *His style was that of the 'seventies, with no concession to modern tendencies in our art. His strongest suit was unquestionably his absolute certainty in changes of position. The purity of his intonation was proverbial. His scales, runs, and passage work, moreover, showed an outstandingly fluent left-hand technique. His vibrato was noble if a little thin [...] His playing in itself made a somewhat prosaic impression on many listeners; 'Rosé plays beautifully, but coldly,' people used to say during my years of study in Vienna. I myself never shared this impression. Essentially, his individuality was purely musical; he did not belong to those violinists who put their 'feeling' on show as soon as they tune their instrument. His feeling required a worthy object, a significant composition, in order to reveal itself - an attitude of which Joachim had been a shining example. For Rosé, as for all real artists, sound and technique were valued only as a means in the service of a higher idea. Such a conception is alien to all who are chiefly concerned with sensuous ear-tickling - hence the legend of the 'cold' Rosé.* (Flesch, 1957: 52)

The **Leipzig Gewandhaus** Quartet (referred to henceforth as the Gewandhaus Quartet for convenience) was another ensemble intimately associated with an orchestra, in this case even deriving their name from the Leipzig Gewandhaus Orchestra. Previous incarnations of the quartet associated with the Gewandhaus Orchestra had been led by the renowned violinist and Beethoven editor Ferdinand David.

Julius Klengel (1859-1933), the Quartet's cellist, had been solo cellist with the orchestra since 1881 (the same year that Rosé joined the Vienna Court Orchestra), and the first violinist, Edgar Wollgandt (1880-1949), became concertmaster in 1903. The formation on the 1925 recording studied here appears to have been constant since 1903. Klengel is perhaps best known as an extremely active and influential teacher, numbering among his pupils Emanuel Feuermann (1902-1942), Paul Grümmer (1879-1965) (later of the Busch Quartet), Gregor Piatigorsky (1903-1976), William Pleeth (1916-1999) and Mischa Schneider (later of the Budapest Quartet).

The French nineteenth century tradition can be seen to be firmly embodied in the **Capet** Quartet, which was founded in 1893. Lucien Capet (1873-1928) himself was a pupil of

Jean Pierre Maurin (1822-1894), who had pioneered the performance of Beethoven Quartets in France, and whose performances of Beethoven had been admired by Liszt and Wagner. Capet also played for a while in the Geloso Quartet, which was the successor to Maurin's quartet in the 'Société des Derniers Quatuors de Beethoven.'

Capet inherited from Maurin a peculiar method of holding the bow, involving a 'ring-shaped lock of the thumb and middle finger creating a firm axis around which pronation and supination were to develop in a natural manner' (Flesch, 1957: 92). This emphasis on right-hand technique was further developed by Capet and published in his *La Technique Supérieure de l'Archet* (1916). This 'ring' bow-hold allowed the bow to be rolled, producing a kind of 'bow vibrato', a colouring of the tone without any left-hand vibrato (Schwarz, 1983: 369-373).

The avoidance of left-hand vibrato tempers this inheritance from the French school, and links Capet more with Joachim, whom he revered. Indeed, Flesch remarks:

> *Capet was hypnotically influenced by the old Joachim: as a thirty-year-old man, he played the wise and dignified patriarch, wore square boots, polished his spectacles ceremoniously and stuck his beard into his vest opening before he began to play. His dry style was deliberate - the Romance conception of German classicism. Only now and then did he allow his true French nature to break through.* (Flesch, 1957: 94)

Flesch also speaks of a fluctuation 'between touches of "classical" dryness and an occasional emergence of a somewhat effeminate sweetness' (Flesch, 1957: 94).

Where the Capet Quartet differs profoundly from the Rosé and Gewandhaus Quartets is in its establishment as a virtually full-time ensemble group.[4] After its original foundation

[4] Quartet ensembles which devoted their professional lives to quartet playing to the exclusion of other activities are rare prior to the twentieth century, although there are some notable exceptions, of which two might be mentioned here.

The Müller Quartet was founded in the 1820s by four brothers in the employ of the Court of Brunswick. They left the Duke's employment in 1831 and spent the next twenty-four years touring Europe as a quartet. Of particular interest in the present context, they were also responsible for the first performance of Beethoven's Op. 131 quartet, which took place at Halberstedt on 5 June 1828. They received encomiums from Berlioz for their 'precision of ensemble, unanimity of feeling, depth of expression, purity of style, grandeur, power, vitality and passion' (Berlioz, 1977: 308). They were succeeded in 1855 by another Müller Quartet, again formed by four brothers, all sons of the leader of the original Müller Quartet.

Secondly, the Florentine Quartet, which was active from 1865 to 1880, spent its time touring Europe and pioneering Beethoven performances in remote locations. These protracted and gruelling tours are documented in great detail by Mahaim (Mahaim, 1964).

the quartet was re-established no less that three times, each time with new personnel (in 1903, 1910 and 1914). Capet experimented with a solo career between 1899 and 1903, but returned to quartet and teaching activities full time. After the 1910 re-formation the Quartet rehearsed intensively for a year before giving any public performances, and contemporary commentators all agree on their immaculate ensemble and homogeneity of bowing and tone.

The Capet Quartet was very closely associated with Beethoven, and gave twenty-six complete Beethoven cycles between 1920 and 1928 (Mahaim, 1964: i, 263). Capet himself gained a reputation for a deeply serious, almost mystic approach to these works, as described in an obituary by Alfred Heuss, quoted by Mahaim:

> *De fait, dans l'Allemagne d'aujourd'hui [...] on ne pourrait lui opposer aucun représentant qui soit digne de lui, particulièrement pour les oeuvres de Beethoven, aucun serviteur de la musique animé d'une si belle foi artistique, d'une foi ascétique, même. Pour Capet, jouer un quatuor de Beethoven, c'était célébrer le culte d'une religion. D'aucun violiniste, pas même de Joachim, on ne pouvait recevoir cette impression de sainte dévotion qu'exprimait son visage sévère à la longue barbe, tout animé de vie spirituelle, rappelant celui de Tolstoï.*[5] (Mahaim, 1964: i, 268)

The Op. 131 recording studied here was made in 1928, with a formation that had been stable since 1919. As Capet died in December 1928, this recording represents the Capet Quartet at the very end of its career.

The final pre-First World War quartet represented is the **London** Quartet, which was founded in 1908 as the New String Quartet and re-named as the London Quartet in 1911. The most famous names associated with the Quartet are Albert Sammons (1886-1957), who was first violinist from 1911 to 1917, and William Primrose (1904-1982), who was violist from 1930 to 1934. However, the recording studied here dates from 1925, almost certainly with a line-up which had been in place since 1918 (James Levey, first violin since 1917, Thomas Petre (1879-1942), second violin since 1918, Harry

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[5] 'Indeed, in contemporary Germany one could not find any worthy counterpart to him, especially in the works of Beethoven, nor any servant of music inspired by such a fine artistic, even ascetic, faith. For Capet, to play a Beethoven quartet was to celebrate a religious ritual. No other violinist, not even Joachim, could radiate such an impression of holy devotion, as did his severe face with long beard, animated with spiritual life, recalling that of Tolstoy.' [author's translation]

Waldo Warner (1874-1945), violist since 1911, and Charles Warwick Evans (1883-), the founding cellist) – although they are not credited individually on the record label.

Like the Capet Quartet, the London Quartet seems to have been a virtually full-time ensemble, and spent much of its time touring in Europe and America. It had a wide repertoire of nearly five hundred works (Cobbett, 1929: ii, 102), and championed British compositions.

Hungary

In many respects, the **Léner** Quartet, named after its leader, Jenő Léner (1894-1948) was representative of a new breed of quartet which emerged immediately after the First World War. The Quartet was formed in 1918, at the outbreak of revolution in Hungary, by four members of the Budapest Opera Orchestra, who retired to a secluded village to rehearse the quartet repertoire, and made their début in 1919 (Campbell, 1980: 299). They retained their founding membership until 1939, when the Second World War forced the players to emigrate to various destinations. (Léner reformed the Quartet in the USA in 1942, and continued with various personnel until his death in 1948.) While other quartets had dedicated themselves virtually full-time to quartet playing (for example the Capet and London Quartets discussed above), very few had attempted this with such dedication and fewer still had retained a long-term membership.

They also had very firm ideas on their approach to playing as an ensemble, which emphasized the blending of the four instruments into a homogeneous whole, and this approach was advocated in the manual *The Technique of String Quartet Playing* published by Léner in 1935. His ideal is summed up in the statement in the foreword of this manual that 'the ideal quartet should sound like *one* instrument; and in order to attain this, it is essential, among other things, that all the four parts should adopt the same phrasing, bowing and volume of tone' (Léner, 1935: [foreword]); or again, 'an ideal quartet *timbre* is the outcome of similar tone production and vibrato among the individual players' (Léner, 1935: 17).

This homogeneity was also remarked on by a number of critics and commentators, for example Samuel Langford: 'The rich tone, which never for an instant loses beauty, the equal part borne by the four instruments, the dazzling execution and the perfection and consistency of every detail are the great technical marks of the Léner players' supremacy' (Langford, 1929: 125).

Another aspect of their innovative spirit was their enthusiastic espousal of recording technology. They were the first quartet to record a complete Beethoven cycle, starting with an acoustic recording of Op. 131 in 1924; with the advent of electric recording they re-recorded the works which had been recorded acoustically, hence the existence of a second recording of Op. 131 made in 1933. The rest of their discography is extensive, including works by Brahms, Debussy, Dvořák, Haydn, Mozart, Ravel, Schubert, Schumann, Tchaikovsky and Wolf, and they were awarded a gold disc in 1935 for selling more than a million records (Potter, 2000: 626).

Their style of playing was also very different from the quartets considered so far, including a great deal of both vibrato and portamento. Their pedagogical roots go back to the Hungarian tradition, and their teachers included Jenő Hubay (1858-1937) and David Popper (1843-1913). As remarked by Potter, they inherited their vibrato from Hubay, but used it 'to set up a halo of warmth around their performances,' and used portamento, with discretion in the classical repertoire, but in a 'positively soupy' way with more romantic works (Potter, 2000: 625).

The **Hungarian** was another quartet very much in the Hungarian tradition. It was founded in 1935 with Sándor Végh (1912-1997), another Hubay pupil, as first violinist, and Vilmos Palotai (1904-1972) as cellist. A re-alignment of the Quartet in 1937 saw Végh take the second violinist's position, where he remained for a year before leaving to form his own quartet; his place as first violin was taken by yet another Hubay pupil, Zoltán Székely (1903-2001), who remained with the quartet until its dissolution in 1972. Dénes Koromzay (1913-2001), the violist, was another Hubay pupil and stayed with the Quartet for its duration, with the exception of a short gap between 1952 and 1953. Koromzay had also been taught by Imre Waldbauer (1892-1953), and the quartet as a whole therefore owes much to the first Hungarian Quartet, often known as the Waldbauer-Kerpely Quartet (active from 1909 to 1946).

Their Hungarian credentials are confirmed by Székely's personal friendship and long-standing musical association with Bartók, and by his early compositional studies with

Kodály. Only Alexandre Moskowsky (1901-1969), the second violinist, was an Auer pupil, introducing a different, Russian, tradition to the Quartet.

The Quartet underwent a number of changes of membership in its early years, but by 1938 a line-up had been established (Székeley, Moskowsky, Koromzay and Palotai) which lasted until 1956, when Palotai left for reasons of ill-health. Their first Beethoven interpretations were forged during a period of enforced idleness, after they had been trapped in Holland in 1940 by the German invasion. Vilmos Palotai appears to have been the driving force behind the formation of the Quartet (Kenneson, 1994: 167), and certainly had a major influence on their early interpretations. Bewley records Palotai's obsessiveness in the matter of observing Beethoven's metronome marks, and the rhythmic drive he gave to the Quartet (Bewley, 1990: 270). It was this line-up which was responsible for the first (1953) of the two recordings studied here. By the time of this recording the Quartet had moved to the USA (in 1950) as quartet in residence at the University of South California.

Gabriel Magyar (1914-) replaced Palotai when he left in 1956, and three years later Moskowsky was replaced by Michael Kuttner (1918-1975) (who had also played in a late, American, incarnation of the Léner Quartet), thus establishing the line-up that made the second recording (1965) studied here, and which lasted for the remainder of the Quartet's life. The style of this new formation is widely recognized, not least by the Quartet members themselves, as looser and more flexible, largely as a result of the loss of Palotai's insistence on a firm rhythmic foundation, and this stylistic shift will become more apparent during this study.

Bewley characterizes the early Hungarian ensemble as:

> *a quartet with a phenomenal rhythmic drive. The sonority was such as to produce a clear texture, whether pianissimo or any dynamic up to fortissimo, having an unusual mutual understanding of rhythm and intonation. The quality of sound contained no harshness and their unison playing was just that; one sound source. In fact one was not aware of instruments at all, just music. Their understanding of sonority and musical structure made it possible to create an internal balance which ensured the utmost clarity of texture in everything they did; the texture and phrasing never became clouded or ambiguous.* (Bewley, 1990: 270)

This view of the early Hungarian style is confirmed by remarks made by Dénes Koromzay in a 1997 interview, relating to the group's approach to rehearsals:

> *We had a system of rehearsing that was superior to all of my previous experience. In the past, the Hungarian always started rehearsals at ten in the morning and continued until three or four in the afternoon. Székely had no notion of time. It took an hour before we could agree on anything! Székely and Palotai always disagreed. In my opinion, Székely talked sense about making music. Palotai was very scholastic - an extremist in his belief that every single note and metronome mark should be faithfully realised. Some of Beethoven's metronome marks, for example, are totally unrealisable. The old Hungarian did not rehearse, we fought and discussed.* (Glyde, 1997: 291)

Tully Potter noted that 'the peevish Hubay vibrato was less in evidence [in Székely's playing] than with most of his colleagues' (Potter, 1990), and this is confirmed by Székely's own assessment of their playing style:

> *Our quartet's vibrato was tempered, as well as its intonation. I tried to avoid excessive vibrato and instead aimed for purity of tone. In principle, we held back the sonorities called for in a dramatic climax until the right moments. In the slow movements I searched for moments of peace without the constant intensity that besets some quartets. That result we achieved with a quality of tone dependent on almost immeasurable factors: hardly perceptible dynamic change, proportioned bowstrokes, nuanced vibrato, the use of tenuto.* (Kenneson, 1994: 414)

The Quartet's attitude to recording demonstrates a more interventionist approach than we have encountered hitherto, and Kenneson quotes Székely's insistence on listening to takes at slow speed to identify lapses of ensemble for correction, and his modification of relative dynamic levels by editing (Kenneson, 1994: 312).

After Sándor Végh left the Hungarian Quartet, he formed his own ensemble in 1940 (the **Végh** Quartet) with three Hungarian colleagues (Sándor Zöldy, Georges Janzer and Paul Szabó). These remained in place until 1978, and the Quartet survived for a further two years with two further second violinists and violists, and one other cellist. The Quartet left Hungary in 1946 and finally settled in Switzerland, where their acclaimed Beethoven cycle was recorded.

Oswald Beaujean described them as 'sceptical, indeed almost disapproving, of technical perfection, which they saw all too often coupled with coldness and soulnessness. Végh insisted on the changeability and unrepeatability of each interpretation, and even in the recording studio he placed liveliness of expression and the musical and intellectual coherence of the music above technical perfection.' (Beaujean, 1993). From this description it is easy to see why Végh might not have felt at home in the world of the early Hungarian Quartet with its emphasis on accuracy and its perfectionism in the recording studio.

Erich Höbarth (1956-), who played second violin with the Végh Quartet during the last two years of its existence, and is currently a member of the Mosaïques Quartet (see below), remembers their playing style as follows:

> *Végh was such a charismatic player, with such fantasy in his phrasing and colouring, that it was impossible not to be influenced by him. And though we don't in any way model our own Beethoven interpretations on the Végh Quartet's recordings, its spirituality and purity of expression, its lack of any false emotion or external show, have made a deep impression on all of us.* (Wigmore, 1999: 16)

The final Hungarian quartet represented in this study is the **New Budapest**, which was formed in 1971 by four students at the Franz Liszt Academy in Budapest, thus establishing their bona fides in the Hungarian tradition. This was consolidated in 1972 when they received postgraduate training from the Hungarian Quartet in the USA. The cellist at the time of the recording, Károly Botvay, had previously been a member of the Bartók Quartet, and briefly of the Végh Quartet in its last incarnation.

Austria and Germany

The **Busch** Quartet was heir to both the Austrian and German traditions. Adolf Busch's (1891-1952) first experience of professional quartet playing was when he was invited to take over the leadership of the Wiener Konzertverein Orchestra and its associated Quartet in 1912. This position obviously placed him in close proximity to the Rosé Quartet, and the closeness of their association can be judged from the fact that they planned a joint performance of the Mendelssohn and Spohr Octets (although in the event this was cancelled – however Busch did give many concerts with Rosé including a duo concert). His German credentials were firmly established by his studies with Willy Hess (1859-1939) and Bram Eldering (1865-1943) in Cologne; Eldering was himself a pupil of both Joachim and Hubay, providing Busch with a second-remove link to the Hungarian school. Busch himself met Joachim on a number of occasions, and intended to study with him, but this plan was prevented from coming to fruition by Joachim's death in 1907.

The Busch Quartet itself was founded in Berlin in 1919. The line-up at the time of the 1936 recording of the Op. 131 Quartet consisted of Gösta Andreasson (1895-1981) (a pupil of Auer, second violinist from 1921), Karl Doktor (1885-1949) (violist from 1921) and Busch's brother Hermann (1897-1975) (cellist from 1930). The cellist before 1930 was Paul Grümmer (1879-1965), who had been taught by Julius Klengel, the cellist of the Gewandhaus Quartet. Grümmer was asked to leave the Quartet in 1930 on account of his Nazi sympathies, and the Quartet themselves did not perform in Germany after 1933, moving first to Switzerland, and finally re-assembling in America in 1940.

Busch devoted a great deal of time and energy to the Quartet, although he did have other outlets for his performing career, both as an extremely busy soloist (one of his earliest feats was to perform the Violin Concerto of Reger from memory at the age of seventeen in the presence of the astonished composer), and also in other chamber ensembles, notably the violin / piano duo with his son-in-law Rudolf Serkin. Potter describes the Quartet as occupying a position between the older, leader-dominated, quartets, and more modern quartets with a more democratic cast: 'The ensemble was essentially a transitional one between the earlier style of Joachim or Rosé, in which the leader dominated, and the modern style best exemplified by the Budapest and Smetana Quartets, in which every player has an equal role' (Potter, 1984: 36).

The Quartet is generally considered an heir to the 'classical style' represented by the Joachim Quartet; Andor Toth, cellist of the New Hungarian Quartet from 1972 to 1979, voiced this view in an interview with James Reel as follows: 'the Hungarian school and the Berlin school are where I'm coming from, and that would be a dry, classical thing, not this big, lush sound you get from most players these days. What I'm interested in you can hear if you listen to the old recordings of Beethoven with the Busch Quartet - it's all short and dry and accented. In that school the music came from clarity of structure, and intellectual ideas were more paramount' (Reel, 1998: 60). Potter adds, of Adolf Busch himself, 'as a performer, he hewed to the Classical line: tempi, once set, must not be altered unless the composer so directed. But he was also a child of his Late

Romantic era: fast movements were taken very fast, slow movements very slow, with an unequalled combination of warmth and spirituality' (Potter, 1992a: 550).

Prominent features of this style, remarked on by a number of commentators, include a sense of broad structure, with a feel for the long line and a sense of proportion (Potter, 1984: 29-30), a somewhat dry tone with a pure finger vibrato (Potter, 1992a), and a 'spiky' staccato and a precise rhythmic articulation (Hamilton, 1982: 130). The spirituality of their late Beethoven is almost universally recognized.

More direct heirs to Rosé and the Austrian tradition were the **Schneiderhan** Quartet. The ensemble was formed in 1938 by four members of the Vienna Philharmonic Orchestra, and Wolfgang Schneiderhan (1915-2002) himself had sat in the front desk next to Arnold Rosé. Like Rosé, Schneiderhan also had a flourishing solo career, and the conflict between his quartet commitment and his solo career eventually caused the Quartet to disband in 1952. A link with the Busch Quartet is provided by the Schneiderhan's cellist, Richard Krotschak (1904-), who studied with the Busch's first cellist, Paul Grümmer.

Schneiderhan himself has been characterized by Boris Schwarz as 'the most classical of all Austrian violinists, an antivirtuoso who specializes in the great repertoire of the past' (Schwarz, 1983: 403). The Quartet's style was described, in somewhat extravagant language, by the Viennese critic Hans Weigel as follows: 'Their playing knew not only no technical problems, but none of any kind. Harmony and beauty of sound were sovereign. From the ensemble's opulently sensual wealth they made sweet-toned music above the chasms of late Beethoven and the self-tortured acerbity of Brahms, like sleep-walkers who, deep in sweet dreams, are unaware of the dangerous heights on which they are moving' (Kraus, 1993).

The Quartet remained in Vienna throughout the war and the recording studied here was made for radio broadcast in September 1944, as the Red Army was approaching Vienna.

The other German quartet studied here, the **Petersen**, has somewhat different roots, being formed by four students at the Hans Eisler Academy in East Berlin in 1979. After a period as quartet-in-residence with East German Radio they became independent and full-time in 1989. Links with other quartets studied here are provided by their post-graduate studies with Sándor Végh and the Amadeus Quartet, among others.

France

The French tradition represented by Capet was continued by the **Calvet** Quartet, founded in Paris in 1919. Indeed, the Quartet's cellist, Paul Mas (1890-), won first prize in Capet's ensemble class at the Paris Conservatoire in 1908, and Joseph Calvet (1897-1984) went on to become a professor at the Conservatoire. The Quartet disbanded in 1940, but a new quartet was established by Calvet after the war with different personnel, which lasted until 1950. The second violinist, Daniel Guilevitch, went on to found his own quartet as well as the Beaux Arts Trio under the name Daniel Guilet. The Quartet recorded a number of Beethoven quartets in the 1930s for Telefunken, but their 1938 performance of Op. 131 studied here was their only late Beethoven recording.

After the Calvet Quartet's dissolution in 1940, their violist, Léon **Pascal** (1899-), another pupil and later teacher at the Paris Conservatoire, formed his own ensemble. His first violinist was Jacques Dumont (1913-), another Paris Conservatoire alumnus. The Quartet was closely associated with French Radio, and continued in existence until at least 1955. Their recordings of the complete Beethoven cycle for the budget record label Nixa did not meet with a favourable critical reception, and many considered them to 'lack depth.'

Czechoslovakia

There was a long and flourishing tradition of quartet ensembles in Czechoslovakia from the end of the nineteenth century, of which the Bohemian (or Czech) Quartet, discussed in the previous chapter, is the most outstanding example. There were also many other ensembles operating in Prague in the first half of the twentieth century, with a highly mobile and overlapping membership. With the exception of the Bohemian Quartet, it would be true to say that there was a number of quartet players who appeared in a variety of different formations, often at the same time. Thus names such as Herbert Berger, Ladislav Černý (1891-1975), Jiři Herold (1875-1934), Stanislav Novák, Milos Sádlo (1912-2003), Karel Sancin, Josef Suk (1874-1935), Ladislav Zelenka (1881-1957) and Richard Zika (1897-1947) all appear in more than one of the formations which include the Novák-Frank, Ondříček, Prague, Ševčík-Lhotský and Zika Quartets.

Many of these quartets, including the Bohemian, also left a reasonably significant recorded legacy. It is therefore surprising to discover that there is no commercial recording of a Beethoven quartet by a Czech ensemble from before the Second World War. The first Czech recordings are those by the Czechoslovak Quartet of Op. 132 (c. 1947), by the Drolc Quartet of Op. 59 No.1 (1952) and by the Smetana Quartet of Op. 18 No. 4 (1959). The earliest Czech recording of Op. 131 is that by the Vlach Quartet in 1962.

The **Smetana** Quartet was founded in 1943 and lasted until 1989. Between 1947 and the end of the Quartet's life there was only one change of personnel, when Jaroslav Rybenský (1923-) was replaced as violist by Milan Škampa (1928-) in 1956. The Quartet's roots go back deep into the Czech tradition outlined above, being coached by the Ondříček and Ševčík-Lhotský Quartets and by seasoned quartet players such as Ladislav Černý and Josef Micka (1903-). Jiří Novák (1924-), the first violinist, was taught by Karel Hoffmann (1872-1936), the first violinist of the Bohemian Quartet, from the age of five (Potter, 1995b: 5).

Their Beethoven repertoire developed slowly, and it was not until 1970 (the date of their Op. 131 recording) that they first played a complete Beethoven cycle, at the Prague Spring Festival. In 1949, inspired by the examples of the Italiano and Kolisch Quartets, they started to perform from memory, and by 1972 they had forty-five works in their repertoire which they played without music (Sefl, 1972). Potter remarks on their 'lean, vibrant and coherent tone', and on the 'rock-like rhythmic foundation' provided by Antonín Kohout's (1919-) cello which strongly recalls the role played by Palotai in the Hungarian Quartet (Potter, 1982); he also finds their late Beethoven less successful than their middle period Beethoven, complaining that their adagios are not slow enough.

The **Vlach** Quartet was of the same generation as the Smetana, being founded in 1949 and disbanding in 1977. Josef Vlach (1923-1988) had indeed played quartets in transient formations including the Smetana's cellist, Antonín Kohout, in the 1940s before the formation of either the Smetana or Vlach Quartets. Vlach and his cellist, Victor Moučka (1926-), stayed with the ensemble for its entire life, but the violist at the time of their Op. 131 recording (1962), Josef Koďousek (1923-1995), was their third. Their background was therefore very similar to the Smetana's, but they are a less well known and less well documented ensemble, and travelled very little outside Czechoslovakia. Unlike the Smetana, who tended to concentrate on established repertoire, they were responsible for the premières of many Czech works by composers such as Borkovec, Feld, Kalabis and Krejci, although they also established a reputation for their performances of core classical and romantic repertoire. This concentration on contemporary Czech repertoire was no doubt encouraged by their position as the official chamber music ensemble of Czech Radio, succeeding the Ondříček Quartet in this role, from 1957 to 1967.

Their playing has a reputation for warmth and flexibility: 'their corporate style was quite different to those of their rivals: they made a big, warm, romantic sound and excelled in Late-Romantic music' (Potter, 1992b: 45). Elaborating on this point elsewhere, Potter states: 'tending to approach all music in the same expressive, Romantic fashion, with a good deal of rubato, they excelled in large-scale works, for which they had the stamina, structural sense and sheer "size" of vision and phrasing' (Potter, 1995a: 1283). For Barbier, their 'energetic, powerfully structured style' places them directly in the line of the Bohemian and Ondříček Quartets (Barbier, 1995).

The **Talich** Quartet was founded in 1962 at the instigation of Josef Micka, and was coached by the Smetana Quartet. The founding first violinist, Jan Talich, took the viola chair in 1970, following two previous violists, to allow Petr Messiereur to succeed him as leader.

The final Czech quartet included in the recordings studied is the **Prazak**, which was founded in 1972 and was named after the founding cellist Josef Prazak. They studied with Antonin Kohout of the Smetana Quartet. Prazak was replaced during the 1980s by Michal Kanka, thus giving rise to the line-up represented in the Op. 131 recording.

The New World

It may at first sight seem perverse to consider the **Budapest** Quartet as a New World quartet. It was after all founded in 1916 in Budapest by four Hungarians and enjoyed a career as an established Hungarian quartet for a number of years. But by 1936 all of the original members had been replaced by Russians, and they settled in the USA in 1938. There had, of course, been a number of active American quartets before 1936, most notably the Kneisel (1885 – 1917) and Musical Art (1926 – 1947); however, the upsurge in the numbers of professional quartets in the years around the Second World War can be attributed to the influx of émigré musicians from Europe, including the members of the Budapest Quartet. An argument can be made that what has come to be considered an American tradition of chamber music performance originated with, and was stimulated by, this influx.

The all-Russian line-up that was in place by 1936 consisted of Joseph Roisman (1900-1974), Alexander Schneider (1908-1993), Boris Kroyt (1897-1969) and Mischa Schneider, and remained static until the Quartet's demise in 1967 with the exception of the period from 1944 to 1955, when Alexander Schneider left to pursue other interests and was replaced first by Edgar Ortenberg (1901-1996), and then in 1949 by Jac Gorodetzky (?-1955). The first two of the three Budapest Quartet recordings studied here (1940 and 1943) included Alexander Schneider, while in the third (1952) Gorodetzky was the second violinist. The original all-Russian line-up had all been taught in Germany, Mischa Schneider being a pupil of Julius Klengel, whom we have encountered in the Gewandhaus Quartet.

From 1938 until 1962 the Quartet held the position of Quartet-in-Residence at the Library of Congress, and the second of their recordings of Op. 131 studied here emanates from a public performance at the Library of Congress itself.

Many accounts suggest that the replacement of the Hungarian personnel by Russians was quite predatory in nature. The final Hungarian member, the violist Istvan Ippolyi (1886-1955) survived his Hungarian colleagues by four years but eventually left in 1936 in the advanced stages of a nervous breakdown, and it may not be entirely coincidental that the two later temporary second violinists also left after problems of nervousness, Gorodetzky actually committing suicide in 1955. The tensions associated with the Russian take-over perhaps also account for the elaborate and convoluted methods they devised during rehearsals to ensure that any deadlocks in decision making could be resolved without causing excessive conflict.[6] Whatever the manner of the changeover it

[6] 'Henceforth, in deciding how each piece was to be played, one member would have two votes instead of one. Who would have the second vote was a matter of chance. Before rehearsing as a quartet, the four musicians took out four matchsticks. They broke three of them in half, but left the fourth intact. One of them held the matchsticks in his hand, so that they all appeared

is indisputable that a radical change in playing style was the result. This is perhaps best characterized by Hamilton:

> *Roisman, especially, brought a more modern style of string playing, with more intense vibrato, tauter rhythm, and cleaner phrasing. The Budapest of these vintage years was the Rolls-Royce of string quartets, smooth and silken in tone, alert in ensemble, light and brilliant in staccato, secure in intonation. Mechanically, they were almost perfect, not only in the obvious sense of their management of the individual instruments and their unity and unanimity but also in the management of the total string-quartet texture. They knew how to make lines and chords balance so that the logic of the music's progression was not obscured, which is more than a simple matter of adjusting relative loudness; it also entails coordinating types of attack, carefully planning the swell and decay of individual notes, attending at all times to the total sound. The Budapest really presented the image of a unified instrument, the four individualities subordinated to an ideal of ensemble perfection.* (Hamilton, 1992: 122)

This is echoed by Goldsmith: 'with the changes in personnel came a stylistic face-lift: the every-man-for-himself freedom and the copious use of portamento heard in their pre-1930 recordings was replaced by a taut, polished efficiency whose concentration and technical brilliance stamped the Quartet as the chamber music counterpart of Toscanini's NBC Symphony Orchestra.' (Goldsmith, 1992: 86).

The emphasis on technical brilliance set a trend for many later American Quartets, and was taken to extreme lengths. For example, John Dalley, second violinist of the Guarneri Quartet, assesses the Guarneri's debt as follows:

> *I would say that every quartet of the present day owes something to the Budapest. We admire many aspects of their playing: their warmth, their vitality. While we don't always agree with their ideas on interpretation, we greatly appreciate their wonderful sense of style, their aristocratic elegance. Their playing had a sheen to it.* (Blum, 1987: 22)

Mischa Schneider recalled that many hours of rehearsal time were spent in ensuring that bow direction, fingering, phrasing and vibrato were all perfectly co-ordinated between all

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equal in length, while the others chose. Whoever picked the whole match received the second vote to cast whenever a deadlock occurred over a musical point in the work - a vote that theoretically was cast for the composer. They kept track of who held the deciding vote by putting the person's initials on the first page of that quartet's music.' (Brandt, 1993: 50) four instruments (Brandt, 1993: 76). The first half hour of every rehearsal was spent in playing unison scales to ensure perfect intonation.

Although they did not start performing on a regular basis until 1946, the **Hollywood** Quartet was formed before the Second World War by musicians whose regular employment was in the various Hollywood studio orchestras. The initial members, Felix Slatkin (1915-1963), Paul Shure (1921-), Paul Robyn (1908-1970), and Eleanor Aller (1917-1995), were all children of Russian immigrants, although they received their training in American institutions (the Juilliard and Curtis schools). By the time of the 1957 recording studied here, Robyn had been replaced by Alvin Dinkin (1912-1970), and the Quartet retained this membership until its dissolution in 1959.

Felix Slatkin's son, the conductor Leonard Slatkin, remembers their sound as 'warm, clear and homogeneous [...] Matters of rubato, portamento and dynamic balances were paramount in rehearsals: I hardly remember discussions of technical matters' (Cowan, 1995: 23). Potter also remarks on their 'transparency of texture' and 'colourful tone', adding that 'what set them above even such tonally luxuriant groups as the Stuyvesant Quartet was their ability to combine warmth, colour and intensity with intellectual rigour, firm rhythm and an intuitive grasp of the music's architecture. Their control over long spans of slow music was almost in the Busch Quartet class.' (Potter, 1989: 934).

The **Fine Arts** Quartet was formally founded in 1946, although it had a short prior existence with the fifteen year old Lorin Maazel (1930-) as first violinist. The founding leader, Leonard Sorkin, and cellist, George Sopkin are represented on the Op. 131 recording studied here, which dates from around 1961. The second violinist, Abram Loft had been in place since 1954, and the violist, Irving Ilmer, since 1952. The Quartet is still in existence, although the original membership had been totally replaced by 1981. The Russian influence is present in this Quartet as well, Leonard Sorkin being a great-grand pupil of Leopold Auer (via Sergei Korguev amd Mischa Mischakoff). George Sopkin was taught both by Emanuel Feuermann, who was taught by Julius Klengel (cellist of the Gewandhaus Quartet) and by Daniel Saidenberg who was in turn the pupil of Felix Salmond, who also taught Eleanor Aller, the cellist of the Hollywood Quartet. Ralph Evans, the current first violinist, is quoted as regarding beauty of sound as a primary objective for this new generation of the Quartet: 'not all quartets stress tonal quality as much as we do and this sort of surface beauty in addition to whatever interpretative qualities we can bring to the music – I'd say they're the factors that make up our sound.' (Banks, 1989: 940).

The **Orford** Quartet was a Canadian ensemble which was founded in 1965 and took up a post as quartet-in-residence at the University of Toronto in 1968. They were formed under the guidance of Lorand Fenyvès, who was born in Budapest, was a pupil of Hubay, and was active in Israeli quartets around the time of the Second World War. They received intensive coaching from Fenyvès, and can thus be considered to have inherited more from the Hungarian tradition than any New World influences. They retained the original violinists (Andrew Dawes (1940-) and Kenneth Perkins (1935-) until their dissolution in 1993, although they had a total of three violists and four cellists. At the time of the 1985 recording studied here, the violist was Terence Helmer and the cellist was Denis Brott.

As its name suggests, the **Yale** Quartet was formed from faculty members at Yale University, and was active in the 1960s and 1970s. The first violinist, Broadus Erle (?-1977), was also the founding leader of the New Music Quartet. This latter ensemble was formed in 1947, and was noted for its meticulous observance of Beethoven's metronome markings. The Yale Quartet's violist, David Schwartz (1916-) had previously played in the Paganini Quartet, an ensemble which achieved critical acclaim for its recordings of Beethoven's Op. 59 quartets.

Britain

The **Amadeus** Quartet was almost certainly the best known British quartet in the decades after the Second World War, and achieved the rare feat of retaining its founding membership for the whole of its forty-year life, from its foundation in 1947 to its disbandment in 1987 following the death of its violist, Peter Schidlof (1922-1987). While it is universally regarded as a British quartet, the players taking the three upper parts (Norbert Brainin (1923-), Siegmund Nissel (1922-) and Schidlof) were all born in Austria and received their early training in Vienna, Brainin with Rosa Hochmann-Rosenfeld and Ricardo Odnoposov (1914-), and Nissel with Max Weissgärber. However, all three found themselves in Britain at the outbreak of war and remained as enemy alien internees. They all received subsequent training in London from Max Rostal (1905-). The cellist, Martin Lovett (1927-), was born in Britain, and was taught by Ivor James (1882-1963), cellist of the Menges Quartet. The Quartet was therefore British both by adoption and training, and made its début in 1948 in the Wigmore Hall, London.

Their Beethoven cycle, recorded between 1959 and 1969, achieved wide circulation and critical acclaim, and they had recorded two quartets in a projected second cycle (Op. 59 No.3 and Op. 74) when Schidlof died in 1987.

There is general agreement that their style evolved from an early phase where accuracy of intonation and beauty of tone were paramount, to a later phase where a certain amount of roughness was tolerated in the interests of expression. In 1964, Conrad Wilson could say that 'the Amadeus Quartet is like Herbert von Karajan – so perfect a musical machine, so smooth, so effortless, so beautifully balanced that people are forever condemning it for its virtues' (quoted in Snowman, 1981: 55). By 1973, William Mann could comment on their 'full yet clean sound' and 'intensity and polished virtuosity', while noting that 'nowadays they are not afraid to risk some roughness of tone in the interests of truth and aspiration' (quoted in Snowman, 1981: 54). Muriel Nissel, Siegmund's wife, also states: 'in their later years, they thought they played with much greater freedom and projection than early on when they were more concerned to make sure that everything was neat, together and in tune. Their playing may have become rougher but it was more eloquent and the artistic results better' (Nissel, 1998: 79).

However, this slackening of technical perfection did not lead to a relaxed attitude to tempo modification. Siegmund Nissel, in a master-class attended by the author in 1999, constantly upbraided the student quartet for slowing the tempo to make expressive points or at the end of phrases, or even between the scherzo and trio sections of a minuet.

Their approach to interpretive decisions seems to have been painstakingly democratic, with great efforts being made to avoid imposition by a single member on the one hand and compromise on the other. Interviewed by Anne Inglis, Brainin stressed the importance of argument, discussion and persuasion with the aim of achieving complete agreement (Inglis, 1988: 43).

Since the dissolution of the Quartet, the three remaining members have been extremely active in teaching and coaching young quartets, and have founded an annual summer school for this purpose.

The **Lindsay** Quartet was founded in 1967, and has experienced two changes in personnel since then: the second violinist, Ronald Birks, joined in 1972, and the founding violist, Roger Bigley (who is represented in the recording studied) left in 1986, to be replaced by Robin Ireland. Their training exposed them to a wide variety of influences: Hungarian, in the person of Sándor Végh and the Hungarian Quartet; Austrian, in the form of Rudolf Kolisch (1906-1978); and British, in the person of Sidney Griller (1911-1993).

Peter Cropper, the first violinist, describes the three years they spent with Alexandre Moskowsky of the Hungarian Quartet as a process of assimilation of the Hungarian's performances, Moskowsky going as far as persuading his wife to copy all of Zoltán Székely's personal annotations from his parts so that they could be studied by the Lindsays (personal communication.) Kolisch seems to have had a major influence on the Quartet, and his theories on tempi in Beethoven (discussed later in this study) are taken very seriously by Cropper.

The Quartet has been responsible for a large number of premières and has a special association with Sir Michael Tippett, giving the premières of his fourth and fifth quartets. Their Beethoven cycle was recorded in the early 1980s, and at the time of writing a second cycle has just been completed: Cropper believes that their interpretations have changed dramatically since the first recording.

In spite of the rigidity of their training by the Hungarian Quartet, the Lindsays are known for their spontaneity and willingness to sacrifice beauty of sound for intensity of expression. Their approach is radically different from those quartets whose goal is to achieve homogeneity of tone and to subsume the individual as part of a single quartet 'instrument'. Cropper, interviewed by Joanne Talbot, states: 'when you start playing quartets, you all try and be like each other, and bring everything down to the lowest common denominator. When you do that you create a bland nothing. What you have to do is build individual parts as high as you can, so that the whole is greater.' (Talbot, 1994: 13)

Neither do they aim for a definitive interpretation. In a personal interview with the author in July 2000, Cropper expressed their approach to creating a performance as follows: 'we don't rehearse a performance, we rehearse the music, so that when we're performing we're free to do what we want to... We never play it the same.'

The **Medici** Quartet is a British quartet with a more strictly British background, their basic training being received from Sidney Griller. They were formed in 1971, and at the time of their recording of Op. 131 retained their founding membership with the exception of the violist, Ivo-Jan van der Werff, who joined the Quartet in 1986. The second violinist in the recording, David Matthews, left the Quartet soon afterwards.

They have developed a special affinity with Czech composers, in particular Smetana and Janáček. Paul Robertson, the first violinist, throws some interesting light on their British pedigree and the performance tradition it involves, in describing their experience of playing Czech repertoire in Czechoslovakia (as it then was), and finding that their performance was stylistically worlds apart from that of Czech artists: 'we came from a totally different tradition, and had totally different insight into the music. Even now we don't play in the Czech manner. We play in a more structural way.' (Cohe, 1991: 50)

Other Quartets

There remain three quartets in the sample studied which do not fit into any of the categories described above: the Italiano, Bulgarian and Mosaïques.

The string quartet tradition in Italy is meagre in comparison with central and northern European countries. There were quartets in Bologna, Florence, Milan, Naples, Rome and Turin during the late nineteenth century, and a handful of further quartets in the first half of the twentieth, but the earliest to achieve wide eminence were the **Italiano** and Carmirelli after the Second World War. The Italiano Quartet was founded in 1945 and lasted until 1986, retaining its founding violinists and cellist; the founding violist soon left, to be replaced by Piero Farulli (1920-), who remained with the Quartet for most of the rest of its life, leaving in 1977.

They were taught by Arturo Bonucci, later cellist of the Carmirelli Quartet, and seem to have been isolated from any foreign teaching. However, a performance of the Brahms Piano Quintet in 1949 with Wilhelm Furtwängler at the piano seems to had an overwhelming and formative effect on their performance approach: 'that one evening changed their whole attitude to their work, and it can now be seen that the 1950s was a transitional decade for them, as they struggled to bring a new rhythmic freedom to bear on their innate (albeit Italianate) Classicism' (Potter, 1996: 12). More generally, Potter considers that the Italian inheritance betrayed by 'suave, sonorous bowing and chording' in their early days, was later tempered by an overlay of Germanic influence: 'the Quartetto Italiano that emerged in the mid-1960s had undergone a radical rethinking [...] They seemed to risk much broader tempi, executed with a more massive, muscular approach to chording and tone quality [...] Their Italianate qualities - polish, charm, elegance and gentleness - were in danger of being swamped by an assumed Germanic seriousness.' (: 15)

From the start of their career, they made a point of playing all their repertoire from memory, and, as we have seen, influenced the Smetana Quartet in this regard.

The **Bulgarian** Quartet, also known as the Dimov Quartet after its leader, Dimo Dimov, was founded in Sofia in 1956, and continued in existence until 1993. With a wide repertoire, from Haydn to Penderecki, its 'Performances [were] distinguished by stylishness, and subtleties of rhythm and accent, as well as by outstanding technique and tonal quality.' (Brashovanova, 1980: 482)

The **Mosaïques** Quartet was chosen for inclusion in this study as the only 'historically aware' ensemble to have recorded Op. 131 (albeit as a live performance for BBC Radio). The Quartet was formed in 1985 by members of the period orchestra Concentus Musicus Wien, and consists of three Austrians (Erich Höbarth – formerly a member of the Végh Quartet, Andrea Bischof (1957-) and Anita Mitterer (1955-)) and a French cellist (Christophe Coin (1958-)).

Their approach to authentic performance practice is not in the least doctrinaire, as can be surmised by the fact that the violinists and violist all use chin rests. The important aspect of historical performance for them appears to be the tonal qualities of gut strings, and no attempt is made to follow the prescriptions of the theorists of historically aware performance practice. As Mitterer puts it: 'from the musical point of view, once you have a clear idea of how you want to make music or how you want to play a piece, the musical idea doesn't change a great deal. The right instrument set-up helps to bring the ideas through but it doesn't basically change. If we all used steel strings we wouldn't play with continuous vibrato all of a sudden, but we find it easier on gut strings to bring out the implications we feel and we hear.' (Barber, 1997: 1096)

Höbarth claims that gut strings make it easier for the leader to blend with the rest of the quartet, a particular advantage with Beethoven where the first violin part tends to lie high on the E string, and becomes unduly prominent on a metal string; but the limitations of gut strings are also hinted at by Mitterer in a comment of special relevance to this study of Op. 131: 'we don't see any special problems playing late Beethoven on gut strings, except in occasional passages such as the final pages of the C sharp minor, Op. 131, where the composer does seem to be driving the instruments close to breaking point.' (Wigmore, 1999: 16)

Summary

The above review of the quartets whose performances are studied here has paid particular attention to their teaching pedigree, in so far as this provides evidence for a quartet's association with a particular performance tradition, usually national or geographic. One of the aims of the study is to investigate the extent to which such handed-down performance traditions are reflected in measurable characteristics of performance style relating to tempo, portamento and vibrato. An attempt is therefore made here to group the quartets into 'traditions' as defined by the extent of their shared teaching heritage; these 'tradition' groups can then be compared with the groups which emerge from the analysis of various shared measurable performance characteristics.

Fig. 2.2. Pedagogical family tree for Quartets included in the study

The accompanying chart (Fig. 2.2) provides a detailed 'pedagogical family tree' for all the quartets studied, tracing the teaching ancestry of the quartets themselves and their individual members. Quartet ensembles are represented in boxes, with the names of the individual members included. Where there are multiple performances by the same quartet, but with changed membership, they are represented separately; in other words each unique ensemble of four players is identified. Individual teachers are identified without surrounding boxes (even though many of them also played in various quartet ensembles). A long dashed arrow indicates an ensemble which was taught or coached by another ensemble; a dotted arrow indicates an ensemble which was taught or coached by an individual; a normal arrow indicates an individual who was taught by another individual. Where a normal arrow has a quartet ensemble at one or other end, this indicates that one of the individuals in the ensemble was the teacher or pupil. In the interests of visual clarity an attempt to identify the actual individuals concerned has not been made. Where a teacher has a relationship with more than one member of a quartet, the arrow is shown somewhat thicker. A complete list of the teaching relationships shown on the chart is included in Appendix A, sorted both by teacher and by pupil.

It should be emphasized that the only teaching relationships represented are those that can be traced back from the quartets studied here, or their members. The chart would obviously be much more complex if all pupils of the individuals represented were included.

The relative independence of the French and Czech traditions (at the left and right hand sides of the chart respectively) is immediately apparent from this chart. The French tradition descends ultimately from Giovanni Viotti, via Pierre Baillot; the only later external influence on this tradition came about through the studies of Daniel Guilevitch (second violinist of the Calvet Quartet) with Georges Enesco. This influence is in itself only partially external, as Enesco was taught by Vieuxtemps, solidly in the French tradition, as well as by Joseph Hellmesberger (junior) and Sigismund Bachrich who are part of a Central European tradition tracing its origins back to Joseph Boehm.

The Czech tradition also appears strongly self-sufficient, stemming from a lineage starting with Ferdinand Franzel, Friedrich Pixis and Moritz Mildner for the violinists and Hüttner, Franz Hegenbarth and Hanus Wihan for the cellists. The only external influence comes from Hugo Becker's teaching of Ladislav Zelenka (cellist of the Ševčík-Lhotský Quartet). Otakar Ševčík himself, however, as a renowned international violin pedagogue, made his mark on other central European quartets such as the Schneiderhan and Kolisch. The Smetana, Vlach, Talich and Prazak Quartets, whose performances are studied here, are very tightly bound by an interconnecting and self-contained network of teacher-pupil relationships.

All the other national traditions represented in this study show far more evidence of cross-fertilisation at all periods of their history than the French and Czech traditions discussed above. They all stem ultimately largely from Joseph Boehm, whose quartet was active from 1814 to 1823 in Beethoven's Vienna. However, within this meshed network of relationships a number of later names stand out as having a strong influence in shaping 'sub-traditions'. For example, Joseph Joachim for some of the German and Austrian quartets (including the Gewandhaus, Busch and Schneiderhan); Jenő Hubay for the Léner, Hungarian and Végh Quartets (i.e. the Hungarian tradition); and Leopold Auer (himself of course a pupil of Joachim, although normally identified with the 'Russian School') for the Budapest and Hollywood Quartets.

The statistical technique of cluster analysis was used to attempt a more objective identification of groups or clusters of quartet ensembles based on their pedagogical heritage. This technique will be applied on a number of occasions subsequently in this study in order to cluster the ensembles on the basis of a variety of measurable performance characteristics. The clusters that result will be compared with the present clusters based on pedagogical heritage, and the extent to which the clustering of actual performance characteristics reflects shared training will be assessed.

The technique of cluster analysis is based on the comparison of the values of a number of variables for the entities being analysed. In a first attempt to perform the analysis, the variables considered were the individual teachers, with values assigned based on the closeness of the teacher to the quartet concerned in the pedagogical family tree. Initial results demonstrated that this approach was flawed for two reasons: firstly, teachers with a long teaching ancestry themselves were over-weighted, as the taught quartets accumulated scores for the teacher's teachers as well as for the teacher himself; secondly, the approach takes no account of the relative position of the teacher in the comparison of individual quartets, or the position in the teaching hierarchy at which any two quartets start to share a common heritage. A second approach was therefore devised in which the variables were the quartets themselves, and a score was assigned based on the degree of similarity in the teaching ancestry of the quartets concerned. In other words, a matrix was established of quartets against quartets, in which the scores in the individual cells represented the degree of similarity between the quartets. Three quartets were excluded from the analysis because they had no teaching ancestry in common with any other quartet in the study (at least in the data available to the author); these are the Bulgarian, Italiano and Yale Quartets.

The scoring system devised was inevitably somewhat arbitrary, but was designed to provide a realistic value for the degree of shared influence. It therefore took account of the number of 'generations' involved in the relationship, and the extent to which the influence of several teachers was funneled through a single more recent teacher in the case of a particular quartet. The cells which represented a quartet compared with itself (on the diagonal of the matrix) were allocated a score of 600; a quartet which taught another quartet was allocated a score of 400; if both quartets were taught by the same individual teacher, a score of 150 was allocated; if an individual in both quartets was taught by the same teacher, a score of 120 was allocated. Second generation teachers added 60 to the score, third generation 50, and so on. If a first generation teacher taught more than one member of a quartet, then 10 was added to the score for the second and each subsequent member taught (i.e. an individual teaching three members of a quartet would score 140 (120 + 20) rather than 360 (120 x 3)). If more than one shared teacher appears in a quartet's lineage, but they appear by virtue of their own teaching of a single teacher, then the normal score for the generation concerned is only allocated for one of them; others score 10 each. For example, the Gewandhaus Quartet has Charles de Beriot, Joseph Joachim and Lambert Meerts in its teaching ancestry, but only by virtue of the fact that they all three taught Hugo Heermann; as second generation teachers they would normally score 60 each (i.e. 180), but in this case they would score 60 + 10 + 10 = 80. For each cell (i.e. each comparison of two quartets) only the teachers who were shared contributed to the score, and only those at the most recent generation of shared teaching pedigree (i.e. if Joseph Joachim appeared in the teaching ancestry of two quartets, the score was based on his position in the pedigree, with nothing added for all Joachim's own teachers).

An illustrative example of this scoring is given below for a comparison of the Prazak and Smetana Quartets. The overlapping components of their pedagogical genealogy are shown in Fig. 2.3. The score of 220 for the comparison of these two quartets is made up as follows:

1. The Prazak Quartet was taught by Antonín Kohout, a member of the Smetana Quartet. As an individual member of a quartet teaching another quartet, this counts for 150.
2. The Prazak Quartet and Jiří Novák (first violinist of the Smetana Quartet) share Jaroslav Kocian as a teacher (at the third generation for Novák, and the fourth for the Prázak Quartet, which counts for 40.)
3. They also share Anton Bennewitz at the fourth / fifth generation (through a line of descent which is different from the Kocian line), which counts for 30.

None of the other shared antecedents counts towards the score, as they are only present by virtue of their line of descent through either Jaroslav Kocian or Anton Bennewitz. The lineage through Karel Sádlo is not counted separately either, as it is transmitted to both quartets through the person of Antonín Kohout, who is accounted for in the score by virtue of his membership of the Smetana Quartet and his role as teacher of the Prazak Quartet.

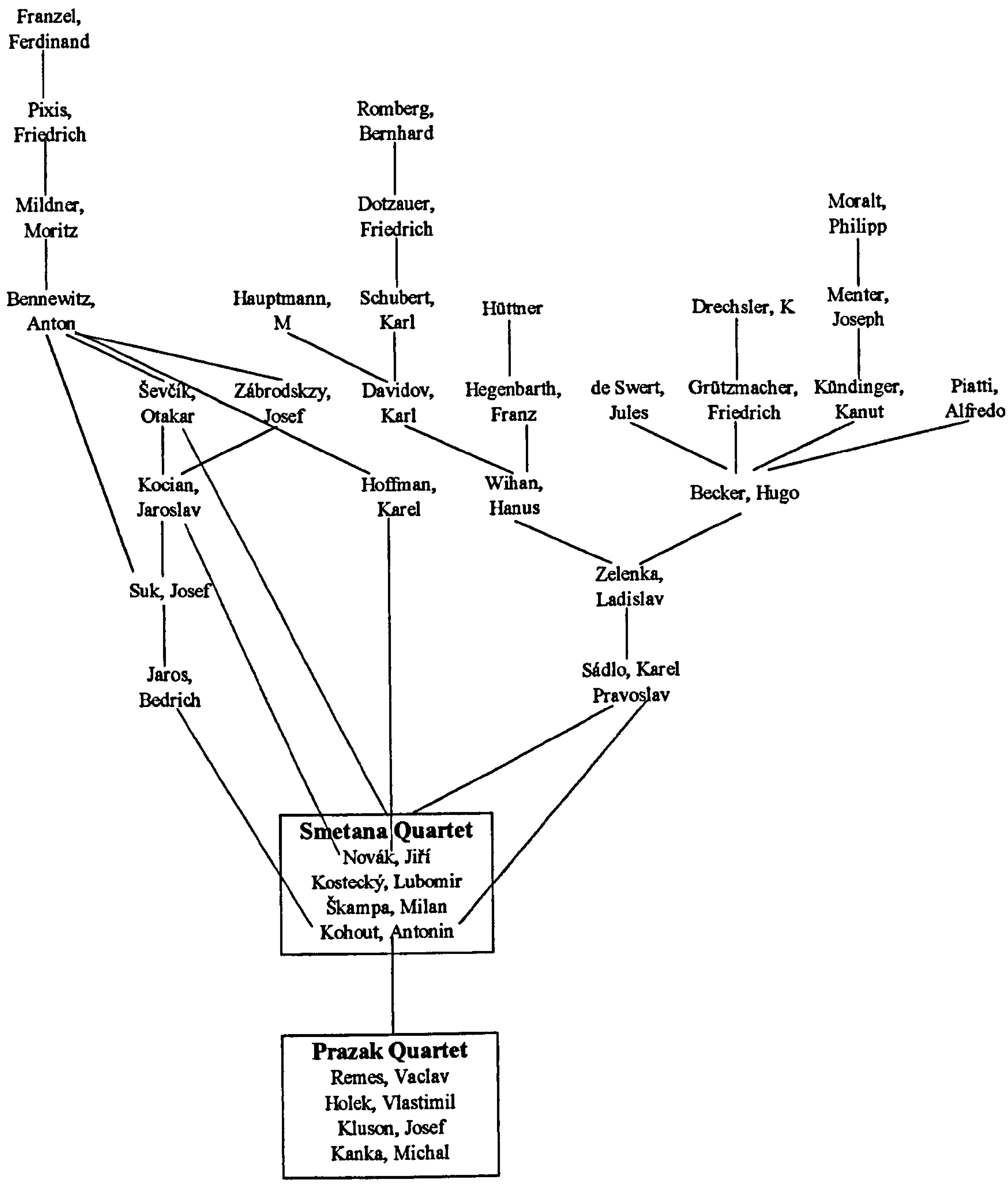

Fig. 2.3 – Pedagogical genealogy of the Prazak and Smetana Quartets

	Amadeus	Budapest 1940, 1943	Budapest 1952	Busch	Calvet	Capet	Fine Arts	Hollywood	Hungarian 1953	Hungarian 1965	Gewandhaus	Léner	Lindsay	London	Medici	Mosaïques	New Budapest	Orford	Pascal	Petersen	Prazak	Rosé	Schneiderhan	Smetana	Talich	Végh	Vlach
Amadeus	600	120	100	90	110	60	0	50	150	150	140	100	60	0	50	90	60	90	0	400	20	120	0	30	20	100	30
Budapest 1940, 1943	120	600	500	100	115	50	110	60	210	150	250	90	120	0	50	80	100	80	0	60	20	110	60	30	20	90	30
Budapest 1952	100	500	600	140	190	20	110	70	90	105	210	60	120	0	50	70	110	70	0	110	20	70	60	30	20	70	30
Busch	90	100	140	600	115	40	50	70	310	60	60	60	160	60	50	60	60	60	0	100	60	70	150	80	60	60	80
Calvet	110	115	190	115	600	300	0	50	125	125	55	60	115	0	50	60	75	60	150	115	20	100	0	30	20	60	30
Capet	60	50	20	40	300	600	0	20	55	55	60	40	45	0	20	30	45	30	60	45	0	40	0	0	0	40	0
Fine Arts	0	110	110	50	0	0	600	110	50	0	60	0	50	0	0	0	0	0	0	0	0	0	60	0	0	0	0
Hollywood	50	60	70	70	50	20	110	600	65	55	55	55	65	0	50	55	55	55	0	55	20	110	0	30	20	55	30
Hungarian 1953	150	210	90	310	125	55	50	65	600	450	65	150	280	60	50	60	80	60	0	120	45	120	60	55	45	120	55
Hungarian 1965	150	150	105	60	125	55	0	55	450	600	65	150	260	0	50	60	400	60	0	120	20	110	0	30	20	120	30
Gewandhaus	140	250	210	60	55	60	60	55	65	65	600	65	110	0	50	55	60	55	0	95	20	120	60	30	20	65	30
Léner	100	90	60	60	60	40	0	55	150	150	65	600	115	0	50	60	100	60	0	100	10	120	0	20	10	120	20
Lindsay	60	120	120	160	115	45	50	65	280	260	110	115	600	0	150	150	260	60	0	240	50	100	60	90	80	120	90
London	0	0	0	60	0	0	0	0	60	0	0	0	0	600	0	0	0	0	0	0	40	0	60	50	40	0	50
Medici	50	50	50	50	50	20	0	50	50	50	50	50	150	0	600	40	40	40	0	90	20	90	0	20	20	40	20
Mosaïques	90	80	70	60	60	30	0	55	60	60	55	60	150	0	40	600	60	60	0	160	20	100	0	30	20	130	30
New Budapest	60	100	110	60	75	45	0	55	80	400	60	100	260	0	40	60	600	60	0	130	20	100	0	30	20	70	30
Orford	90	80	70	60	60	30	0	55	60	60	55	60	60	0	40	60	60	600	0	90	20	100	0	30	20	60	30
Pascal	0	0	0	0	150	60	0	0	0	0	0	0	0	0	0	0	0	0	600	0	0	0	0	0	0	0	0
Petersen	400	60	110	100	115	45	0	55	120	120	95	100	240	0	90	160	130	90	0	600	70	100	50	140	130	120	90
Prazak	20	20	20	60	20	0	0	20	45	20	20	10	50	40	20	20	20	20	0	70	600	20	70	220	290	20	100
Rosé	120	110	70	70	100	40	0	110	120	110	120	120	100	0	90	100	100	100	0	100	20	600	0	30	20	65	30
Schneiderhan	0	60	60	150	0	0	60	0	60	0	60	0	60	60	0	0	0	0	0	50	70	0	600	170	100	0	110
Smetana	30	30	30	80	30	0	0	30	55	30	30	20	90	50	20	30	30	30	0	140	220	30	170	600	400	30	500
Talich	20	20	20	60	20	0	0	20	45	20	20	10	80	40	20	20	20	20	0	130	190	20	100	400	600	20	260
Végh	100	90	70	60	60	40	0	55	120	120	65	120	120	0	40	130	70	60	0	120	20	65	0	30	20	600	30
Vlach	30	30	30	80	30	0	0	30	55	30	30	20	90	50	20	30	30	30	0	90	100	30	110	500	260	30	600

Fig. 2.4- Matrix of similarity scores for quartets based on teaching heritage

The cluster analysis of this matrix was performed using the SPSS package, and used a hierarchical cluster method with between-groups linkage with the measure being the interval by squared Euclidian distance. The analysis produced the dendrogram contained in Fig. 2.5, in which the more closely related the ensembles, the nearer to the left of the diagram the link between them.

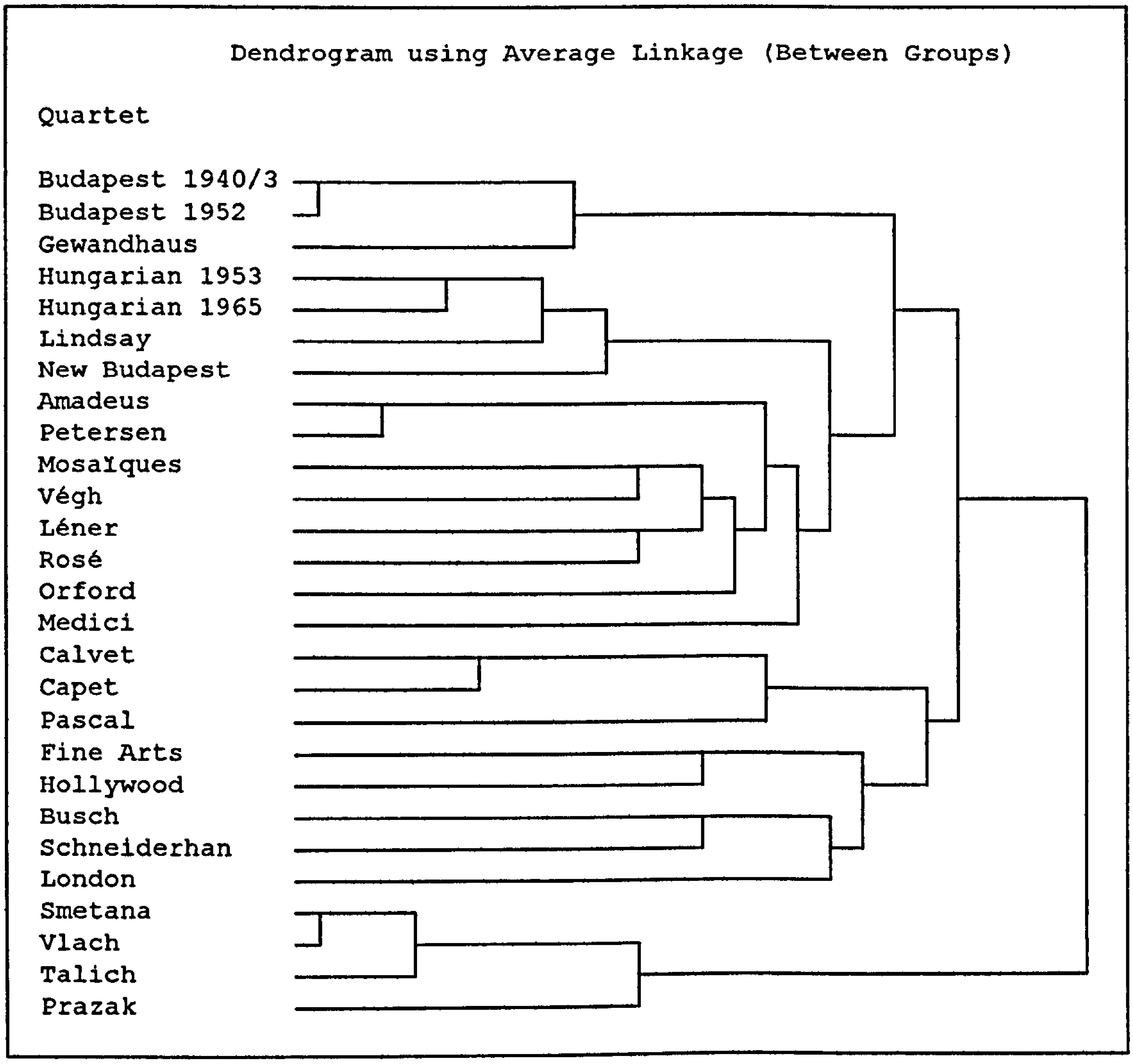

Fig. 2.5 - Dendrogram from the cluster analysis of teaching relationships

The dendrogram confirms the impression given by the 'family tree' (Fig. 2.2) that a separate Czech 'school' exists comprising the Smetana, Vlach, Talich and Prazak Quartets. The appearance in the family tree of a relatively independent French group, however, receives less support from the dendrogram, the Calvet, Capet and Pascal Quartets being linked only at a somewhat distant level. On closer examination of the family tree, it can be seen that their shared teaching heritage is restricted to a few individuals (e.g. Cros-Saint-Ange, François Habeneck and Pierre Baillot), and most of these at several generations remove. While the teaching heritage of these three Quartets is overwhelmingly French, there is relatively little sharing of individual teachers.

As might be expected, the two incarnations of the Budapest Quartet are very closely linked in the diagram, and are slightly more distantly associated with the Gewandhaus Quartet. A further distinct grouping is made up of the two incarnations of the Hungarian Quartet and the Lindsay and New Budapest Quartets; this is accounted for by the overlap in membership of the two Hungarian ensembles and by the fact that the later incarnation was responsible for coaching both the Lindsay and New Budapest Quartets. The Amadeus and Petersen Quartets are also closely related, again on account of the tuition of the latter by the former.

The Fine Arts and Hollywood Quartets form a loosely connected pair, based largely on the presence of Felix Salmond in both Quartets' teaching ancestry. None of the remaining ensembles are linked particularly closely with each other. This reflects the diversity of influence apparent in all their pedigrees, and they present a predominantly Central European aspect.

In conclusion, if the hypothesis is true that performance style is largely determined by training, then the evidence of the cluster dendrogram produced here would predict a number of recognizable and distinct styles in the performances studied here. A strongly individualized Czech style would certainly be expected, with very similar performances from the Smetana and Vlach Quartets; a similar performance style would be expected from the Hungarian (both incarnations), Lindsay and New Budapest Quartets. The Petersen Quartet's style would be expected to follow that of the Amadeus Quartet closely, and the performances of the two incarnations of the Budapest Quartet would be extremely similar. Conversely, one would expect that the style of the Budapest Quartet would be substantially different from that of the Schneiderhan Quartet, and that of the Amadeus from the Schneiderhan, to give just two examples.

Reference will be made throughout the rest of this study to this clustering of quartet ensembles on the basis of shared teaching heritage. The expectations of performance style derived from the hypothesis that performance style is largely determined by taught tradition, embodied in this analysis, will also be examined in the light of other groupings based on measurable performance characteristics.

Chapter 3: Basic Tempo

Introductory remarks

This chapter, and the following three chapters, seek to explore the evidence for stylistic diversity in the performances being reviewed in terms of approach to tempo. The choice of basic tempo, and the ways in which this basic tempo is modified, are perhaps the most flexible and effective mechanisms through which performers can articulate their interpretation of the music; this in its turn results in a richness of interpretive variety embodied in the recorded performances which lends itself to measurement and analysis. It is the combination of the richness of the data available, the relative ease with which it can be measured, and its expressive importance, which has led many studies of recorded performance to concentrate heavily on this aspect at the expense of other expressive features (e.g. Bowen, 1996a; Cook, 1995; Repp, 1990; Repp, 1992).

Tempo variation also represents an almost inexhaustible area for experimental research for musical psychologists attempting to develop theoretical structures to explain the nature of expressivity in musical performance (e.g. Cook, 1987; Gabrielsson, 1988; Repp, 1994a; Shaffer, 1995; Todd, 1985 and Todd, 1992). Many of the analytical techniques developed by these researchers can be borrowed and adapted to analyse historical recordings. There is, however, a major difference in the objectives of historical performance analysis and psychological research in employing these techniques: whereas the psychologists are attempting to generalise about the nature of musical expressivity, historical performance studies are looking for evidence of stylistic diversity and similarity, and their causes.

The potential of these methods for identifying diversity is recognized by Clarke: 'cognitive studies of music performance could legitimately be criticised for having revealed little or nothing about the specificities of interesting and exceptional performance' (Clarke, 1995: 52). Bruno Repp is one researcher who has addressed this criticism, and used experimental techniques developed in musical psychological research to analyse pre-existing recordings of performances. His study of a set of recorded performances of Schumann's *Traümerei* (Repp, 1992) explicitly seeks to group them into stylistic clusters based on a statistical analysis of their timing microstructure, as represented by the measurement of the inter-onset intervals of each individual tone, identifying the distinctive features of each stylistic cluster.

This part of the present study employs a 'top down' approach to the examination of tempo and tempo variation, starting with an analysis of the main basic tempo for each movement, and then exploring tempo variation at successively smaller structural units, starting at the movement section level and finishing with the examination of tempo variation within individual small-scale musical gestures. This approach broadly parallels the categorisation of meanings of tempo made by Gabrielsson:

> *'four different meanings of tempo should be distinguished: (a) the abstract mean tempo, calculated as the total duration of a music section divided by the number of beats in the same section, (b) the main tempo, being the prevailing (and intended) tempo when initial and final retardations as well as more amorphous caesurae are deleted, (c) local tempi, maintained only for short periods but perceptibly differing, and (d) beat rate [...] for describing minor fluctuations, which may not be perceptible as such.'* (Gabrielsson, 1988: 33)

Gabrielsson's *mean tempo* is not considered in this study. Mathematically, a comparison of the mean tempo of a set of performances is identical to a comparison of their durations. It will become clear later in the analysis that local variations in tempo occur extensively, but to different degrees, in every performance, and most often in the form of a decrease in tempo rather than an increase. These variations often distort the overall average to the extent that at no point in the actual performance is the resultant 'mean tempo' actually adhered to. It is, therefore, largely a meaningless abstraction; consideration of the basic 'established' tempo and the nature of the deviations from it, contribute in a much more meaningful way to our understanding of stylistic and interpretive approach in performance. As a result, this chapter, the first of four chapters addressing tempo and tempo variation, considers the 'main tempo' in Gabrielsson's sense (termed here 'basic tempo').

Chapter 4 addresses tempo variation between the main sections of each movement, as suggested by a number of published formal structural analyses of the work. The extent to which these structural sections are demarcated by local tempo changes at their boundaries, as well as by changes in basic tempo which are maintained throughout the section, is also examined. The empirical evidence of tempo variation in the performances themselves is explored to determine whether any of them articulate different structural boundaries from those suggested by the formal analyses, and may thus indicate a different conceptualisation of the work.

Chapter 5 examines tempo variation at a sub-section level, and broadly addresses Gabrielsson's *local tempo* categorisation. This amounts to a discussion of the phenomenon usually termed *rubato*. Some specific instances of local tempo variation, such as tempo dislocation through the use of agogic accents in conjunction with other events such as *sforzando* markings, are considered.

Throughout the analysis, the attempt is made to identify stylistic categories for each performance aspect being examined, and to group the performances into these categories. Chapter 6, in summary, attempts to collate all of these findings and to determine whether there is sufficient evidence to group the quartets being studied into broad stylistic groupings, at least in terms of their approach to tempo-related interpretive choices.

Methodology

The data on which most of the following analysis is based consist of the inter-onset intervals between each bar expressed in milliseconds. These intervals are then converted into metronome markings (expressed in terms of the prevailing beat according to the time signature: for example, tempi for the second movement, in $\frac{6}{8}$ time, are expressed as metronome markings for dotted crotchets [♩. = x]). The result is a table of metronome markings for each bar of each movement for each performance studied.

The measurement of tempo in single bar units applies to all the movements of the quartet except the third (Allegro moderato - adagio) and sixth (Adagio quasi un poco andante), where the beat is used as the unit of measure rather than the bar. This is partly because the basic tempi are slow, giving rise to large inter-onset intervals, but mainly because there are too few bars (11 and 28 respectively) to provide an acceptable statistical sample for further analysis.

The methods employed to collect these data are described in detail in Appendix B. The basic data set was loaded into a series of spreadsheets (using Microsoft Excel) which allows a wide range of statistical analyses and graphical representations to be derived.

Some of the analysis of tempo variation at a sub-bar level required more detailed measurements to be taken and different methodologies to be employed. These are described in the appropriate chapters.

Basic tempo

There is abundant evidence that Beethoven himself regarded the choice of an appropriate tempo as the single most important interpretive decision in the attempt to achieve a performance which realises the true character of a piece. This evidence has been rehearsed extensively elsewhere,[1] and includes his enthusiastic espousal of the metronome as a means of dispelling the ambiguities of the prevailing *tempi ordinarii* descriptions, his insistence on the inclusion of his metronome markings in editions of his music, and, especially in his later works, the increasingly lengthy and convoluted tempo descriptions applied to his compositions. The implication of all this is that Beethoven would have regarded at least some of the performances studied here, which between them exhibit a wide range of basic tempi, as straight-forwardly incorrect, and guilty of falsifying the true character of the music.

While Beethoven supplied metronome markings for his first eleven quartets, he failed to do so for the late quartets. On 19 August 1826, he wrote to the publisher Schott, regarding the Op. 131 Quartet: 'the metronome markings (the deuce take everything mechanical) will follow - follow - follow...' (Anderson, 1961: iii, 1295) - but they never did; the tone of the letter also suggests some disaffection or exasperation with the metronome and the appropriateness of providing metronome markings for his works after his earlier enthusiasm. In addition, the metronome markings that do exist for the quartets, symphonies and some other compositions have given rise to voluminous controversy. It is outside the scope of this study to review this debate, and many such reviews exist;[2] suffice it to say that there is now broad acceptance that the metronome markings given by Beethoven are as he intended, and have not been distorted by his possession of a metronome with a faulty mechanism or in any other accidental manner.

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[1] e.g. Newman, 1988: 85

[2] e.g. Newman, 1988: 83-104

As far as the Op. 131 Quartet is concerned, we therefore have no direct reliable or precise prescription of what Beethoven regarded as the correct tempo for each movement, merely indirect evidence that his tolerance for any significant variation from it would have been low. However, the violinist Karl Holz, who played second violin in the Schuppanzigh Quartet (which gave the first performances of many of Beethoven's quartets), made his notebooks available to Beethoven's biographer Wilhelm von Lenz, and tempi for the late quartets from this source are included in von Lenz's 1857 biography (reported in Platen, 1977). To what extent these tempi were noted at the time, and to what extent they were recollected after a period of years is not clear, and they should therefore be treated with a degree of caution. There is also a number of later sources which offer metronome markings for some or all of its movements based on a variety of rationales; these provide a range of tempi as prescribed by a number of authorities and covering the period of the performances under study which we can compare with the observed values in these actual performances.

The first of these is contained in Alberto Bachmann's *An Encyclopaedia of the Violin*, published in New York in 1925 (Bachmann, 1925: 311). While conceding that 'the correct tempos to be observed in the playing of chamber music have always been a matter of endless discussion', he offers a table showing the 'approximate *rational* tempo indicated for each of the movements' of a number of Haydn and Beethoven quartets, without explaining how these are chosen (: 306).

A more comprehensive, and in many respects a landmark study is that by Rudolf Kolisch. In its first version this was given as a talk in 1942, and published in 1943, but it was continuously revised up until Kolisch's death in 1978. A completion of this revised version was published in 1993 (Kolisch, 1993). Kolisch's intention was to promote the acceptance of Beethoven's known metronome markings against the performance practice of his time, which he felt was the result of a trend away from Beethoven's intentions, generally towards slower tempi. He also attempted to extend the spirit of these markings to Beethoven's other compositions without given metronome marks. This he achieved by developing a categorisation based on the combination of the tempo marking (adagio, allegro, etc.) and the time signature, which gives the metric unit. This provides a theoretical framework within which Beethoven's own markings can be extrapolated to other pieces in the same category. A total of forty-nine such groupings are defined, with the addition of nine special cases applying to movements of the scherzo or minuet type. For example, an allegro in ¢ time is given a range of 𝅗𝅥 = 112-132. It should be noted in passing that as Kolisch was the leader of a celebrated German string quartet his prescriptions for the string quartets merit especial attention, although unfortunately his quartet never recorded the Op. 131 Quartet.

Hermann Beck is a third authority, whose attempt to derive metronome markings for those works which lack markings given by Beethoven himself uses a similar methodology to that of Kolisch (Beck, 1956). Beck's study, which is limited to tempi designated *allegro* or faster, also takes as its starting point a categorisation of Beethoven's own metronome markings by time signature and tempo description. A further sub-categorisation is made according to the pattern of stresses or accents within the bar: generally, the more the phrasing suggests accents within the bar, the slower the tempo. Other features of the work in question are taken into account to determine whether the tempo should be weighted towards the upper or lower values in the range so derived: the tempo is moderated to a slower value if one or more of a number of factors are present in the piece. These include a prevalence of many small value notes (e.g. runs of demisemiquavers), the use of smaller rather than larger phrase units, and more broken phrasing incorporating more rests. Beck does not himself give any metronome markings for the faster movements of Op.131, but it is possible to derive suggested tempi for them from his tables and the application of the rules outlined above.[3]

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[3] The rationale behind the derivation of these metronome markings is as follows:

The *allegro molto vivace* second movement: the nearest measurement in Beck for this movement is an *allegro vivace* for a $\frac{6}{8}$ movement with a '- ∪' stress pattern, given as ♩. = 132. The *molto* in the second movement's description would give a faster tempo than this, but its '- ∪̲' stress pattern would counteract this effect. A marking of ♩. = 132 would therefore seem appropriate (see Beck 1956, Tabelle 3, p.46).

The *allegretto* in the fifth variation of the fourth movement: the nearest measurement in Beck for this section is a $\frac{2}{4}$ *allegro* with a '- ∪̲' stress pattern, marked as ♩ = 96; the *allegretto* marking, and the fact that the syncopation gives an accent on the second beat of the bar would both tend to give a slower marking, while the fact that the smallest note value is a quaver would tend in the opposite direction; hence a slightly slower marking of around ♩ = 92 seems appropriate (see Beck 1956, Tabelle 1, p.39).

The *allegretto* section in the coda of the fourth movement: the nearest measurement for this is a $\frac{2}{4}$ allegro with a '- ∪' stress pattern, with markings ranging from ♩ = 120 to ♩ = 132; again, the *allegretto* marking and the presence of some fast semiquaver runs would tend to a slower tempo, of perhaps ♩ = 112 (see Beck 1956, Tabelle 1, p.39).

The *presto* fifth movement: this movement falls into Beck's third tempo group for the ¢ time signature, which has a '- ∪̲' stress pattern for each two-bar phrase. The fastest marking in this group is an *allegro molto* at 𝅝 = 92; another marking for a *presto* tempo with a '- ∪' stress

The table below (Fig. 3.1) summarises the tempo prescriptions given by the above sources for the Op. 131 Quartet.

Mvt	Tempo marking	Time signature	Holz, 1857	Bachmann, 1925	Kolisch, 1943	After Beck, 1956
i	Adagio ma non troppo e molto espressivo	¢	♩ = 76	♩ = 80	𝅗𝅥 = 30	
ii	Allegro molto vivace	6/8	♩. = 116	♩. = 126	♩. = 152	♩. = 132
iii	Allegro moderato	C	♩ = 76	♩ = 120	'senza	
	Adagio	C	♪ = 76	♪ = 100	tempo'	
iv	Andante ma non troppo e molto cantabile	2/4	♪ = 80	♩ = 56	♩ = 56	
	Piu mosso	C	♩ = 108	♩ = 76		
	Andante moderato e lusinghiero	C	♩ = 69	♩ = 84		
	Adagio	6/8	♪ = 92	♪ = 116		
	Allegretto	2/4	♪ = 132	♩ = 69		♩ = 92
	Adagio, ma non troppo e semplice	9/4	♩ = 96	♩ = 108		
	Allegretto	2/4	♩ = 96			♩ = 112
v	Presto	¢	𝅗𝅥 = 160	𝅗𝅥 = 160	𝅝 = 132	𝅝 = 112
vi	Adagio quasi un poco andante	3/4	♪ = 76		♩ = 60	
vii	Allegro	¢	𝅗𝅥 = 120	♩ = 126	𝅗𝅥 = 120	𝅗𝅥 = 120

Fig. 3.1 - Table of prescribed tempi for the Op. 131 Quartet

This table provides a range of theoretically derived tempi for each movement which any quartet preparing a performance might take as a guideline for their choice of tempo. Two major anomalies in this table are the tempi prescribed by Bachmann for the fifth and seventh movements, which are almost half those suggested by Kolisch and Beck. The tempo of ♩ = 126 for the seventh movement is impossibly slow, and the only sensible suggestion is that a straight forward error has been made, substituting a crotchet measure for the intended minim, and that a tempo of 𝅗𝅥 = 126 was intended. The tempo of 𝅗𝅥 = 160 for the fifth movement, however, is a different matter, and is the same as that remembered by Holz. The conclusion that this tempo is the one intended by Bachmann seems inescapable, as the alternative of 𝅝 = 160 is impossibly fast, although to modern

pattern for the two minims within a bar is 𝅗𝅥 = 176 (or 𝅝 = 88). The movement in question is in a tempo group which is two steps removed from this towards faster tempi; a marking of 𝅝 = 112 would seem to be appropriate (see Beck 1956, Tabelle 2, p. 43)

The *allegro* seventh movement: this fits directly into the second tempo group for the ¢ time signature, for which a marking of 𝅗𝅥 = 120 exists (see Beck 1956, Tabelle 2, p.43).

ears the tempo of 𝅗𝅥 = 160 is very turgid, and much slower than any actual performance in the sample studied (unless, of course, the figure of 160 is itself a misprint). Holz's tempi for the Andante ma non troppo and the piu mosso in fourth movement also seem impossible to accept at face value. A value of ♪ = 80 for the andante and of ♩ = 108 for the piu mosso represents more than a doubling of the tempo, and the latter tempo seems impossibly fast. The most likely explanation is that the piu mosso tempo should be ♪ = 108; while this is fairly slow, it is consistent with Holz's other tempo markings, which are nearly all slower than those provided by Bachmann.

Historical surveys

The avowed intention of Kolisch's work, cited above, to reassert Beethoven's metronome markings in the face of a contemporary performance tradition which involved the use of much slower tempi suggests that there had been a general trend in the first half of this century for tempi to become slower, at least in performances of Beethoven. However, much of the evidence from secondary sources is contradictory.

Philip, in a survey of early twentieth century recordings of Beethoven, suggests that overall, pre-war tempi were faster than those of today (Philip, 1994). This is in line with his general observations on tempi in pre-war recordings of orchestral, chamber and instrumental works by a range of composers: 'the maximum tempos within movements are usually slower in post-war than in pre-war performances, so that the average tempo of a movement has generally dropped [...] In pre-war performances, fast movements were often very fast, so that the contrast between fast and slow movements was very great.' (Philip, 1992: 35).

As Kolisch was writing in 1942, then either post-war performance has continued the trend towards slower performance that Kolisch was protesting against, or the actual situation is rather more complicated than either of these two authors suggest. Other reviews have suggested precisely the opposite of Kolisch's view: that throughout the century, tempo has tended to increase as part of a general 'modernising' trend. Taruskin, for example, sees the self-conscious adoption of faster tempi by the 'authentic' movement in the last two or three decades as part of a wider modernising trend of which Stravinsky was a pioneer.[4]

A study by Bowen based on a number of recordings of standard orchestral repertoire made from 1913 to 1993 failed to find any marked historical trend in basic tempi for all but one of the pieces analysed (Bowen, 1996a).[5] This finding applied whether he considered the overall durations of pieces or their individual movements, or the perceived metronome marking at the start of the movement (the method used to determine this is not described). The main conclusion of this study regarding basic tempi is that the variety of tempi prevalent at any one time is far more remarkable than any tentative historical trend derived from the data.

One is forced to concur with Newman, who reviews briefly the evidence for tempo trends in the performance of Beethoven piano sonatas. Finding that the evidence is contradictory, he also suggests that a wide variety of tempi were employed at any one time, and concludes: 'one begins to suspect that individual artistic temperament and athletic prowess have influenced the choice and flexibility of tempo quite as much as historical attitudes have' (Newman, 1988: 120).

How does one establish the 'basic tempo'?

Turning to review the evidence of the recordings studied here, one must first attempt to define fully what is meant by 'basic tempo' and secondly how a measure for this conceptual tempo can be derived from the available evidence. The bar-by-bar 'tempo maps' which can be drawn for each performance in this study clearly demonstrate that no tempo is sustained in a precise fashion for very long, even in those performances with the least variation in tempo; on the contrary, a constant flexibility of the pulse rate is more in evidence.

Faced with this 'continuous flux' it is evident that the use of any single measure to represent basic tempo is bound to be a statistical artifact. However, the speed of this pulse, to whatever extent it varies, is definitely felt by the listener, and it seems likely that

[4] Most notably in *The Pastness of the Present and the Presence of the Past*, in Taruskin, 1995: 90-154

[5] The exception was Brahms' Second Piano Concerto, which appears to have got progressively slower.

most listeners would be able to make some intuitive distinction between a tempo variation which indicated a slight and perhaps unconscious shift in the overall pulse and one that was a deliberate deviation from that pulse intended to make a specific expressive point.

Repp has addressed precisely this issue, conducting an experiment in which a number of performances of the first eight bars of Schumann's *Traümerei* were analysed in terms of their beat inter-onset intervals and a number of statistical measures compared both with the 'intended tempo' (as defined by the metronome rate chosen by the performers in the experiment before recording the performance) and the 'judged tempo' as determined by a number of graduate students with the aid of a metronome and repeated play-backs of the recording (Repp, 1994a). His conclusion was that the mean of the inter-onset interval measurements came closest to matching the judged tempo. He briefly considers the mode of these measurements as an alternative indicator, but rejects this on the grounds that it provides a bad match with the intended tempo. However, a glance at the frequency diagrams he reproduces in his Fig. 2 (Repp, 1994a: 161) suggests that the modal value is often close to the judged tempo. Repp's study is limited by the fact that the musical extract chosen contains no ritardandi, which would have the effect of lowering the mean tempo, a fact which Repp himself acknowledges. It was also limited to an eight-bar section of a piece, and therefore offers no opportunity to test its findings against a performance where larger scale tempo changes, as between movement sections, may come into play.

This study has opted to use the mode of the local tempi derived for each bar as a measure of overall basic tempo. This is calculated by first rounding the individual tempi for each bar to the nearest whole number, and then identifying the most frequently occurring value in the sample. The movements studied here are all of longer duration and more complex structure than those studied by Repp, and most have local tempo changes indicated in the score (ritardandi, fermata, etc.) which have the effect of significantly lowering the mean tempo. Measures of both the mean and mode of the local bar tempi for fourteen movements (or movement sections with different tempo markings) are available for all thirty-two performances studied (i.e. 448 measurements); in 67% of these cases the mean tempo is lower than the mode, as one would expect from the above considerations. If we exclude from consideration the adagio section of the third movement (which contains a cadenza-like passage which is always taken considerably faster than its surrounding material), then this figure rises to 72%. Using the mode as a measure of basic tempo thus avoids the problems associated with the mean value, and provides a more meaningful comparison of basic tempo between performances which exhibit a great deal of tempo fluctuation and those that are relatively flat. While no claim can be made that the mode tempo represents an intended tempo, or even a significantly sustained tempo, in every case, it is suggested that it is a more indicative and more comparable measure than the mean.

Fig. 3.2 illustrates graphically the difference between the mode and mean tempi for a specific example, in this case the performance of the first movement by the Budapest Quartet in 1943. The local bar tempi as determined from the inter-bar onset intervals are plotted to show the actual variation and flexibility of tempo at a bar-to-bar level; the modal tempo line is superimposed in red, and the mean tempo line in blue.

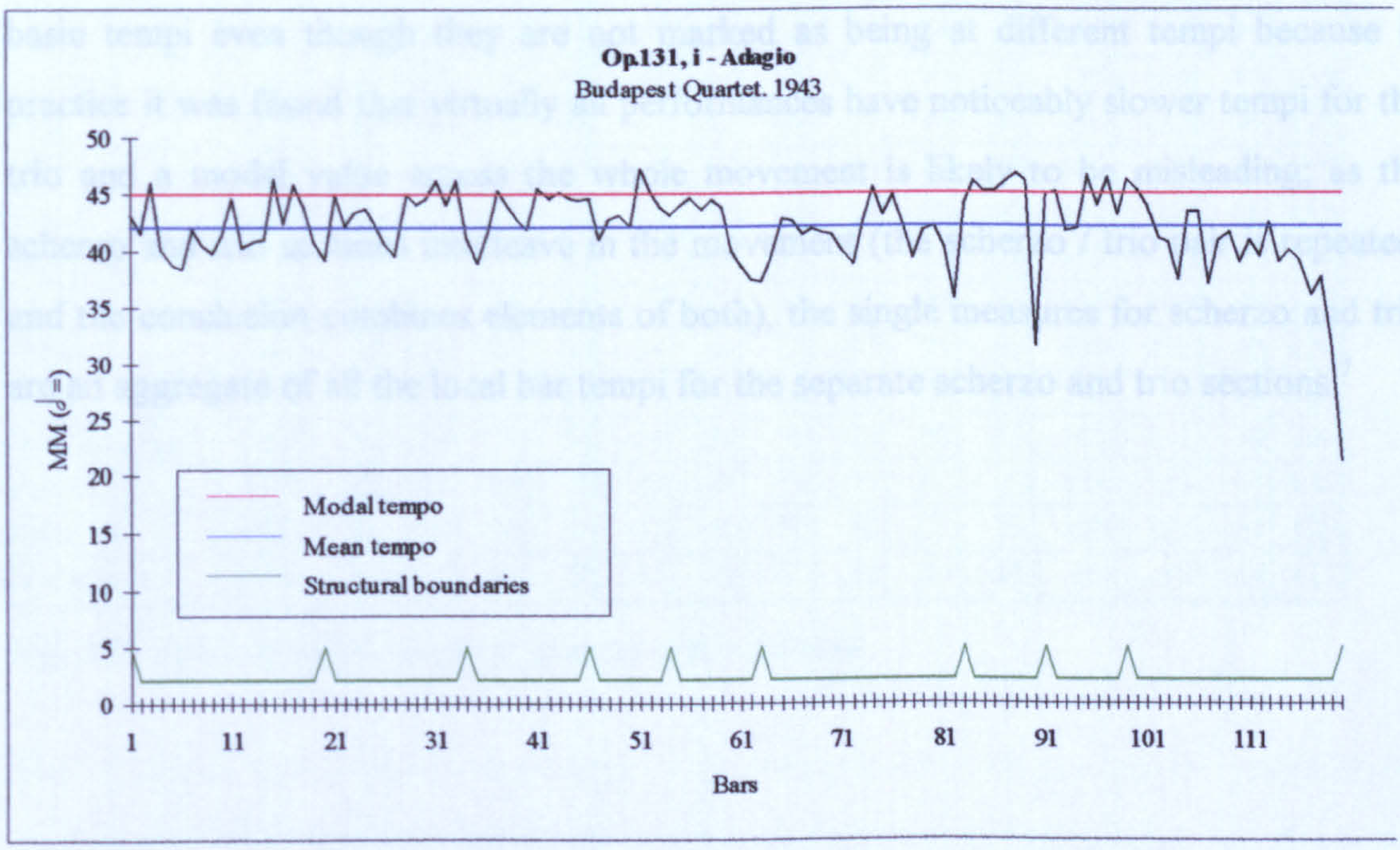

Fig. 3.2 - Tempo map of the first movement, as performed by the Budapest Quartet in 1943

It is apparent from this graph that the mean tempo line (in blue) is less representative of the movement as a whole than the modal tempo line (in red), and its lower value is to a great extent due to the significant slackening of tempo towards the end of the movement and in the section between roughly bars 60 and 70. The modal tempo line fits better as an overall basic tempo, which is slowed down at certain specific places; many of these correspond to section boundaries as defined by a number of formal analyses of the music, and are indicated by the peaks in the green line.

Basic tempo in the performances under review

Fig. 3.3 is a table of the basic tempi (i.e. the mode of the local bar tempi) for all the performances studied, while fig. 3.4 gives their rank order, from fastest to slowest. In each case the performances are listed in chronological order of recording. Separate figures are given for each movement or each section of a movement which has a different tempo marking; thus the 'allegro moderato' and 'adagio' sections of the third movement are given individually (identified as '3/1' and 3/2' respectively); and the six main sections of the fourth theme and variations movement are also given separately.[6] Finally, the scherzo and trio sections of the fifth movement are given separate modal values for their basic tempi even though they are not marked as being at different tempi because in practice it was found that virtually all performances have noticeably slower tempi for the trio and a modal value across the whole movement is likely to be misleading; as the scherzo and trio sections interleave in the movement (the scherzo / trio pair is repeated, and the conclusion combines elements of both), the single measures for scherzo and trio are an aggregate of all the local bar tempi for the separate scherzo and trio sections.[7]

[6] These are 'andante ma non troppo e molto cantabile', comprising the theme and first variation ('4/1'); 'più mosso', comprising the second variation ('4/2'); 'andante moderato e lusinghiero', comprising the third variation ('4/3'); 'adagio', comprising the fourth variation ('4/4'); 'allegretto', comprising the fifth variation ('4/5'); and 'adagio, ma non troppo e semplice', comprising the sixth variation ('4/6'). The coda, consisting of alternating 'allegretto' and 'a tempo' sections, is excluded from the table.

[7] The scherzo sections comprise bars 1-67, 169-234, 335-446 and 469-497, while the trio sections comprise bars 68-168, 235-334 and 447-468.

		1	2	3/1	3/2	4/1	4/2	4/3	4/4	4/5	4/6	5 (S)	5 (T)	6	7
Quartet	**Date**	𝅗𝅥	♩.	♩	♩	♩	𝅗𝅥	♩	♩.	♩	𝅗𝅥.	𝅝	𝅝	♩	𝅗𝅥
Léner	1924	32	137	165	37	53	83	52	23	85	37	101	100	39	141
Gewandhaus	1925	29	140	106	28	42	67	60	27	65	38	111	100	39	135
London	1925	48	142	107	52	55	69	64	39		39	98	91	44	132
Rosé	1927	31	135	95	48	48	75	73	30	89	52	112	106	55	128
Capet	1928	33	135	89	33	56	81	60	34	65	42	111	109	47	145
Léner	1933	40	137	122	37	57	76	52	33	117	40	109	100	55	133
Busch	1936	33	135	77	33	45	63	83	31	49	33	122	109	32	139
Calvet	1938	28	143	111	35	53	75	50	30	64	29	117	108	40	136
Budapest	1940	41	155	116	53	60	80	76	29	101	36	122	114	49	134
Budapest	1943	45	158	120	59	61	80	64	33	108	38	125	114	51	135
Schneiderhan	1944	36	133	115	37	57	63	72	36	108	35	98	96	41	127
Pascal	1951	40	141	109	31	53	72	63	33	88	37	115	109	39	130
Budapest	1952	38	141	102	48	60	80	70	27	93	36	120	109	50	155
Hungarian	1953	37	171	110	38	56	84	85	29	92	47	120	114	54	135
Hollywood	1957	38	151	94	30	52	83	68	29	89	34	120	109	43	129
Fine Arts	1961	35	147	93	36	52	62	56	26	84	32	114	106	43	134
Vlach	1962	41	133	66	32	53	68	70	34	62	37	103	88	47	136
Amadeus	1963	37	141	82	31	49	68	84	28	68	35	120	109	41	133
Hungarian	1965	33	153	128	41	56	83	80	28	96	44	120	112	41	127
Italiano	1970	31	143	96	25	47	67	61	31	54	35	115	105	35	129
Smetana	1970	42	137	86	43	57	64	82	31	97	35	115	106	47	138
Yale	1970	34	146	118	36	49	72	69	30	97	30	125	122	35	125
Végh	1973	32	125	96	35	45	66	71	28	77	38	109	100	47	139
Talich	1978	33	129	102	29	45	62	64	31	87	40	111	109	46	133
Bulgarian	1979	33	140	81	34	48	69	63	30	82	31	122	120	37	129
Lindsay	1983	28	143	85	35	42	58	51	26	80	33	115	109	38	137
Orford	1985	32	147	104	39	53	66	73	27	91	36	120	118	43	136
Medici	1990	35	136	118	44	51	63	60	34	75	30	101	96	40	129
New Budapest	1990	36	146	78	34	44	78	70	29	95	35	109	111	38	140
Prazak	1991	35	141	85	39	50	65	74	31	67	34	118	111	43	136
Petersen	1994	34	130	98	36	47	60	79	30	73	35	129	122	55	122
Mosaïques	1995	41	125	89	30	45	62	63	30	67	41	96	95	49	111

Fig. 3.3 - Table of modal tempo by quartet and movement

Quartet	Date	1	2	3/1	3/2	4/1	4/2	4/3	4/4	4/5	4/6	5 (S)	5 (T)	6	7
Léner	1924	25	20	1	12	11	2	29	32	16	12	28	24	24	3
Gewandhaus	1925	30	18	13	31	31	19	25	27	26	9	21	24	24	13
London	1925	1	13	12	3	10	15	18	1		8	30	31	14	21
Rosé	1927	28	24	20	4	22	11	9	14	12	1	20	20	1	27
Capet	1928	20	24	23	23	7	5	25	3	26	4	21	11	9	2
Léner	1933	7	20	3	12	4	10	29	6	1	6	24	24	1	18
Busch	1936	20	24	31	23	26	25	3	9	31	26	4	11	32	5
Calvet	1938	31	10	9	18	11	11	32	14	28	32	14	19	22	9
Budapest	1940	4	3	7	2	2	6	7	20	4	15	4	5	7	16
Budapest	1943	2	2	4	1	1	6	18	6	2	9	2	5	5	13
Schneiderhan	1944	13	27	8	12	4	25	11	2	2	18	30	28	19	28
Pascal	1951	7	14	11	26	11	13	21	6	14	12	15	11	24	22
Budapest	1952	9	14	15	4	2	6	13	27	9	15	7	11	6	1
Hungarian	1953	11	1	10	11	7	1	1	20	10	2	7	5	4	13
Hollywood	1957	9	5	21	28	16	2	17	20	12	24	7	11	15	23
Fine Arts	1961	15	6	22	15	16	28	28	30	17	28	19	20	15	16
Vlach	1962	4	27	32	25	11	17	13	3	29	12	27	32	9	9
Amadeus	1963	11	14	28	26	20	17	2	24	23	18	7	11	19	18
Hungarian	1965	20	4	2	8	7	2	5	24	7	3	7	8	19	28
Italiano	1970	28	10	18	32	24	19	24	9	30	18	15	23	30	23
Smetana	1970	3	20	25	7	4	24	4	9	5	18	15	20	9	7
Yale	1970	18	8	5	15	20	13	16	14	5	30	2	1	30	30
Végh	1973	25	31	18	18	26	21	12	24	20	9	24	24	9	5
Talich	1978	20	30	15	30	26	28	18	9	15	6	21	11	13	18
Bulgarian	1979	20	18	29	21	22	15	21	14	18	29	4	3	29	23
Lindsay	1983	31	10	26	18	31	32	31	30	19	26	15	11	27	8
Orford	1985	25	6	14	9	11	21	9	27	11	15	7	4	15	9
Medici	1990	15	23	5	6	18	25	25	3	21	30	28	28	22	23
New Budapest	1990	13	8	30	21	30	9	13	20	8	18	24	9	27	4
Prazak	1991	15	14	26	9	19	23	8	9	24	24	13	9	15	9
Petersen	1994	18	29	17	15	24	31	6	14	22	18	1	1	1	31
Mosaïques	1995	4	31	23	28	26	28	21	14	24	5	32	30	7	32

Fig. 3.4 - Table of modal tempo ranking by quartet and movement

The question of whether these tempi are representative of the normal performance practice of the quartets involved has to be addressed, especially for the early performances constrained by the technical limitations of 78 rpm shellac recording. The London Quartet's 1925 performance of the first movement, with its aberrant value of 𝅗𝅥 = 48, is almost certainly not typical of their normal practice. This is by far the fastest performance, and seems to be the result of an attempt to fit the entire quartet onto four shellac discs instead of the five taken by every other 78 rpm recording. The performance is extensively cut in many places; in particular the first movement is cut short at bar 83,

save for a patched cadence passage to bring the movement to its normal close. The first 83 bars are thus squeezed onto a single side instead of the full two sides taken for the whole movement by every other 78 rpm recording. The practice of speeding up normal tempi to fit within the restrictions of the 78 rpm format certainly took place on some occasions: the Spencer Dyke Quartet, for example, are on record as claiming that they cut twenty-five seconds from their normal playing time of the scherzo of Beethoven's Op. 74 Quartet in their 1924 recording in order to fit the movement onto one side.

However, this effect seems unlikely to have distorted any of the other 78 rpm recordings of this movement, as these include the slowest of all (Gewandhaus Quartet, 1925), and a number of others which are slower than average. Indeed the Budapest Quartet's 1940 78 rpm recording (at 𝅗𝅥 = 41) is slower than their live 1943 Library of Congress recording (at 𝅗𝅥 = 45).

A series of graphs, one for each movement, plotting modal tempo against year of performance is presented in vol. 2, figs. 3.1 - 3.14. A linear trend line is superimposed on these graphs, as determined by the spreadsheet software from the data series, to indicate any general historical trend discernible from the data.

A brief review of these trend graphs reveals that there is very little evidence for any universal historical trend for most of the movements to become either slower or faster in basic tempo. The suggestion by Newman (1988) and Bowen (1996a) that such trends pale into insignificance beside the amount of variation prevailing at any one time is borne out by this evidence. There may be some significance in the fact that all the trend line directions apart from three (fourth movement variation three, fourth movement variation five, and fifth movement) are downwards, indicating a slight overall trend towards slower basic tempi. However, many of these are influenced by special factors: the downward trend in the third movement (allegro moderato) (vol.2 fig. 3.3) is definitely exaggerated by the exceptionally fast tempo of the Léner Quartet's 1924 performance (which is nearly half as fast again as their 1933 performance); the trend in the fourth movement, theme and variation one (vol.2 fig. 3.5), is also exaggerated by the three performances of the Budapest Quartet, which happen to be the three fastest of all; similarly the trend in the fourth movement, variation six (vol.2 fig. 3.10) is distorted by the exceptionally fast outlier value of the Rosé Quartet in 1927. Finally, the downward trend for the seventh movement (vol.2 fig. 3.14) is influenced by the exceptionally slow tempo for the latest performance considered here, that by the Mosaïques Quartet in 1995.

The only downward trend which does not appear to be subject to such distortions, and which is steep enough to have any significance, is that for the fourth movement, variation two (vol.2 fig. 3.6). There is some evidence for two separate conceptions of this variation in terms of basic tempo, with one group, mainly of early performances, preferring a faster tempo of around 𝅗𝅥 = 80, and another, mostly later, a slower tempo of around 𝅗𝅥 = 65, and it may be this feature which gives rise to the downward trend line rather than any continuous historical shift in the tempo. This evidence is examined further below.

Only three movements exhibit an upward trend (towards faster tempi), but in no case does this trend carry any conviction. The steepest such trend, for the fourth movement, variation three (vol.2 fig. 3.7), is extrapolated from data which show examples of a wide range of extremes (from approximately ♩ = 50 to ♩ = 80) at all periods.

It is worth noting that Johnson also fails to find any clear trend in the initial tempi of the third movement of Beethoven's Op. 135 in a survey of thirty-five performances between 1927 and 1998 (Johnson, 2002: 203), although here there is clearly a greater range in the early part of the period (the fastest tempo being set by the Léner in 1927, the slowest by the Busch in 1934).

Bowen has implied the possibility that such historical trend graphs might be unduly biased by the paucity of performances in earlier years, with the result that atypical early performances would have a disproportionate effect on the overall trend (Bowen, 1996a: 129). The recordings in this study have been deliberately chosen to even the spread of the sample over the whole period as far as possible, precisely to minimise the possibility of such distortions.

One must therefore conclude that no strong evidence exists for any overall historical trend in basic tempi towards either faster or slower tempi, but rather that a rich diversity of tempi existed throughout the period covered by this survey. The one exception to this observation is exhibited in the graph for the second movement (vol.2, fig. 3.2). Here there is some evidence that a single, and rather tightly constrained view of the appropriate tempo existed up until the end of the thirties, where all eight performances concerned are between ♩. = 135 and 143, after which the tempo range expanded to embrace ♩. = 125 at the slow extreme and ♩. = 171 at the fast extreme. In this instance at least performance practice appears to have become more varied since the 1920s rather than more uniform.

It is instructive to consider the range of basic tempi for each movement without taking into account the historical dimension. A series of frequency distribution graphs are included in vol.2 fig. 3.15: one graph is given for each of the fourteen movements or movement sections considered above, plotting the number of performances against their basic tempi. The basic tempo scale is divided into an equal number of bins for each movement so that the graphs are directly comparable; the bin size therefore depends on the size of the range of tempi exhibited. In the top right hand corner of each graph a figure is given to indicate the extent of this range. The figure is the fastest tempo divided by the slowest tempo (i.e. a range of 1.00 would indicate that the slowest tempo is the same as the fastest tempo, or in other words that all the tempi are the same; a range of 2.00 would indicate that the fastest tempo is twice as fast as the slowest tempo). Where they are available, the tempi prescribed by Bachmann, Kolisch and Beck (as discussed above) are also shown as green, red and blue vertical lines respectively.

As one might expect, most of the graphs exhibit an approximately normal distribution, although the size of the peak varies. The most extreme is that for the seventh movement (allegro) which has a relatively narrow range (1.40) and a high peak (with sixteen performances, half of the total studied, falling in the bin which contains the peak value). The range would be narrower still if it were not for the exceptionally fast performance by the Budapest Quartet in 1952 and the exceptionally slow performance by the Mosaïques Quartet in 1995 (this can been seen clearly in vol.2 fig.3.14). It could be argued that this movement is the mostly strongly characterized of the quartet, and depends on a strong rhythmic character and forward pulse for its successful realisation. The second movement is another example where the range is low (1.37) and the peak fairly high (12 performances in the peak bin); this is another allegro movement where a sense of forward momentum is critical, and like the seventh is perhaps not as amenable to extremes of tempo.

Of the three graphs showing a tempo range greater than 2.00 (i.e. the fastest tempo is more than twice as fast as the slowest tempo), two belong to the two sections of the third movement. This movement is very short (eleven bars), consists of two sections marked allegro moderato and adagio, and the adagio section contains a cadenza-like passage for the first violin which is habitually taken at a faster tempo than the surrounding adagio material; it also acts as an introduction to the fourth (theme and variations) movement. Kolisch refrains from prescribing a tempo value for this movement, describing it as 'senza tempo'. Its weaker definition in terms of tempo characterization means that there is little constraint on the choice of basic tempo and little opportunity within its short length to establish a steady tempo. The third graph with a range greater than 2.00 is that for the fifth variation (allegretto) of the fourth movement; the curve for this movement is also much flatter, indicating a fairly even spread of tempo between the extremes of ♩ = 49 (Busch Quartet) and 117 (Léner Quartet 1933) [these two performances are sampled in CD tracks 1 and 2]. Whereas the seventh movement is perhaps the most strongly characterized movement of the quartet, this variation is perhaps the least: it is largely shorn of melodic content and breaks down the theme almost into an abstraction of its harmonic content. The two extreme performances are only three years apart, the fastest from the Léner Quartet and the slowest from the Busch. Their very different approaches to the basic tempo of this movement perhaps confirms the popular conception of the Busch Quartet as having a more 'spiritual' approach, in which such an abstract variation would be felt with unworldly serenity, and of the Léner Quartet as a more forthright and dynamic ensemble which would tend to emphasize forward movement.

The graphs for the theme and first variation of the fourth movement, and for the second variation of this movement, are unusual in possibly indicating a divergence of approach to their basic tempo, as suggested above: while the range is fairly small (1.45 in both cases), there is some evidence of a bimodal distribution, although given the smallness of the sample perhaps not too much should be read into this. There is, however, a potential ambiguity in the tempo marking for the theme of this movement (andante, ma non troppo e molto cantabile); depending on whether one considers 'andante' to be a basically fast tempo or a basically slow tempo, the moderating effect of the 'ma non troppo' could operate in either direction. Looking at the historical trend graphs for these two movement sections (vol.2, figs. 3.5 and 3.6) it is apparent that most of the faster camp occur before 1960, and most of the slow camp after 1960, in both cases. This example is one of the very few cases where there seems to have been a genuine shift in conception of a movement's basic tempo over time.[8]

Comparison of these frequency graphs with the tempi prescribed by Holz, Bachmann, Kolisch and Beck (as discussed above) is also instructive at this point. It is noticeable that most of the tempo prescriptions given by Kolisch are close to the observed peak of actual performances, and in only two cases (fifth movement, *presto*, and sixth movement, *adagio quasi un poco andante*) are his prescribed tempi appreciably faster than those realised in the performances under study. Indeed, his prescription of ♩ = 120 for the seventh movement is substantially slower than all but one actual performance. Since the main purpose of his treatise on tempo was to counteract a perceived slackening of tempo in contemporary performance, then one must question either the representativeness of the sample performances under study or the reality of Kolisch's perception. Again with the exception of the seventh movement, the tempi derived using Beck's methodology are more representative of the observed tempi.

Bachmann's tempi, offered without rationale or other justification, are often at variance with the consensus of the observed performances; in particular he tends to prescribe slower tempi for fast movements (e.g., the second, fifth and seventh) and faster tempi for slow movements (e.g., the first movement, the *adagio* section of the third, and the adagio variation of the fourth.

Most of the tempi given by Holz are significantly slower than those observed in practice, with the exception of the two sections marked *adagio* (in third and fourth movements), where his tempo coincides with the peak in the frequency graph.

No performance comes close to matching either Holz's or Bachman's tempi in all movements, so there is no evidence here to suggest that they have been followed

[8] Further extensive discussion on the conception of andante as basically slow or basically fast, and of the interpretation of qualifying phrases (such as 'ma non troppo') can be found in Brown, 1999 p.351-361.

systematically by any quartet. The performance that is closest to Holz's tempi is that by the Mosaïques Quartet, with all movements or sections within 29% of the tempi prescribed by Holz, and it is perhaps suggestive that the closest match with tempi remembered by a member of the Schuppanzigh Quartet should be that of the only historically-informed performance in the study.

If there is little real evidence for historical change in basic tempo, the question arises of whether individual quartet style influences choice of tempo, and whether a generic categorisation of quartets is possible in terms of their choice of tempo. For example, do some quartets consistently choose faster tempi than others, or vice versa? While a comprehensive answer to this question would require the study of performances of a large number of works, some general, if tentative, conclusions can be drawn from the present data. To achieve this, the thirty-two tempi for each performance of a movement or movement section were grouped into quartiles: in other words, the quartets whose tempi ranked between 1 and 8 in the table in fig. 3.4 were allocated to the fastest quartile for the movement, those ranked between 25 and 32 to the slowest quartile, and those ranked between 9 and 24 in the middle two quartiles. Given the normal frequency curve which usually applies to the distribution of tempi for each movement (as discussed above), one can consider the quartets in the middle two quartiles to be around average, and the quartets in the fastest and slowest quartiles to be appreciably faster or slower than average.

Fig. 3.5 plots each of the thirty-two quartets on a scatter diagram where the horizontal axis represents the number of movements for which their tempo falls into the slowest quartile, and the vertical axis the number of movements for which it falls into the fastest quartile. Thus, a quartet whose tempo for all movements was in the fastest quartile would appear at the top left of the graph, and one whose tempo for all movements was in the slowest quartile would appear at the bottom right. The diagonal line traversing from top left to bottom right represents each possible position where all of the fourteen movement sections are in either the slowest or fastest quartile, and it is therefore not possible for quartets to be plotted in the shaded area above it: the nearer to this diagonal line the quartet is positioned, the more extreme do its tempi tend to be (or in other words the fewer of its movement sections fall in the middle two quartiles). Finally, the dot-dash diagonal line running from bottom left to top right represents the positions where equal numbers of movements fall into the slowest and fastest quartiles: the closer a quartet is plotted to this line the lower the overall tendency to either slow or fast tempi.

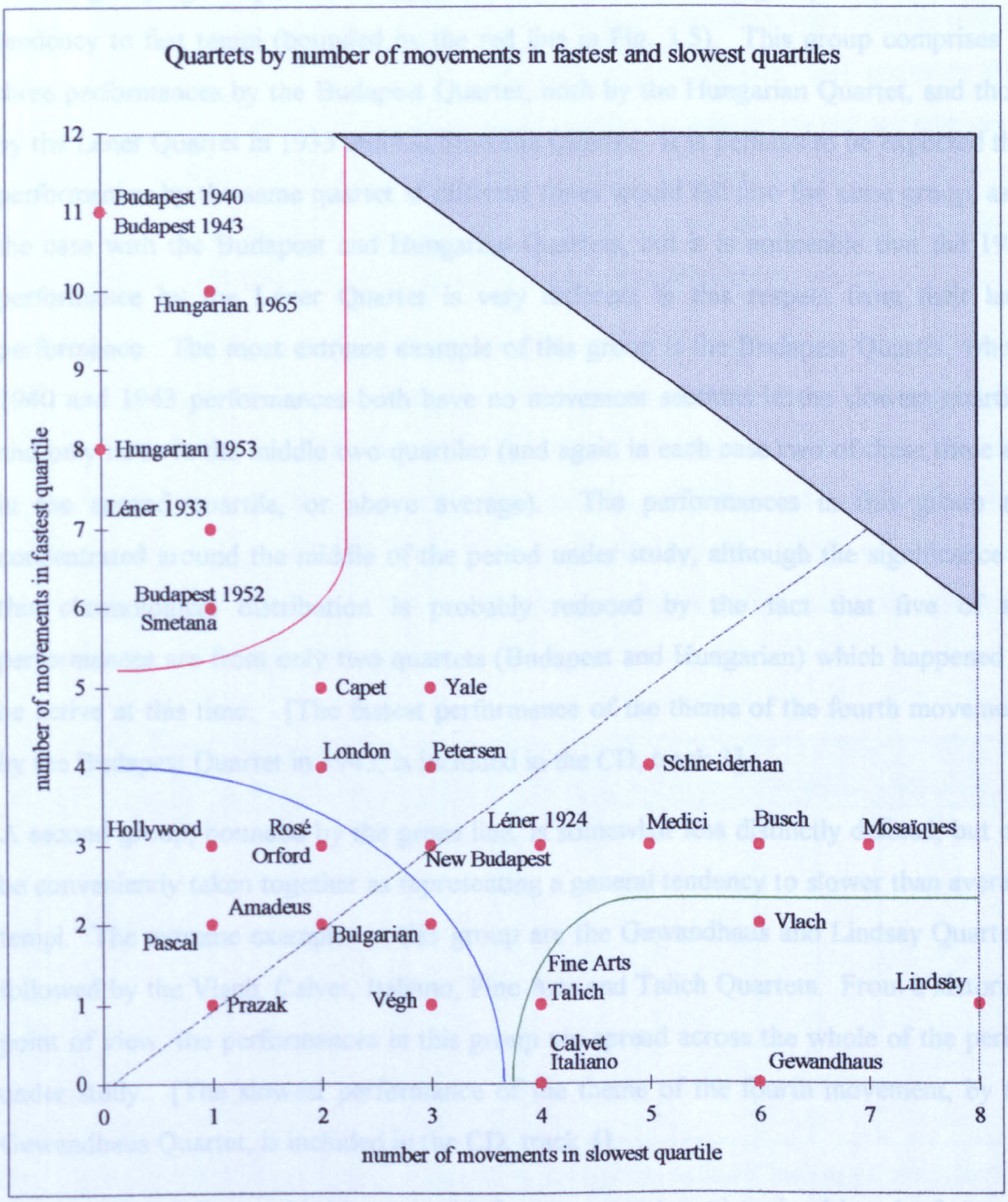

Fig. 3.5 - Quartets plotted by the number of movements in the slowest quartile against the number of movements in the fastest quartile

A number of observations can be made from this diagram. It is interesting that the highest number of occurrences of fastest quartile movement sections (eleven) is higher than the highest number of slowest quartile movement sections (eight), which suggests that the tendency to fast tempi is more marked in the generally fast quartets than is the tendency to slow tempi in the slow quartets.

Several groupings of quartets are apparent. Most obvious is the group of quartets with a tendency to fast tempi (bounded by the red line in Fig. 3.5). This group comprises all three performances by the Budapest Quartet, both by the Hungarian Quartet, and those by the Léner Quartet in 1933 and the Smetana Quartet. It is perhaps to be expected that performances by the same quartet at different times would fall into the same group, as is the case with the Budapest and Hungarian Quartets, but it is noticeable that the 1924 performance by the Léner Quartet is very different in this respect from their later performance. The most extreme example of this group is the Budapest Quartet, whose 1940 and 1943 performances both have no movement sections in the slowest quartile, and only three in the middle two quartiles (and again in each case two of these three are in the second quartile, or above average). The performances in this group are concentrated around the middle of the period under study, although the significance of this chronological distribution is probably reduced by the fact that five of the performances are from only two quartets (Budapest and Hungarian) which happened to be active at this time. [The fastest performance of the theme of the fourth movement, by the Budapest Quartet in 1943, is included in the CD, track 3].

A second group, bounded by the green line, is somewhat less distinctly defined, but can be conveniently taken together as representing a general tendency to slower than average tempi. The extreme examples in this group are the Gewandhaus and Lindsay Quartets, followed by the Vlach, Calvet, Italiano, Fine Arts and Talich Quartets. From a historical point of view, the performances in this group are spread across the whole of the period under study. [The slowest performance of the theme of the fourth movement, by the Gewandhaus Quartet, is included in the CD, track 4].

The blue line defines a third group, with few movement sections in either the fastest or slowest quartiles, which can be characterized as the 'middle of the road' quartets as far as basic tempo choice is concerned. Again, these performances cover the entire period under study.

The remainder of the performances are in that portion of the graph where there are a significant number of movements in both the fastest and the slowest quartiles. Closer examination of the evidence for these performances shows that the movements chosen for the fast tempi and those chosen for the slow tempi differ substantially between the individual quartets, and suggests that there are really two separate stylistic approaches encompassed here. If we consider only those movement sections with tempo markings which are clearly fast (allegro, presto) or clearly slow (adagio),[9] and compare these quartets' choice of fast and slow tempi against these, an interesting picture emerges in which some quartets use their choice of tempi to reinforce these extremes (i.e. they play fast movements fast and slow movements slow) and others choose tempi to minimise these extremes (by playing slow movements fast and fast movements slow).

The table below (Fig. 3.6) lists the quartets in question, showing for each movement section with definitely slow or fast tempo markings whether their tempo ranking quartile reinforces the tempo (marked with a ✓) or moderates it (marked with a ✗). The final two columns give a count of the number of extreme tempi which reinforce the tempo marking and of those which moderate it. The table is ordered so that those quartets with tempi that exaggerate or reinforce the tempo marking are listed first and those with tempi that moderate the tempo marking are listed last.

	slow					fast					
	1	3/2	4/4	4/6	6	2	3/1	5	7	Reinforce	Moderate
Yale				✓	✓	✓	✓	✓	✗	5	1
Busch				✓	✓		✗	✓	✓	4	1
Léner 1924	✓		✓				✓	✗	✓	4	1
New Budapest					✓	✓	✗		✓	3	1
Medici		✗	✗	✓			✓	✗		2	3
Capet			✗	✗					✓	1	2
Petersen					✗	✗		✓	✗	1	3
Schneiderhan			✗			✗	✓	✗	✗	1	4
Mosaïques	✗	✓		✗	✗	✗		✗	✗	1	6
London	✗	✗	✗	✗				✗		0	5

Fig. 3.6 - Table of slowest and fastest quartile tempi against selected movements for selected quartets

[9] This excludes the fourth movement sections marked *Andante, ma non troppo e molto cantabile; Più mosso; Andante moderato e lusinghiero;* and *Allegretto*. The tempi for the trio sections of the fifth movement are also excluded, because they tend to reinforce those for the scherzo sections and could lead to biasing the results in one direction or the other.

From this table it is apparent that the Yale, Busch, Léner (at least in 1924) and New Budapest Quartets tend to emphasize tempo markings by playing fast movements faster than average, and slow movements slower than average, while the London, Mosaïques, Schneiderhan and Petersen tend towards a 'flatter' approach where fast movements tend to be played more slowly than average and slow movements faster. A further illustration of the 'reinforcer' trend is the fact that the Léner Quartet's 1924 performance includes both the fastest of all performances of the third movement (allegro section) and the slowest of all performances of the fourth variation of the fourth movement (adagio). A corresponding illustration of the 'moderator' trend is given by the Petersen Quartet's performance, which includes the fastest of all performances of both the first movement (adagio) and the fourth variation of the fourth movement (adagio) as well as the second slowest performance of both the fifth movement (presto) and the seventh movement (allegro). The Medici and Capet occupy a kind of middle ground with no definite tendency in either direction. [To illustrate the 'reinforcer' and ' moderator' types, the same passages in the adagio variation of the fourth movement and the presto fifth movement are included in the accompanying CD (tracks 5 - 8) as played by the Yale Quartet (a 'reinforcer', with the third slowest adagio variation and the second fastest presto) and the Mosaïques Quartet (a 'moderator', with the fifth fastest adagio variation and the slowest presto)].

Summary

This review of basic tempo choices in the performances under study has failed to identify any convincing historical trend towards either faster or slower tempi in any movement. There is also no consistent evidence for any trend towards increasing uniformity of tempo choice; indeed in at least one case the trend appears to have been in the opposite direction. Neither does any quartet appear to follow any of the tempo prescriptions published by various authors. However, a number of stylistic groupings do emerge, and it is possible to identify quartets which generally adopt faster than average tempi, quartets which adopt slower than average tempi, quartets which take fast movements faster than average and slow movements slower than average, and finally quartets which take fast movements slower than average and slow movements faster than average. The choice of approach is retained by the Hungarian Quartet in both of its recordings, and by the Budapest Quartet in all three of its. By contrast, the Léner Quartet changes from adopting extreme tempi (both slow and fast) in its 1924 recording to adopting faster than average tempi for most movements in 1933. The picture that emerges is one where quartets make their own informed choice of tempo, and tend to stay with that choice, without influence from other performances, from contemporary fashion, or from any other external consideration.

The next chapter moves from a consideration of overall tempi to commence the examination of the ways in which tempo is modified for expressive purposes. The first aspect investigated is the use of changes in tempo to articulate the larger sectional structure of three of the movements of the Op. 131 Quartet.

Chapter 4: Tempo Variation between Movement Sections

Introduction

In this chapter we turn from a consideration of basic movement tempo and the relationships between the basic tempi of different movements to the differentiation by tempo of the sections of an individual movement. This largely corresponds to the third of Gabrielsson's meanings of tempo (local tempo) referred to in page 48 above.

The delineation of sectional boundaries and the differentiation of sections within a movement in terms of tempo can be achieved by means of two principal expressive devices: the end of the section can be signalled by a slowing of tempo, or phrase-final lengthening, this slowing of tempo acting as a kind of 'closure gesture'; or a new section can be differentiated from the preceding section by the adoption of a perceptible change of tempo which is more or less sustained throughout the new section.

The former 'phrase-final lengthening' device is a well-studied phenomenon and has provided a rich source of experiment and analysis for students of musical psychology.[1] A large number of studies have contributed to the development of a 'generative' theory of musical expression in which a conceptual analysis of the hierarchical structure of a piece of music is articulated by the application of a phrase-final lengthening algorithm in which the degree of the lengthening is proportional to the hierarchical level of the section whose closure is being articulated. This theory was first propounded in detail by Todd (1985) in a paper which almost goes so far as to suggest that this structural articulation is the major task of the performer.

Clarke summarises this approach to the articulation of musical structure by phrase-final lengthening, and draws the converse conclusion that it should be possible for the listener

[1] However, it is worth noting that the use of phrase-final lengthening is not universally advocated. Schenker, for example, encouraged a quickening of tempo at section ends in some instances: 'The requirement that a composition's form not be exposed too nakedly frequently demands considerably quicker playing where the seam occurs...Played in this way, the separate sections are pulled together, whereas without such a tempo deviation they would fall apart needlessly, compromising the texture of the form.' (Schenker, 2000: 55-7)

to reconstruct the performer's structural analysis from the articulation embodied in the performance:

> *A strong underlying assumption of this work is that expressive features are related to musical structures by means of generative rules, for which there have recently been various attempts to provide explicit models [...] These models suggest that if it were possible to obtain a clear formulation of the rules, those same rules could be used in reverse to pinpoint structural features that determine a performer's understanding of a piece of music. The expressive profile would now be the data from which a performer's structural interpretation is inferred.* (Clarke, 1989: 2-3)

A paper by Cook applies Todd's ideas to a number of recorded performances of Bach's C Major Prelude (WTC 1) and concludes that the actual performance practice of prolongation at structural boundaries is very varied (Cook, 1987). Shaffer considered Cook's findings in conjunction with his own analysis of a number of laboratory performances of the same piece, and considered that the articulation of a structural hierarchy in this piece might be suppressed by 'an expressive intention not to interrupt the flow of the musical argument in a piece which remains within a single key and obtains its rhythmic interest mainly from a single phrase overlap and the pacing of its large-scale harmonic development' (Shaffer, 1995: 20). In other words, the appropriateness and/or degree of phrase-final lengthening in any particular instance might depend on the inherent characteristics of the piece.

Two studies by Repp which have applied statistical analysis to the timing microstructures of a number of recorded performances of the same piece have yielded further evidence of phrase-final lengthening as a prevalent expressive device for articulating section closure. In a study of nineteen performances of the third movement of Beethoven's Piano Sonata Op.31 No.3, factor analysis of the timing microstructure of the nineteen performances found that 63% of the variance could be accounted for by a factor in which phrase-final lengthening at section boundaries was a major component, although the degree to which this was applied varied considerably from performance to performance. The second most important factor included change of tempo at structural boundaries (Repp, 1990: 631). The second study, which included twenty-eight performances by twenty-four pianists of Schumann's *Träumerei*, showed that virtually all performers exhibited phrase-final lengthening at the end of major sections, although at varying degrees; it also found that the lower the structural hierarchy level the more variability there was between performances (Repp, 1992).

Studies which are more concerned with discerning historical trends in performance practice tend to focus on different aspects and reach different conclusions. Philip summarises his survey of historical recordings, largely restricted to the Romantic orchestral repertoire, as follows:

> *Recordings demonstrate that, in any movement containing contrasts of mood and tension, it was the general practice in the early twentieth century to underline the contrasts by changes of tempo. Lyrical and reflective passages would be played more slowly and energetic passages more quickly.* (Philip, 1992: 16)

This implies that tempo change was the major sectional differentiator in the early part of the century, and that this practice has subsequently died out. Somewhat different conclusions are reached by Bowen, whose study is also largely concerned with standard orchestral repertoire: he finds that early performances are characterized by a large number of small tempo fluctuations, including at the ends and beginnings of sections (which would broadly correspond to the phrase-final lengthening phenomenon discussed above), whereas modern performances are often flat within each section but display more dramatic shifts between sections.[2]

A striking difference of emphasis between the psychological and historical approaches is apparent in this summary. While the psychological studies have concentrated almost exclusively on phrase-final lengthening as a means of articulating structural analysis, the historical studies have emphasized the role of changes of basic tempo to differentiate sections. A number of reasons can be advanced for this dichotomy of approach. The psychological studies take as their subject of study short pieces, usually of piano music, whose mood and character are consistent throughout the piece (e.g. Bach's *Prelude in C* from the Well Tempered Clavier, Schumann's *Träumerei*, the minuet from Beethoven's Op.31 No.3 Piano Sonata); these are often chosen precisely because of their undifferentiated surface or foreground so that structural articulation can be studied with

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[2] "The flexibility and flux of these 'barely perceptible' internal tempo changes turn, in modern performances, into larger, 'structural' tempo shifts between sections. Perhaps large-scale sectional tempo changes in these pieces is intended to compensate for a loss of small-scale internal rubato." (Bowen, 1996a: 148)

minimal interference from other factors. By contrast the historical studies have tended to concentrate on large scale symphonic movements, usually from the Romantic orchestral repertoire, in which dramatic development, tension and resolution is of the essence. The individual sections of such movements can often be strongly contrasted in character (e.g. the classic contrast between the 'masculine' first subject and 'feminine' second subject in sonata form), and the structure of the movement as a whole is geared around the generation and final resolution of dramatic tension. It is therefore hardly surprising that the two approaches stress different performance characteristics. It is equally evident that in a work such as the Beethoven Op.131 String Quartet studied here, both phrase-final lengthening and tempo change between movement sections are appropriate devices available to performers to articulate and characterize their concept of the work's movements.

Performers of string quartets themselves, who might be expected to have a more pragmatic approach to such questions, are by no means unanimous. Robert Martin, in a discussion of interpretative decisions in performing the Beethoven quartets, contrasts the views of Paul Katz, sometime cellist of the Cleveland Quartet, with those of László Mezo, cellist of the Bartók Quartet. He quotes Katz as saying that 'most modern quartets feel uncomfortable about changing tempos markedly within a movement when there is no special marking to that effect. It is felt that the unity of the movement requires a fairly high degree of constancy of pulse. Nowadays it seems objectionably self-indulgent to change tempos (except very subtly) to accommodate the second theme.' Mezo, by contrast 'took it as a matter of course that first and second themes in Beethoven first movements should have different tempos' (Martin, 1994: 121-122), and while Mezo does not qualify the degree of difference he would expect, by implication it would be greater than the 'subtle' change allowed by Katz.

Martin's own summary reflects the considerations which will inform any individual quartet's approach to the articulation of movement sections by tempo modification: 'speeding up and slowing down are related to phrasing, to clarifying architectural features of the piece for the listeners, as well as to matters of character. Many decisions involve trade-offs between clarifying details, on the one hand, and achieving a sense of the large section, on the other' (Martin, 1994: 125).

Op. 131

Three movements of the Op.131 String Quartet have been selected for detailed study of the nature and extent of section demarcation in the thirty-two performances under review here. These are the first, second and seventh movements. The first (*Adagio, ma non troppo e molto espressivo*) is a slow movement of fugal character with a number of fairly well defined episodes and no markings in the score to indicate any modification of tempo (apart from the fermata in the very last bar). The second (*Allegro molto vivace*) is a faster movement which is less clear in its formal structure but is of basically the same character throughout; it contains a variety of tempo modification indications (poco rit. and fermata), although most of them do not correspond to the structural boundaries recognized by most published analyses. The seventh movement (*Allegro*) is a fast and complex sonata form movement with strongly characterized and contrasted sections.

This selection of movements is intended to take into account any variations in performance practice prompted by the nature of the music itself: variations which might reflect the differences between fast and slow movements, movements with single and varied character, and movements with simple and complex formal structures.

Methodology

The previous chapter considered absolute tempo; in this chapter it is tempo variation, temporary prolongation and the tempo of one section compared with another which are important, in other words relative tempo. Tempo map graphs for the three movements in question are included in Volume 2, Figs 4.1 - 4.3. Each graph shows the tempo map for eight performances. The tempi plotted for each bar are expressed as a percentage difference from the modal tempo for the whole movement, the solid horizontal line representing that modal tempo and the dotted horizontal lines occurring at ten percent intervals above and below the modal tempo line. Using a percentage variation from modal tempo ensures that the relative magnitude of bar-to-bar variations in fast or slow performances can be readily compared.

The vertical lines in each graph represent the section boundaries in the movement as identified by a number of published formal analyses, and are discussed below in relation to each individual movement. These boundary lines are aligned with the last bar of a section (rather than the first bar of a new section) so that any phrase-final lengthening event marking the end of the section (which will cause the last bar of the section to be taken at a slower tempo) will show as a sharp trough with its base immediately superimposed on the section line. Side breaks in shellac recordings are indicated both by a break in the tempo map line and by a diagonal arrow.

Analysis of these tempo maps relied largely on visual examination to determine the presence or absence of phrase-final lengthening or tempo change between sections. A tempo difference of ten percent was taken as a threshold to determine whether phrase-final lengthening or tempo change events were counted. The use of a ten percent threshold was determined partly on empirical, and partly on theoretical grounds. Since experiments in musical time perception discussed above suggest that a variation must be at least five percent to be perceptible, it is also reasonable to assume that a performance gesture which is intended by the performers to be registered by a listener would need to be somewhat greater than five percent. While this may appear to be a somewhat subjective approach, the method was successful in isolating larger structural demarcations from more continuous and smaller scale rubato effects, which are considered in more detail in the next chapter.

The adoption of a different tempo to characterize a movement section is indicated by a marked shift in the tempo graph at the section boundary, and the maintenance of the new tempo for all, or at least most, of the new section. This can be seen clearly, for example, in the tempo map for the Talich Quartet's performance of the first movement at bar 90 (Volume 2, fig. 4.1 (b)), and in that for the Calvet Quartet's performance of the same movement at bar 53 (Volume 2, fig. 4.1(c))).

Instances of phrase-final lengthening occur as one of three broadly recognizable categories on the tempo graphs. The first and clearest category shows as a distinct trough at the section boundary itself, in which a sudden (i.e. greater than 10%) decrease in tempo occurs in the last bar of the section: examples of this category can be seen in the tempo map graphs for the performance of the first movement by the Budapest Quartet in 1952 (among many others) at bar 82 and at bar 90 (Volume 2, fig. 4.1 (d)). The second category shows as an equally deep but more rounded profile, indicating that the lengthening occurs over a number of bars before the end of the section and only recovers to an established tempo for the new section after a further few bars: examples of this category, again from the first movement, can be seen at bar 63 in the Prazak Quartet's performance and at bar 20 in the Budapest Quartet's 1940 performance (both in Volume 2, fig. 4.1 (c)). The final category also shows as a rounded profile, but with less depth (i.e. less than 10% in all): examples of this category can be seen in the Hungarian Quartet's 1953 performance of the first movement at bars 20 and 34 (Volume 2, fig. 4.1 (b)). These three types can usefully be taken to indicate progressively weaker realisations of phrase-final lengthening.

Section demarcation in the first movement

The first movement of the Op. 131 Quartet provides the best opportunities to observe the different approaches taken to section demarcation by the quartets under study. There are no indications in the score of any tempo modification anywhere in the movement (except for the *fermata* on the very last bar, which is in any case excluded from the tempo graphs as it is an incomplete bar); and its division into sections is relatively unambiguous and largely agreed on by a number of published commentaries (Mason, 1947; Steinberg, 1994; Tovey, 1927; and Truscott, 1968). On the other hand, one might expect that its fugal character would encourage a more seamless approach to performance and the avoidance of marked tempo disruptions: Kerman (1967: 333) remarks on the basically 'flat' character of both this and the second movements. As we shall see, this has not prevented a number of the quartets under study from adopting unambiguous tempo changes at section boundaries.

The tempo map graphs for all thirty-two performances of this movement are included in Volume 2, Fig. 4.1. The performances are shown in order of increasing incidence of phrase-final lengthening. A visual comparison of tempo map graphs at the two extremes of phrase-final lengthening (e.g. the Smetana Quartet with virtually none, and the Orford or Gewandhaus Quartet with a great deal) is sufficient to demonstrate the extremely wide range of approach in the performances under consideration.

The sectionalisation of the movement, on which all the commentators cited above are in broad agreement, is also shown on these tempo map graphs where the last bar of each section is indicated by a vertical line. Each section can be characterized as follows:

Bars 1-20	Statement of the fugue subject in all four voices
Bars 21-34	Stretto leading to a climax at the *sforzando* in bar 27
Bars 35-45	Passage in which the viola has the theme in the dominant
Bars 46-52	Second stretto, becoming increasingly agitated with the appearance of dotted crotchet and quaver rhythms
Bars 53-63	The theme appears in diminution in the first violin and at normal pace in the cello; preponderance of quaver passages
Bars 64-82	Normal pace resumed, marked by the 'seraphic entrance' (Mason) of the fugue subject in the first violin, displaced by half a bar; prevalence of duet textures, at first between first and second violin, then between viola and cello
Bars 83-90	This section is marked by the return to C# minor - a cadential passage at normal pace
Bars 91-98	A further diminution passage in which a quaver theme in the first violin accompanies the restatement of the main subject in the viola at normal pace
Bars 99-121	The main subject appears in augmentation in the cello, accompanied by agitated passages in the inner voices, leading to the climax of the movement at the *sforzando* in bar 113

Fig. 4.1, below, attempts to summarise the extent of section differentiation exhibited by the performances under study. The abscissa shows the number of section boundaries which are marked by a change of tempo between sections, while the ordinate shows the degree of phrase-final lengthening at section boundaries. The determination of a value for this phrase-final lengthening axis attempts to take account of the degree of lengthening apparent at each boundary, making use of the three broad categories established in the methodology section above: a sudden lengthening in the last bar of a section carries a score of 3; a deep rounded profile a score of 2, and a shallow rounded profile a score of 1.

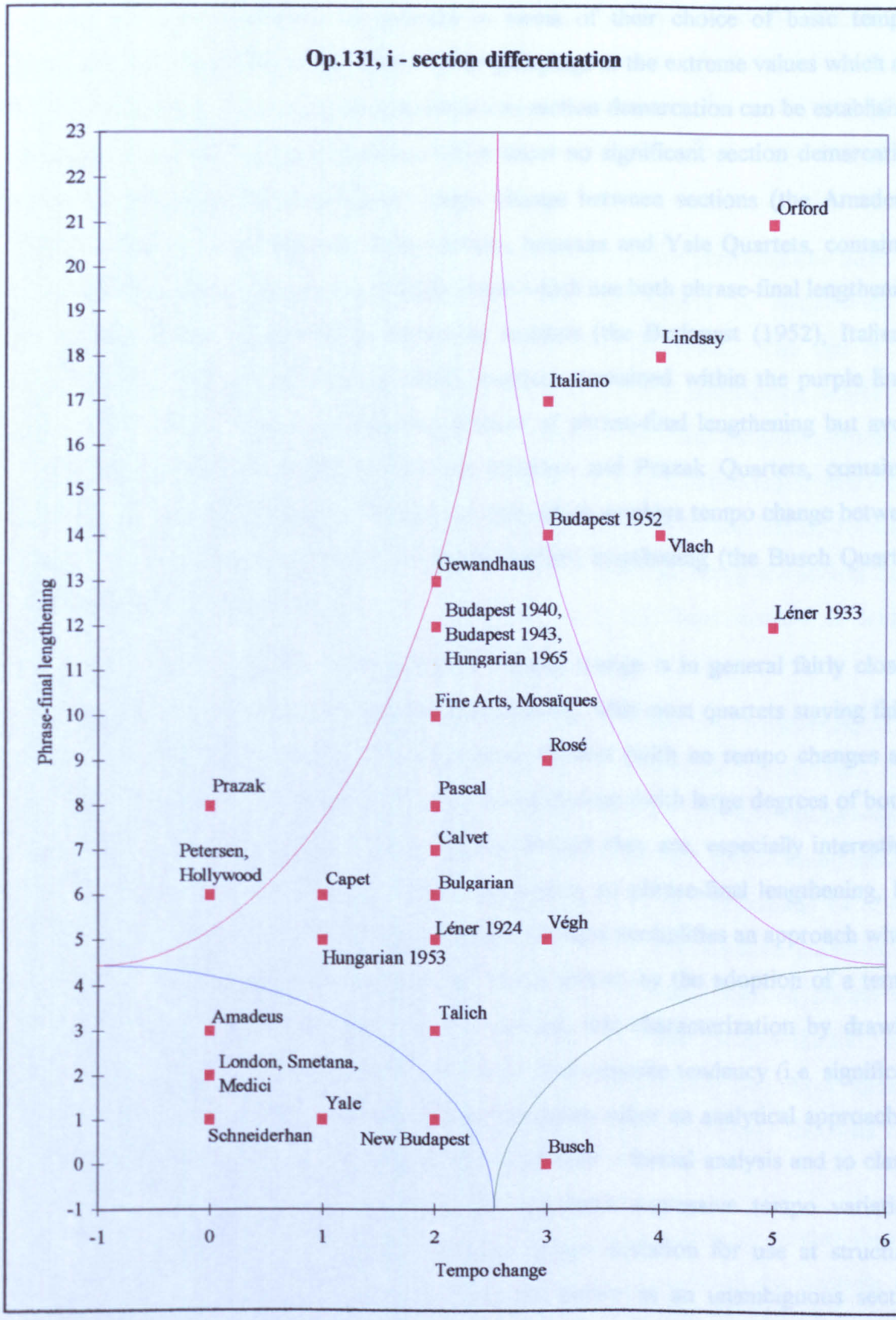

Fig. 4.1 - Performances of the first movement of Op.131 plotted by incidence of phrase-final lengthening against incidence of between-section tempo change.

As with the characterization of quartets in terms of their choice of basic tempo, illustrated in a similar chart (Fig. 3.5), it is the groupings at the extreme values which are of greatest interest. Four separate approaches to section demarcation can be established from this graph: firstly, those quartets which show no significant section demarcation either by phrase-final lengthening or tempo change between sections (the Amadeus, London, Medici, New Budapest, Schneiderhan, Smetana and Yale Quartets, contained within the blue line on the graph); secondly those which use both phrase-final lengthening and tempo change extensively to demarcate sections (the Budapest (1952), Italiano, Léner (1933), Lindsay, Orford, and Vlach Quartets, contained within the purple line); thirdly those which employ a significant amount of phrase-final lengthening but avoid tempo change completely (the Hollywood, Petersen and Prazak Quartets, contained within the red line); and fourthly the single quartet which employs tempo change between sections to a significant extent but avoids phrase-final lengthening (the Busch Quartet, contained within the green line).

This graph also indicates that the amount of tempo change is in general fairly closely correlated with the amount of phrase-final lengthening, with most quartets staying fairly close to a line drawn between the Schneiderhan Quartet (with no tempo changes and virtually no phrase-final lengthening) to the Orford Quartet (with large degrees of both). This makes the outlier groups, small in number though they are, especially interesting. The Busch Quartet, which stands alone as employing no phrase-final lengthening, but marks three section boundaries by tempo change, perhaps exemplifies an approach where the ideal is to express the innate character of each section by the adoption of a tempo appropriate to its specific content, and to enhance this characterization by drawing contrasts of tempo between contrasting sections. The opposite tendency (i.e. significant phrase-final lengthening but no tempo change) suggests rather an analytical approach to performance, where the goal is to present the performer's formal analysis and to clarify structure to the listener at the expense of large-scale expressive tempo variation; structure is articulated by reserving significant tempo deviation for use at structural boundaries, so that the listener can interpret the device as an unambiguous section closure marker.

The measure used for phrase-final lengthening, which uses a score of 1, 2 or 3 for each instance depending on its type and degree (as described above), means that theoretically a performance which had six instances of very slight phrase-final lengthening would appear at the same point on the graph as one with two instances of substantial single-bar phrase-final lengthening. In practice this potentially distorting factor appears to be largely absent: only five performances have more than one instance of the very slight category, and thirteen have none.

Closer examination of the tempo map graphs shows that in some performances there are some instances of phrase-final lengthening where the degree of lengthening is substantially greater than the 10% employed here as a threshold. The end of the cadential section at bar 90 is a favoured locus for such extreme lengthening, where five performances show a bar-to-bar difference of more than 20% (the Bulgarian, Budapest (1940), Fine Arts, Lindsay and Mosaïques Quartets), and two a difference of more than 30% (the two other performances of the Budapest Quartet, in 1943 and 1952). As might be expected, these quartets with such extreme degrees of lengthening are among those which employ the phrase-final lengthening device at a significant number of section boundaries.

Three examples illustrating the difference of approach to phrase-final lengthening at the end of sections are included in the accompanying CD. Each example includes bars 72 to 94, starting with the duet passage for viola and cello, including the cadential passage in bars 83 to 90, and concluding with the first four bars of the second diminution section. The first example is by the Schneiderhan Quartet [track 9], and is marked by a total absence of any tempo modification to mark the end of the sections in question; the second is by the Hollywood Quartet [track 10], and exhibits marked phrase-final lengthening at bars 82 and 90 in the context of an otherwise steady tempo; the third is by the Pascal Quartet [track 11] and exhibits phrase-final lengthening of a more rounded profile in which each section ends with a more prolonged *rallentando* followed by a sudden resumption of tempo for the new section.

It is interesting to speculate whether any of the four extreme tendencies defined above is in any way correlated with choice of basic tempo: it might be expected, for example, that faster performances would employ fewer instances of phrase-final lengthening, as they might be more reluctant to interrupt the rhythmic pulse. The evidence in support of this supposition is suggestive, although not conclusive: all but one of the performances in the group with little phrase-final lengthening and little tempo change between sections fall in the fastest two modal tempo quartiles for this movement (the exception, the Yale Quartet, just falls inside the third quartile); and the three performances which exhibit the most phrase-final lengthening (the Italiano, Lindsay and Orford Quartets) are all in the slowest modal tempo quartile. However, two other performances in the high phrase-final lengthening and high tempo change group fall in the fastest modal tempo quartile (those by the Léner Quartet in 1933 and by the Vlach Quartet), thus contradicting the expected trend.

There is no evidence of any correlation of section demarcation approach with date: the members of all four extreme groups come from both extremes of the date range under study (apart from the high tempo change / low phrase-final lengthening group, of which the Busch Quartet is the only member). In other words, there is no discernible historical trend to confirm either Philip's conclusion, quoted above, that tempo change between sections was a feature of early twentieth century performance, or Bowen's contrary position, also quoted above, that sectional change has tended to replace internal rubato as an expressive device in the second half of the century. In fact, there are examples of almost every approach to section demarcation over the whole period under study.

Closer examination of the section tempo changes exhibited by the performances under study yields further evidence for stylistic diversity. The sections most frequently marked by a tempo change in this movement are the diminution sections starting at bar 54[3] (eleven instances) and at bar 91 (eight instances), the 'duet' passage starting at bar 64 (fifteen instances), the cadential passage following this duet passage, starting at bar 83 (twelve instances) and the augmentation section starting at bar 99 (five instances).

Turning first to the augmentation section, it is perhaps not surprising that all five performances which mark the start of this section by a tempo change do so by adopting a slower tempo (the Hungarian (1965), Italiano, Orford, Rosé and Végh Quartets): this is

[3] In the structural analysis presented on page 79, this section is indicated as starting with bar 53, i.e. with the recurrence of the main subject in the cello. However, without exception all performances which articulate this section boundary by phrase-final lengthening do so in bar 54 or 55, thereby placing the break at the end of the four-bar crescendo, and at the sudden dynamic change to *piano* at the start of the quaver passages in the three upper voices. This certainly seems far more natural than would any tempo disruption in bar 53, where the resumption of the main subject in the cello appears initially as the culmination of a four-bar pattern, emphasized by the crescendo mentioned above, where the first three notes of the main subject are repeated in ascending sequence.

in keeping with the portentous effect of the introduction of the main subject in the cello at twice its original note values. By contrast, there is a variety of practice for the diminution sections, where some quartets opt for a slower tempo while others increase their tempo. Faster tempi are employed in both diminution sections by the Talich Quartet, and in one or other section by the Fine Arts, Hungarian (1965), Lindsay, Pascal, Rosé and Végh Quartets; slower tempi are adopted in both diminution sections by the Léner (1933) and Orford Quartets, and in one or other section by the Budapest (1952), Calvet, Capet, Italiano, Léner (1924), Vlach and Yale Quartets. It is noteworthy that in the first diminution passage four of the performances adopting slower tempi also maintain a continuous *rallentando* throughout the section (both performances by the Léner Quartet and those by the Calvet and Vlach Quartets): indeed, this is so exaggerated in the Léner's 1924 performance that by the end of the section they are around 35% slower than their modal tempo for the movement. The first diminution section in particular is characterized by increasing tension, as the sequential quaver passages build up, accompanied by a prolonged *crescendo* and culminating in two *rinforzandi*, after which the tension suddenly subsides to make way for the 'seraphic' entry of the first violin in bar 63. Both approaches to tempo change for this section can be seen as responses to this build up of tension, the faster tempi emphasizing the nervous excitement, and the slower tempi the deepening pathos.

Examples of three different approaches to the demarcation of the first diminution section by tempo change are included in the accompanying CD. Each example includes bars 45 to 72, encompassing the whole of the stretto section prior to the diminution passage (bars 45 to 53), the diminution section (bars 54 to 62) and the first half of the duet passage. The first example is by the Smetana Quartet [track 12], which maintains a steady tempo throughout; the second is by the Lindsay Quartet [track 13], which adopts a faster tempo for the diminution passage; and the third is from the 1933 performance by the Léner Quartet [track 14], which adopts a slower tempo for the diminution section and continues to slow down to the end of the section before adopting a faster tempo for the duet passage. It should be noted, however, that the end of the diminution section in the Léner's recording on 78 rpm discs coincides with the first side break, and that this may have had an undue effect on the tempo discontinuity apparent at this point.

For the duet passage, the only quartet which adopts a slower tempo is the Busch. This is perhaps a further reflection of their tendency to respond to simplicity of texture and content by evoking a more inward and timeless feel which was alluded to above in connection with their extremely slow basic tempo for the fifth variation of the fourth movement. A number of other quartets exhibit a sudden increase in tempo for this duet passage; however in some of these cases this tempo increase results in a resumption of the tempo established prior to the diminution section, and is probably better viewed as marking the end of the deliberate slowing of the tempo for the diminution passage rather than as the start of a characterization of the duet passage by a faster tempo. These performances by the Léner Quartet in 1924 and 1933 and by the Calvet and Vlach Quartets are the very performances singled out above as having a marked *rallentando* during the preceding diminution section. Other performances show a genuine increase in tempo for this section which is obviously associated with their characterization of the duet passage itself rather than acting as compensation for a previous slower tempo: these include the Bulgarian, Gewandhaus, Mosaïques, Orford and Rosé Quartets.

This duet passage is further subdivided in a number of performances, with the passing of the duet from the violins to the viola and cello in bar 73 acting as a further section boundary. The Gewandhaus Quartet is extraordinary in this respect, in that it marks the start of the violin duet by an increase of tempo of nearly 30%, followed by a sudden drop of nearly 20% when the viola and cello take over; indeed, this performance stands out from all the others for the large number of tempo discontinuities at places not recognized in the same way by other performances. The Vlach and Orford Quartets also mark this duet transition by a phrase-final lengthening gesture, which in the Vlach's case is sudden and deep, and in the Orford's case more prolonged and nearer to a *rallentando* during the violin duet followed by a sudden resumption of tempo for the viola and cello duet.

Discussion of this subdivision of the duet passage section leads naturally to consideration of tempo discontinuities in the performances under study at places other than the section boundaries defined above. A number of quartets exhibit either phrase-final lengthening or tempo change of the same kind and degree as those analysed above at various well-defined points in the movement. To a large extent those quartets which do this most often are the same quartets as those which mark the section boundaries suggested by analysis; in other words, they are not presenting an alternative view of the structure of the movement so much as further subdividing it. The Gewandhaus Quartet has the most instances of such discontinuities (five), followed by the Budapest (1943), Orford and Vlach Quartets (with four each), the Fine Arts, Mosaïques and Talich Quartets (three each), and the Busch, Capet, Hollywood, Italiano, Léner (1933), Lindsay and Végh Quartets (two each).

Taking the points at which these events occur in their order of appearance in the movement, the first such location is at bar 15. This follows the last of the initial statements of the main subject (by the cello), and marks the start of the elaboration of this theme in all four parts: the movement starts to flow for the first time after the disruptive effect of the *sforzando* in the statement of the main subject by all four voices. Not surprisingly, a number of performances adopt a faster tempo at this point, including the Budapest (1943), Fine Arts, Hollywood, Italiano, Gewandhaus, Léner (1933), Lindsay and Orford Quartets.

The next location where tempo discontinuities are observed by several quartets is at bar 26. This bar immediately precedes the first *sforzando* in the movement which appears simultaneously in all four voices, and marks the climax of the first stretto section; more flowing four-part crotchet writing follows. A number of performances mark this bar with a sudden decrease in tempo which looks very much like a phrase-final lengthening gesture on the tempo map graphs; however this is probably better interpreted as the manifestation in terms of tempo of an agogic accent to add stress to the effect of the *sforzando* rather than as a section closure. This phenomenon is examined in more detail in Chapter 5. Another feature of several performances at this point is an increase in tempo after the *sforzando* which is similar in context and intent to that described for bar 15, above. The agogic accent effect is exhibited by the Capet, Mosaïques and Vlach Quartets and the increase in tempo by the Budapest (1952), Italiano, Pascal and Végh Quartets; the Fine Arts, Gewandhaus, Hollywood, Hungarian (1965) and Talich Quartets use both devices.

From a thematic point of view bar 63 indisputably marks the end of the first diminution section and the beginning of a new section with the 'seraphic entry' of the first violin which leads to the duet passages discussed above. While many quartets adopt a faster tempo for this new section, in some the onset of this faster tempo is delayed until the start of the duet between the two violins at bar 67. This is the case in the performances by the Bulgarian, Fine Arts, Gewandhaus, Orford, Rosé, Talich, Vlach and Yale Quartets. It would be misleading, however, to suggest that this feature in these eight performances implies a common approach, as the context in which the tempo increase takes place is very varied. At least five different profiles for the preceding diminution section and the start of the duet section can be discerned in these eight performances, with quite different expressive effect; they are illustrated schematically in Fig. 4.2. Firstly, a gradual *rallentando* to the end of the diminution section followed by a gradual *accelerando* in the new section, reaching its peak at the start of the violin duet (Bulgarian, Rosé, Vlach and Yale) (profile 1 in Fig. 4.2); secondly, a gradual *rallentando* to the end of the diminution section, with this slower tempo maintained for the start of the new section, followed by a sudden increase at the start of the violin duet (Fine Arts) (profile 2 in Fig. 4.2); thirdly, the maintenance of a steady tempo through the diminution section and the first few bars of the new section, followed by a sudden increase for the violin duet (Gewandhaus) (profile 3 in Fig. 4.2); fourthly the maintenance of a steady tempo for the diminution section, followed by a marked phrase-final lengthening effect at the end of this section, followed by a gradual *accelerando* for the first few bars of the new section, peaking at the violin duet (Orford) (profile 4 in Fig. 4.2); and fifthly the maintenance of a steady tempo for the diminution section, followed by a sudden decrease of tempo which is maintained for the first few bars of the new section, followed by a sudden increase for the violin duet (Talich) (profile 5 in Fig. 4.2). The overriding impression is one of an extraordinary diversity of approach.

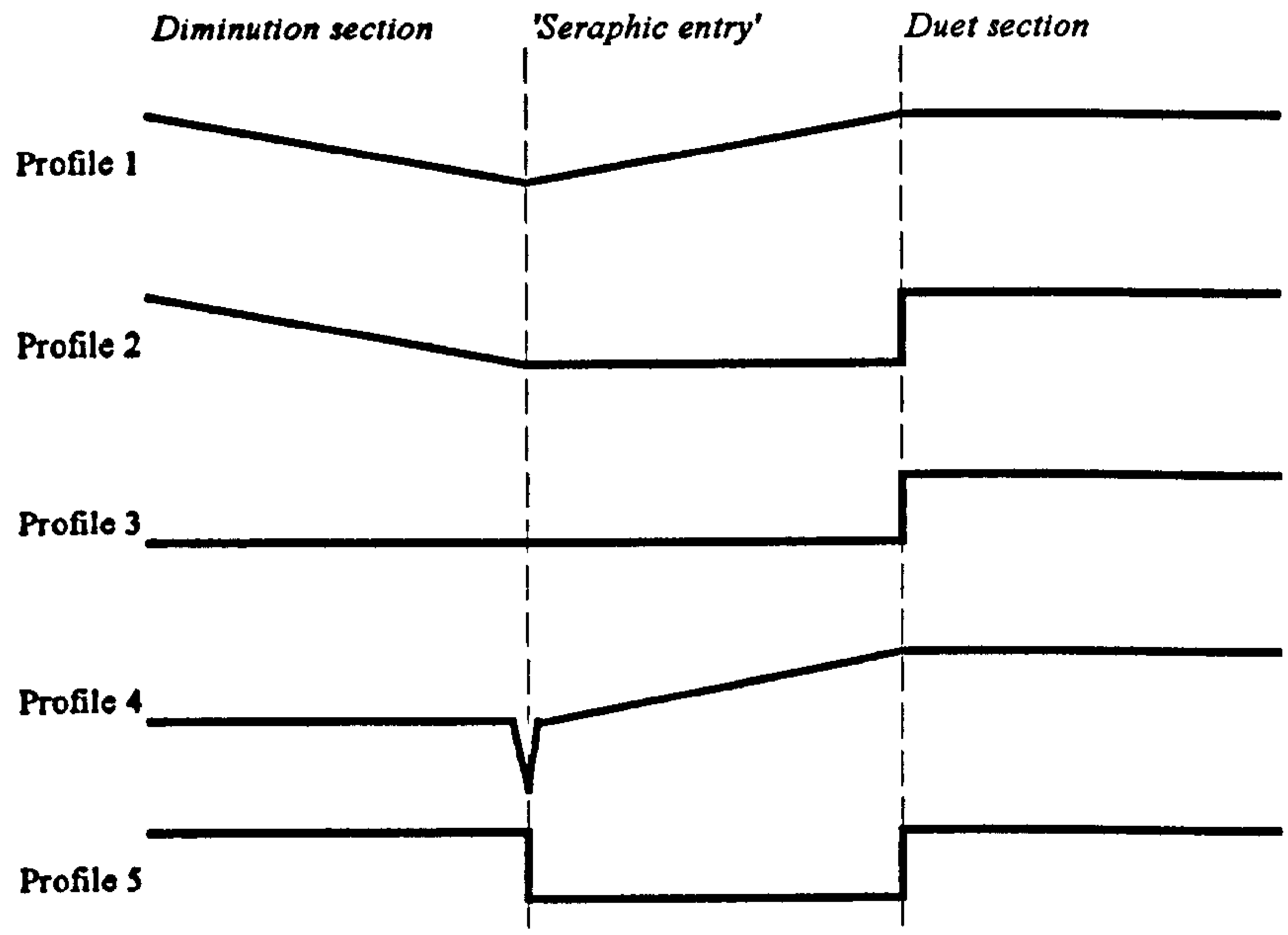

Fig. 4.2 - Schematic representation of tempo profiles for bars 54 to 82 of the first movement of Op.131.

Three quartets (Budapest 1943, Mosaïques and Orford) appear to have a phrase-final lengthening effect in bar 104. This bar marks the end of the statement of the main subject in augmentation by the cello, and the start of a sequential passage in the first violin accompanied by agitated dotted and syncopated rhythms in the inner parts building up to the climax of the entire movement. This sudden slowing of tempo for bar 104 has an effect as if the performers are pausing for breath before the assault on the final summit.

At bar 107, a sudden decrease of tempo, which is maintained for only one bar, is observed by the Busch Quartet. This instance is doubly interesting in that the Busch is the only quartet to mark this point in the movement in such a way, and this is the only example of this kind of event in this movement's performance by the Busch Quartet. The bar marks the climax of the sequential passage starting in bar 104 alluded to above, and contains a *sforzando* in the first violin part and *rinforzandi* in the other three parts. As with the similar event in bar 26, where a number of quartets show what appears to be a phrase-final lengthening event, this instance is probably better interpreted as an agogic accent adding weight to the *sforzando*. This is discussed further in Chapter 5.

Section demarcation in the second movement

The tempo map graphs for the second movement, prepared as described above for the first movement, are included in Volume 2, Fig. 4.2. As for the graphs for the first movement, performances are shown in ascending order of phrase-final lengthening score; where several performances have the same value for phrase-final lengthening they are ordered by their incidence of tempo change. Unlike the first movement, the second contains a number of markings prescribing tempo change (three *fermata* and five *poco rit.* markings); the bars affected by these markings are omitted from the tempo map graphs, resulting in tempo profiles which are broken at these points. This is partly to avoid the visual confusion that would result from plotting the very large variations in tempo at these points, but primarily to focus attention on the deliberate use of changes in tempo for which there is no indication in the score as means of marking section boundaries.

The formal analyses of the second movement offered by commentators display a much greater lack of agreement than those of the first; whereas some (e.g. Truscott, 1968; de Marliave, 1928) attempt to apply a sonata form framework with first and second subjects, development and recapitulation, Kerman considers the movement a kind of sonata form without a development section (Kerman, 1967) and Mason considers it to be closer to a rondo form (Mason, 1947). However, whatever overall formal framework they propose for the movement as a whole, a number of points in the movement emerge as important sectional boundaries in nearly all analyses. These are detailed below:

Bars 1-24	Statement of main theme
Bars 25-47	Transitional theme leading to C♯ major chord at bar 44
Bars 48-59	Re-statement of main theme in E
Bars 60-83	Arrival at A major, with the statement of new (second) subject
Bars 84-113	Original theme returns in tonic
Bars 114-132	Chord sequence corresponding to the transitional theme at bar 25
Bars 133-156	Second subject repeated in D (tonic)
Bars 157-198	Return of main theme (seen as coda by Truscott)

Of the seven section boundaries defined above, three coincide with a marked tempo change (the *fermata* at bar 48, and the *poco rit.* markings at bars 83 and 156), which means that only four such boundaries can be analysed for the phrase-final lengthening phenomenon. One of these (at bar 59) has no instance of phrase-final lengthening in any performance, another (at bar 24) has phrase-final lengthening in only two performances (Fine Arts and Végh), and a third (at bar 132) in only three performances (Capet, Végh and Talich). The remaining instance (at bar 113) has phrase-final lengthening in twenty-five performances; however, this last instance feels less like a section closure than an agogic accent in anticipation of the start of the chord sequence at bar 114: the arrival at F♯ at the start of this chord sequence has been prepared for some bars previously, and in the preceding two bars the prevailing crotchet/quaver 6/8 rhythm has been suspended in favour of sustained notes, held over the bar line.

There is thus little evidence for genuine phrase-final lengthening in the second movement, and this is reflected in Fig. 4.3, where the maximum value for the phrase-final lengthening score is 6, as opposed to 21 for the first movement. However, the maximum occurrence of tempo change as a means of differentiating sections is five, the same as for the first movement. This perhaps confirms the expectation raised above that a faster movement where there are fewer surface contrasts would be less amenable to having its onward flow interrupted by section closure gestures.

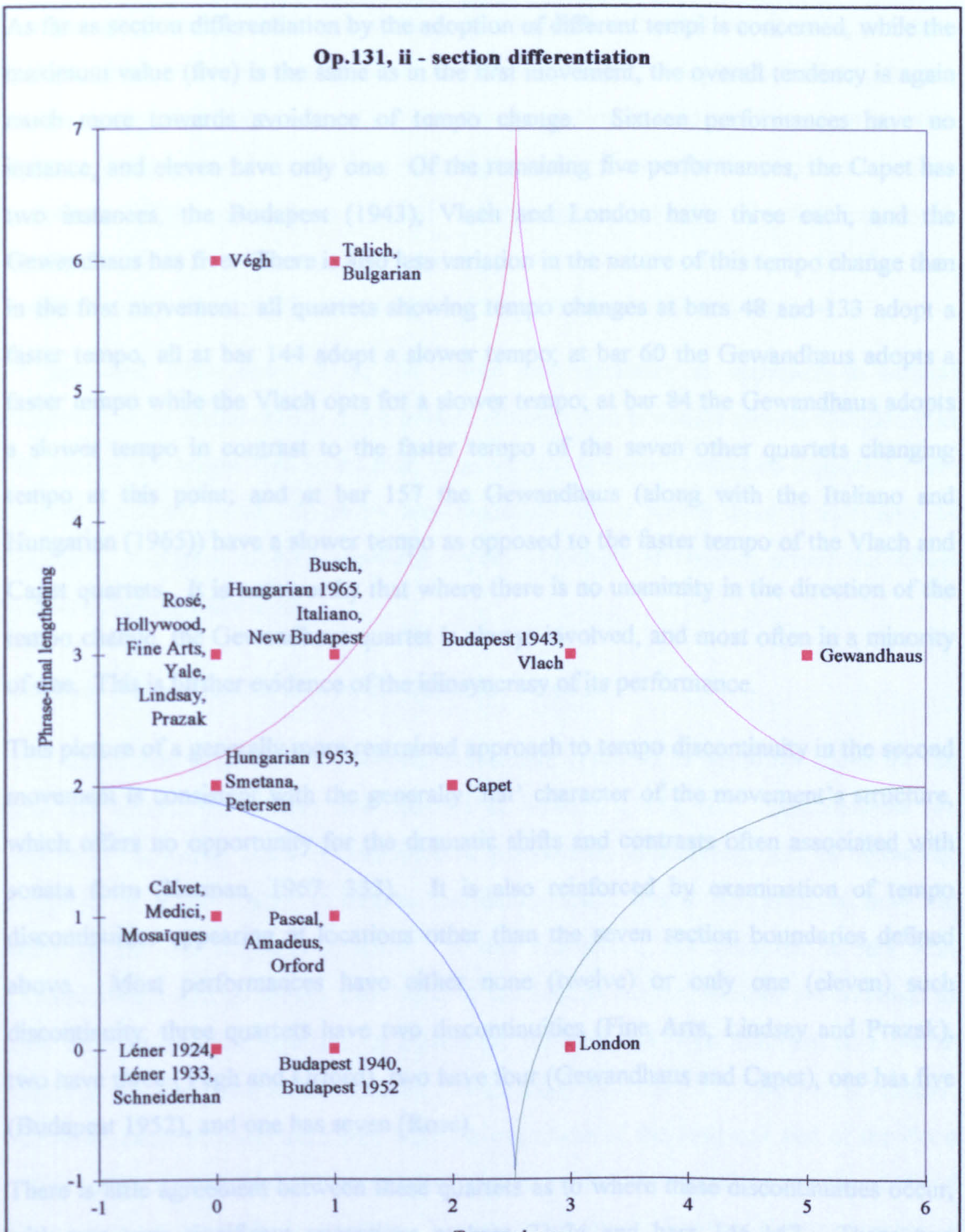

Fig. 4.3 - Performances of the second movement of Op.131 plotted by incidence of phrase-final lengthening against incidence of between-section tempo change.

As far as section differentiation by the adoption of different tempi is concerned, while the maximum value (five) is the same as in the first movement, the overall tendency is again much more towards avoidance of tempo change. Sixteen performances have no instance, and eleven have only one. Of the remaining five performances, the Capet has two instances, the Budapest (1943), Vlach and London have three each, and the Gewandhaus has five. There is also less variation in the nature of this tempo change than in the first movement: all quartets showing tempo changes at bars 48 and 133 adopt a faster tempo, all at bar 144 adopt a slower tempo; at bar 60 the Gewandhaus adopts a faster tempo while the Vlach opts for a slower tempo; at bar 84 the Gewandhaus adopts a slower tempo in contrast to the faster tempo of the seven other quartets changing tempo at this point; and at bar 157 the Gewandhaus (along with the Italiano and Hungarian (1965)) have a slower tempo as opposed to the faster tempo of the Vlach and Capet quartets. It is noteworthy that where there is no unanimity in the direction of the tempo change, the Gewandhaus quartet is always involved, and most often in a minority of one. This is further evidence of the idiosyncrasy of its performance.

This picture of a generally more restrained approach to tempo discontinuity in the second movement is consistent with the generally 'flat' character of the movement's structure, which offers no opportunity for the dramatic shifts and contrasts often associated with sonata form (Kerman, 1967: 333). It is also reinforced by examination of tempo discontinuities appearing at locations other than the seven section boundaries defined above. Most performances have either none (twelve) or only one (eleven) such discontinuity; three quartets have two discontinuities (Fine Arts, Lindsay and Prazak), two have three (Végh and Orford), two have four (Gewandhaus and Capet), one has five (Budapest 1952), and one has seven (Rosé).

There is little agreement between these quartets as to where these discontinuities occur, with two very significant exceptions at bars 73-74 and bars 146-147. These two locations have an identical context in that they are both preceded by a build-up over a number of bars of an insistent rhythm with a *sforzando* in all four voices on the off beat emphasizing a single note (A in the first instance, D in the second), and they both signal an immediate relaxation where the dynamic reduces to *piano*, the *sforzandi* disappear and a freer melodic dialogue between single voices ensues. In both instances, this point is marked by the adoption of a slower tempo by both the Capet and Orford quartets. A number of quartets exhibit a temporary slowing down for the two bars in question, followed by a resumption of the basic tempo, which looks like phrase-final lengthening on the tempo graph, but does not act as a closure gesture at the end of a section so much as an 'opening gesture' for the new relaxed passage in contrast to the previous relentless insistence. This approach is adopted in both instances by the Gewandhaus, Rosé, Budapest (1952), Lindsay and Prazak quartets; in the first instance only by the Fine Arts and Smetana quartets; and in the second instance only by the Mosaïques Quartet.

In summary, while there is on the whole less variability in approach to section demarcation by tempo change and a greater reluctance to articulate section boundaries in the second movement than in the first, what variability there is offers no support for any general historical trend. In every area discussed above where there is variability of approach, examples of each approach appear seemingly at random across the whole period covered by this study.

Section demarcation in the seventh movement

The tempo map graphs for the seventh movement, prepared as described above for the first and second movements, are included in Volume 2, Fig. 4.3. Performances are shown in increasing order of incidence of phrase-final lengthening, and in increasing incidence of tempo change at section boundaries where several performances have the same phrase-final lengthening score. In this movement, the omission of bars with marked tempo change means that much of the second subject sections are missing, as they account for eight instances of a *poco rit.* marking and three instances of a *ritard.* marking; also the entire section marked *Poco Adagio* from bar 377 to bar 382 is omitted. However, none of these markings, with the exception of the start and end of the *Poco Adagio* section, coincide with section boundaries, so that sixteen of the eighteen defined boundaries are available for analysis. The recording by the London Quartet contains a cut which encompasses the section boundaries at bars 147 and 159, so that in this one performance only fourteen of the section boundaries can be analysed.

Because of the large number of bars in this movement (388), the graphs appear somewhat more congested than for the other movements, and there is only room on the horizontal scale to mark every second bar.

In contrast to the second movement, there is widespread agreement among commentators on the formal analysis of this movement, and the salient divisions which are recognized by many of them (e.g., de Marliave, 1928; Kerman, 1967; Mason, 1947; Steinberg, 1994; Tovey, 1927; Truscott, 1968) are as follows:

Bars 1-20	**Exposition** - statement of first subject, first and second themes
Bars 21-39	Third 'mournful' (Tovey) theme
Bars 40-55	Repeat of first theme
Bars 56-77	Second subject
Bars 78-92	**Development** - section based on first theme
Bars 93-116	Fugato section based on rising semibreve scale
Bars 117-147	New development of first theme
Bars 148-159	'*Ritmo di tre battute*' section
Bars 160-184	**Recapitulation** - first subject, first and second themes
Bars 185-203	Third theme
Bars 204-215	Section based on second theme
Bars 216-241	Second subject
Bars 242-261	Repeat of second subject
Bars 262-277	**Coda** - first subject, first theme
Bars 278-284	Third theme
Bars 285-312	Section emphasizing first part of third theme
Bars 313-328	Second theme against emphatic descending semibreve scale
Bars 329-348	Section based on *non ligato* rushing scales
Bars 349-376	Combination of first and third themes
Bars 377-382	*Poco Adagio* section
Bars 383-388	Final flourish in Tempo primo

This movement offers considerably more scope for variation in tempo than the other two considered. Firstly, the simple fact that more section boundaries can be clearly identified (eighteen, as opposed to eight and seven for the first and second movements respectively) means that more combinations of approach are possible. Secondly, the movement is musically far more diverse, and contains more contrasting extremes of content, from relentless driving rhythms to sections of unstable and constantly modified tempo (especially in the second subject sections); or, in de Marliave's more colourful language, from 'profound gloom' to a 'veritable orgy of wild joy' (de Marliave, 1928: 321 and 325). Many of these extremes of expression positively invite rhythmic and tempo manipulation.

This potential for variability is borne out in practice, as Fig. 4.4 amply demonstrates. The maximum value for the phrase-final lengthening score is 35, and for tempo change it is eleven, in each case substantially greater than for the other two movements studied. The positioning of the quartets on the graph is also far more varied, with a number of quartets in each of the four extreme areas of the graph. There is some slight evidence in favour of historical trends here, in that all of the performances in the section of the graph exhibiting high values for both phrase-final lengthening and tempo change date from after 1960, and the two performances in the high tempo change / low phrase-final lengthening section are the two earliest in this study (Léner, 1924 and Gewandhaus, 1925). However, this trend is not evident in the other movements studied. Also, two of the earliest performances (Capet and Rosé, both from 1928) lie close to the high tempo change / high phrase-final lengthening section, thus blurring the association of high values for both parameters with later performances. The grouping of the Léner Quartet's 1924 performance and the Gewandhaus Quartet is also somewhat artificial, and casual inspection of their two tempo map graphs makes the great differences between them obvious (both graphs can be seen in Volume 2, Fig. 4.3 (a)). While they both have high numbers of instances of tempo change at section boundaries, the degree of change is invariably greater in the Gewandhaus performance than in the Léner. This disparity between degree of tempo change and the number of instances of tempo change is discussed further below.

There is a great deal of consistency between all performances in the use of a marked phrase-final lengthening gesture at three particular section boundaries: these are at bar 55, where only two quartets refrain (Léner 1924 and Gewandhaus); bar 215, all except four quartets (Léner 1924, Léner 1933, Budapest 1952 and Amadeus); and bar 241, all except six quartets (London, Rosé, Budapest 1952, Talich, Bulgarian and Medici). These boundaries define the start of an occurrence of the second subject (bar 56 in the exposition, bar 216 in the recapitulation, and bar 242 a second occurrence in the recapitulation); the second subject contains a number of *poco rit.* and *ritard.* markings, and the phrase-final lengthening at these points serves to usher in a period of unstable tempo, which is often basically slower than the surrounding material.

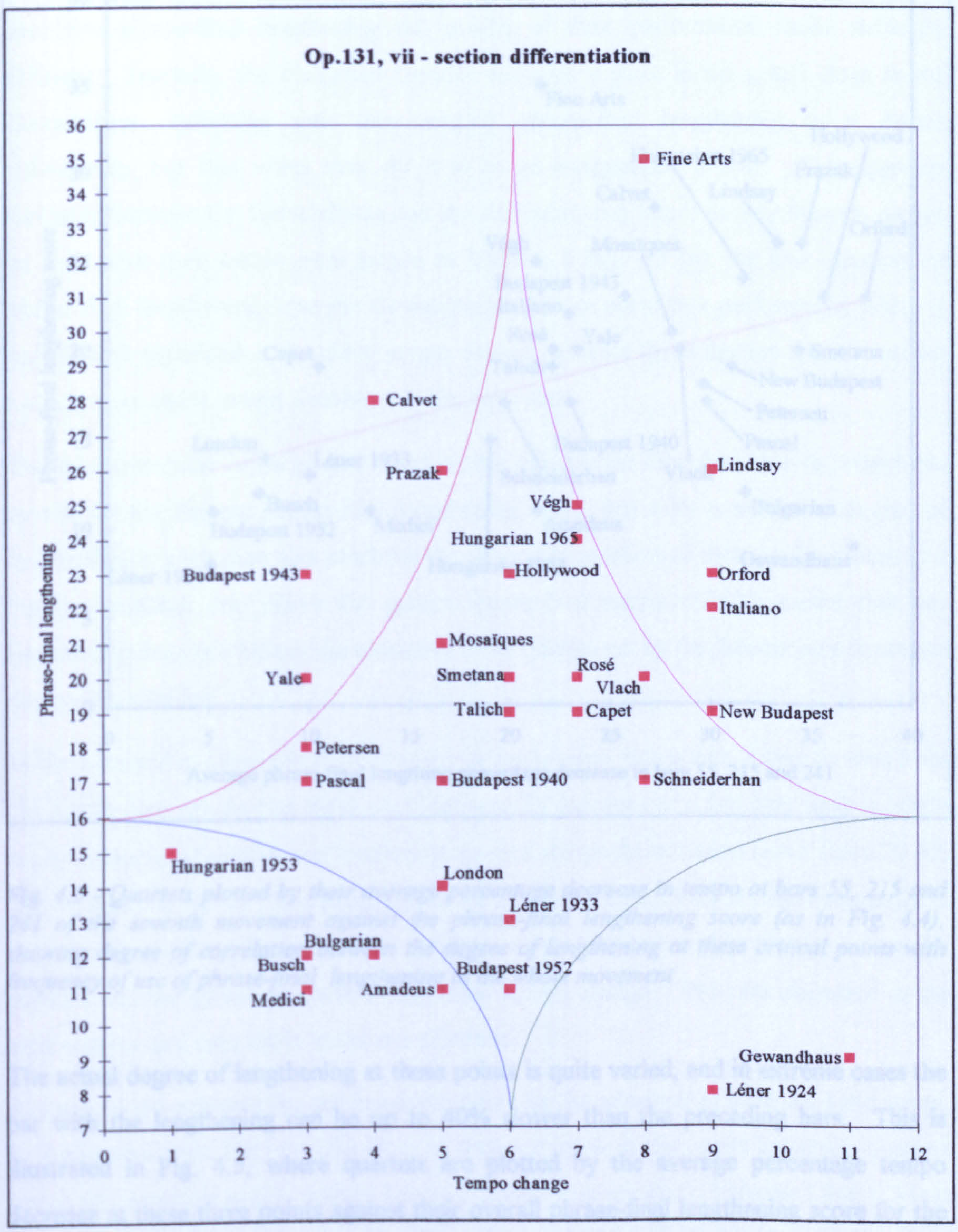

Fig. 4.4 - Performances of the seventh movement of Op.131 plotted by incidence of phrase-final lengthening against incidence of between-section tempo change

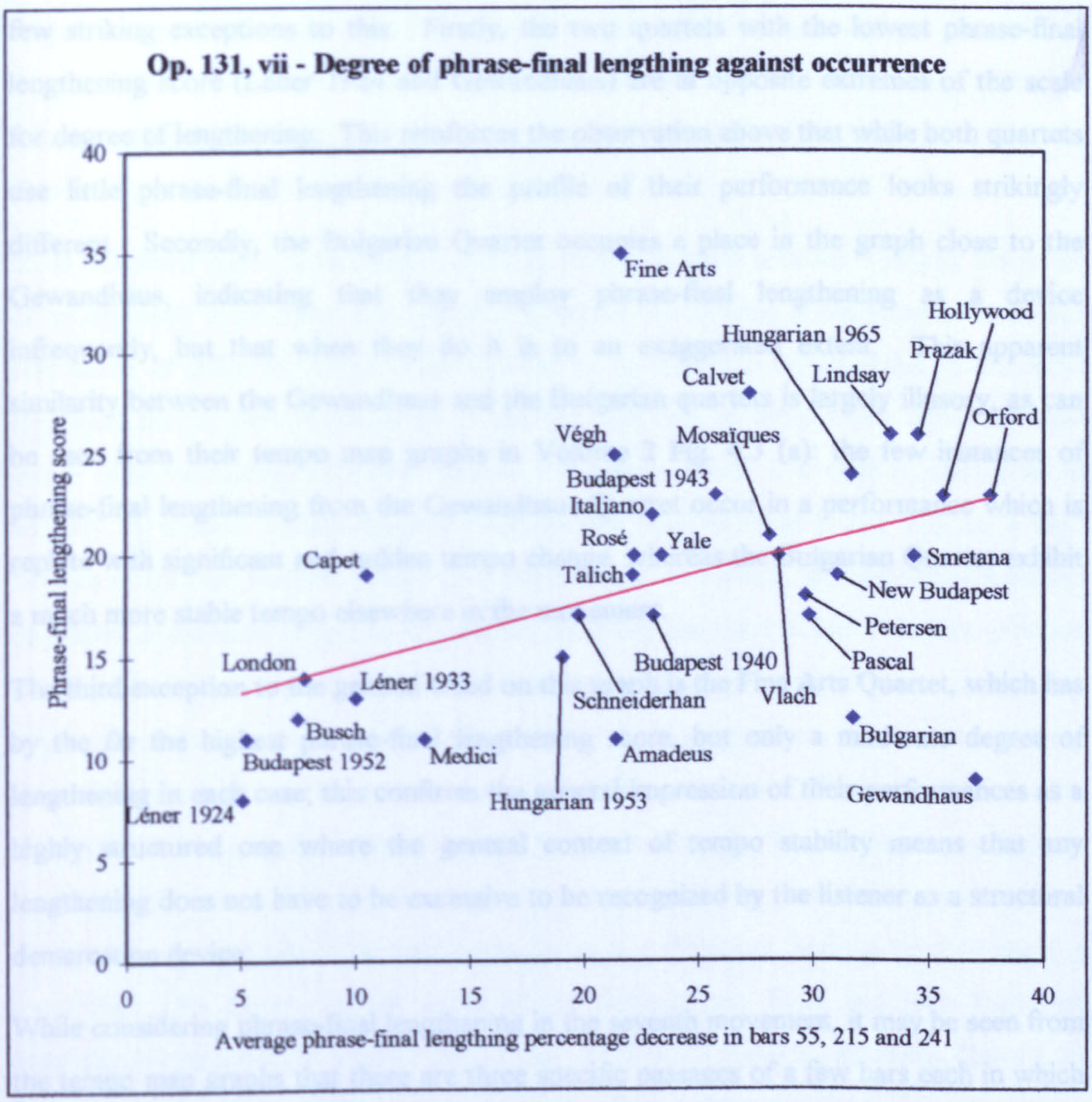

Fig. 4.5 - Quartets plotted by their average percentage decrease in tempo at bars 55, 215 and 241 of the seventh movement against the phrase-final lengthening score (as in Fig. 4.4), showing degree of correlation between the degree of lengthening at these critical points with frequency of use of phrase-final lengthening in the whole movement

The actual degree of lengthening at these points is quite varied, and in extreme cases the bar with the lengthening can be up to 40% slower than the preceding bars. This is illustrated in Fig. 4.5, where quartets are plotted by the average percentage tempo decrease at these three points against their overall phrase-final lengthening score for the movement. As one would expect, there is a strong degree of correlation between these two attributes: in other words, the quartets which use phrase-final lengthening most frequently also tend to exaggerate the degree of the lengthening. However, there are a few striking exceptions to this. Firstly, the two quartets with the lowest phrase-final lengthening score (Léner 1924 and Gewandhaus) are at opposite extremes of the scale for degree of lengthening. This reinforces the observation above that while both quartets use little phrase-final lengthening the profile of their performance looks strikingly different. Secondly, the Bulgarian Quartet occupies a place in the graph close to the Gewandhaus, indicating that they employ phrase-final lengthening as a device infrequently, but that when they do it is to an exaggerated extent. This apparent similarity between the Gewandhaus and the Bulgarian quartets is largely illusory, as can be seen from their tempo map graphs in Volume 2 Fig. 4.3 (a): the few instances of phrase-final lengthening from the Gewandhaus Quartet occur in a performance which is replete with significant and sudden tempo change, whereas the Bulgarian Quartet exhibit a much more stable tempo elsewhere in the movement.

The third exception to the general trend on this graph is the Fine Arts Quartet, which has by the far the highest phrase-final lengthening score, but only a moderate degree of lengthening in each case; this confirms the general impression of their performances as a highly structured one where the general context of tempo stability means that any lengthening does not have to be excessive to be recognized by the listener as a structural demarcation device.

While considering phrase-final lengthening in the seventh movement, it may be seen from the tempo map graphs that there are three specific passages of a few bars each in which many instances of sudden and temporary troughs and peaks of tempo occur (bars 22-39, 186-199 and 278-292). The effect cannot be construed as marking section boundaries in any way, and should be considered rather as a rubato effect within phrases where the stresses and the dynamics invite exaggerated tempo change. They are discussed in the next chapter as a case study in the use of rubato.

Turning to the evidence for section demarcation by the adoption of different basic tempi, it is apparent from Fig. 4.4 that there is wide variation in the extent to which quartets adopt this device; it is also evident from the tempo map graphs in Volume 2 Fig. 4.3 that the degree of change varies considerably. However, it is remarkable that where tempo change does occur there is almost complete unanimity between the performances being studied on the direction of the change, for example in slowing down for the second subject or speeding up for the development section: of 219 tempo changes observed in the thirty-two performances under study, all apart from two are in the same direction (the two exceptions being the New Budapest and Mosaïques quartets, which adopt a slower tempo at bar 285 where others speed up).

If, as discussed above, a tendency to change tempo between sections is largely the result of an approach to interpretation which emphasises the contrast of the inherent character and mood of different sections, as opposed to an approach which seeks to articulate structural points, then examination of the last few bars of the seventh movement can throw some interesting additional light on this phenomenon. The coda is interrupted at bar 377 by a short section marked *Poco Adagio*, and resumed at bar 383 for a final flourish of six bars marked *Tempo I*; in other words, as marked the final flourish should be played at the same tempo as the section preceding the *Poco Adagio*. In fact, practice at this point is very varied, with some quartets finishing at much the same tempo, but others adopting a tempo up to 45% faster than that before the *Poco Adagio*, thus turning these final few bars into an exuberant and breathless conclusion. The table below splits the performances into three broad groups, listed chronologically; the first where there is no discernible tempo difference between the tempo before the *Poco Adagio* and the final six bars, the second where the final tempo is up to 25% faster, and the third where it is more than 25% faster. In the cases of the Gewandhaus, Rosé and New Budapest quartets, this adoption of a faster tempo after the *Poco Adagio* is somewhat illusory, as they all slacken their tempo noticeably several bars before the *Poco Adagio* section, usually at bar 349.

No change	*up to 25% faster*	*more than 25% faster*
Léner 1924	Léner 1933	Gewandhaus
London	Busch	Rosé
Budapest 1940	Budapest 1943	Capet
Schneiderhan	Pascal	Calvet
Budapest 1952	Hungarian 1953	Talich
Amadeus	Hollywood	Orford
Hungarian 1965	Fine Arts	New Budapest
Medici	Vlach	
	Italiano	
	Smetana	
	Yale	
	Végh	
	Bulgarian	
	Lindsay	
	Prazak	
	Petersen	
	Mosaïques	

It is apparent from this table that there is again no evidence of a historical trend here, with the quartets in each of the three groups spread fairly evenly over the period covered by the recordings. Two pairs of examples on the accompanying CD, commencing a few bars before the *Poco Adagio* and continuing to the end, illustrate the two extremes of approach at the two extremes of the date range under study: two of the earliest recordings, by the Léner Quartet in 1924, with no tempo difference, and the Capet in 1928, with a difference greater than 25% [tracks 15 and 16 respectively]; and two later recordings the Medici Quartet in 1990, with no tempo difference, and the Orford Quartet in 1985, with a difference greater than 25% [tracks 17 and 18 respectively].

Conclusions

Summarising the results of the analysis of the way in which the quartets under study articulate section boundaries in the first, second and seventh movements, it is possible to draw a few general stylistic conclusions. The table below attempts to give an overview of the approach of each quartet to section demarcation in each of these movements, and is based on their position in the graphs plotting phrase-final lengthening scores against tempo change for each movement (Figs. 4.1, 4.3 and 4.4). The three columns against each quartet relate to the three movements, and the codes relate to the quartet's position on these graphs: 'M' (medium) means that they appear in the central portion of the graph, away from extreme positions; 'L' (low) and 'H' (high) indicate that they occur at the low or high extreme for phrase-final lengthening (first character) and tempo change (second character). The table attempts to group the quartets into a number of generic approaches.

It was suggested above that an approach which involved extensive use of phrase-final lengthening and little tempo change might indicate an 'analytical' approach to performance, in which the emphasis is on clarification and articulation of structure rather than on expressing the inherent character of the musical material. This approach is represented by eight quartets in the table (the 'extensive phrase-final lengthening, little tempo change' group); these quartets are from the whole of the period under study, and there is no evidence to consider this approach a recent phenomenon.

Little phrase-final lengthening or tempo change				*Extensive phrase-final lengthening, extensive tempo change*			
Amadeus	LL	LL	LL	Vlach	HH	M	M
Medici	LL	LL	LL				
Schneiderhan	LL	LL	M	*Extensive phrase-final lengthening, little tempo change*			
Smetana	LL	M	M	Prazak	HL	HL	HL
Budapest 1940	M	LL	M	Hollywood	HL	HL	M
Pascal	M	LL	M	Budapest 1943	M	M	HL
Mosaïques	M	LL	M	Rosé	M	HL	M
Hungarian 1953	M	M	LL	Hungarian 1965	M	HL	M
				Végh	M	HL	M
Little phrase-final lengthening, variable tempo change				Talich	M	HL	M
London	LL	LH	M	Petersen	HL	M	M
Léner 1924	M	LL	LH				
				Extensive phrase-final lengthening, variable tempo change			
Little tempo change, variable phrase-final lengthening				Italiano	HH	HL	HH
Yale	LL	HL	HL	Lindsay	HH	HL	HH
Calvet	M	LL	HL	Fine Arts	M	HL	HH
Bulgarian	M	HL	LL				
				Extensive tempo change, variable phrase-final lengthening			
Inconsistent approach				Gewandhaus	M	HH	LH
New Budapest	LL	HL	HH				
Busch	LH	HL	LL	*Medium phrase-final lengthening and tempo change*			
Léner 1933	HH	LL	M	Capet	M	M	M
Budapest 1952	HH	LL	M				
Orford	HH	LL	HH				

Fig. 4.6 - Quartets grouped by their approach to phrase-final lengthening and tempo change as means of section demarcation in the first, second and seventh movements of Op. 131. 'HH' indicates high phrase-final lengthening and high tempo change; 'LL' indicates low phrase-final lengthening and low tempo change; 'M' indicates no extreme of either phrase-final lengthening or tempo change.

The opposite extreme, with the emphasis on characterization of sections by adopting different tempi, but with little or no phrase-final lengthening, has no representative, although the Gewandhaus and Vlach quartets come closest. The evidence from the table is rather that extensive tempo change is usually accompanied by extensive phrase-final lengthening, as if the expressive effect of the tempo change is enhanced by a ritardando immediately before it. Taking this view, the group containing the Italiano, Lindsay and Fine Arts quartets can be added to the Vlach and Gewandhaus. It is noticeable that for these quartets, the only low scores for tempo change occur in the second movement; the fact that the second movement has a relatively undifferentiated surface and that there are no strongly contrasted sections in terms of thematic or textural content means that there is less opportunity for tempo change. Again, these performances are spread fairly evenly over the whole period.

A third readily identifiable group which calls for comment is made up of those quartets with little phrase-final lengthening and little tempo change, where the tempo is relatively undifferentiated throughout. There are no very early performances in this group (the earliest being the Budapest Quartet from 1940), and this is the only slender evidence for any kind of historical trend.

Five quartets are included in an 'inconsistent approach' group, where their approach is diametrically opposite in different movements. In three of these (Léner 1933, Budapest 1952 and Orford) it is the second movement which is out of character, with low values for phrase-final lengthening and tempo change, and this perhaps reinforces the comment above that the movement itself offers less opportunity for differentiation in terms of tempo; the greater inherent contrast in the outer movements is more often articulated by tempo change.

If there is little evidence of any historical trend here, there is equally little evidence of stylistic consistency between different performances by the same quartet. The two performances by the Léner Quartet, the two by the Hungarian Quartet and the three by the Budapest Quartet all fall into different groups in the table. The difference is most clear in the two performances by the Hungarian Quartet, where the 1953 performance has fewer instances of phrase-final lengthening or tempo change than the 1965 performance in all three movements; the 1965 performance also has more tempo discontinuities at points other than those identified as section boundaries. The explanation for this probably lies in the fact that the 1965 formation was different from the 1953 formation, Gabor Magyar having succeeded Vilmos Palotai as cellist, and we should not strictly consider these performances as being by the same quartet. Indeed, there is a great deal of anecdotal evidence that the Hungarian Quartet became much freer in its approach to tempo after Palotai left, and that in its earlier incarnation Palotai provided a firm rhythmical foundation for the group and was less tolerant of any deviation from strict tempo (Bewley, 1990).

In the two performances by the Léner Quartet, it is again the earlier (1924) that is generally more regular in tempo and avoids phrase-final lengthening, although the difference is less striking than in the case of the Hungarian Quartet. The 1924 performance by the Léner is the only acoustic recording under study, and the conditions under which such recordings were made may provide an explanation. A photograph of the Léner Quartet in the recording studio in 1922 (reproduced in Antal, 1968: 30) shows the two violinists sitting side by side, with the violist and cellist behind them, with the recording horn off to the side. In such conditions it could not have been possible for the players to communicate expressive nuances between them as they could in a more normal disposition, where they would each be visible to the others, and a greater reliance on metronomic tempo could be expected. In other words, the 1924 recording may not be representative of their normal 1924 performance style in this respect.

The case of the three performances by the Budapest Quartet is more complicated. There are minor differences between the 1940 and 1952 performances, but both are more restrained than the 1943 performance, particularly in terms of phrase-final lengthening incidence. The formation of the quartet was the same for both the 1940 and 1943 performances, but by 1952 Jac Gorodetzky had replaced Alexander Schneider as second violinist. The most likely explanation for the differences in the 1943 performance cannot therefore be attributed to a change of personnel, but is much more likely to be due to the fact that the 1943 recording is of a concert performance in the Library of Congress while the other two were studio recordings. The spontaneity of a live performance seems to have given rise to a freer approach to tempo and the exaggeration of tempo effects which might be more restrained in the studio.

These three cases serve as a warning that performance style can be influenced by a number of extraneous factors which have little or nothing to do with training, influence or national tradition. In these cases they include the change of personnel within a group, and the effect which can be made by a strong individual personality; the unnatural conditions imposed by early recording technology; and the difference in approach to concert performance and studio recording.

Chapter 5: Tempo Variation within Movement Sections

Introduction

The previous two chapters have considered the choice of basic tempo for individual movements, and the way in which the main structural sections are differentiated in terms of tempo; in this chapter the focus moves to tempo variability at a lower structural level, within the section and within the phrase. This level of tempo variability or flexibility is of course loosely known as *tempo rubato.*

Hudson, in his exhaustive study of the theory and practice of *tempo rubato* (Hudson, 1994) draws and elaborates on a basic distinction between two senses in which the term is applied. The first, or 'earlier' sense originates in the baroque world, and is advocated by a number of eighteenth century theorists. This is rather strictly defined as a flexibility of beat lengths within the bar, but with an unbreakable injunction that a steady bar to bar tempo must be preserved, and that therefore any lengthening of a note must be balanced by a corresponding shortening in the same bar. An even more strictly controlled variant of this type of *tempo rubato* insists on the maintenance of a steady tempo in the accompaniment throughout (i.e. within the bar as well as between bars), but with some flexibility in the melody.

The second, or 'later' sense identified by Hudson is a more general flexibility of tempo which seems to have gained currency during the nineteenth century, and in which the injunction to maintain strict bar to bar tempo is waived.[1] It is this type of *tempo rubato* which is examined in this chapter. Indeed, since the raw data for the analysis of tempo flexibility that follows consist for the most part of the local bar tempi measured for all thirty-two performances, as described in Chapter 3, it would be impossible to identify *tempo rubato* in the early sense.

The first attempt to measure *tempo rubato* in an objective manner was by McEwen, in 1928. He took advantage of the opportunity offered by the technology of the 'Duo-Art'

[1] 'It was during this period [of Haydn, Mozart and Beethoven] that the expression *tempo rubato* was extended in keyboard sources to include not only the earlier type, but also the later type involving tempo flexibility. Therefore the notated and performed tempo flexibility and alteration of note values in the music of these composers seem closely related to the history we are tracing.' (Hudson, 1994: 174)

piano roll to obtain precise measurements of note onsets, and analysed *tempo rubato* in performances of works by Chopin and Beethoven by a number of eminent contemporary pianists, including Busoni, Pachmann and Carreño. While recognizing the theoretical distinction between the early (strict) and late (flexible) definitions described above, he found no evidence for the former, but rather a continuous process of tempo modification. He does not restrict himself to this observation, but goes on to affirm, perhaps in the spirit of the time, the absolute requirement in performance for such continuous tempo modification for expressive purposes, especially in Classical or Romantic music.[2]

An influential manual of string quartet performance more or less contemporary with McEwen's work was written by Alfred Pochon, who was the second violinist of the celebrated Flonzaley Quartet for the duration of its existence (1903-1929). He too advocates a flexibility of tempo within certain limits:

> *For the sake of exactitude in their metronomic markings, some authors indicate by two different figures the slowest and the swiftest tempo permissible. (E.g., Allegro = 108-144.) These are the 'speed-limits' within which the artist is to play throughout the piece [...] Other authors simply write circa (or an equivalent term) after the indicated tempo. (E.g., Allegro = 132 circa.) The given figure fixes the average time-basis of the whole piece, thus leaving the interpreter at liberty to play a little slower or a little faster than is indicated, as inspiration suggests [...] To sum up:- When you are executing, interpreting, a piece, there must be a certain elasticity in the rhythm; but when you are practising, you must be able when necessary to keep exactly with the metronome and follow its every pulsation with precision.* (Pochon, 1924: ii, 8)

Observers of performance practice during this century are unanimous in tracing a broad trend for a marked elasticity in tempo in pre-war performances to be replaced by a much stricter adherence to metronomic tempo after the war, and particularly in the 50s and 60s.

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[2] 'In the heat of artistic performance things are done, and peculiarities of treatment can be justified, which are too personal and individual ever to be crystallized into a guide or reason for universal practice, or to be compressed into the defining limits of a general "rule" or "law". With regard to the vital elements of musical interpretation - tone and time fluctuation - this is particularly the case. No two performers will ever view the emotional content of an art-work from the same angle; and - what is perhaps of more significance - will never re-act to it as it develops and unfolds itself in the act of performance, in exactly the same way. The equilibrium of the living performance is only maintained in a condition of stability by continual adjustment and re-adjustment to the musical and emotional stimulus. The fire glows, the flame leaps and flickers and its motion and its continual and ready response to the wind of feeling are the guarantee and the condition of its life.' (McEwen, 1928: 22)

In a wide-ranging study of recordings of mainly standard orchestral repertoire, Bowen concludes: 'conductors from the first half of this century use more tempo fluctuation in more diverse ways than conductors from the second half of the century [...] It is clear [...] that flexibility on all levels has been decreasing since mid-century' (Bowen, 1996a: 148). He further observes that in this respect period style appears stronger than interpretive ideology, or in other words that the overall historical trend superimposed itself on all performers, whatever their individual interpretive philosophy.

Hudson traces this trend back to before the start of the recording era, and finds its origin in Wagner's emphasis on the role of tempo flexibility as opposed to the Mendelssohnian school of adherence to a stricter tempo. By 1895, he finds Weingartner complaining of the excesses of the 'tempo-rubato conductors', although Weingartner seems to be offended more by the unnatural emphasis of insignificant detail by an artificial application of rubato, than by a more natural flexibility of tempo. Furtwängler made a similar, and more explicit, distinction between natural flexibility and false rubato in 1937 (Hudson, 1994: 313-314). The 1950s and 60s, to Hudson, represent a period of considerably more rhythmic strictness and greater fidelity to the score (Hudson, 1994: 337). However, as early as 1936 Furtwängler was condemning in his notebooks what he saw as a trend to strict tempo:

> *Fidelity to the work clearly means today: playing in time! Toscanini's Fidelio. A large proportion of absolute music - from Haydn onwards - consists of concentrations: the content becomes more dense, more intense, and then dissolves once more [...] Playing in time throughout is not 'true to the work', but the opposite.* (Furtwängler, 1989: 83)

Philip's survey of a wide range of recordings, mainly of orchestral repertoire from Mozart to Stravinsky, but also including some solo piano and a little chamber repertoire, leads to conclusions similar to those of Bowen, quoted above. He finds great tempo flexibility in pre-war performances of music of all kinds, including frequent use of acceleration rather than relaxation, whereas in post-war performances there is far less flexibility, and what there is tends both to avoid acceleration and to be restricted to the romantic repertoire (Philip, 1992: 20). He also cites several examples of conductors who recorded the same piece on more than one occasion, and finds that the later recordings are always 'flatter' than the earlier: 'most performers who lived through the period of change in attitude to tempo fluctuation reflected those changes in their own performances' (Philip, 1992: 26). This conclusion corroborates that made by Bowen, and quoted above, that the historical trend was stronger than individual preferences.[3]

From these surveys a consistent picture emerges. Tempo flexibility of all kinds had become a norm of performance style with the Wagnerian school of conducting, and was probably reaching its peak when recording technology became available, and at the time of the earliest recordings included in the present study. A reaction to this flexibility set in perhaps in the 1930s, but had certainly become predominant after the war, where in the 1950s and 1960s particularly a new 'objective' approach came to the fore with an emphasis on fidelity to the score and a consequent avoidance of tempo modification. The 'authenticity' movement of the 70s and 80s might well be seen as strengthening this trend to strict tempo, although the extremism and dogmatism of the more doctrinaire exponents of the 'authenticity' approach seems to have been abandoned, or at least moderated, since the late 80s.

The evidence of the quartet performances under study here will now be examined against this background of consensus. First a general measure for tempo variability is derived for each performance of each movement, and some general conclusions drawn concerning the characteristics of each quartet and the existence or otherwise of historical trends. Subsequently, two specific extracts from the Op. 131 String Quartet are examined in more detail in order to gain an insight into the nature of the variability observed taken in its musical context.

Methodology

As the basis of any attempt to compare the extent and degree of tempo variability between the different performances under study, a single quantitative measure is required for each performance. The raw data from which this measure will be derived consist of the local bar tempi which were measured for all movements for all performances, which

[3] As Philip's evidence is based on snap-shot estimates of metronome markings at a few key points in each movement studied, it is impossible to be sure of the level at which this tempo flexibility operates: his base data could indicate tempo change at major section boundaries or more subtle flexibility within the section. His findings are presented in a chapter entitled *flexibility of tempo* and are evidently intended to cover flexibility at all structural levels above the bar; the following chapter, entitled *tempo rubato* deals largely with details of rhythmic articulation within the bar.

also constitutes the raw data for the earlier chapters on basic tempo and section demarcation.

A normal statistical measure for this variability would be the standard deviation, which gives a single measure of the variability in a population of figures. However, there are two problems with this measure for the present purposes. Firstly the value of the standard deviation is influenced by the range of actual values in the population being measured: in other words, faster performances which exhibited proportionately similar variability to slower performances would have higher standard deviation measures because the raw data of local bar tempi would consist of higher figures. This problem could admittedly be circumvented by adjusting all local bar tempi such that the modal tempo equals 100. The second, and more serious, problem is that the measure takes no account of the sequence of the figures in the population and therefore of the structure of the tempo map under consideration. This can be seen graphically in Fig. 5.1, which shows three fictitious tempo maps. Each tempo map contains an equal number of bars, and in each the distribution of local bar tempi among the bars is identical: hence, the standard deviation measures are also virtually identical (3.03 or 3.04). However, the structure of the tempo variability is radically different in each case, with the bottom line representing a smooth and continuous accelerando, the middle line an equally smooth and continuous deceleration, and the top line a far more locally varied profile. Since we are examining local variability within the section and within the phrase in this chapter, a measure is needed which will distinguish the type of variability represented by the top line, and quantify it.

The measure adopted to achieve this is the mean percentage bar-to-bar difference. In other words, each bar's tempo is expressed as a percentage increase or decrease compared to the previous bar (both increase and decrease are treated as positive values), and the mean of these percentage differences is calculated. As can be seen from the examples in Fig. 5.1, this figure gives a much better measure of local tempo variability. The other advantage of the mean percentage difference measure is that it makes measurements derived from performances with different basic tempi directly comparable.[4]

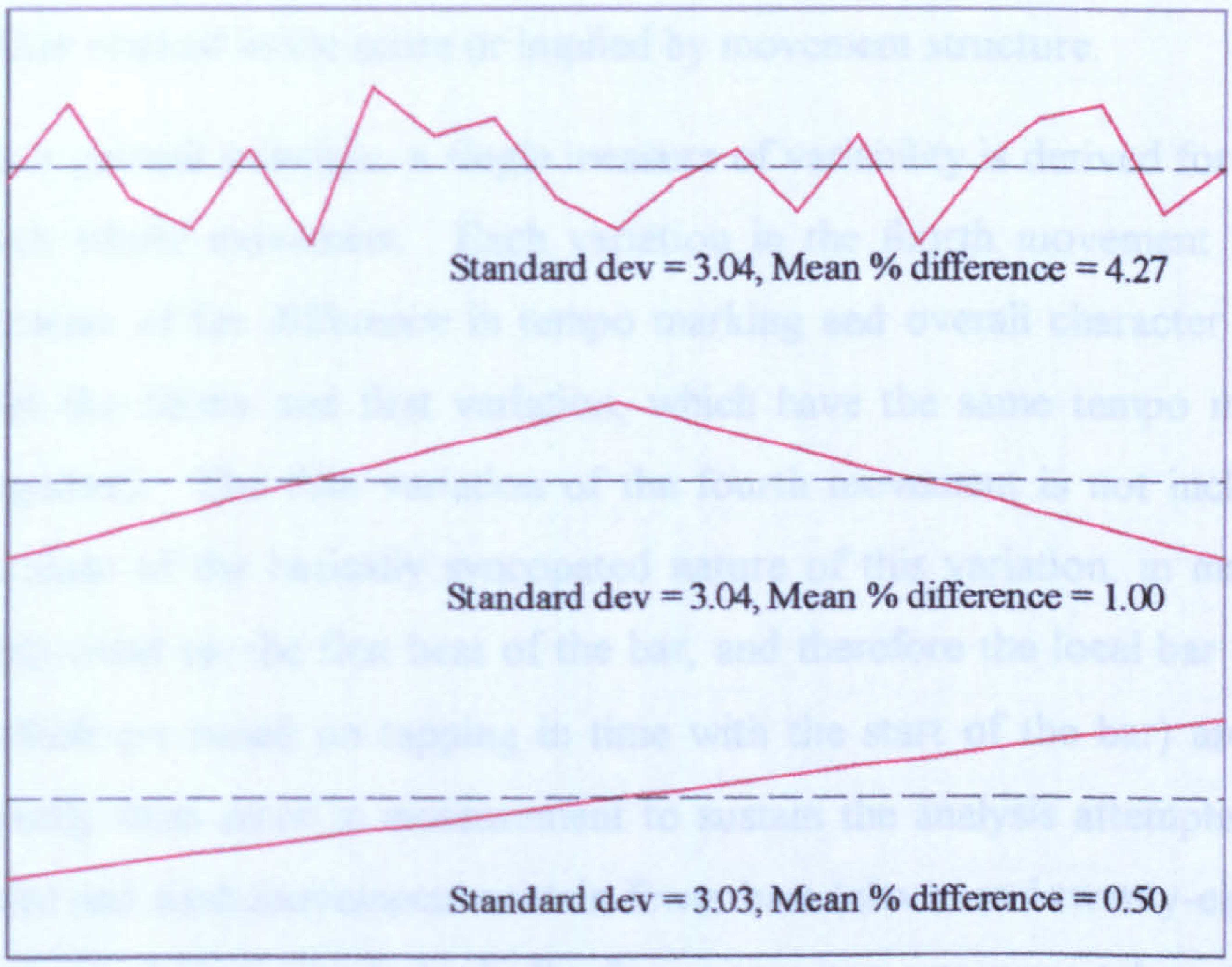

Fig. 5.1 - Three fictitious tempo maps illustrating the difference between standard deviation and mean percentage difference as a measure of tempo variability.

As the purpose of this chapter is to discuss tempo flexibility within the section for which there is no prescription in the score, certain bars have been excluded from the calculation. For instance, the final bar of a section and the first bar of the next (using the section boundaries defined in Chapter 4) have been omitted so that the effect of any sudden tempo shift or phrase-final lengthening does not distort the measure. Similarly, all bars containing a tempo modification marking, and the following bar in each case are also excluded. The analysis of the sixth variation of the fourth movement finishes at bar 219, or before the coda section in which there are several marked tempo changes and several cadenza-like passages. Finally, the *poco adagio* section of the seventh movement (bars 377-382) and the following bar are also discounted. This means that only those

[4] In this context it might be questioned whether it is inherently likely that the proportional degree of tempo flexibility in performances of different basic tempi will be similar, or that faster performances might predispose the performer, or impose constraints on the performer, either to restrict tempo flexibility or to give it freer rein. Experimental evidence in the literature is not conclusive on this point, although Repp concludes from his investigations that major tempo features do scale with basic tempo, whereas smaller features (such as grace notes) which may be subject to physical motoric limitations on the part of the performer, do not (Repp, 1994).

bars unaffected by any tempo modification marked in the score and those which do not occur at section boundaries are considered, making the resultant measure the best possible representation of variability of tempo within sections where no variability is either marked in the score or implied by movement structure.

As a general principle, a single measure of variability is derived for each performance of each whole movement. Each variation in the fourth movement is treated separately, because of the difference in tempo marking and overall character in each case (except that the theme and first variation, which have the same tempo marking, are analysed together). The fifth variation of the fourth movement is not included in the analysis: because of the basically syncopated nature of this variation, in many cases there is no note onset on the first beat of the bar, and therefore the local bar tempo measurements (which are based on tapping in time with the start of the bar) are likely to suffer too greatly from error in measurement to sustain the analysis attempted here. Because the third and sixth movements contain fewer bars (eleven and twenty-eight respectively), and because their tempo is basically slow, measurements were taken of the local tempo of each crotchet rather than each bar, and the variability measure is therefore the mean percentage crotchet-to-crotchet tempo difference.

Overall findings

The mean percentage difference figures derived by the above method for each movement in each performance are given in Fig. 5.2, and the rankings of the scores for each movement are given in Fig. 5.3.

Quartet	Date	1	2	3	4/1	4/2	4/3	4/4	4/6	5	6	7
Léner	1924	4.71	5.52	8.75	3.82	2.48	3.84	3.18	2.85	5.82	10.12	4.95
Gewandhaus	1925	6.15	6.65	14.16	6.36	4.09	5.27	5.79	6.59	6.93	11.67	5.85
London	1925	4.93	6.46	9.28	4.17	4.12	3.91	4.72	2.44	5.70	8.09	4.59
Rosé	1927	4.06	7.66	12.15	5.01	4.30	3.94	5.15	4.01	6.10	9.53	6.55
Capet	1928	4.66	6.62	9.28	6.08	3.07	7.20	5.76	5.54	6.38	12.37	6.04
Léner	1933	4.28	6.07	8.55	5.36	3.66	4.41	3.75	3.44	5.86	9.13	4.15
Busch	1936	4.23	5.19	12.39	4.76	2.75	4.32	3.30	3.43	5.98	8.26	5.03
Calvet	1938	4.32	4.50	8.57	5.92	2.91	4.94	5.66	5.39	5.31	11.60	5.87
Budapest	1940	4.64	4.97	6.47	4.51	3.30	3.74	4.78	4.36	6.03	7.61	5.28
Budapest	1943	5.24	5.47	8.09	5.34	3.17	5.19	5.68	5.45	5.24	8.86	4.98
Schneiderhan	1944	3.43	4.57	8.47	3.76	2.89	4.80	2.49	2.33	4.97	6.97	5.72
Pascal	1951	4.74	4.53	7.72	5.66	2.49	4.03	4.31	3.47	5.08	9.39	4.64
Budapest	1952	4.76	5.83	8.51	6.29	3.51	4.92	6.15	7.09	6.15	8.40	4.30
Hungarian	1953	3.71	5.59	11.53	4.60	3.29	4.08	2.97	5.08	4.80	7.49	4.42
Hollywood	1957	4.50	4.76	5.76	5.44	2.51	4.80	3.31	4.85	5.60	6.33	4.72
Fine Arts	1961	5.04	5.04	10.01	6.21	3.87	4.96	6.19	4.58	5.63	8.48	5.73
Vlach	1962	5.88	5.53	9.59	6.23	2.74	4.97	5.75	5.34	5.50	9.32	5.59
Amadeus	1963	3.81	4.70	7.52	4.10	2.56	4.15	3.99	3.16	4.97	8.32	4.51
Hungarian	1965	5.78	5.50	8.54	6.92	4.03	4.45	4.14	8.39	5.52	9.43	6.58
Italiano	1970	5.26	5.30	6.72	4.93	2.84	5.20	3.34	3.79	5.91	7.23	6.10
Smetana	1970	3.44	5.13	8.80	5.04	1.89	4.70	3.23	3.68	6.80	8.49	5.78
Yale	1970	3.82	4.35	10.30	4.86	2.56	5.07	4.35	3.53	5.60	7.77	5.86
Végh	1973	4.97	5.98	10.17	4.22	4.38	5.14	4.94	3.57	5.44	9.94	5.83
Talich	1978	4.92	6.57	8.63	4.82	3.05	5.15	3.86	3.69	6.46	9.86	6.02
Bulgarian	1979	3.59	4.50	8.11	3.82	1.90	4.99	3.94	3.18	5.24	7.15	4.48
Lindsay	1983	5.62	5.82	8.25	7.23	2.81	5.09	5.27	5.15	6.10	11.06	6.78
Orford	1985	5.66	5.06	9.80	6.36	4.68	5.07	6.58	4.66	6.68	9.37	6.30
Medici	1990	4.35	4.03	6.26	4.32	1.56	3.36	2.30	1.91	5.03	6.77	4.53
New Budapest	1990	4.60	5.54	8.36	6.65	3.28	5.82	4.75	4.42	5.60	9.38	5.11
Prazak	1991	4.55	5.08	8.87	5.97	2.78	3.91	6.46	3.55	7.07	7.79	5.87
Petersen	1994	3.94	4.66	6.08	4.56	2.69	4.75	3.31	3.77	5.95	9.78	5.41
Mosaïques	1995	5.77	5.52	11.25	6.97	3.41	5.98	5.86	4.91	4.95	8.45	5.63

Fig. 5.2 - Table of mean bar-to-bar percentage tempo difference by quartet and movement (third and sixth movements use crotchet-to-crotchet difference)

Quartet	Date	1	2	3	4/1	4/2	4/3	4/4	4/6	5	6	7
Léner	1924	15	13	15	30	29	30	29	29	15	5	23
Gewandhaus	1925	1	2	1	6	5	4	6	3	2	2	11
London	1925	11	5	11	28	4	28	16	30	16	23	26
Rosé	1927	25	1	3	18	3	27	12	16	8	9	3
Capet	1928	16	3	12	10	15	1	7	4	6	1	6
Léner	1933	23	6	18	15	8	22	23	25	14	15	32
Busch	1936	24	18	2	22	22	23	27	26	11	22	21
Calvet	1938	22	30	17	12	17	15	10	6	24	3	8
Budapest	1940	17	23	29	25	11	31	14	15	10	26	19
Budapest	1943	8	16	25	16	14	6	9	5	26	16	22
Schneiderhan	1944	32	27	21	32	18	18	31	31	30	30	15
Pascal	1951	14	28	26	13	28	26	18	24	27	11	25
Budapest	1952	13	8	20	7	9	16	4	2	7	20	31
Hungarian	1953	29	10	4	23	12	25	30	9	32	27	30
Hollywood	1957	20	24	32	14	27	17	26	11	20	32	24
Fine Arts	1961	9	22	8	9	7	14	3	13	17	18	14
Vlach	1962	2	12	10	8	23	13	8	7	22	14	17
Amadeus	1963	28	25	27	29	25	24	20	28	29	21	28
Hungarian	1965	3	15	19	3	6	21	19	1	21	10	2
Italiano	1970	7	17	28	19	19	5	24	17	13	28	5
Smetana	1970	31	19	14	17	31	20	28	20	3	17	13
Yale	1970	27	31	6	20	26	10	17	23	18	25	10
Végh	1973	10	7	7	27	2	8	13	21	23	6	12
Talich	1978	12	4	16	21	16	7	22	19	5	7	7
Bulgarian	1979	30	29	24	31	30	12	21	27	25	29	29
Lindsay	1983	6	9	23	1	20	9	11	8	9	4	1
Orford	1985	5	21	9	5	1	11	1	12	4	13	4
Medici	1990	21	32	30	26	32	32	32	32	28	31	27
New Budapest	1990	18	11	22	4	13	3	15	14	19	12	20
Prazak	1991	19	20	13	11	21	29	2	22	1	24	9
Petersen	1994	26	26	31	24	24	19	25	18	12	8	18
Mosaïques	1995	4	14	5	2	10	2	5	10	31	19	16

Fig. 5.3 - Table of mean bar-to-bar percentage tempo difference ranking by quartet and movement (third and sixth movements use crotchet-to-crotchet difference)

The graphs in Volume 2, Figs. 5.1 - 5.9 plot for each movement the mean bar-to-bar percentage tempo difference against the year of performance in much the same way as the plots of modal tempo (Volume 2, Figs. 3.1 - 3.14). Each of these graphs has the same vertical scale for the mean percentage difference value, ranging from 1.5 to 8.5 to facilitate comparison between movements. The third and sixth movements, where the tempo differences are calculated on crotchet-to-crotchet differences rather than bar-to-bar differences, as described above, are shown in Volume 2, Figs. 5.10 and 5.11. For these two graphs the vertical scale ranges from 5 to 15, reflecting the higher overall values observed for these two movements. The fact that the scores for these movements were higher overall than for other movements is attributable to the fact that they are based on local beat (crotchet) tempi rather than local bar tempi, and suggests that this closer focus avoids the 'averaging' effect that must come into play when a bar is considered as a whole.

The trend lines superimposed on these graphs demonstrate that there is no simple or ubiquitous tendency for early performances to show high variability and later performances to show low variability, contrary to what one might expect from the conclusions of previous surveys of historical performance reviewed above. Some movements do indeed have a trend line indicating an overall decrease in tempo variability over time: the graphs for the second movement, the third movement, the second variation of the fourth movement and the sixth movement all have a downward trend line, but there is generally a large range of values at all periods. Other movements, by contrast, show a trend to increasing variability (e.g. the theme and first variation, and the third variation of the fourth movement, and the seventh movement). More striking is the fact that most graphs demonstrate a wide range of practice at both ends of the time scale.

Some of the graphs show a little support for the observation quoted above that stricter tempo was maintained in the 50s and 60s. Instances of high variability are largely absent for these decades in the second movement, the second and third variations of the fourth movement, and the sixth and seventh movements. But again there are contrary examples: the two highest values of all for the sixth variation of the fourth movement both occur between 1952 (Budapest) and 1965 (Hungarian).

The range of values displayed varies somewhat between movements. Generally the slower movements exhibit more variability (e.g. the fourth and sixth variations of the fourth movement), perhaps because there is more space in a slower movement in which to exercise tempo flexibility, and more musical incentive to indulge it, for those quartets inclined towards a flexible approach. By contrast, the second variation of the fourth movement, where a regular march-like accompaniment acts as a constraint on excessive tempo flexibility, shows a much smaller range of values, and a concentration at the lower end.

If the evidence for any overriding historical trend is inconclusive, the performance styles of individual quartets in respect of local tempo flexibility are strongly characterized. This is clearly seen in the chart (Fig. 5.4), which plots each quartet according to the number of movements it has in the most variable quartile and the number of movements in the least variable quartile (i.e. the number of movements ranked between one and eight in the rankings table in Fig. 5.3, and the number ranked between 25 and 32 respectively).

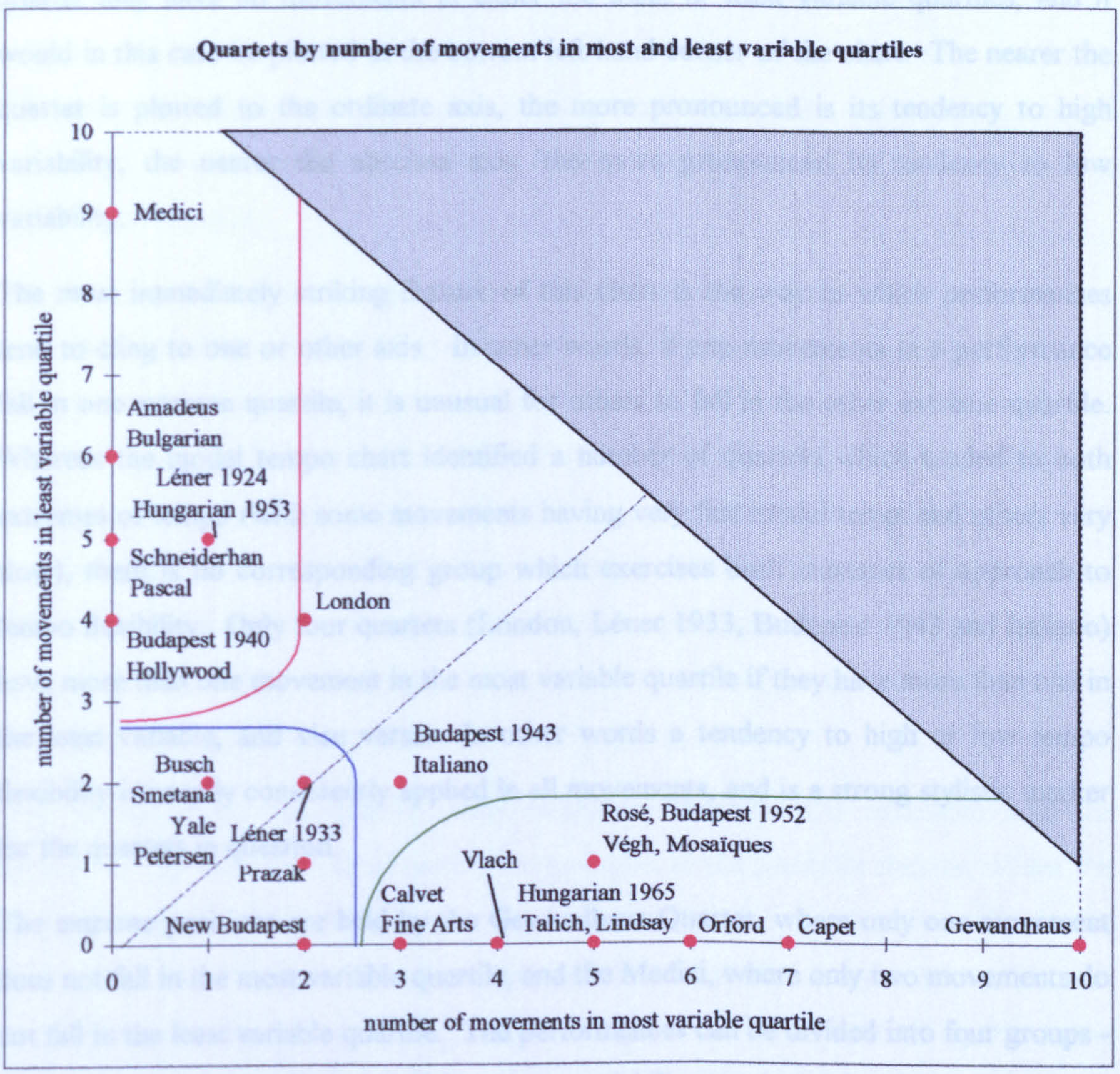

Fig. 5.4 - Quartets plotted by the number of movements in the least variable tempo quartile against the number of movements in the most variable tempo quartile

This chart is organised in the same manner as that in Fig. 3.5, which plotted modal tempo. The unshaded area represents the space that could in theory be occupied by any quartet: eleven movements (or variations in the case of the fourth movement) are measured, and so it is possible that any one quartet may have all eleven movements in the most variable quartile or the least variable quartile, or the eleven movements could be split between the most and least variable quartiles in any proportion. The nearer to the shaded area that the quartet is plotted, the greater its tendency to extremes of indulgence or avoidance of tempo flexibility; conversely, the further away from the shaded area the more 'middle of the road' is the approach to tempo flexibility. At the extreme case, a quartet may have no movements in either the most or least variable quartiles, and it would in this case be plotted at the bottom left hand corner of the chart. The nearer the quartet is plotted to the ordinate axis, the more pronounced is its tendency to high variability, the nearer the abscissa axis, the more pronounced its tendency to low variability.

The most immediately striking feature of this chart is the way in which performances tend to cling to one or other axis. In other words, if any movements in a performance fall in one extreme quartile, it is unusual for others to fall in the other extreme quartile. Whereas the modal tempo chart identified a number of quartets which tended to both extremes of tempo (with some movements having very fast modal tempi and others very slow), there is no corresponding group which exercises both extremes of approach to tempo flexibility. Only four quartets (London, Léner 1933, Budapest 1943 and Italiano) have more than one movement in the most variable quartile if they have more than one in the least variable, and vice versa. In other words a tendency to high or low tempo flexibility is usually consistently applied in all movements, and is a strong stylistic marker for the quartets in question.

The extreme positions are held by the Gewandhaus Quartet, where only one movement does not fall in the most variable quartile, and the Medici, where only two movements do not fall in the least variable quartile. The performances can be divided into four groups - those which consistently show little tempo variability, enclosed by the red line, and headed by the Medici Quartet; those which consistently show much variability, enclosed by the green line, and headed by the Gewandhaus Quartet; those which have few movements in either extreme quartile, and fairly consistently show average variability values, enclosed by the blue line; and the remainder, for which a significant number of movements (five or six) fall in both the highest and lowest variability quartiles (the London, Budapest 1943 and Italiano Quartets).

The membership of all four groups is made up of performances spread fairly evenly over the period covered, and this is another reflection of the lack of any clear historical trends. It is true that the two extreme performances are consistent with a trend to decreasing tempo variability, with the second earliest performance (Gewandhaus) being the most variable and one of the latest (Medici) being the flattest; however the earliest performance of all (Léner 1924) is included in the group showing least variability and the latest performance of all (Mosaïques) belongs to the group with the most variability. The case of the Mosaïques Quartet is especially interesting, as one might expect a period instrument ensemble with an interest in historical performance practice to produce a 'flatter' performance.

Examination of the quartets represented by two or more performances is also revealing. In each of the three cases, there is a marked trend for the later performances to exhibit greater tempo variability than the earlier. The Léner Quartet moves from the low variability group in 1924 to the 'middle of the road' group in 1933; the Budapest Quartet has a trajectory starting in the low variability group in 1940, moving to the group with tendencies to both extremes in 1943, and ending in 1952 in the high variability group. The contrast between the two Hungarian Quartet performances is especially marked, with their 1953 performance firmly in the low variability group, and the 1965 performance equally firmly in the high variability group.

This evidence from the quartets with multiple performances is consistent with the findings of the investigation of section demarcation in the previous chapter, where the three quartets in question showed a greater tendency to use tempo modification at section boundaries in their later performances. It is, however, completely at odds with the findings of Bowen and Philip, quoted above, that performances by the same conductor show a tendency to decreasing tempo flexibility, in conformance with the perceived general historical trend. A number of explanations for this trend in respect of section demarcation by tempo modification were advanced in the previous chapter; to these may be added the suggestion that there are different dynamics at work in the development of a quartet's playing style over time from those that may operate with orchestral conductors. The cooperative nature of chamber music performance suggests that with increasing experience the group may have the confidence to deviate more from strict performance of the 'notes as written'. Through time, increasing familiarity, leading to increasing trust and intuition of the other members' intentions, and increasing practice of the subtle techniques of communication between the four members of a quartet, must give rise to an increased feeling of security, and to a combined technique which allows greater liberties to be taken in performance without undue risk of failures of ensemble. This development of a quartet's performance style probably takes place largely irrespective of, and possibly in contradiction to, general historical trends in performance style.

Comparison of each quartet's position on the tempo flexibility chart with its overall approach to section demarcation by phrase-final lengthening (see Fig. 4.6) is also instructive. With the single exception of the Mosaïques Quartet, all of those quartets classified as exhibiting little phrase-final lengthening appear in the top left half of the tempo flexibility graph (above and to the left of the diagonal dot-dash line), indicating a tendency to low tempo variability. Similarly, all those quartets included in the extensive phrase-final lengthening groups, with the exception of the Hollywood and Petersen Quartets, appear in the bottom right half of the tempo flexibility graph. In other words, a tendency to section demarcation by phrase-final lengthening is associated with a preference for local tempo flexibility. This is perhaps not surprising.

Considering the contrary examples, it would appear that the Mosaïques Quartet maintains a level of local tempo flexibility without differentiating sections particularly. This perhaps helps to explain the impression the performance gives of an interpretation that has not fully matured, where ideas relating to shape and structure are not very developed; lack of familiarity with the music may also be responsible for some unintentional local tempo variability. The Hollywood Quartet, by contrast, give a very polished performance in which rhythmic discipline is maintained within each section, but the sections themselves are marked by phrase-final lengthening gestures which are all the more effective because they occur in a context of general tempo stability. In other words, theirs is a more analytical approach to interpretation.

In summary, as with other facets of performance style examined so far, it is the immense variety of approach evident at every period which impresses one more than any overall trend.

Having developed an overall classification of the performances under study in terms of the extent of tempo variability exhibited, the remainder of this chapter goes on to explore three particular extracts from Op. 131 in greater detail, with the intention of elucidating the variety of ways in which tempo flexibility can occur in specific musical contexts.

The musical context of rubato

The preceding discussion has dealt with local tempo variability in a generic manner, with the development of overall measures for this variability, but did not consider the specific musical context in which it may occur. We will now turn to the examination of some specific passages of the Op. 131 Quartet, and explore the ways in which this variability may arise from different interpretive approaches to specific musical phrases.

Other studies of such local tempo variation have identified features such as the lengthening of salient melodic inflections (Repp, 1990: 639), or of accented tones within melodic gestures (Repp, 1992: 2554). Hudson (1994: 110) also notes the prolongation of important notes, particularly in vocal and violin rubato; in addition he draws attention to the delay of the onset of the accented note, for which the term *agogic accent* is often employed (Hudson, 1994: 324).

Three contexts within the Op. 131 Quartet have been selected for further detailed exploration of these, and other similar expressive devices. These are a passage of answering phrases in the seventh movement with no marked tempo change; the various occurrences of *sforzando* and similar markings in the first movement; and the occurrences of dotted and double-dotted rhythms in the sixth movement.

Flexibility in the seventh movement

The passage selected for analysis consists of bars 184-199 in the seventh movement, illustrated below in Ex. 5.1. The large amount of bar-to-bar tempo variation apparent in performances of this passage has been remarked on above; while it is clearly made up of two-bar phrases and answering phrases, there are no larger scale section boundaries, and the passage would therefore seem to present a suitable context in which to examine the nature of the local tempo variability observed. The passage has an a-b-a-b-c-b-c-b structure, as marked in the example; the *a* sections consist of a downward phrase in minims, which each seem to carry increasing weight; the *b* sections consist of an answering phrase in crotchets of a basically upward motion; the *c* sections are variants of the *a* sections, in that the downward minim figure in the lower voices is immediately answered by a corresponding upward minim figure in the upper voices. One might expect the differing note values and melodic direction of the individual sections to give rise to expressive contrasts, which could well take the form of inflections of tempo. The passage carries a burden of tension which is readily felt by the listener.

Two similar passages occur elsewhere in the movement: firstly at bars 21-36, where a continuous dotted rhythm in the viola serves to constrain any tempo variation; and secondly at bars 277-292, where the c-b-c-b pattern changes to a repeating *c* figure.

Ex. 5.1 - Seventh movement, bars 184 - 199

The local bar tempo data on which all the previous analysis has been based are obviously insufficient for the purposes attempted here, and inter onset intervals for each crotchet event (or minim where there is no intervening crotchet) were measured. Similarly, the 'tapping' method for collecting the data would be insufficiently accurate for analysis at this level, and the timings were therefore measured using the Sound Designer II package. A millisecond timing for each onset was derived by repeated playback at slow tempi until the note onset could be unambiguously identified on the waveform display. Complete accuracy cannot be achieved, as the 'sine wave' pattern created by the sounding of a note on a string instrument has no immediately obvious start, unlike the pattern created by a percussive instrument such as a piano, where there is a clear discontinuity in the waveform at the onset of a note; however, repeated measurements showed that an accuracy to within 30 milliseconds was possible in the most unclear cases, and usually much better than this. Issues of ensemble also add to the complexity of identifying the onset of the event, as there are inevitably minute differences between the onset of the different parts in a theoretically simultaneous event. It is often difficult to identify the precise onset of any delayed parts, which tend to be masked by the part with the earliest onset, and so in practice it is the earliest onset event in theoretically contemporaneous events which was measured.

These timings were then converted to MM tempi, expressed in minims, for each crotchet event in the passage. In addition, average tempi for each bar were also calculated from the data: these obviously correspond to the local bar tempi already derived elsewhere, but because of the method of measurement, they provide a more accurate basis for analysis at the bar level. Since the purpose of the exercise is to examine the shaping of tempo within the passage, rather than the tempo values themselves, these MM tempi were normalised, with the mean tempo for the passage adjusted to 100, to aid comparison.

The tempo maps for each performance are shown in Volume 2, Figs. 5.12 a-d. They are aligned with the score, with the vertical lines on the tempo maps corresponding with the bar lines in the score. The base line for each performance represents the mean tempo for that performance, and the vertical distance between each base line represents a 50% tempo difference from mean. The *a* sections are shown in red, the *b* sections in green, and the *c* sections in blue. Against each performance, an overall measure for the mean crotchet-to-crotchet percentage tempo difference is given, along with the mean tempo for the passage.

There is a wide range of values for this mean crotchet-to-crotchet tempo percentage difference, from 10.24 (Vlach) to 17.88 (Capet). If the tempo variability in this passage were representative of that in the movement as a whole, one would expect there to be a good correlation between this figure and the mean bar-to-bar percentage difference for the movement. These figures are plotted for each performance in Fig. 5.5. One immediately apparent observation is that the range for the crotchet-to-crotchet mean percentage difference is made up of much higher values (10.24 - 17.88) than the range for the bar-to-bar percentage differences for the movement (4.15 - 6.78). This is partly because the bar-to-bar tempi are somewhat affected by the averaging out of their constituent crotchets, but it also indicates that the passage in question is subject to more tempo variation than many others in the movement.

As expected, there is a fairly good overall correlation between the two figures, with the Capet, Lindsay, Orford and Prazak Quartets both having high levels of variability in this passage and in the movement as a whole; and with the Budapest (1952), Medici and Pascal having low levels in both. However, as always, it is the exceptional cases which are most interesting. At one extreme, the Vlach Quartet has the lowest figure for the passage in question, but a relatively high figure for the movement as a whole; while the Amadeus, Bulgarian and Hungarian (1953) have high variability in this passage but little in the movement as a whole. This perhaps indicates a difference of focus in the expressive articulation of the movement, with the latter quartets bringing out low levels of detail, or particularly dramatic moments, such as this passage, while the Vlach tends to subordinate the local detail to a more general tempo flexibility.

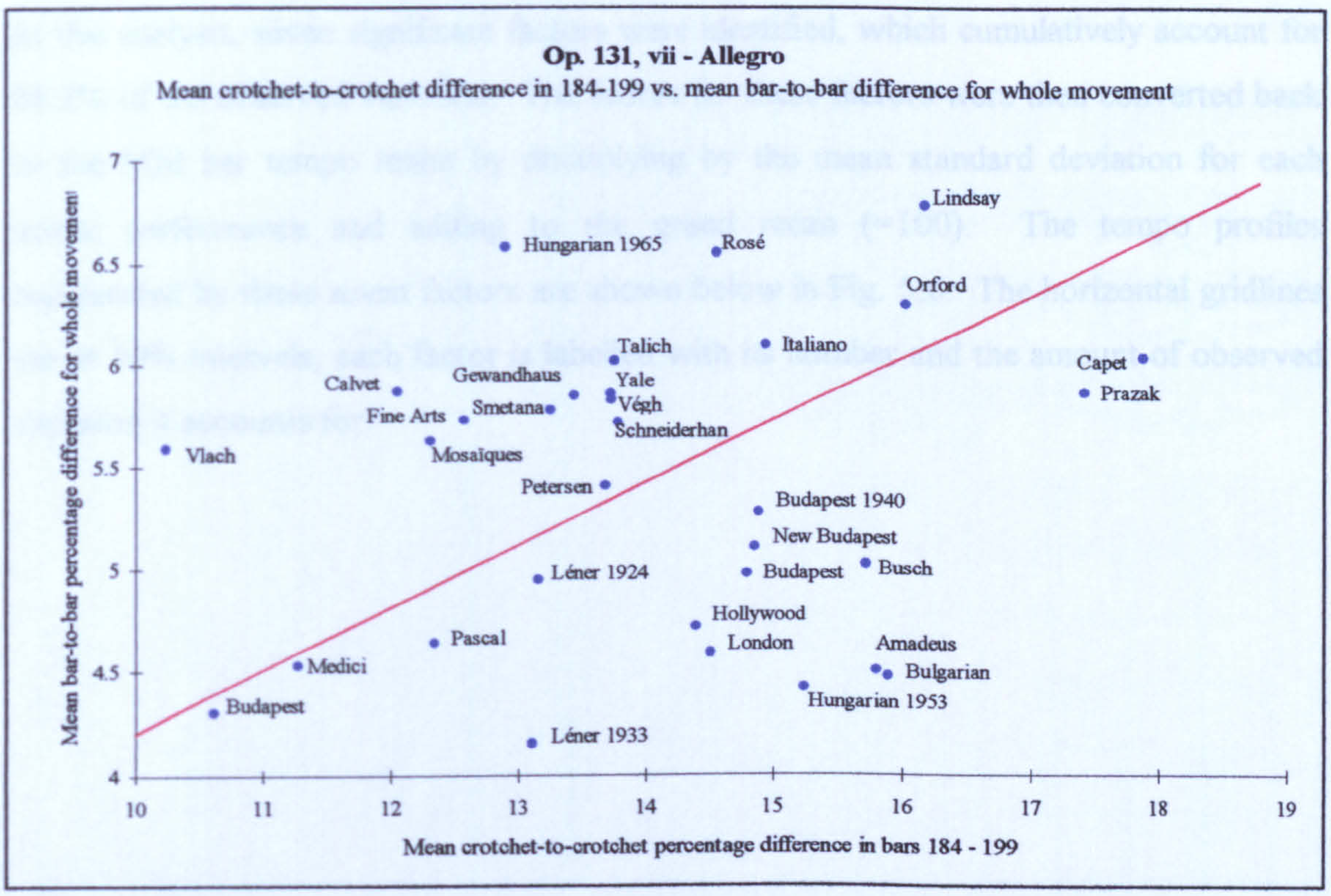

Fig. 5.5 - Seventh movement, mean crotchet-to-crotchet percentage tempo difference for bars 184-199 compared with mean bar-to-bar percentage tempo difference for the movement as a whole

The tempo maps clearly show a very large diversity and contain too much low-level detail to enable comparisons to be made on a subjective basis. A suitable technique to analyse such data so as to elucidate common factors or patterns is offered by factor analysis; indeed this has now become almost a standard technique for analysing tempo maps of musical performances (e.g. Bengtsson & Gabrielsson, 1980; Repp, 1990; Repp 1992). In common with these studies, the factor analysis carried out here used the principal components extraction method with varimax rotation, and ignored any resulting factors with an eigenvalue of less than one.

The analysis was initially attempted on the crotchet tempo data. However, this identified thirteen significant factors, of which the most significant explained only 14.4% of the total variation. This is largely because at this level of measurement any higher level patterns in phrase shaping can be easily distorted by lower level details such as the late or early placement of an up-beat crotchet. In order to establish whether any such higher level patterns could be discerned, the analysis was repeated on the bar-to-bar tempo data.

In this analysis, seven significant factors were identified, which cumulatively account for 88.2% of the observed variation. The scores for these factors were then converted back to the MM bar tempo realm by multiplying by the mean standard deviation for each actual performance and adding to the grand mean (=100). The tempo profiles represented by these seven factors are shown below in Fig. 5.6. The horizontal gridlines are at 10% intervals; each factor is labelled with its number and the amount of observed variation it accounts for.

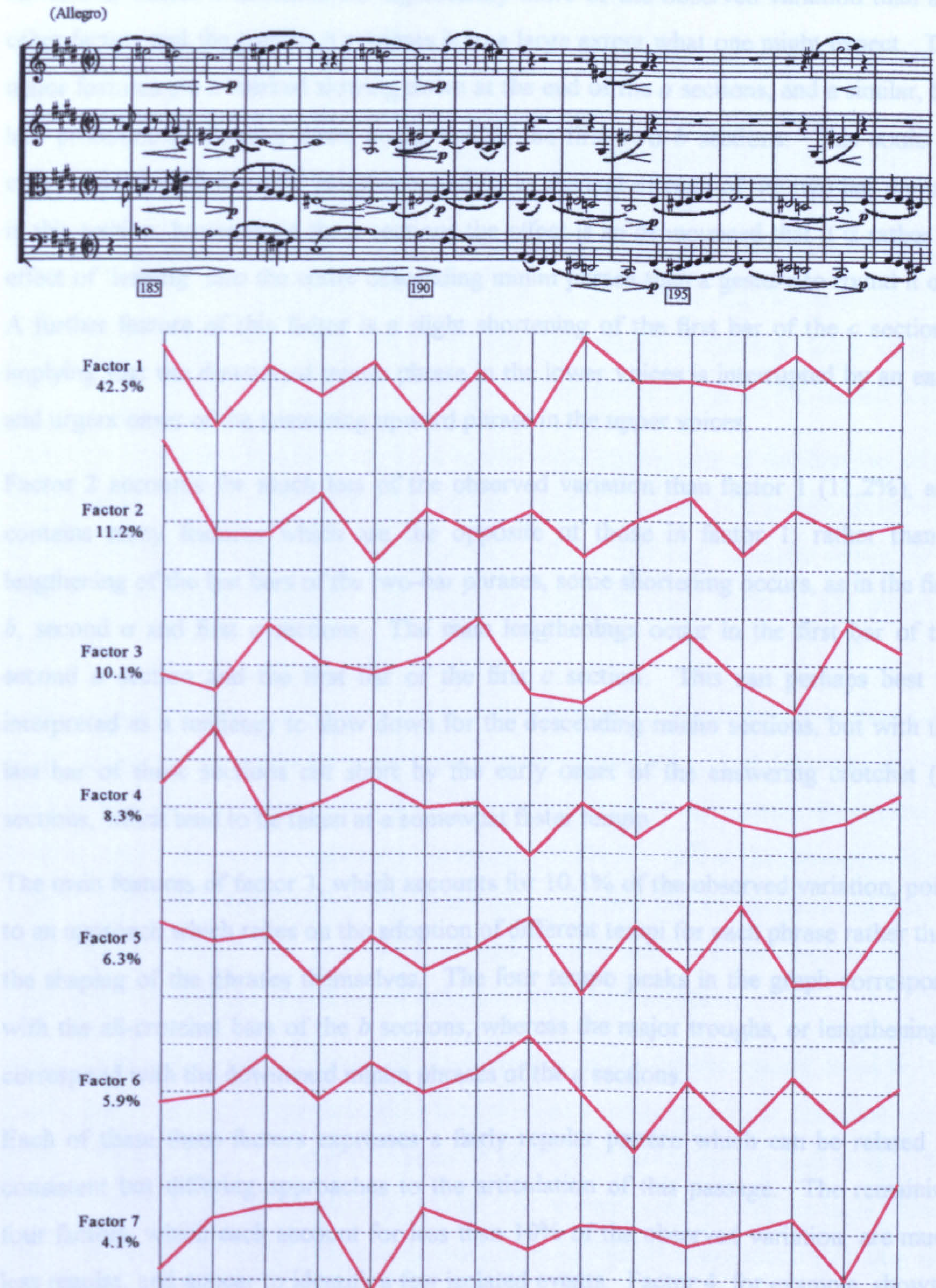

Fig. 5.6 - Factors derived from the analysis of local bar tempi for the seventh movement, bars 184-199. Horizontal gridlines are at 10% intervals; each vertical line corresponds to the bar immediately above it in the music example.

At 42.5%, Factor 1 accounts for significantly more of the observed variation than any other factor, and the pattern it presents is to a large extent what one might expect. The major features are a marked slowing down at the end of the *a* sections, and a similar, but less pronounced, slowing down at the end of the first two *b* sections. This could be considered as a phrase-final lengthening effect at the end of each of the two-bar phrases in this section; however, in the *a* sections the effect is so pronounced that it is rather an effect of 'leaning' into the entire descending minim phrase than a gesture to round it off. A further feature of this factor is a slight shortening of the first bar of the *c* sections, implying that the downward minim phrase in the lower voices is interrupted by an early and urgent onset of the answering upward phrase in the upper voices.

Factor 2 accounts for much less of the observed variation than factor 1 (11.2%), and contains many features which are the opposite of those in factor 1: rather than a lengthening of the last bars of the two-bar phrases, some shortening occurs, as in the first *b*, second *a* and first *c* sections. The main lengthenings occur in the first bar of the second *a* section and the first bar of the first *c* section. This can perhaps best be interpreted as a tendency to slow down for the descending minim sections, but with the last bar of these sections cut short by the early onset of the answering crotchet (*b*) sections, which tend to be taken at a somewhat faster tempo.

The main features of factor 3, which accounts for 10.1% of the observed variation, point to an approach which relies on the adoption of different tempi for each phrase rather than the shaping of the phrases themselves. The four tempo peaks in the graph correspond with the all-crotchet bars of the *b* sections, whereas the major troughs, or lengthenings, correspond with the downward minim phrases of the *c* sections.

Each of these three factors expresses a fairly regular pattern which can be related to consistent but differing approaches to the articulation of this passage. The remaining four factors, which each account for less than 10% of the observed variation, are much less regular, and appear to identify a few isolated events. Factor 4, for example, shows a fairly regular tempo which is disturbed only by a faster tempo in the second bar of the first *a* section and by slower tempi in the second bar of the second *b* section and the second bar of the first *c* section. The most pronounced slowing down in this factor comes in the second bar of the second *b* section, or in other words at the end of the first half of the passage, and it may be considered as a phrase-final lengthening articulation to differentiate the two halves of the passage, splitting the a-b-a-b pattern from the c-b-c-b pattern.

Factors 5 and 6 show a similar, and not very strongly articulated profile for the first half of the passage; unlike the other factors they share a shortening in the second bar of the second *b* section (i.e. instead of slowing down before the start of the second half, they actually rush into it). They are also similar in showing most variation in the second half, although the nature of the variation is different, with factor 5 showing slower tempi in the first bar of the two-bar phrases, while factor 6 has slower tempi for the second bars.

The main characteristics of factor 7 are a substantial lengthening of the first bar of the second *a* section and of the second bar of the second *c* section. This is difficult to relate to a consistent approach to the passage as a whole, and may to some extent be an artefact of the factor analysis - the factor accounts for only 4.1% of the observed variation.

Comparing the factors extracted by the analysis, factors 1, 2, 5 and 6 form an interesting group in which the two-bar phrases are articulated consistently: 1 and 5 shorten the first bar and lengthen the second, while 2 and 6 lengthen the first and shorten the second; in factors 1 and 2 this trait is exhibited most strongly in the first half of the passage, while in factors 5 and 6 it is restricted to the second half. The fact that the patterns represented particularly by factors 1, 2, 3, 5 and 6 can be discussed sensibly in terms of the musical structure of the passage adds confidence to the results of the analysis.

An analysis of the scores of each of the thirty-two performances against these factors shows that the individual performances tend to align to single factors as extracted by the factor analysis. Fig. 5.7 shows the scores of each performance against each factor. For ease of interpretation, all scores of less than .4 have been omitted from the table. Using this .4 threshold, fifteen of the performances have significant associations with only one factor; if we raise this threshold to .5, then this total rises to twenty-eight. In other words, the real performances under study can virtually all be associated readily with one of the factors extracted by the factor analysis.

The table is sorted to show the factor scores for each factor in descending order, so that the performances are grouped by factor, with the those showing the strongest association with the factor at the top of the list. The 'communality' figure provides an indication of the extent to which the variation in the individual performance is explained by a combination of the factors extracted by the analysis.

	Factor	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*Communality*
Talich	1978	.86546							.92064
Busch	1936	.83915							.89522
Vlach	1962	.82608							.93580
Bulgarian	1979	.78742							.93552
Calvet	1938	.75352							.89332
Mosaïques	1995	.74566				.49902			.92417
Pascal	1951	.74509							.90065
Prazak	1991	.64091					.47350		.84718
Hungarian	1965	.55121					.41922		.89215
Gewandhaus	1925		.90947						.94801
Italiano	1970		.73042						.88028
Medici	1990	.40931	.70772			.48205			.93214
New Budapest	1990		.67530						.82448
Smetana	1970		.63556				.48470		.78021
Végh	1973		.59955		.59803				.94758
Lindsay	1983		.50332			.47678			.95367
Rosé	1927			.87316					.89798
Capet	1928			.86749					.91316
Budapest	1943			.73308					.88765
Petersen	1994	.47314		.71594					.90205
Yale	1970				.91564				.92584
London	1925		.40850		.79682				.90315
Orford	1985				.67343			.50046	.85839
Fine Arts	1961			.43975	.48476				.80281
Hungarian	1953					.85964			.90987
Léner	1924	.43332				.76268			.93568
Schneiderhan	1944					.75833	.45004		.89394
Budapest	1940				.43667		.71598		.95895
Amadeus	1963	.49437					.56489		.86075
Hollywood	1957				.48440		.56391		.69703
Léner	1933							.83949	.79924
Budapest	1952			.54798				.59876	.72310

Fig. 5.7 - Factor scores for each performance against the seven factors extracted from the bar-to-bar tempo data for bars 184-199 of the seventh movement

At this stage in the investigation it comes as no surprise that the groups of performances associated with each factor do not correspond in any way with the date of the performance or the country of origin of the performers. Each factor is associated with performances from both ends of the date range studied, and each nationality is represented in more than one of the factors. Even when we look at the quartets represented by more than one performance, we find a lack of consistency: the three Budapest Quartet performances are all in separate factors, as are the two Hungarian and Léner performances. While the distinctions between the factors are statistically real and make musical sense, it would appear that the employment of one of the interpretive approaches exemplified by the factors may be more of a spontaneous decision influenced by the conditions of a particular performance rather than a matter of established practice and tradition. It is necessary to remember in this context that the passage which we have subjected to such detailed analysis lasts for around sixteen seconds, and occurs at a point in the movement where a great deal of energy and tension has been accumulated.

By way of example, the performances showing the most extreme factor 1 and factor 2 characteristics (the Talich and Gewandhaus Quartets respectively) are included in the accompanying CD [tracks 19 and 20].

Sforzando in the first movement

The passage in the seventh movement discussed above allowed us to examine the use of tempo modification in the overall shaping of phrases, and pairs of answering phrases. We now turn to tempo modification as employed to accentuate individual events in the musical narrative, in this case the events in the first movement with a *sforzando* or similar marking.

The use of tempo modification to accentuate such events, either by delaying their onset or prolonging their duration, is well recognized in the literature. In an analysis of timing microstructure in performances of Bach's C major Prelude, Cook notes that 'lengthening a note gives it an emphasis; that is why downbeats are often prolonged [...] But lengthening an upbeat has a different effect: it emphasizes the note that follows it' (Cook, 1987: 262). Blum relates that Pablo Casals advocated a similar prolongation in a slightly different context to emphasize the note of arrival at a new key during a modulatory passage (Blum, 1977: 143).

Not all commentators agree on the desirability of such tempo distortions. Wolff, recounting the performance preferences of Artur Schnabel, relates that 'the [...] older piano schools [...] mostly advise the contrary: *ritardandos* introducing deceptive cadences, recapitulations, etc. The great composers would have been horrified, as Schnabel was, by such false dramatics' (Wolff, 1972: 114). The suggestion here is that Schnabel was correcting the bad practices of an earlier era. By contrast, while finding such over-emphasis similarly distasteful, Epstein views it as a more modern phenomenon: 'such false leads are commonplace in performance. Prime among them in our time are the overcharged *sforzandi* and dynamics imparted by the "vital," energetic, charismatic musician that our media-driven culture increasingly proffers, generating performances that project an almost superhuman image of excitement' (Epstein, 1995: 24).

It is particularly appropriate to examine tempo dislocations in executing *sforzandi* in a late Beethoven context, as the device is a prominent feature of his later style. Hudson draws attention to the number of occurrences of a notated delay to the onset of an expected note in late Beethoven as a general hallmark of this style.[5] The use of *sforzando* and similar events in Beethoven's work has even merited a separate study of its own (Graudan, 1968). In this study Graudan draws attention to the variety of interpretive approaches possible in executing these *sforzando* events, including the length of the implied accent itself; here he is not referring to the duration of the note event as such, but rather to the duration of the accent within the note (e.g. should it be short and sharp, with a sudden piano immediately after the onset, or should there be a more general emphasis of the note as a whole). He concludes that performance practice is so varied that no idea of an accepted tradition is feasible.[6]

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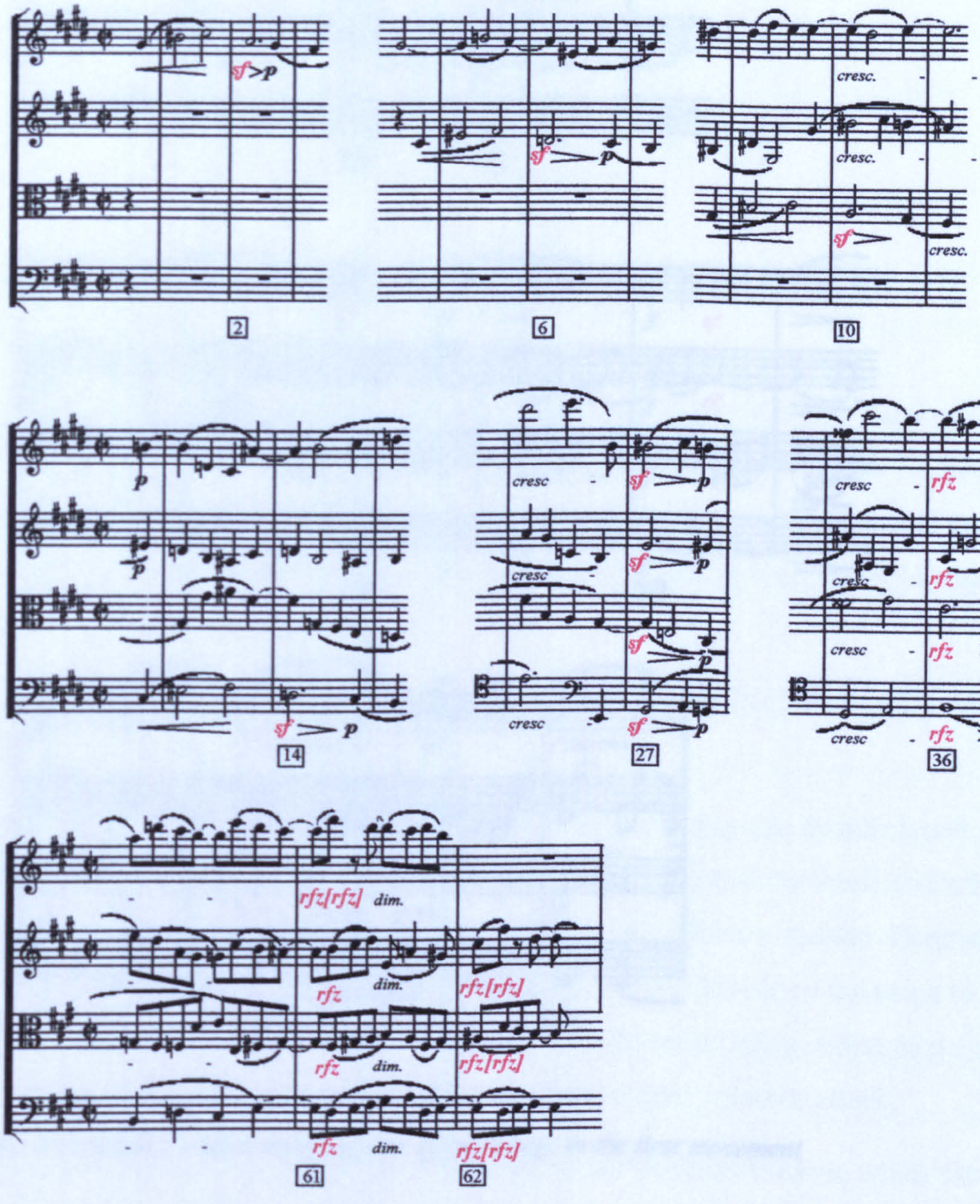
[5] In the specific context of the late works of Beethoven, Hudson notes: 'There are some other methods of altering note values, however, which are particularly characteristic of the late period. These involve certain ways of anticipating or delaying notes or chords so that they do not fall in their expected positions. This creates a feeling of yearning or striving which becomes a part of Beethoven's personal style of romanticism.' (Hudson, 1994: 167). As a specific example of this kind of annotated delay, or withholding of expectation, he quotes the chord on the downbeat of bar 10 in the sixth movement of Op. 131, where the expected downward fifth movement in the cello is delayed until the second beat.

[6] 'Musiklexika geben nur die wörtliche Übersetzung der italienischen Ausdrücke (sforzato - forciert; sforzando - forcierend), ohne ihre genaue Bedeutung und Ausführung befriedigend zu erklären. Auch können wir nicht viel aus Aufführungen lernen, denn die Auffassungen verschiedener Künstler zeigen die größten Unterschiede - von vollständiger Nichtbeachtung bis zu grober Übertreibung. Offensichtlich gibt es keine allgemeine akzeptierte Tradition.' (Graudan, 1968: 226)

['Music lexicons merely give literal translations of the Italian Terms (sforzato – forced; sforzando – forcing), without satisfactorily clarifying their exact meaning and execution. Nor can we learn much from performances, as the interpretations of different artists show the

The first movement of Op. 131 contains seventeen occurrences of *sf* or *rfz* markings, in a variety of contexts. They are shown in Ex. 5.2.



Ex. 5.2 - Instances of ***sf*** *and* ***rfz*** *markings in the first movement*

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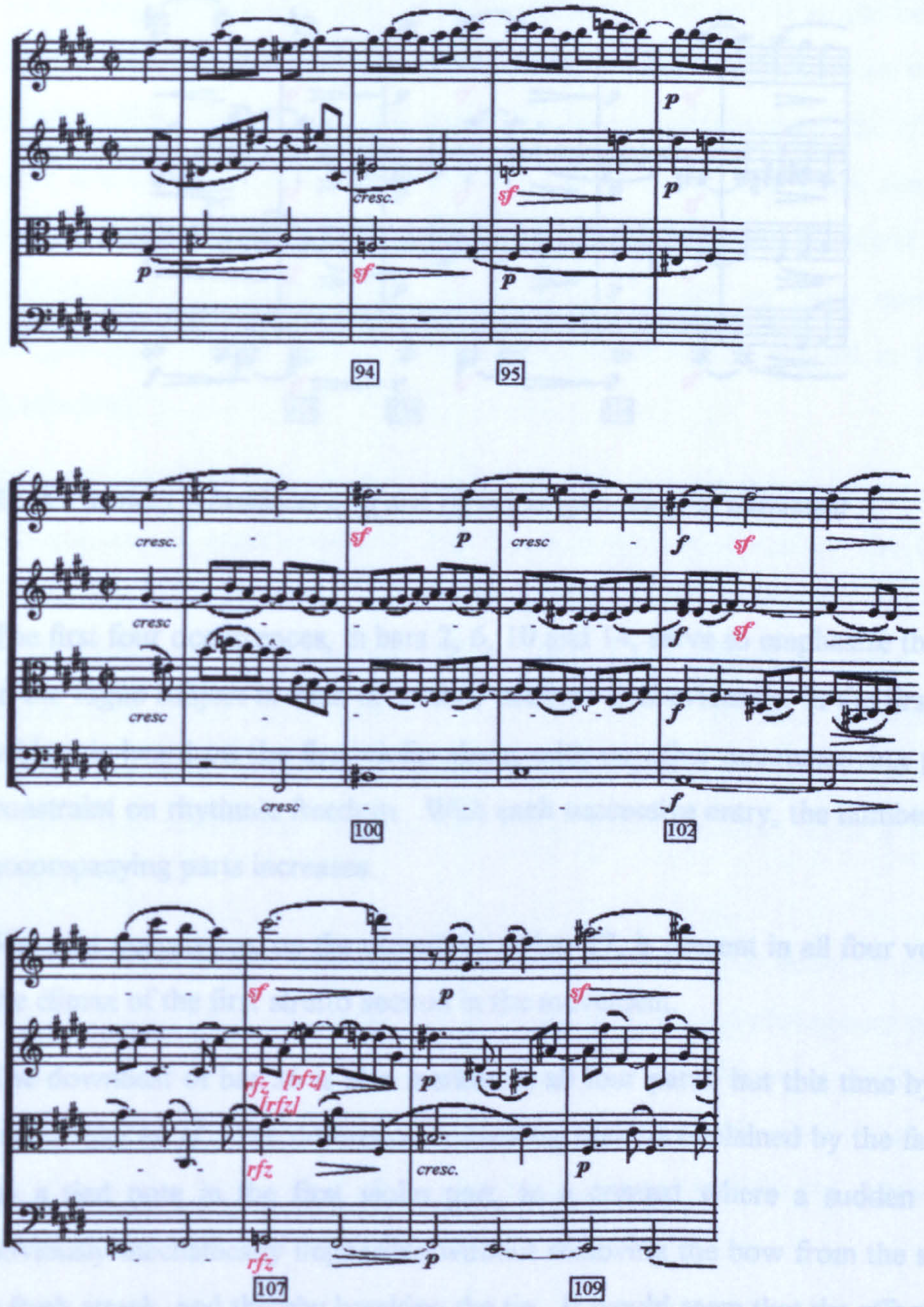
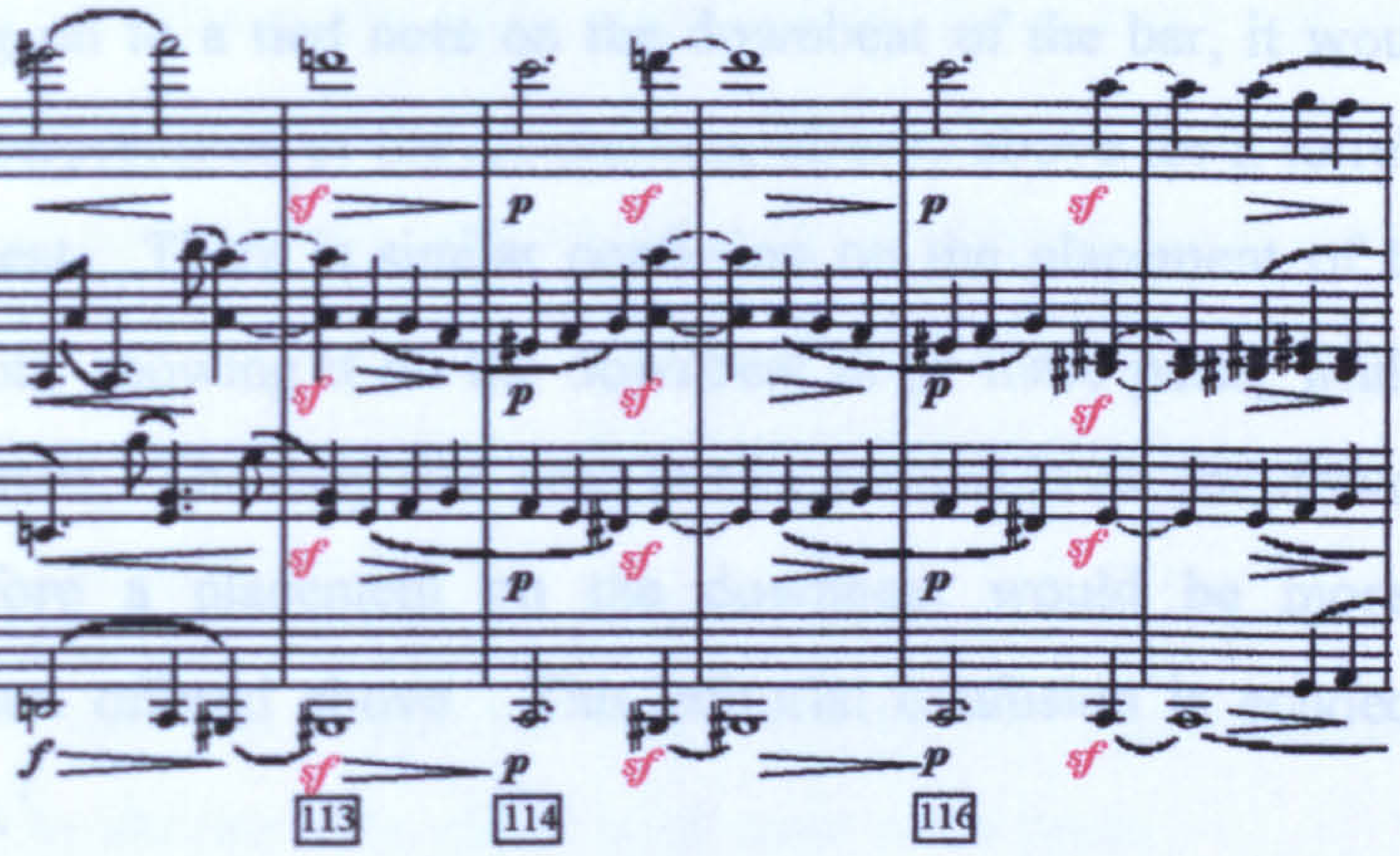
greatest contradictions – ranging from complete lack of observation to gross exaggeration. Clearly there is no universally accepted tradition.' (author's translation)]



Ex. 5.2 (contd.) - Instances of sf and rfz markings in the first movement



Ex. 5.2 (concl.) - Instances of sf and rfz markings in the first movement

The first four occurrences, in bars 2, 6, 10 and 14, serve to emphasize the climactic point in the fugue subject in each of its four entries. Self-evidently, in the first occurrence the subject is heard on the first violin alone, with no other accompanying parts to act as a constraint on rhythmic freedom. With each successive entry, the number of constraining accompanying parts increases.

The next occurrence, on the downbeat of bar 27, is present in all four voices, and marks the climax of the first stretto section in the movement.

The downbeat of bar 36 is also marked in all four parts, but this time by an *rfz* marking rather than an *sf*. The difference in marking may be explained by the fact that it occurs on a tied note in the first violin part, in a context where a sudden sharp accent is obviously mechanically impossible without removing the bow from the string to provide a fresh attack, and thereby breaking the tie. It would seem that the effect intended is one of a sudden swell or reinforcement of the note rather than a distinct attack.

In bars 61 and 62 there are two further occurrences of an *rfz* marking which occur in all the parts which are active at the time (four in bar 61, three in bar 62). Bar 61 occurs at the climax of a rising sequential passage which started in bar 57, and bar 62 repeats the gesture in a kind of post-echo of this climactic point. There is a lack of editorial unanimity in the placing of these *rfz* markings. In bar 61, most editions have the *rfz* on the downbeat in the first violin, and on the second quaver of the bar in the other parts, while some editions have the marking on the second quaver in all parts. As all four parts are holding on to a tied note on the downbeat of the bar, it would be more consistent with the interpretation of the *rfz* marking offered above for it to relate to the tied note on the downbeat. There is similar confusion on the placement of the *rfz* in bar 62, with most editions showing it on the downbeat in all three parts, while some have it on the second quaver. The only tied note in this context is on the downbeat in the cello part, and therefore a placement on the downbeat would be more consistent with the interpretation offered above. This editorial confusion is echoed in the performances themselves.[7]

Bars 94 and 95 contain *sf* markings in the viola and second violin parts respectively, in the context of restatements of the fugue subject as noted at the beginning of the movement. In each case, rhythmic freedom is constrained by activity in the two other parts which are present in these bars. Bar 100 contains a similar *sf* marking in a restatement of the fugue subject in the first violin; in this case, all three other parts are present, but only the second violin and viola act as a rhythmic constraint (i.e. they have smaller note values than the first violin's *sf*, while the cello holds a semibreve for the whole bar).

Bar 102 contains the first of a series of *sforzandi* which serve to add emphasis and finality to the end of the movement, and which in many performances act as devices for reducing the overall tempo in addition to emphasizing the event itself. This is also the first case of a *sforzando* event occurring in mid bar (on the third beat). It is shared by the two violins, and their rhythmic freedom is constrained by the shorter note values in the viola part.

In bar 107, the downbeat is marked *sf* in the first violin, and *rfz* in all other parts. Again, there is editorial inconsistency in the placement of the accent in the second violin part, where some editions place the *rfz* on the second quaver, or even the second crotchet. As in the other examples of editorial inconsistency, a tied note is involved on the downbeat of the second violin part. It would be consistent with the interpretation offered above to assume that the *rfz* relates to the tied note on the downbeat; the first violin, with no tied

[7] The edition by Maurice Hewitt has the *rfz* markings on the second quaver in both instances here; Hewitt was the second violinist of the Capet Quartet from 1911 to 1928, and it is perhaps reassuring that in the performance studied here (in which Hewitt was also second violinist), the Capet Quartet plays both *rfz* markings on the second quaver, in accordance with Hewitt's edition.

note, is free to make a *sforzando* accent rather than a mere reinforcement. The fact that the viola and cello both have *rfz* marks even though they have no tied notes perhaps indicates that they should support the second violin in a less accented reinforcement of note intensity and allow the first violin's *sf* attack to stand out in relief. This is another instance where the accented marking occurs as the climax to a sequential passage which in this case started in bar 103.

In bar 109, the first violin has a *sf* marking on the downbeat, but is rhythmically constrained by shorter note values in all three other parts.

The final three occurrences (bars 113, 114 and 116) all involve *sf* markings in all four parts, and occur on chords which all involve some double stopping, and which provide an emphatic end to the movement.

The performances under study were measured using the Sound Designer II package. For each *sforzando* event, six note onsets were timed: three on events prior to the accented event, the event itself, and two subsequent events. The onsets for the first three events, prior to the accented event, were used to establish a basic tempo for comparison with the tempo of the event preceding the accented event and that of the accented event itself. Due to cuts in the performance, data for the London Quartet are only available up to the event in bar 62; and due to a flaw in the recording available, data could not be obtained for the events in bars 10 and 14 for the 1952 Budapest Quartet performance. Where there is editorial inconsistency in the placement of the accented events (as described above), measurements were taken relative to the event which appeared to receive the accent in the performance in question. In all but one case it was readily apparent from listening where the accented event actually occurred in the performance.

As in previous analyses, a threshold of 10% difference in tempo was applied, and in each case both the event prior to the accented event and the accented event itself were compared with the basic tempo established by the two events prior to this. These two comparisons allow an assessment to be made of the extent to which the onset of the accented event is delayed (in a form of agogic accent or 'luftpause') and of the extent to which it is emphasized by prolongation.

Fig. 5.8 shows the number of occurrences of prolongation greater than 10% for each performance, plotted by year; prolongation of the event preceding the accented event and prolongation of the accented event itself are shown separately (blue triangles and red circles respectively). From this it would appear that prolongation has become more common in the second half of the century, particularly with respect to the preceding event. In other words, the habit of delaying the expected note through a kind of agogic accent is more prevalent now than it was in the earlier part of the century.

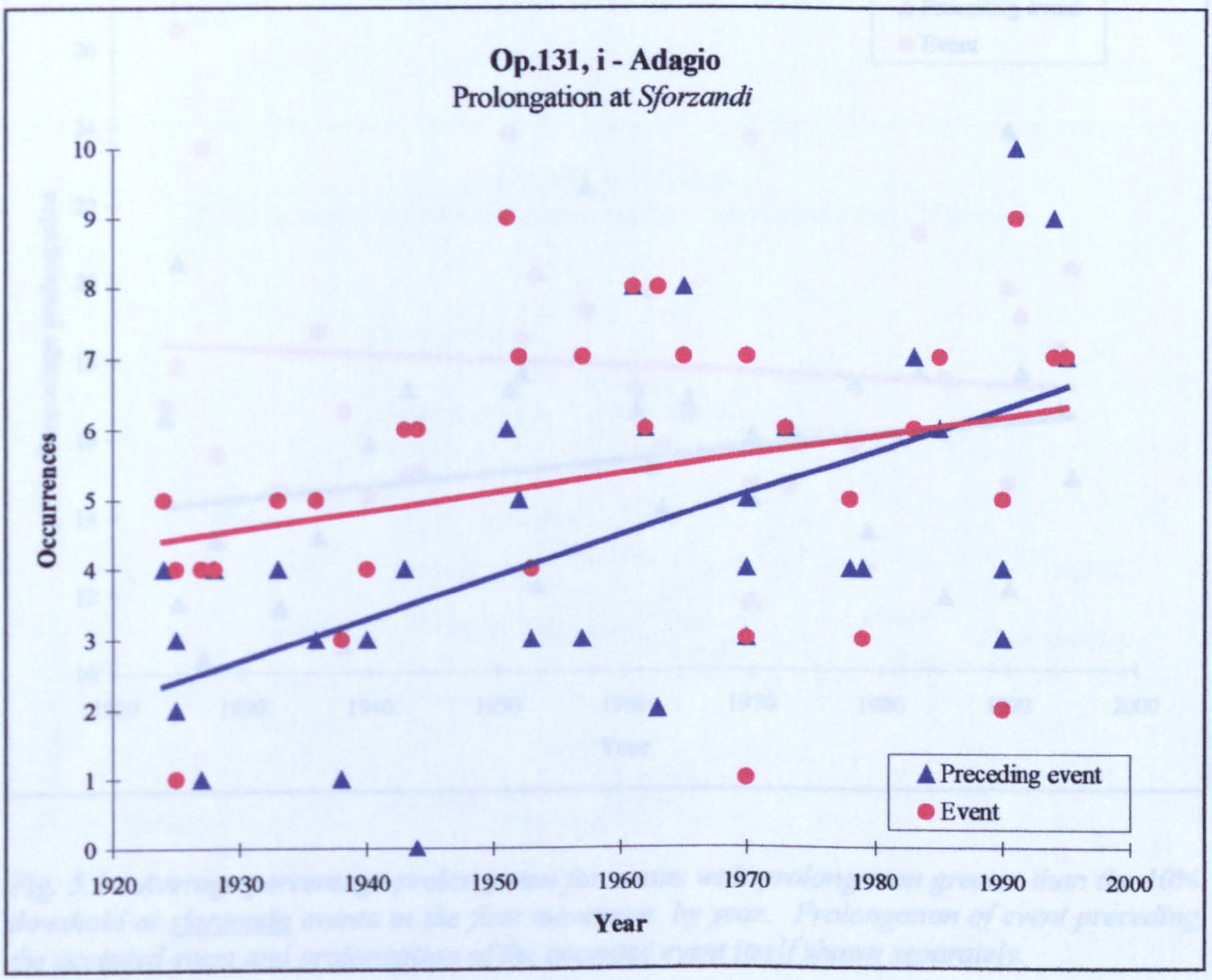


Fig. 5.8 - Number of occurrences of prolongation greater than 10% at sforzando events in the first movement, by year. Prolongation of event preceding the accented event and prolongation of the accented event itself shown separately.

If we turn to the extent of the prolongation, rather than the number of occurrences, a slightly different picture emerges. Fig. 5.9 is a similar plot of performances by year, but shows the average percentage prolongation of those events which exceed the 10% threshold rather than the number of occurrences; the figures for the preceding event and the event itself are again shown separately. Here it is apparent that there is no comparable trend in the extent of the prolongation, with a similar range of values at all periods. While the habit of prolonging *sforzando* events has become more prevalent, there is no difference in the extent of that prolongation when it occurs.

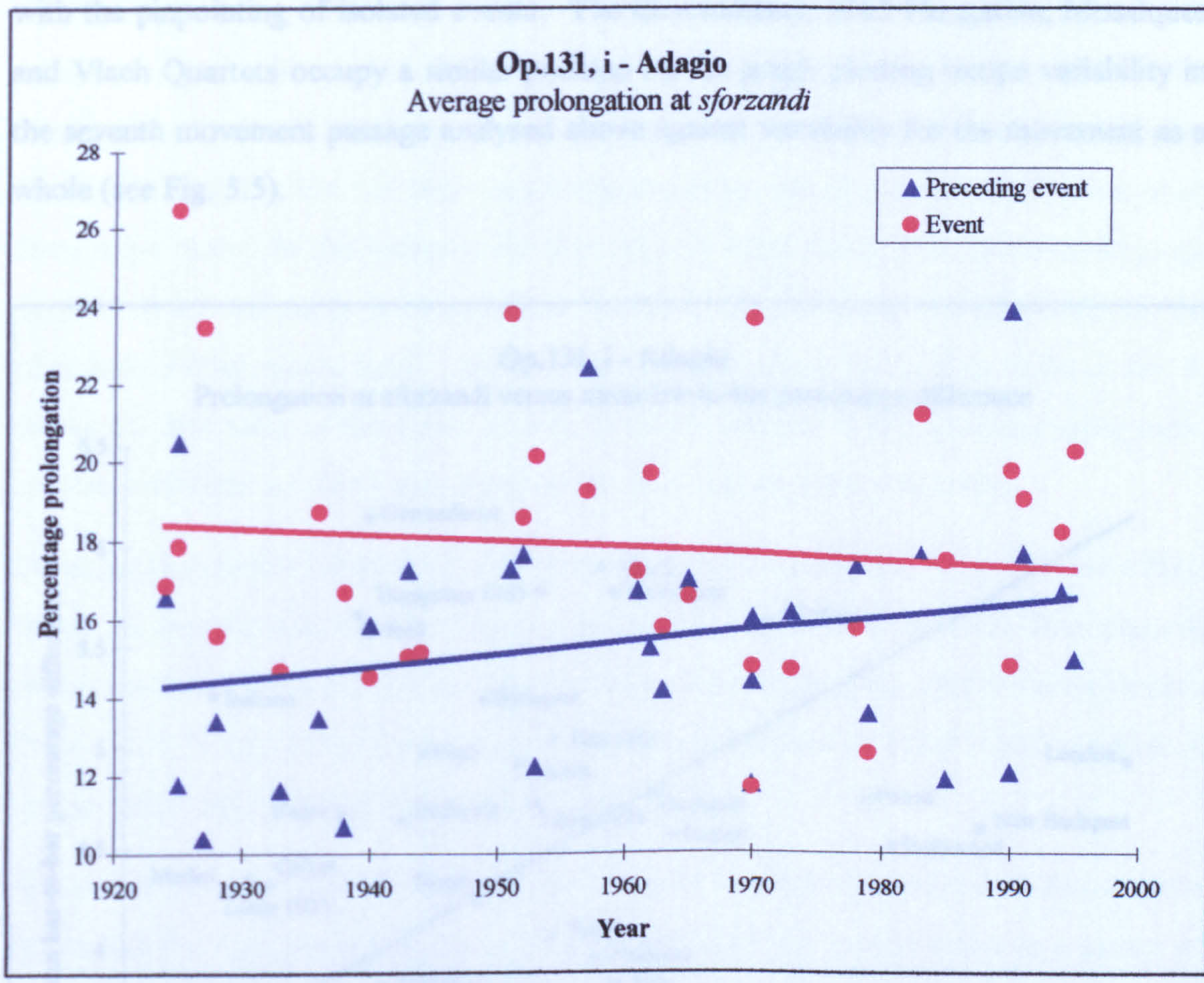


Fig. 5.9 - Average percentage prolongation for events with prolongation greater than the 10% threshold at sforzando events in the first movement, by year. Prolongation of event preceding the accented event and prolongation of the accented event itself shown separately.

As with the analysis of the seventh movement passage above, it is instructive to compare the extent of the tempo variability as measured for these specific *sforzando* events with the overall measure for tempo variability in the movement as a whole. Fig. 5.10 plots the average prolongation at *sforzando* events (both the event and the preceding event) against the mean bar-to-bar percentage tempo difference for each performance. As one would expect, most performances show a tendency for marked prolongation at *sforzandi* to be associated with high overall tempo variability, and vice versa. However, there is a small group of performances which show low prolongation at *sforzandi*, and high overall tempo variability (the Gewandhaus, Italiano and Orford, and to a lesser extent the 1965

Hungarian, Mosaïques and Vlach Quartets). This would suggest that their tempo flexibility operates over a wider span and is more concerned with phrase shaping than with the pinpointing of isolated events. The Gewandhaus, 1965 Hungarian, Mosaïques and Vlach Quartets occupy a similar position on the graph plotting tempo variability in the seventh movement passage analysed above against variability for the movement as a whole (see Fig. 5.5).

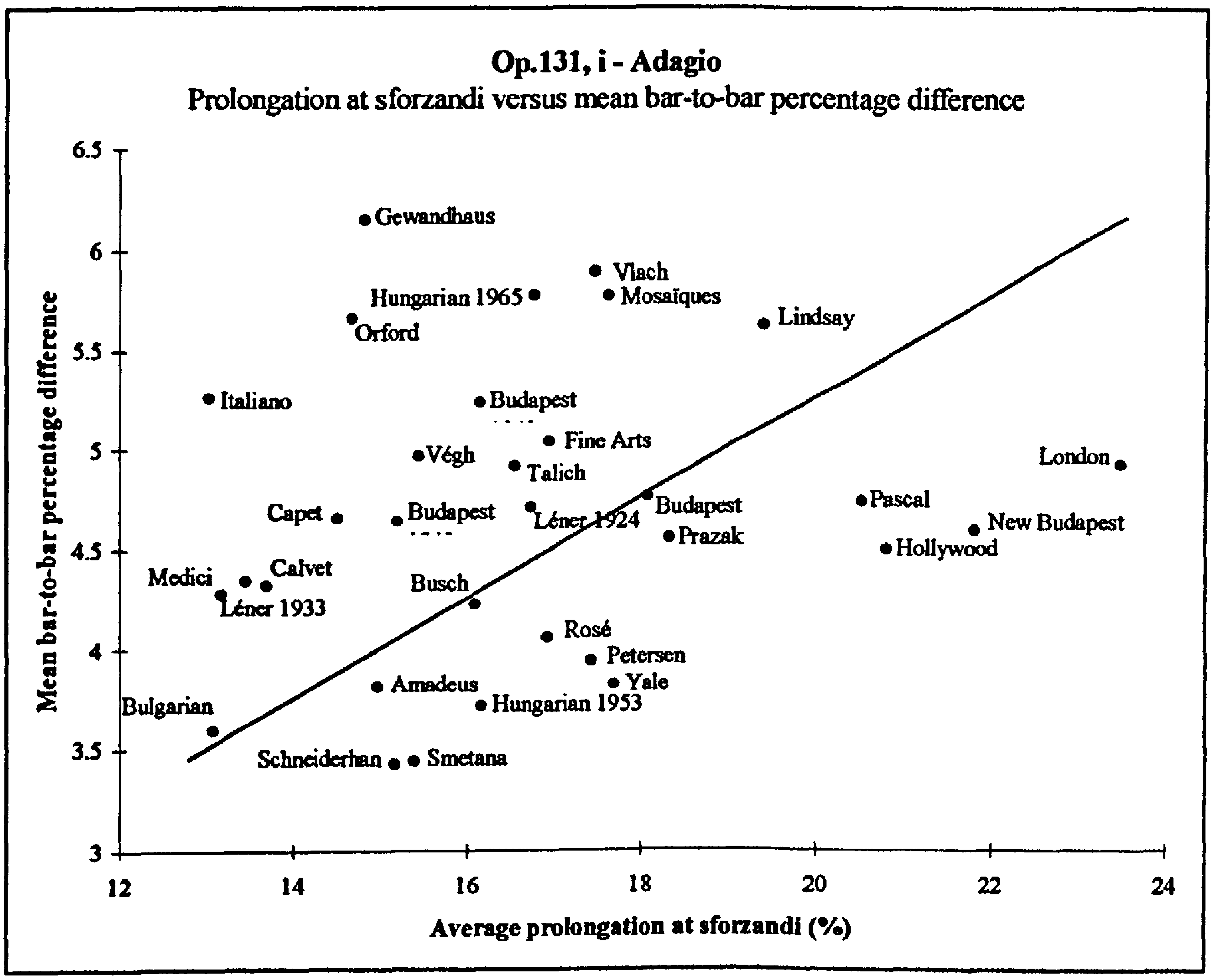


Fig. 5.10 - First movement, mean prolongation at sforzando events compared with mean bar-to-bar percentage tempo difference for the movement as a whole

As indicated above in the description of the *sforzando* events in the first movement, a number of considerations relating to ensemble and the four-part texture of the quartet need to be taken into account when discussing the approach of a quartet to the articulation of these events by tempo dislocations. These events take place in a variety of contexts in terms of this four part texture. Rhythmic activity in parts which do not partake in the *sforzando* may act as a constraint on the extent to which the approach to and execution of the *sforzando* may be prolonged. For example, in bars 108 and 109, the first violin has a crotchet in the last beat of bar 108, followed by a *sforzando* dotted minim on the first beat of bar 109, followed by a crotchet on the last beat of bar 109. During the crotchet in bar 108, there is quaver activity in the second violin, and during the dotted minim in bar 109 there is activity involving various smaller note values in all three other parts. In this instance, the first violin is dependent on co-operation from his partners if he wishes to prolong either the crotchet preceding the *sforzando* or the *sforzando* dotted minim itself. By contrast, the *sforzando* in the first violin in bar 2, during the first entry of the fugue subject, is unencumbered by any accompanying parts, and the performer is able to vary his tempo at will with no other constraint.

Similarly, the number of parts which partake in the *sforzando* may have a similar effect. Where all four parts have a simultaneous *sforzando*, as in bar 27, or in the three massive chords involving double-stopping in one or more parts towards the end of the movement (bars 113, 114 and 116), it requires less corporate discipline to effect a prolongation of tempo than if only one part has the *sforzando*.

Analysis of the way in which different quartets react to these constraints can throw some interesting light on the extent to which they approach the performance as a group of individuals and the extent to which they demonstrate a corporate interpretation. A quartet which emphasizes an event such as a *sforzando* which appears in only one part while the other parts are active in smaller note values must have considered its approach and come to a collective decision, either explicitly or intuitively, that this expressive nuance is appropriate to its interpretation.

A chart which characterizes these and other aspects of a quartet's articulation of the *sforzando* events was devised to aid comparison, and an example (from the performance by the Hollywood Quartet) appears in Fig. 5.11. A full set of these charts for all the performances studied appears in Volume 2, Fig. 5.13.

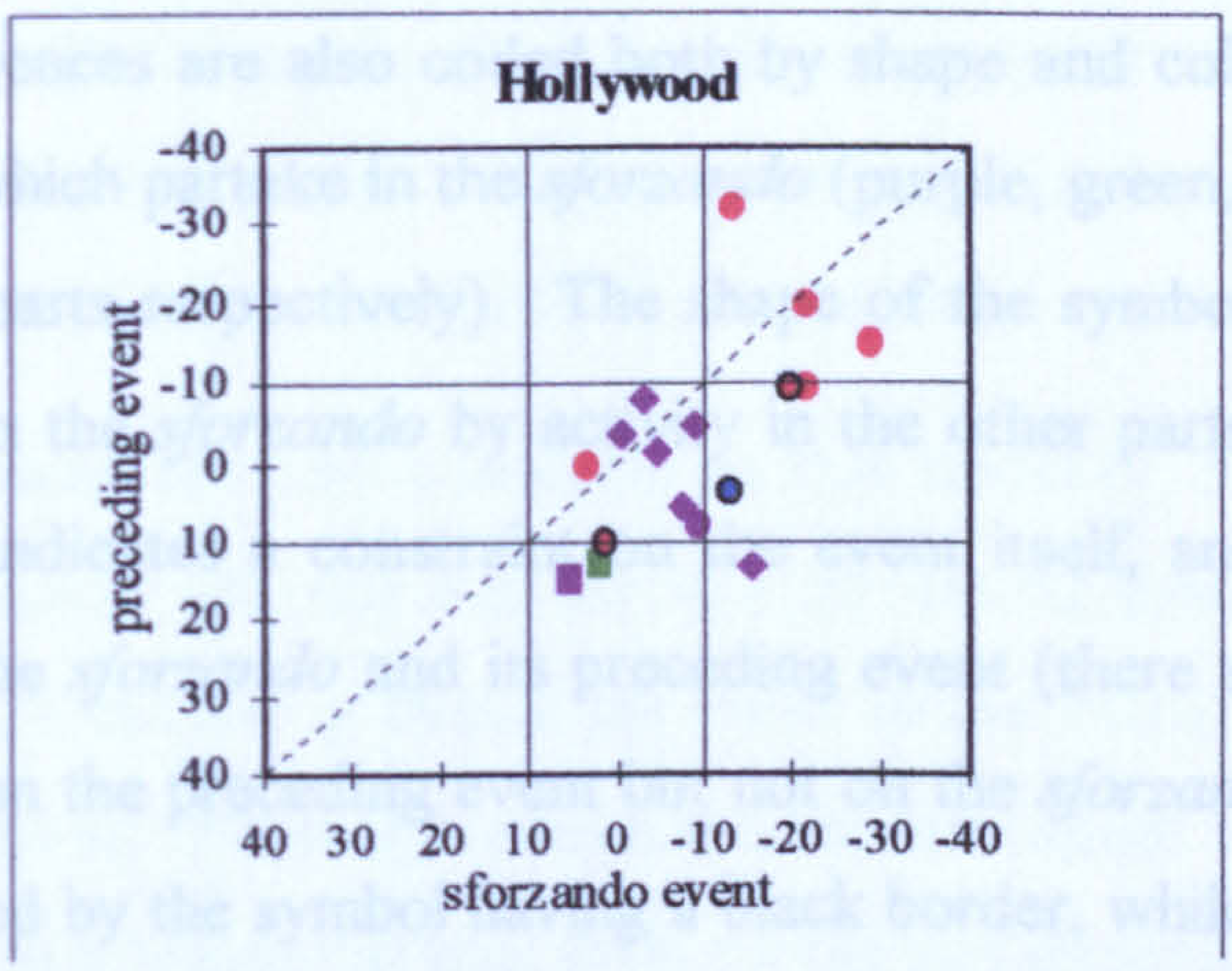


Fig. 5.11 - Example of chart plotting sforzando events in the first movement, for the Hollywood Quartet.

Some words of explanation are required for these charts. Each chart plots the seventeen *sforzando* events in the first movement individually for a single performance. The abscissa shows the percentage tempo difference from the previously established tempo of the *sforzando* event itself, with negative figures representing slower tempi: the range therefore starts form 40% faster (on the left) and extends to 40% slower (on the right). The ordinate shows the percentage tempo difference for the event preceding the *sforzando*, from 40% faster at the bottom to 40% slower at the top. Horizontal and vertical gridlines are indicated at the +10% and -10% values; thus any event which falls below the 10% threshold previously described in both the event itself and the preceding event will appear in the central box formed by these gridlines. The top right segment of the chart will be occupied by events where the prolongation of both the event and the preceding event exceed the 10% threshold; the centre right segment will be occupied by occurrences where the event itself is prolonged, but not the preceding event (i.e. the 'emphasizers'); and the top centre segment will be occupied by occurrences where the preceding event is prolonged but not the event itself (i.e. the 'agogic accent' phenomenon). The diagonal dotted line marks the point of equality of prolongation for the event itself and the preceding event; thus in occurrences which are plotted above and to the left of the line the preceding event is prolonged more than the event itself, and in occurrences which are plotted below and to the right of the line the event is prolonged more than the preceding event.

The individual occurrences are also coded both by shape and colour. Colour indicates the number of parts which partake in the *sforzando* (purple, green, blue and red, for one, two, three and four parts respectively). The shape of the symbol indicates the type of constraint imposed on the *sforzando* by activity in the other parts: a circle indicates no constraint, a square indicates a constraint on the event itself, and a diamond indicates constraints on both the *sforzando* and its preceding event (there are no instances where there is a constraint on the preceding event but not on the *sforzando* itself). Finally, the *rfz* events are indicated by the symbol having a black border, while the *sf* events have no border.

A casual comparison of these charts shows that there is a wide variety of practice, and nearly every quartet has its own individual 'fingerprint'; however, on closer examination some more general themes emerge which allow some groupings of performances to be formed.

Firstly, it is noticeable that there is no performance in which all occurrences are within the 10% threshold. However, a few performances come close to this, either with very few occurrences outside the central 'threshold box' or with occurrences only just outside the box. These include the Capet, 1940 Budapest, Yale and Bulgarian Quartets. The Bulgarian Quartet shows a very consistent pattern, with all of the events involving just one voice (purple) clustered closely round the central point (indicating no tempo change), and all but one of the events involving four voices and no constraints (red circles) appearing close to the 10% prolongation mark for both the *sforzando* and its preceding event.

This split is typical of a number of quartets which show a tendency to prolong *sforzandi* involving all four voices, but which generally do so to a more pronounced extent than the Bulgarian Quartet. This group can be further subdivided into the 'emphasizers' (which prolong the event rather than the preceding event), the 'withholders' which prolong the preceding event rather than the event itself), and those which do both. Firm members of the 'emphasizer' group include the Pascal, Hungarian (1953) and Amadeus Quartets; the 'withholders' include the Smetana and Végh Quartets; and those which both withhold and emphasize include the Budapest (1943 and 1952), Hollywood, Fine Arts, Vlach, Hungarian (1965), Talich, Lindsay, Orford, Medici, New Budapest, Prazak, Petersen and

Mosaïques Quartets. The absence of any performance prior to 1943 from these lists reinforces the trend described earlier, where occurrence of prolongation at *sforzandi* was seen to be more common in the second half of the century.

The earlier performances are less consistent in this respect. For example, the 1933 performance by the Léner Quartet has the two *rfz* events firmly in the 'emphasizer' segment of the chart, while the *sf* events are either in the 'withholder' segment, or fall below the 10% threshold. These *rfz* events are the two about which there is editorial inconsistency. The Léner choose to play them on the tied downbeat in both cases and in both of their performances, and this is perhaps more consistent with a prolongation rather than a withholding: a withholding implies that there is a definite event with a clear attack which can be withheld, which is not the case if a tied note is being reinforced.

In the Rosé Quartet's performance, most events occur within the 10% threshold, with the notable exception of three events in the 'emphasizer' segment, one of which is a single part *sforzando* with constraints on both the *sforzando* and its preceding event. One of the four-part *sforzandi* shows a significant prolongation of the *sforzando* and an equally significant fore-shortening of the preceding event: far from being withheld, this event is anticipated, giving the effect of a somewhat disorienting breathless rush into an emphatic attack on the *sforzando* itself. There are a number of similar instances of this in the Gewandhaus and Calvet Quartets' performances, and two occurrences of a far less pronounced nature in the Schneiderhan Quartet's performance. Apart from a single occurrence in the Vlach Quartet's performance, this feature is entirely absent from all other performances, and it is tempting to suggest that it is a habit which is peculiar to the period before the Second World War.

Occurrences of prolongation of events where there are fewer parts involved or where constraints apply are, as one might expect, more rare. However, they are of particular interest in that they imply that a corporate decision (either explicit or intuitive) has been made to prolong the *sforzando*, and that the other parts are deliberately making allowances for this to happen. They are listed in the table below:

Quartet	*Constraint on sf*	*Constraint on sf and preceding*
Léner 1924	1	0
Gewandhaus	1	0
London	0	1
Rosé	0	1
Capet	1	0
Léner 1933	0	2
Busch	0	1
Budapest 1943	0	1
Schneiderhan	0	1
Pascal	0	1
Hollywood	0	1
Fine Arts	0	1
Vlach	1	0
Amadeus	0	1
Hungarian 1965	1	2
Végh	0	1
Orford	1	0
Medici	1	0
Prazak	0	2
Petersen	0	1
Mosaïques	0	1

These counts are low, given that there are in total eight instances where constraints apply, with only the 1965 Hungarian performance achieving prolongation on more than two occasions. Only three of the events accounted for in this table are significantly in excess of the 10% threshold (one each from the London, Rosé and Pascal Quartets).

There are some instances of a shortening of the *sforzando* event itself, which is contrary to the expectation that such events would be prolonged to give added emphasis. Examples of significant shortening (i.e. with events to the left of the gridline at the 10% faster threshold) can be seen in the charts for the Gewandhaus, Pascal, 1952 Budapest, 1953 Hungarian, Italiano, Smetana and Talich Quartets. There is little consistency in the events in the movement to which they relate: two relate to the event in bar 62, and two to bar 109, while the others all relate to different events. However, there is a common factor in all instances in that the next measured event after the *sforzando* occurs in a different part from the *sforzando* itself. These occurrences may therefore have little to do with the articulation of the *sforzando*, and more to do with the early entry of the other part; whether this is accidental, or whether it is a reflection of an added urgency imparted by the *sforzando* event it is impossible to determine.

Schenker, in discussing the timing of *sforzando* notes, makes an interesting distinction between *sforzandos* that fall on strong beats and those that fall on weak beats, advocating taking weak beat *sforzandos* early and delaying the onset of the following note.[8] In the example being considered here there are three weak note *sforzando* events (at 102/3, 114/4 and 116/4). The Schneiderhan, Calvet and Yale quartets exhibit a shortening of the note preceding the *sforzando* by 10% or more in at least two of these three occurrences (i.e. they take the *sforzando* early, as advocated by Schenker). However, the Calvet has a marked tendency to take the *sforzando* early on both strong and weak notes, and so only the Schneiderhan and Yale quartets observe the distinction made by Schenker in this respect.

In summary, the examination of the articulation of *sforzandi* has indicated a trend towards an increasing tendency during the second half of the century to emphasise the event, either by prolongation of the event itself or by withholding its onset; there is also some evidence that a tendency to anticipate the event by an early attack is restricted to the first half of the century. This is in contrast to other aspects of tempo dislocation studied, where no historical trend is discernible. Closer examination of the ways in which the *sforzando* event is associated with local tempo dislocations has identified a number of common themes running through groups of performances; however, these groups in no way relate to historical periods or national 'schools'.

Dotted and double-dotted rhythms in the sixth movement

The previous two detailed analyses (of a passage in the seventh movement, and of the *sforzando* instances in the first movement) examined tempo flexibility which could be

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[8] 'When an *sf(p)* occurs on a weak beat it is usually advisable to take the weak beat earlier than would be demanded in strict time; one should, as it were, fall onto the tone and balance the timing on the far side of the *sf*. The reason for this: ordinarily the bar organization gives the player no opportunity to shape the flow of time in an unusual way; an *sf* on a weak beat, however, gives the impression that the composer felt compelled to destroy the norm during a particular moment of intense emotion. It is this intense emotion that demands its equivalent on the part of the player. How could it be expressed other than by hurrying, by rushing the weak beat?!
'After the weak beat – in moving to the next strong one – one must hesitate. This slowing down serves not only to restore the regular pace but also, far more, as a contrast to the preceding rushing.' (Schenker, 2000: 61)

measured at the bar-to-bar level. We now proceed to an area of rhythmic freedom which occurs within the bar, and is thus not observable from tempo measurements based on whole bar durations. This lies in the precision (or otherwise) inherent in the observation of dotted rhythms.

Much attention has been given to the execution of dotted rhythms in analyses of historic performance practice, and in particular to the prevalence of 'over-dotting' in early performances. Brown surveys the evidence for eighteenth and nineteenth century practice, and draws from a wide range of evidence the general conclusion that in this period dotted rhythms tended to become assimilated to accompanying triplets, and tended to be played over-dotted (i.e. with the dotted note lengthened and the shorter note shortened) where there is no triplet rhythm in the context (Brown, 1999: 613-627). He argues from features of notation, contemporary transcriptions from performances and contemporary teaching manuals. Nineteenth century over-dotting appears to be more usually associated with pieces of a martial or majestic character, although, interestingly in our context, he also quotes from the eighteenth century violin method by Löhlein the stipulation that 'if there are many dotted figures in a sad and, in any case, moderate and pathetic melody, the rule of performance style demands that one lengthens the dot by half its worth and performs the following note that much shorter' (: 622).

Dotting practice as evidenced by early twentieth century recordings is reviewed by Philip (1992: 70-93, and 1994: 198-199). He finds a number of early twentieth century authorities such as Busoni, Weingartner and Bachmann advocating strict rhythmic interpretation of dotted figures, and complaining about the contemporary common practice of over-dotting. Other authorities, such as Tovey and Craxton prefer avoidance of strict interpretation, allowing considerable leeway as long as the short note does not become a triplet quaver; Frederick Corder's 1924 edition of the Beethoven piano sonatas implies that the length of the short note should vary with the character of the music. The recordings (of works in a wide variety of genres) demonstrate 'the almost universal habit of overdotting and of lightening short notes' (1992: 77). Philip also finds a casualness in the approach to dotted rhythms, usually resulting in a shortening of the short note, in performances of Mozart by the Léner and Flonzaley Quartets, and of Beethoven (Op. 95) by the Busch Quartet.

On the basis of such evidence and reviews we should expect to find in the recordings under study evidence of considerable latitude and over-dotting in the pre-war performances giving way later to a more scrupulous adherence to the musical notation. To test this, the sixth movement of the Op. 131 Quartet was selected for detailed study, as it contains sixteen instances of notated dotted rhythms and four of notated double-dotted rhythms (Ex. 5.3). These instances are all in the context of phrases which are repeated several times, and thus give an opportunity for assessing consistency of approach; they are distributed between the three upper voices, often in one instrument at a time, but in five cases in two or three instruments simultaneously. The basic character of the movement (*Adagio quasi un poco andante*) is slow and deeply felt. It is often implied in writings such as those quoted above that the motivation behind over-dotting is to accentuate a marching rhythm or to provide added weight to a stately or even bombastic statement, and both of these two characteristics are clearly absent here. One should therefore be careful not to extrapolate the findings too widely.

Ex. 5.3 – Sixth movement, with dotted rhythms indicated in red and double-dotted rhythms in blue. The dotting values for the three performances included in the accompanying CD are also indicated: + indicates over-dotting; - indicates under-dotting; = indicates dotting as notated. The values for the Busch Quartet are shown in red, for the Yale Quartet in green and for the Léner Quartet (1924) in blue.

All thirty-two performances were recorded onto a PC using the Cool edit 2000 package. Note onsets were determined by scanning the wave form and identifying the onset by repeated listening; in order to improve the accuracy of measurement the recordings were expanded to four times their proper duration using the 'stretch' facility of the package. In each case the onsets of the dotted note, the semiquaver and the following note were recorded. Where one of the notes is approached with a portamento, the time of arrival at the target pitch was recorded as the onset; in cases where more than one instrument has the dotted figure and ensemble is not perfect, the time of the onset of the uppermost voice was recorded. The measurement made is expressed as the proportion of the duration of the semiquaver to that of the whole crotchet (in the case of the dotted rhythms) or minim (in the case of the double-dotted rhythms). A strictly executed dotted rhythm would therefore give a value of 0.25, and a strictly executed double-dotted rhythm would give 0.125.

Initially we will consider the dotted rhythms separately from the double-dotted rhythms. Fig. 5.12 shows the findings for dotted rhythms. The performances are illustrated in chronological order, from left to right on the chart. For each performance, the range of values measured for the sixteen instances of dotted rhythms is shown as a bar, with the mean value shown as a point along the bar. The horizontal grid lines are given at intervals of .025, which includes the 'target' value of 0.25 which would result from a performance exactly as notated. 'Over-dotting' would therefore appear below the 0.25 line, and 'under-dotting' above.

This chart shows no clear evidence for more frequent over-dotting in the early part of the period; if anything, it suggests that over-dotting was more common after 1960 than before. No post-1961 average proportions are significantly above 0.25, and quite a few are significantly below; before 1961, more average values are above 0.25 (i.e. under-dotted) than below, but the variation in average values is greater than in the later period. The ranges themselves tend to be slightly wider before 1950 than after, and the performances in the middle of the period have narrower ranges than any other period; six of the eight performances with a range of less than 0.1 come from the period 1944 – 1973.

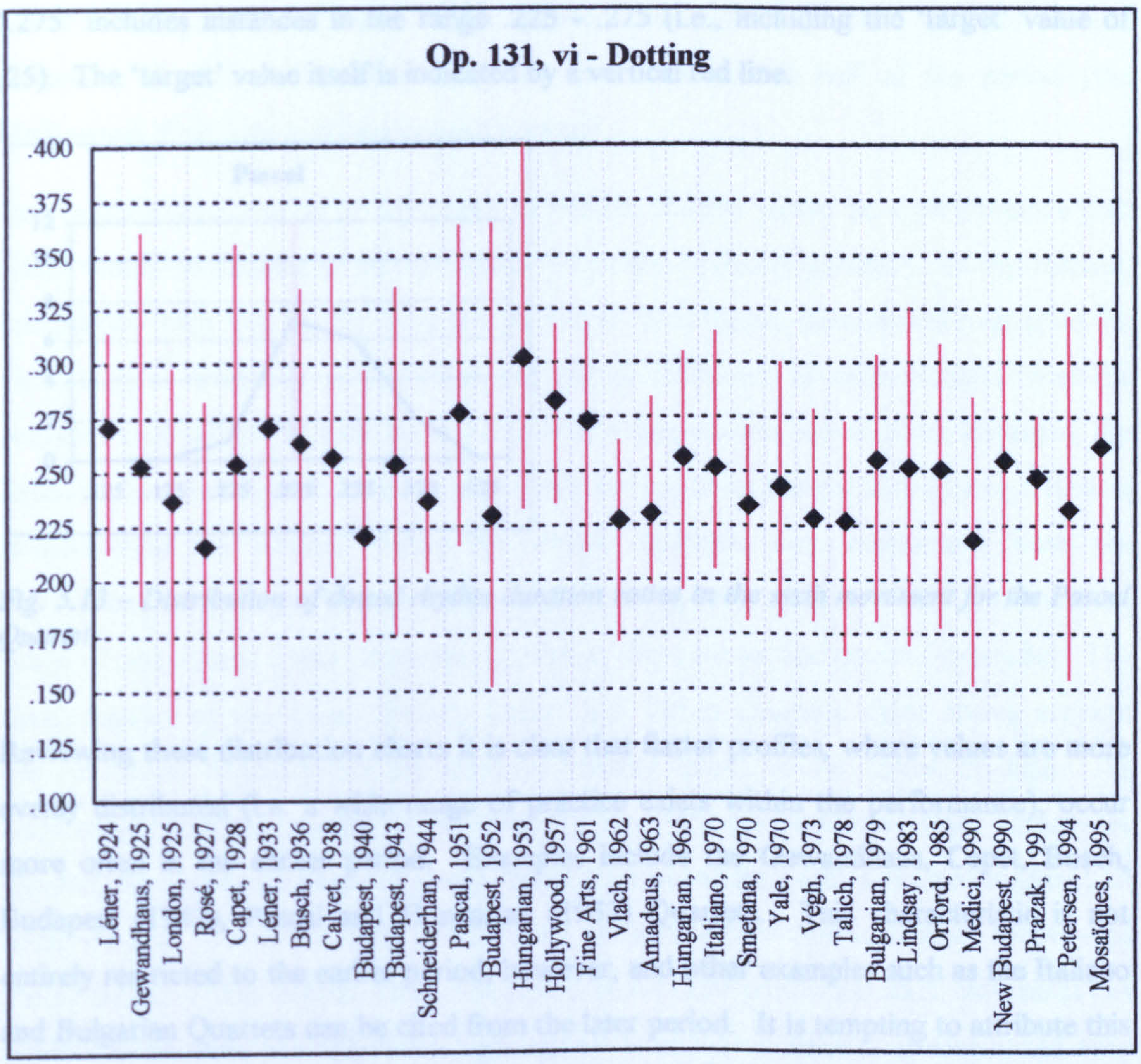


Fig. 5.12 – Semiquaver duration as a proportion of crotchet duration for dotted rhythms in the sixth movement, shown as a range with the mean value identified.

The general picture that emerges, therefore, is one of greater variety of practice in the early period, with both under- and over-dotting common, of a more consistent tendency to slight over-dotting post 1960, and of a period of 'austerity' in the 1950s where there was more consistent practice, at least within each quartet. However, there is no information here about the distribution of values in each performance. In order to examine the evidence in greater detail, a chart was prepared for each performance showing the distribution of the sixteen values obtained. An example, for the Pascal Quartet, is given in Fig. 5.13; a full set is given in Vol. 2, Fig. 5.14. The values are allocated to 'bins' with a range of .05, and the counts of instances in each bin are shown. The bin values shown on the axis are the upper values of the bin, so that the bin labelled

'.275' includes instances in the range .225 - .275 (i.e., including the 'target' value of .25). The 'target' value itself is indicated by a vertical red line.

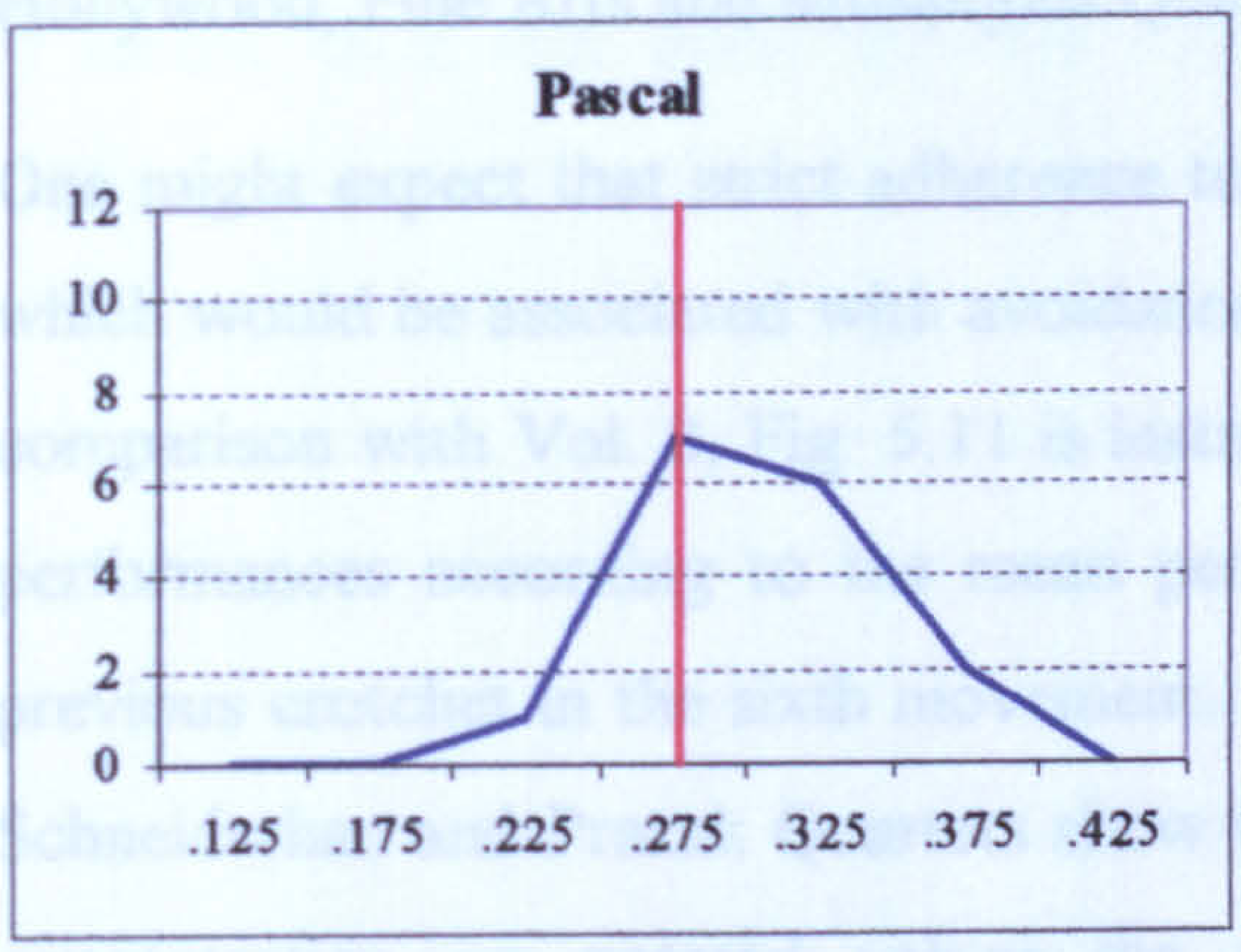


Fig. 5.13 – Distribution of dotted rhythm duration ratios in the sixth movement for the Pascal Quartet.

Reviewing these distribution charts it is clear that flatter profiles, where values are more evenly distributed (i.e. a wide range of practice exists within the performance), occur more often in the earlier period. Examples include the Gewandhaus, Capet, Busch, Budapest (1943), Pascal and Hungarian (1953) Quartets. This characteristic is not entirely restricted to the earlier period, however, and other examples such as the Italiano and Bulgarian Quartets can be cited from the later period. It is tempting to attribute this flatter distribution to a more casual approach to performance, which is perhaps also indicated by the fact that the earlier performances contain more examples of noticeable asynchronies in note onsets in these rhythmic patterns than the later performances. However, there is no real correlation. Onset asynchronies were noted in the performances by the Calvet, Fine Arts, Léner (1924), London and Rosé Quartets, none of which show particularly flat profiles for dotting. Only the 1943 Budapest Quartet performance has both a flat profile and noticeable failures of ensemble, and this can perhaps best be attributed to the vagaries of live performance.

Quartets whose profile shows a strong peak on the 'target' value of 0.25 include the Léner (1924), Calvet, Schneiderhan, Smetana, Yale, Talich and Prazak, and are therefore spread fairly evenly over the time period under consideration. A tendency towards consistent over-dotting as illustrated in the profile charts is more, although not exclusively, associated with the earlier part of the period (London, Rosé, Budapest

(1940), Budapest (1952) and Végh Quartets); by contrast, those quartets with a consistent tendency to under-dotting are from the second half of the period (the Hollywood, Fine Arts and Mosaïques Quartets).

One might expect that strict adherence to notated rhythm would be a performance trait which would be associated with avoidance of tempo flexibility generally. In this respect, comparison with Vol. 2, Fig. 5.11 is instructive. This figure, discussed above, plots the performances according to the mean percentage difference of each crotchet from the previous crotchet in the sixth movement. The expectation is met in some instances: the Schneiderhan and Prazak Quartets show very little general tempo flexibility as well as a concentration on notated values for dotted rhythms, and, conversely, both the Gewandhaus and Capet Quartets show significant general tempo flexibility and a wide range of practices in dotted rhythms. However, there are several counter-examples. The performances by the Léner (1924), Calvet and Talich Quartets show above average general tempo flexibility but are close to notated values in the dotted rhythms. An interesting converse example is provided by the 1953 performance of the Hungarian Quartet, where an avoidance of tempo flexibility is associated with a marked tendency to under-dotting. However, their maintenance of strict tempo was associated above with the influence of their cellist, Vilmos Palotai, and the cello part in the sixth movement has no dotted rhythms and very little opportunity to influence their execution when they occur in other parts: the first violin is involved in seven of the nine instances of under-dotting, and in only two other instances inside the 'target' bin. This paints an irresistible picture of the Hungarian's first violinist, Zoltán Székely, exploiting every opportunity to escape the straitjacket normally imposed by Palotai.

Further evidence of individual preference within the quartet is provided by the Busch Quartet, where three of the four instances involving the second violin are over-dotted (accounting for three out of a total of four instances of over-dotting), and seven of the ten instances of under-dotting involve the first violinist, Adolf Busch. The Busch performance of this movement is included in the accompanying CD [track 21]. However, the strange profile provided by the Capet Quartet, with peaks of both under- and over-dotting cannot be explained by individual preference, as they are fairly evenly spread in all instruments. Perhaps not surprisingly, three of the five instances in the 'target' bin for this performance involve more than one instrument, suggesting perhaps that here there is more constraint to play in strict rhythm in order to avoid ragged ensemble.

It seems, then, that many quartets show no correlation between articulating dotted rhythms as notated and an avoidance of tempo flexibility generally. However, there is some evidence that in some quartets, avoidance of tempo flexibility may be associated with a consistent approach to dotted rhythms. The Hollywood Quartet, for example, has the least general tempo flexibility in this movement of all the performances under study, and shows a strong tendency to under-dotting dotted rhythms. The consistency of the under-dotting suggests a premeditated policy and care in practice in matters of rhythm which may well be naturally associated with a preference for minimising tempo flexibility.

The evidence from dotted rhythms therefore provides no strong support for a marked historical trend in which an earlier habit of over-dotting is replaced by a tendency to observe the notated rhythm exactly. There is certainly more variety in the earlier performances, and there is some indication of avoidance of variability within one performance in the middle of the period, but there is still a wide range of practice, including over-dotting, at the end of the period.

We turn now to the four occurrences of notated double-dotted rhythms in the sixth movement. Fig. 5.14 shows the ranges and mean values as before, except that the 'target' value for rhythmic articulation as notated is 0.125. A similar set of profile charts for each performance has also been prepared, this time with the red vertical line indicating the 'target' value of 0.125, and is included in Volume 2 as Fig. 5.15.

It is immediately apparent that a historical trend is much more in evidence for double-dotted than for dotted rhythms. Nearly all the performances show under-dotting in varying degrees, with gross under-dotting being limited to the pre-war performances. Only the Yale Quartet has all four instances in the 'target' bin, followed by the Medici with three in the 'target' bin, the fourth being the only observed instance of over-dotting. The performance of this movement by the Yale Quartet is included in the accompanying CD [track 22] as an example of close adherence to notated values in both dotted and double-dotted rhythms. A number of quartets have three occurrences in the 'target' bin and one instance of under-dotting (the Budapest (1940), Schneiderhan, Amadeus, Smetana, Bulgarian and Petersen Quartets). Rhythmic exactitude in notated double-dotting is therefore an overwhelmingly post-war phenomenon.

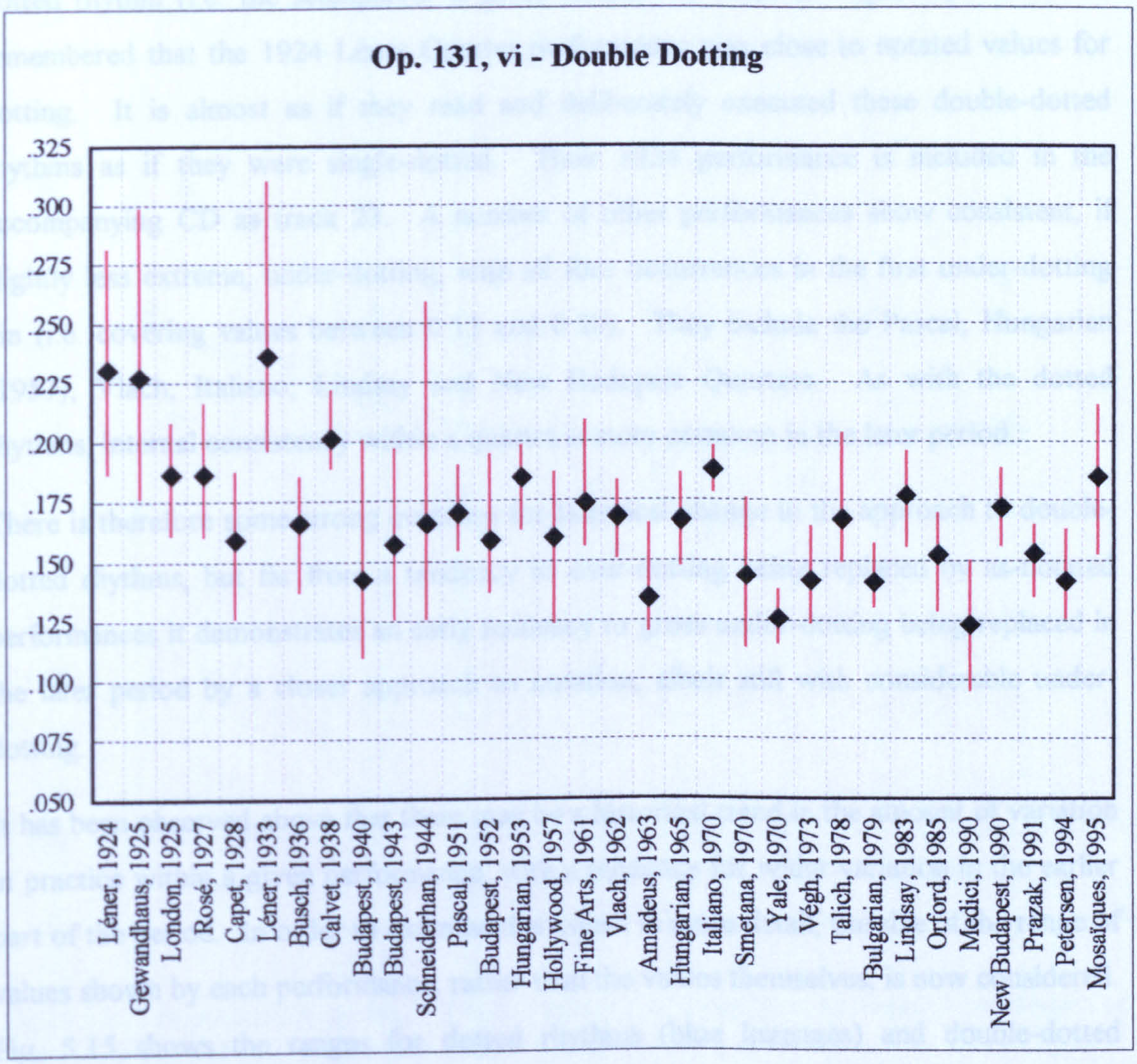


Fig. 5.14 – Semiquaver duration as a proportion of minim duration for double-dotted rhythms in the sixth movement, shown as a range with the mean value identified.

In all the six performances with three occurrences in the 'target' bin and one under-dotted it is the first occurrence in the viola, rather than any of the three subsequent occurrences in the first violin, which is under-dotted. This occurs after a long-held chord (covering four crotchets) and before there is any possibility of establishing a consistent crotchet tempo; there is therefore a perhaps inevitable vagueness about the rhythm at this stage in the movement.

The Gewandhaus and the two Léner Quartet performances demonstrate the most extreme under-dotting, their average values coming close to the 0.25 expected for a dotted rhythm (i.e. the semiquaver is given almost the value of a quaver). It will be remembered that the 1924 Léner Quartet performance was close to notated values for dotting. It is almost as if they read and deliberately executed these double-dotted rhythms as if they were single-dotted. Their 1924 performance is included in the accompanying CD as track 23. A number of other performances show consistent, if slightly less extreme, under-dotting, with all four occurrences in the first under-dotting bin (i.e. covering values between 0.15 and 0.20). They include the Pascal, Hungarian (1953), Vlach, Italiano, Lindsay and New Budapest Quartets. As with the dotted rhythms, internal consistency within a quartet is more common in the later period.

There is therefore some strong evidence for historical change in the approach to double-dotted rhythms, but far from a tendency to over-dotting being replaced by as-notated performances it demonstrates an early tendency to gross under-dotting being replaced in the later period by a closer approach to notation, albeit still with considerable under-dotting.

It has been observed above that there may be a historical trend in the amount of variation in practice within a given performance, with a tendency for wider variation in the earlier part of the period. In order to examine this aspect in more detail, the size of the range of values shown by each performance, rather than the values themselves, is now considered. Fig. 5.15 shows the ranges for dotted rhythms (blue lozenges) and double-dotted rhythms (red squares) against year of performance, and superimposes trend lines for both dotted and double-dotted rhythms. This chart provides clear evidence of a historical trend from high ranges (i.e. large variability of practice within a single performance) to lower ranges (i.e. greater internal consistency), with the lowest ranges falling mostly in the period 1950 – 1970. The appearance given by the chart that dotting ranges are greater and more variable than double-dotting is probably largely illusory. The duration of the period for dotted rhythms is shorter (crotchet rather than minim), and the same absolute time in the dotted rhythm accounts for half the proportion of the total crotchet that it would for the total minim. There are also fewer instances of double-dotting than dotting, thus reducing the opportunity for extremes of value.

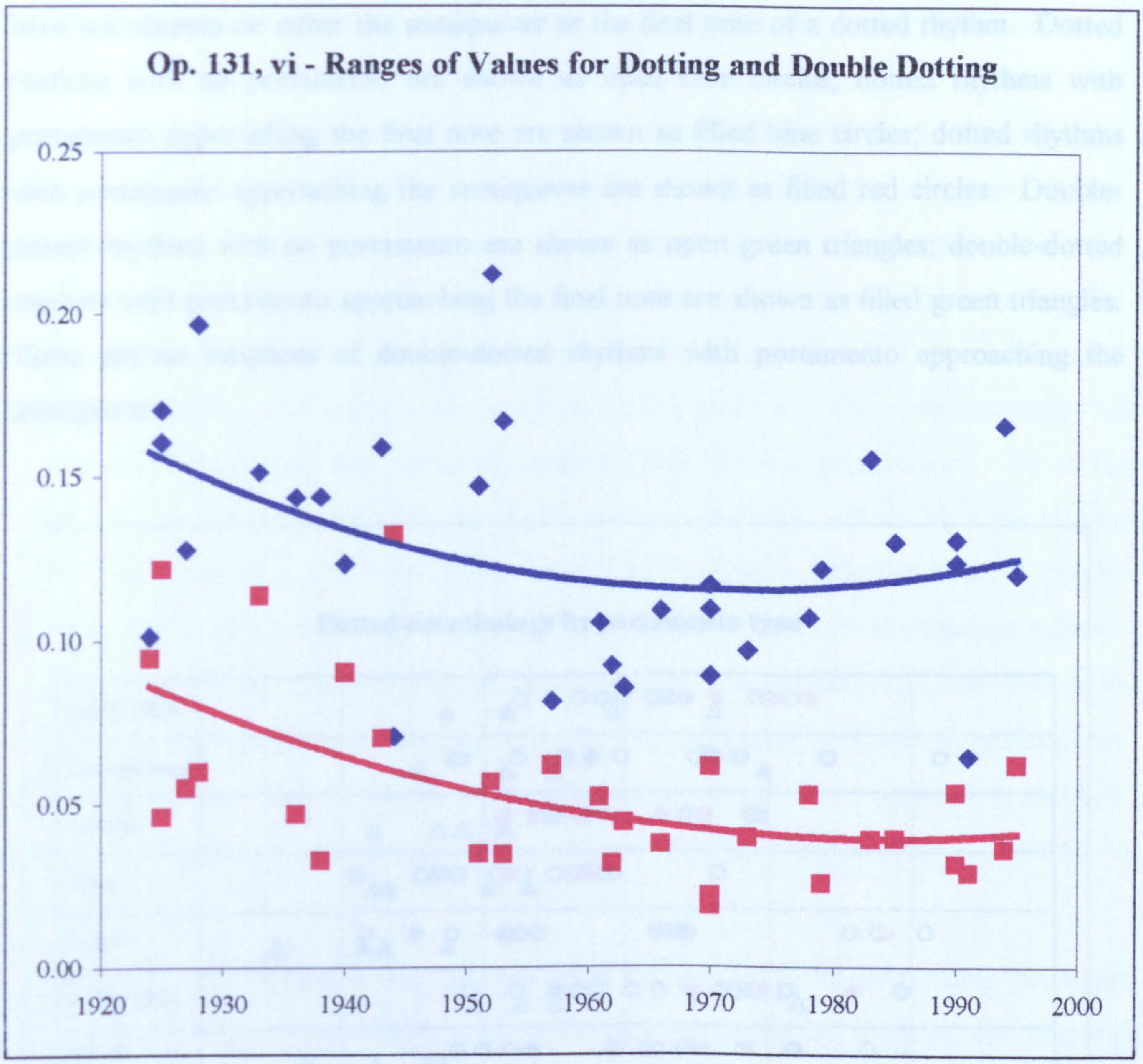


Fig. 5.15 – Performances plotted by year against the range (i.e. maximum – minimum) of dotted (blue) and double-dotted (red) values

Finally, the possibility that the rhythm is being distorted by the use of portamento is examined. A significant number of the performances being studied include many instances of portamento in this movement, and this is discussed in its own right in Chapter 9. However, it is theoretically possible that the introduction of a slide into the dotted phrase may affect its rhythmic articulation: it was stated above that in cases of portamento the note onset was timed from the arrival at the target pitch. One might well imagine therefore that the semiquaver could be taken slightly early in order to allow time for the slide, or that starting a slide in the approach to the semiquaver may limit the amount of control the performer has on the timing of arrival at the note. Fig. 5.16 shows each instance of dotted or double-dotted rhythms in the thirteen performances which have portamento on either the semiquaver or the final note of a dotted rhythm. Dotted rhythms with no portamento are shown as open blue circles; dotted rhythms with portamento approaching the final note are shown as filled blue circles; dotted rhythms with portamento approaching the semiquaver are shown as filled red circles. Double-dotted rhythms with no portamento are shown as open green triangles; double-dotted rhythms with portamento approaching the final note are shown as filled green triangles. There are no instances of double-dotted rhythms with portamento approaching the semiquaver.

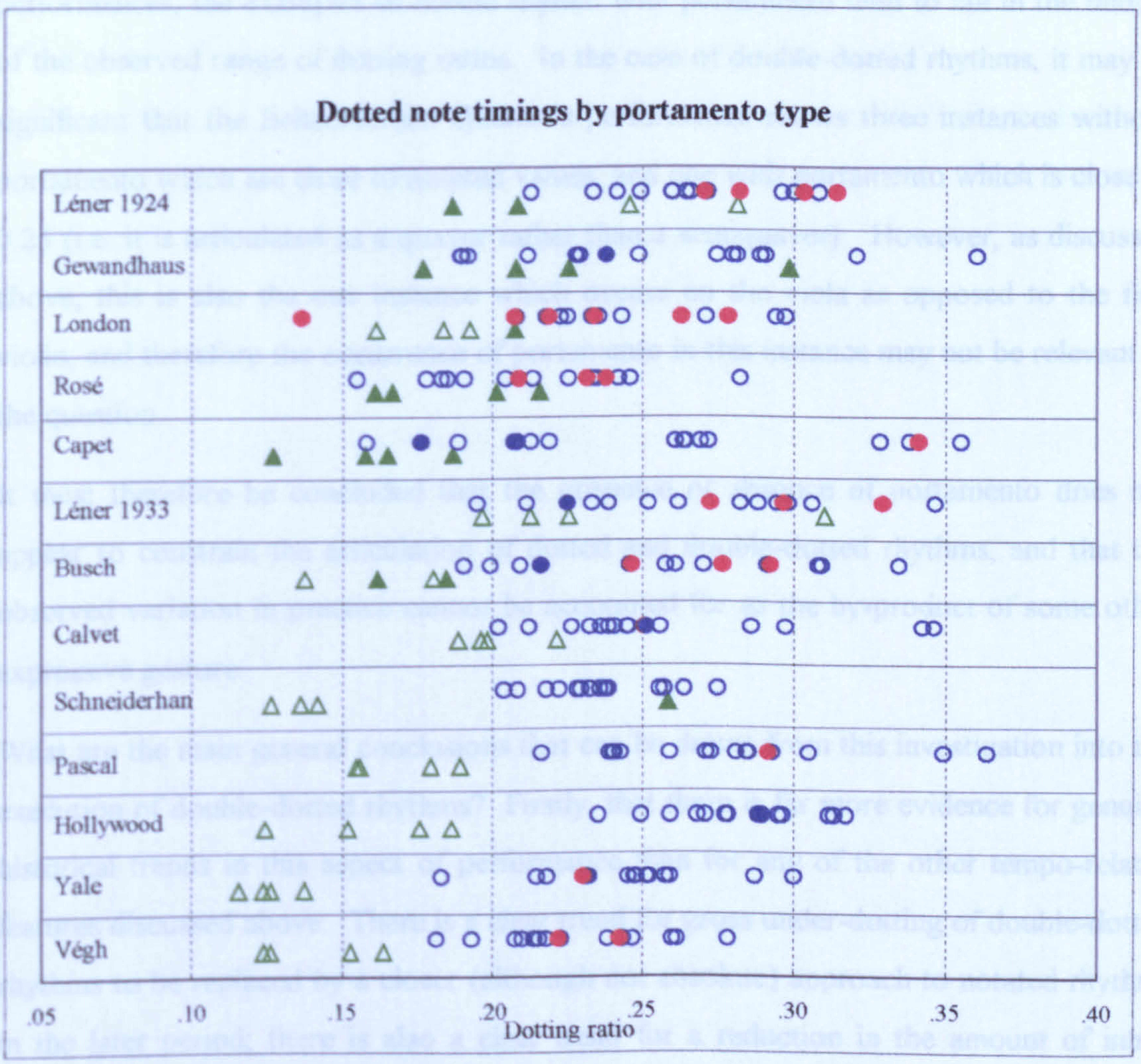


Fig. 5.16 – Dotted and double-dotted rhythm instances as proportion of semiquaver duration to crotchet or minim duration, indicating portamento type (see text for detail).

There is no compelling evidence in this chart to suggest that the articulation of dotted or double-dotted rhythms is in any way influenced by the use of portamento. In virtually all cases, the dotting duration values for instances with portamento are within the range observed for instances without portamento. In the two performances by the Léner Quartet the dotted rhythms which have portamento approaching the final note tend to be in the under-dotted extreme of the range for the performance, and the most under-dotted example in the 1924 performance has portamento, but there are many examples of dotted rhythms without portamento in these two performances which have similar values for under-dotting. At the opposite end of the spectrum, the most over-dotted instance in the London Quartet's performance has portamento, but there are also many examples of portamento throughout the range of dotting ratios in this performance. In other performances, the examples of dotted rhythm with portamento tend to fall in the middle of the observed range of dotting ratios. In the case of double-dotted rhythms, it may be significant that the Schneiderhan Quartet's performance shows three instances without portamento which are close to notated values, and one with portamento which is close to 0.25 (i.e. it is articulated as a quaver rather than a semiquaver). However, as discussed above, this is also the one instance which occurs on the viola as opposed to the first violin, and therefore the occurrence of portamento in this instance may not be relevant to the question.

It must therefore be concluded that the presence or absence of portamento does not appear to constrain the articulation of dotted and double-dotted rhythms, and that the observed variation in practice cannot be accounted for as the by-product of some other expressive gesture.

What are the main general conclusions that can be drawn from this investigation into the execution of double-dotted rhythms? Firstly, that there is far more evidence for genuine historical trends in this aspect of performance than for any of the other tempo-related features discussed above. There is a clear trend for gross under-dotting of double-dotted rhythms to be replaced by a closer (although not absolute) approach to notated rhythms in the later period; there is also a clear trend for a reduction in the amount of intra-performance variation in practice, with an indication that this insistence on conformity peaked in the two decades after the Second World War, and that there has since been a slight relaxation. There is, however, no evidence for an earlier preponderance of over-dotting, as other surveys would lead us to expect; but the nature of the music, which is slow and resigned, may well account for this, and findings may well be different for music of a more martial nature.

A second conclusion is that there is no geographical component in the observed practice: the variation exists within performances from one country as much as it does in the whole set of performances studied.

Thirdly, it is apparent that a preference for strict rhythmic execution does not necessarily go with an avoidance of tempo flexibility generally; however, there is some evidence that a consistent practice in rhythmic execution (even if it does not accurately reflect the notated note values) may well be associated with a strict attitude towards tempo flexibility generally.

Finally, there is compelling evidence that individual preference or habit plays a large role in determining how such rhythms are articulated, as a number of performances, particularly early in the period, show distinct approaches in different instruments.

Chapter 6: A Summary of Tempo-Related Stylistic Characteristics

Introduction

In this chapter an attempt is made to isolate some stylistic tendencies based on the basic tempi and the measures of tempo variation within movement sections, developed and discussed in previous chapters. Choice of basic tempo, and the amount of tempo flexibility permitted, may be considered the most salient tempo-related characteristics of a performance style, and these are used to develop a 'fingerprint' graphical representation of a specific performance and subsequently as the basis of a statistical exercise to group performances into clusters exhibiting similar tempo-related characteristics. The grouping thus derived is finally discussed in relation to the grouping based on pedagogical heritage developed in Chapter 2.

Fig. 6.1 gives an example of the graphical representation of these basic tempo-related characteristics for a single performance, in this instance that of the Orford Quartet. A separate point is plotted for each of movements 1, 2, 5, 6 and 7, and for variations 1, 2, 3, 4 and 6 of movement 4, with basic tempo on the abscissa and tempo flexibility on the ordinate. The values for basic tempo have been recalibrated on a scale of 0 – 100, where 0 is calibrated to the minimum basic tempo for the movement observed in the whole population of performances, and 100 is calibrated to the maximum. The values for tempo flexibility are the measures of mean bar-to-bar difference developed in Chapter 5, similarly recalibrated on a scale of 0 – 100. This measure, it will be remembered, excludes the bars preceding and following a recognized section boundary, and thus concentrates on the extent of small-scale local variability rather than section demarcation. Movements with a basically fast tempo marking (*allegro molto vivace*, *presto*, *allegro*) are plotted as a red dot, those with a basically slow tempo (*adagio*, with various qualifications) as a green dot, and the remainder (*andante*, with various qualifications) as a blue dot.

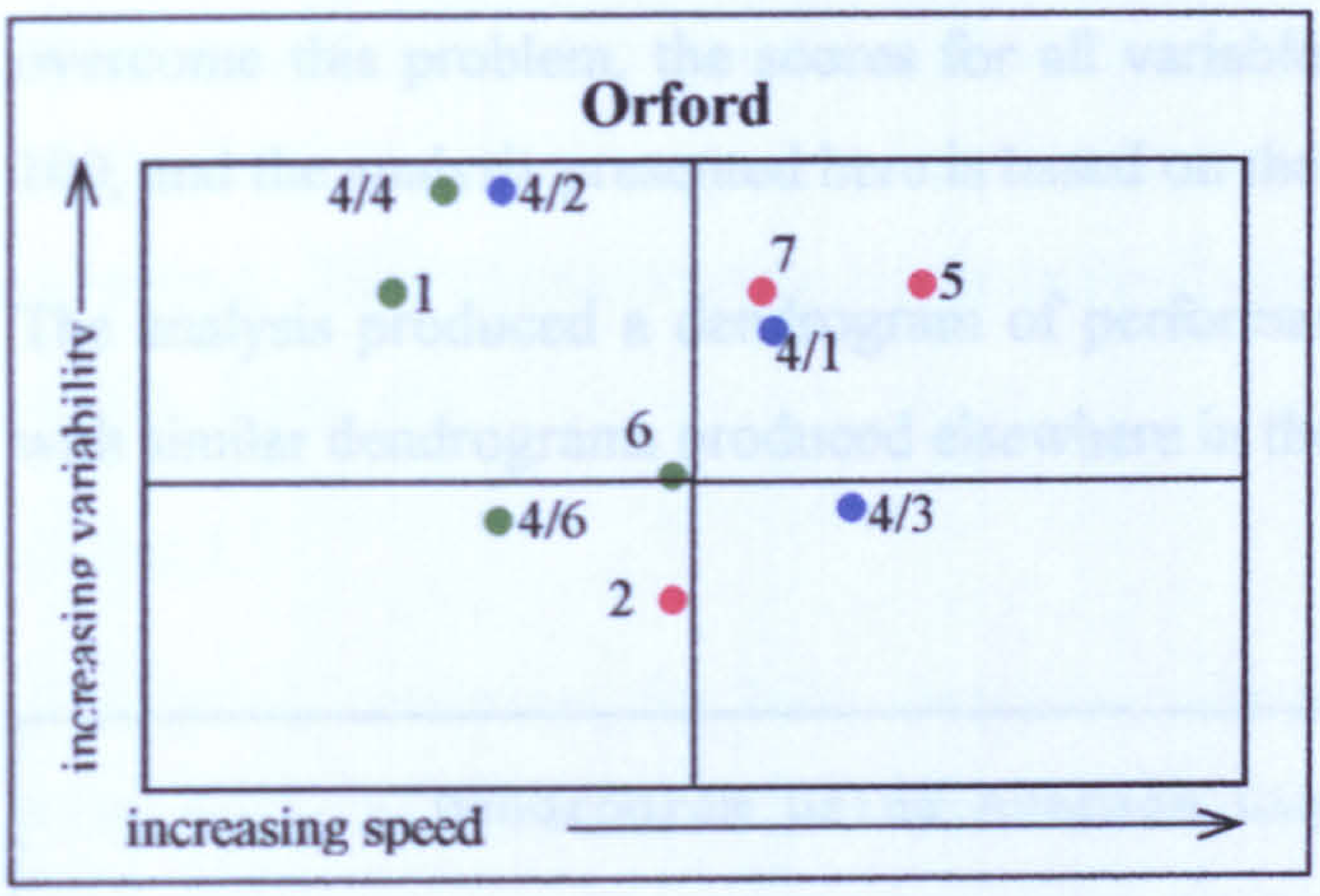


Fig. 6.1 – Modal tempo plotted against average bar-to-bar percentage tempo difference, Orford Quartet

As an example, the plot for the Orford Quartet, shown in Fig. 6.1, illustrates an overall avoidance of extreme tempi, either slow or fast, and a tendency to play slow movements more slowly than average, and fast movements faster than average. A very high degree of tempo flexibility is apparent in a number of movements, although four are around or slightly below average in this regard; the degree of flexibility does not appear to be related to the basic tempo of the movement.

A full set of these plots, for all thirty-two performances under study, is given in Vol.2, Fig. 6.1. They are given in the order suggested by the cluster analysis which is discussed below.

Cluster analysis

A cluster analysis was carried out, using the SPSS package, in which the modal tempo and the mean percentage bar-to-bar tempo difference for each of the ten movements or variations were treated as variables of the thirty-two performances. As with the other cluster analyses in this study, a hierarchical cluster analysis was selected with a clustering method of between-groups linkage and the measure being interval by squared Euclidian distance. An initial attempt used the raw modal tempo values and mean percentage bar-to-bar difference values; the output from this plainly under-represented the tempo flexibility aspect, grouping performances almost solely on their basic tempi. In order to overcome this problem, the scores for all variables were recalibrated on a scale of 0 – 100, and the analysis presented here is based on these recalibrated scores.

The analysis produced a dendrogram of performances which can be directly compared with similar dendrograms produced elsewhere in the study. This is given in Fig. 6.2.

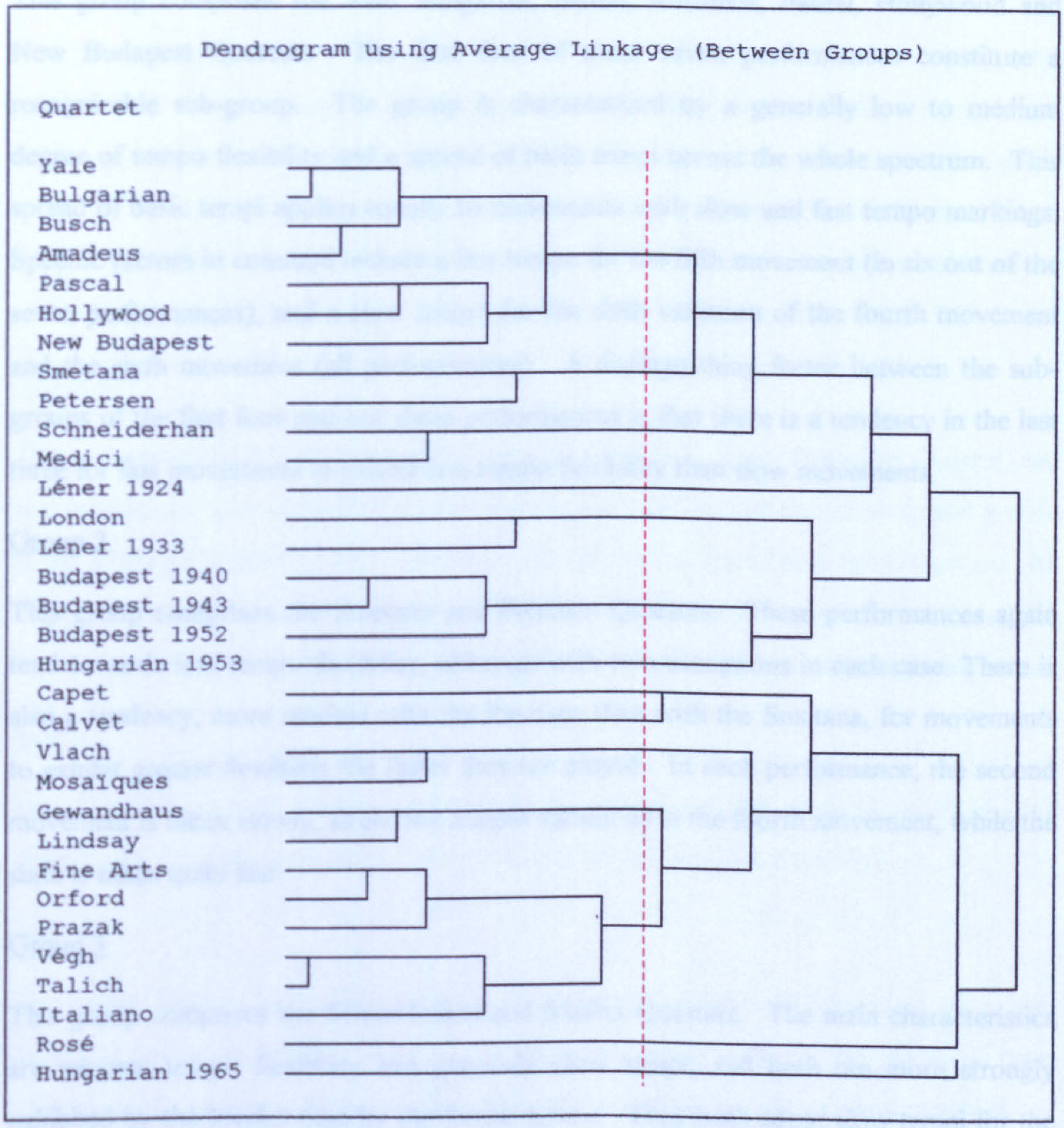


Fig. 6.2 - Dendrogram from the cluster analysis of modal tempo and mean difference from previous bar for movements 1, 2, 4/1, 4/2, 4/3, 4/4, 4/6, 5, 6, 7 of Op.131

By plotting a somewhat arbitrary line on this dendrogram at around the halfway point in the tree structure (shown above as a red dashed line), fourteen separate groupings can be identified. Their characteristics are described below, and can be seen clearly by reference to Vol. 2 Fig. 6.1.

Group 1

This group comprises the Yale, Bulgarian, Busch, Amadeus, Pascal, Hollywood and New Budapest Quartets. The first four of these seven performances constitute a recognizable sub-group. The group is characterized by a generally low to medium degree of tempo flexibility and a spread of basic tempi across the whole spectrum. This spread of basic tempi applies equally to movements with slow and fast tempo markings. Specific factors in common include a fast tempo for the fifth movement (in six out of the seven performances), and a slow tempo for the sixth variation of the fourth movement and the sixth movement (all performances). A distinguishing factor between the sub-groups of the first four and last three performances is that there is a tendency in the last three for fast movements to exhibit less tempo flexibility than slow movements.

Group 2

This group comprises the Smetana and Petersen Quartets. These performances again tend towards low tempo flexibility, although with two exceptions in each case. There is also a tendency, more marked with the Petersen than with the Smetana, for movements to exhibit greater flexibility the faster they are played. In each performance, the second movement is taken slowly, as are the *adagio* variations in the fourth movement, while the sixth is taken quite fast.

Group 3

This group comprises the Schneiderhan and Medici Quartets. The main characteristics are minimal tempo flexibility and generally slow tempi, and both are more strongly exhibited by the Medici than by the Schneiderhan. They both adopt slow tempi for the fast movements, and in each case the fourth (*adagio*) variation of the fourth movement is taken faster than average.

Group 4

This 'group' consists of a single performance, that of the Léner Quartet in 1924. This performance shares a tendency to low to medium tempo flexibility with Group 1, and a concentration on slower than average tempi with Group 3, but is distinguished from both by the facts that all the slow movements fall in the 'slower than average' half of the plot, and that a notably slow tempo is adopted for the fifth movement.

Group 5

This group comprises the performances of the London Quartet and of the Léner Quartet in 1933. It demonstrates a wide range of tempo flexibility and basic tempo, and a tendency to adopt slower than average tempi for fast movements and faster than average tempi for slow movements (in marked contrast to the 1924 performance by the Léner). Tempo flexibility tends to be greater in fast movements than in slow movements, with the notable exception of the seventh movement in the Léner's 1933 performance.

Group 6

This group is entirely composed of all three performances of the Budapest Quartet, and is characterized by a preference for fast tempi, especially in fast movements, and a wide range of tempo flexibility, with flexibility generally increasing in later performances. All three performances exhibit very fast tempi for the first and second variations of the fourth movement, and slightly slower than average tempi for the sixth (*adagio*) variation.

Group 7

This 'group' consists of the performance by the Hungarian Quartet in 1953, and demonstrates a marked preference for fast tempi and little tempo flexibility.

Group 8

The Capet Quartet is the sole member of this group, and is distinguished by a high degree of tempo flexibility in almost all movements, and by a fairly even spread of basic tempo choices, avoiding extremes, regardless of the tempo marking of the movement.

Group 9

Another single performance 'group', this consists of the performance by the Calvet Quartet. It is characterized by very slow tempi for the *adagio* first movement and fourth movement sixth variation, as for the same movement's third variation. The other tempi are more 'middle of the road', and tempo flexibility also ranges from fairly low to fairly high, with a tendency for slow movements to be more flexible than fast.

Group 10

This group comprises the Vlach and Mosaïques Quartets. They share with the Calvet a range of tempo flexibility from low to high and a tendency for slow movements to be more flexible than fast. However they are distinguished from the Calvet by a preference for slow tempi in fast movements and faster tempi in slow movements, a preference which is more strongly marked in the Mosaïques than in the Vlach.

Group 11

This group comprises the Gewandhaus and Lindsay Quartets, and is distinguished from all others by a strong concentration in the top left hand quadrant (representing high flexibility and slower than average tempi). In both cases the slow movements are at the slow end of the tempo spectrum, and the fast movements at the fast end. They also share, in complete contrast to the performances of the Budapest Quartet, a very slow tempo for the first variation of the fourth movement.

Group 12

This larger group comprises the performances of the Fine Arts, Orford, Prazak, Végh, Talich and Italiano Quartets, and splits into recognizable sub-groups made up of the first three and last three of these performances. The shared characteristics of all six performances are a tempo range from slow to average and a wide range of tempo flexibility. The first sub-group (Fine Arts, Orford and Prazak) shows more movements at the high end of the flexibility spectrum than the second. Within the second sub-group, the Végh and Talich Quartets are very closely connected by a number of specific characteristics including a slow, somewhat flexible second movement, faster and somewhat flexible sixth and seventh movements, a slow fourth movement first variation with relatively little flexibility, and a relatively slow first movement with average flexibility.

Group 13

This single performance 'group' consists of the Rosé Quartet. This performance has movements in all segments of the plot exhibiting extremes of basic tempo and tempo flexibility. All three of the fast movements appear in the slower than average and more flexible than average quadrant. Of the *adagio* movements, the sixth movement and the fourth movement sixth variation exhibit the fastest tempi of all the performances under study, while the first movement is near the slow extreme. In short, this performance exhibits more variability than any other.

Group 14

The final group, again including only one performance, consists of the 1965 performance by the Hungarian Quartet. Here the tendency is towards high levels of flexibility, with half the movements very high and the other half nearer average, and for tempi to vary between middling-slow to fast. *Adagio* movements tend to occupy the slowest end of this spectrum and *andante* movements the fast end. The extent of tempo flexibility does not relate to the tempo character of the movement. In all these respects, the performance is in marked contrast to the 1953 performance of the Hungarian Quartet.

Discussion

The grouping of performances described above and based on tempo characteristics could not be predicted by expectations based on historical trends or regional schools. The only respect in which these expectations are met is in the significant similarities between the three performances of the Budapest Quartet.

Even the other quartets represented by more than one performance show striking differences. The two performances of the Hungarian Quartet are connected only at the most remote level in the dendrogram, and this fundamental change in approach must probably be explained by the absence in the second performance of Vilmos Palotai, notorious for his insistence on Beethoven's metronome markings and for the firm rhythmical foundation he gave to the earlier ensemble. The two performances by the Léner Quartet are also connected at a very distant level in the dendrogram, and in this case there is no change of personnel to provide an explanation. The exigencies of acoustic recording or the limitations imposed by 78 side lengths cannot provide an explanation either, as the earlier recording features sides which often exceed those of the later recording in length. In the case of the Léner Quartet there has simply been a change of approach in which the tempo at which slow movements are taken has increased considerably.

The groupings provide very little evidence for the existence of historical trends, or gradual change in approach over time. The largest group (Group 1, comprising seven performances) contains examples from all periods, from the Busch (1936) to the New Budapest (1990). Similarly, one of the earliest performances, that of the Gewandhaus Quartet in 1925, is most closely related to one of the more recent, that of the Lindsay Quartet in 1983. However, it is noticeable that four of the six 'single performance' groups consist of performances from before the Second World War (the Léner Quartet in 1924, and the Capet, Calvet and Rosé Quartets), the other two being the two performances of the Hungarian Quartet. Similarly, the two largest groups (Groups 1 and 12), comprising thirteen performances between them, include only one pre-Second World War performance (the Busch Quartet). This perhaps suggests that while there is no real evidence for a specific change in tempo preferences or approach to flexibility over time, there may have been a change from a greater diversity in performance style before the Second World War to a greater uniformity afterwards. While there is still a wide range of diversity in post-Second World War performances, it is perhaps easier to group them into a set of consistent styles; the earlier performances are more likely to stand on their own with little similarity to any other.

If the evidence for historical trends is at best suggestive, there is even less evidence for geographical groupings. All the performances by Hungarian quartets are in different groups, and the four performances by Czech ensembles are distributed across three groups (while the Prazak and Talich Quartets appear in the same group they are linked in the dendrogram only just below the arbitrary line which was drawn to define the groups). Similarly, all three of the French performances fall into different groups.

When we compare the tempo dendrogram with that derived from the quartets' pedagogical heritage (see Fig. 2.4), there is virtually no point of contact. The two most closely related quartets in the pedagogical dendrogram, the Smetana and Vlach, are separated at the most remote level in the tempo dendrogram. Conversely, one of the two most closely related pairs of quartets in the tempo dendrogram, the Végh and Talich, are separated at the most remote level in the pedagogical dendrogram (the other closely related pair in the tempo dendrogram, the Yale and Bulgarian, are both excluded from the pedagogical dendrogram due to lack of evidence).

This pattern is repeated if we look at other closely related pairs of quartets in the pedagogical dendrogram such as the Amadeus and Petersen, the Calvet and Capet, and the Smetana and Talich: the members of each of these pairs are widely dispersed in the tempo dendrogram. Other closely related pairs in the tempo dendrogram, such as the Busch and Amadeus, the Pascal and Hollywood, the Schneiderhan and Medici, the Vlach and Mosaïques, and the Gewandhaus and Lindsay, are all related only distantly in the pedagogical dendrogram.

The conclusion must be that interpretation at this level, where the characterization of the music by a choice of basic tempo, and the moulding of the shape of a movement by low-level tempo variation, is not subject to influence by training or coaching. An interpretation at this level is not 'handed down' from one quartet to another or from individual teachers. Peter Cropper of the Lindsay Quartet has described the rigorous way in which the Hungarian Quartet's interpretations were handed down to their pupils as carbon copies (personal communication), but this process has not resulted in any significant similarities between the performance of the mature Lindsay Quartet in 1983 and the 1965 performance of their Hungarian mentors. Rather, interpretation at this level is a function of corporate decision making, taking into account the individual input of each of the ensemble's members. As such, it evolves through time, often giving rise to significant changes, as in the case of the Léner Quartet. A change of personnel, especially where the departing member has a strongly held viewpoint, can lead to a radical change in interpretation, as in the Hungarian Quartet.

In subsequent parts of this study, we shall see to what extent these conclusions apply to aspects of performance style such as the use of portamento and vibrato.

Chapter 7: Portamento: Trends and characteristics

Background

If evidence for any historical trend relating to tempo and tempo flexibility is at best tenuous, this certainly does not apply in the case of portamento. Indeed, the rapid demise of portamento after the 1920s is one of the most frequently commented on and best documented changes in string performance style in the twentieth century. However, as we shall see in this chapter, it would be a gross over-simplification to portray the history of portamento in the twentieth century as a rapid and almost total abandonment of an ingrained 'portamento habit' which took place in the late 1920s or early 1930s. Not only does there appear to be something of a revival of the incidence of portamento in the latter part of the century, but at all times there has been wide variation in the type, style and placement of portamento in the musical context. This chapter and the following two explore some of this variety and attempt to analyse any general trends or stylistic approaches, using the evidence of the thirty-two recordings of Beethoven's Op. 131 quartet.

This first chapter concentrates on a statistical analysis of the occurrence and typology of portamento as evidenced in the recordings of the first movement of Op. 131, deriving evidence for historical trends and attempting to identify factors which contribute to a quartet's 'portamento style'. Chapter 8 considers the placement of instances of portamento in the first movement in their musical context, and draws some distinctions between stylistic approaches based on these considerations. Chapter 9 attempts a similar analysis of portamento in the sixth movement, where the musical argument is ostensibly simpler, and phrase patterns are repeated a number of times in different instruments.

There is a large body of contemporary comment on the practice of portamento from the early nineteenth century onwards, but this is ultimately elusive and inconclusive. In a useful survey of this literature, Philip repeatedly draws attention to the difficulty of understanding what is really meant by admonitions by these commentators to employ portamento circumspectly or to avoid excess, which give no reliable information on the absolute amount of portamento which they would have considered acceptable (Philip, 1992: 143-155). One of the most precise and perceptive of these commentators was Carl Flesch, who wrote:

> *It is indubitable that technically well executed portamenti at the right place, sparingly applied, enrich the palate of interpretative art with new, wondrously exotic colors, but that their abuse eventually becomes unendurable. A portamento is the more convincing the less frequently it is employed. Two portamenti in immediate sequence always are unbeautiful. So far as possible the portamento should coincide with the culminating point of a musical phrase. When too frequently used, and used in the wrong place, it produces an effect of artificial pathos, insincerity and weariness. Indeed, it may even, when successively applied, call forth in the auditor an insupportable physical disgust.* (Flesch, 1924: 35)

It is impossible to deduce from this passage what level of frequency is implied by 'sparingly' and what by 'too frequently': these are terms which must be considered in the context of contemporary taste and practice, and could apply equally in our own time as in the first decades of the twentieth century. They cannot on their own give any insight into what contemporary practice actually was.

The literature is full of such injunctions to avoid excess in the application of portamento, starting with Spohr in 1832 (Spohr, 1832: 108). The first stirrings of a counter reaction appear in the 1960s, suggesting (as is borne out by the phonographic evidence) that by this time portamento had been largely expunged from normal performance practice. For example, Galamian warns against complete avoidance of portamento in his highly influential treatise 'Principles of Violin Playing and Teaching':

> *The new devices for the elimination of slides have led many violinists to the extreme of trying to avoid all slides. To do so deprives violin playing of a great deal of color and makes it dry and cold. The right idea is to do away with slides that are musically undesirable, but, by all means, not to cast out the good with the bad by eliminating also those glissando slides that are musically justified.* (Galamian, 1962: 35)

In a similar appeal for warmth and colour, Joseph Szigeti considers the trio section of the Scherzo of Haydn's Quartet in E flat, Op. 33 No.2, where Haydn clearly indicates a desire for a portamento effect by his instruction to play on the same string. He adds:

> *A far cry indeed from the glissando-shy manner of our nouvelle vague quartet players who for all I know would start this trio in the fourth position and prefer to ignore Haydn's marking of Sull'istessa corda. A recent commentator used the words: 'sterile perfectionism' when writing about some performances we hear these days.* (Szigeti, 1969: 155)

We should not, of course, take these commentaries as being indicative of contemporary practice; they are probably better seen as reactions against this practice (excess in the earlier period, and undue restraint in the later). We know from recordings that portamento was far more prevalent before World War Two than after it, but we cannot tell whether Spohr's early nineteenth century condemnation of excessive portamento reflected a practice which was comparable to that preserved in early recordings, or one that was significantly more or less portamento-prone.

The conditions of quartet, and other ensemble, performance introduce other considerations into the decision on whether or not to employ portamento, such as whether it is appropriate for two instruments to slide simultaneously, and whether a portamento in one part should be imitated or avoided in another part when the second part subsequently has the same phrase. Alfred Pochon, second violinist of the Flonzaley Quartet, devotes only two pages of his substantial string quartet playing primer to questions of portamento, but offers this advice:

> *Portamenti brought in at the wrong place can utterly spoil a phrase. General rule: a portamento (glissando) will be all right in an ascending movement, but is preferably avoided in descending. In slow movements, more especially, two players should avoid employing the same démanché at the same moment, for that brings about an abuse of the glissando.* (Pochon, 1924: 46)

Herter Norton, writing in 1963 is even more restrictive:

> *One is tempted to say: in quartet playing never slide, because of the shocking impurities that technical act may produce in this purest of music. But then one thinks of Hungarian and other folk music in which certain slides are typical and significant. Therefore it may be better to say that the slide should only be used when it is characteristic – and even then with reservations.* (Norton, 1963: 83)

And again:

> *The fact should be envisaged that any principal phrase launched, say, by the first violin with great expression, is likely to recur at one time or another and in one form or another in every voice, and that a distinct slide, suitable for a solo voice, can become appalling when repeated over and over again.* (: 82)

The Guarneri Quartet, in conversation with David Blum, regarded portamento as a valid expressive device, and described their own practice as varying from performance to performance, depending on spontaneous changes of fingering, and reacting to each other's expression and articulation. Discussing a passage from the cavatina of Beethoven's Op. 130, the second violinist, John Dalley, remarked: 'Arnold's [Arnold Steinhardt, first violin] decision as to whether or not to make a glissando from the B flat to the E flat in bar 25 depends on what I do in bar 23 [where the same phrase occurs in the second violin part]. If I make no glissando at all, he might make a little, or vice versa.' (Blum, 1986: 48)

The injunction to apply portamento only when it is characteristic introduces the consideration that performance style should be adapted to the style of the composition, and therefore the possibility that the portamento displayed in performances of Beethoven may not be characteristic of the same quartet's style in more romantic music. This is borne out by the remarks of Eleanor Aller, the cellist of the Hollywood Quartet, in an interview with Tully Potter (Aller was the wife of the first violinist, Felix Slatkin: hence Potter's reference to Mrs. Slatkin):

> *One of Slatkin's favourite tricks was to give a flick of upward portamento to a crucial note in a phrase; and of course they made highly expressive use of the downward portamento. 'But you won't hear it in Beethoven,' said Mrs Slatkin firmly. 'We discussed that sort of thing before we recorded it - nothing was done without thought, I can tell you. It was dependent on who the composer was, and the musical content; and of course most of the music we recorded was from the Romantic period.'* (Potter, 1989: 934)

Incidentally, the evidence of the Hollywood Quartet's recording of Op. 131 contradicts this assertion of the avoidance of portamento in Beethoven, as we shall see.

A Typology of Portamento

Nearly all writers on string technique agree on a classification of types of portamento, even if they sometimes employ differing terminology.

The most obvious form of portamento is the slide, in which the note of departure and the note of arrival are stopped by the same finger, which simply slides along the string between them. It is this type which is most frequently compared to vocal portamento (e.g. Yampolsky, 1936: 121).

A second type is labelled the 'B-portamento' (i.e. beginning note) by Flesch, and is characterized by a slide on the finger which stops the note of departure to a position where a different finger can stop the note of destination (Flesch, 1924: 30). This type is also known as the 'classical' portamento, and is often commended for the possibility it allows of hiding the intermediate note in the slide, and the 'clear, well-defined, and rather objective sound' that it produces (Yampolsky, 1936: 121). This type is associated by Galamian and others with the French school (Galamian, 1962: 27). However, Flesch cautions against the excessive use of this type of portamento: 'however useful and desirable B-*portamenti* may be in rapid passages, in *cantilena* they appear inexpressive and amateurish and should be avoided as much as possible, especially in spanning larger intervals, such as octaves' (Flesch, 1966: 362).

A third type of portamento is labelled the 'L-portamento' (i.e. last note) by Flesch, and involves the stopping of the string by the finger that will play the destination note in the position already established for the starting note, and sliding on this finger to the destination note. This type is also known as the 'romantic' portamento, and according to Yampolsky 'produces a more sensual, soft and rather subjective sound' (Yampolsky, 1936: 121). It is associated by Galamian with the Russian school (Galamian, 1962: 27). This type of portamento is almost universally shunned by nineteenth century sources, but seems to have become more acceptable during the early part of the twentieth century, as suggested by Flesch:

> *If, sixty years ago, a daring student of a musical academy had formed the habit of using L-portamenti instead of B-portamenti, he certainly would have been expelled for perversion of musical taste. On the other hand today a violinist who rejected L-portamenti on principle would be ridiculed as a fossil surviving from a period long past.* (Flesch, 1966: 329)

A final type of portamento combines the B- and L- portamenti and is therefore frequently known as a 'combination' portamento. In this type, the finger stopping the starting note commences the slide, the finger stopping the destination note takes over during the slide, and then completes the slide to the destination note.

In addition to its type, as defined above, a portamento may apply to an ascending or a descending interval, and it may be started by either the higher finger or the lower. This gives rise to a theoretical typology of portamento types illustrated diagrammatically in Fig. 7.1. In this figure the combinations that are logically impossible are greyed out. In practice, the higher / lower finger distinction is of little importance: as can be readily seen from the diagram, ascending portamenti starting with the higher finger and descending portamenti starting with the lower finger would both produce intermediate notes which do not lie between the starting and destination notes of the interval if they were executed exactly as notated. In fact, they would normally only occur when the shift also involved string crossing, and normally the player would lift the starting finger out of the way as the finishing finger approached the destination note on the second string; the result would therefore be practically indistinguishable from an 'L-portamento'. Indeed, no definite examples of these portamento types were encountered in the analysis of the recordings which follows.

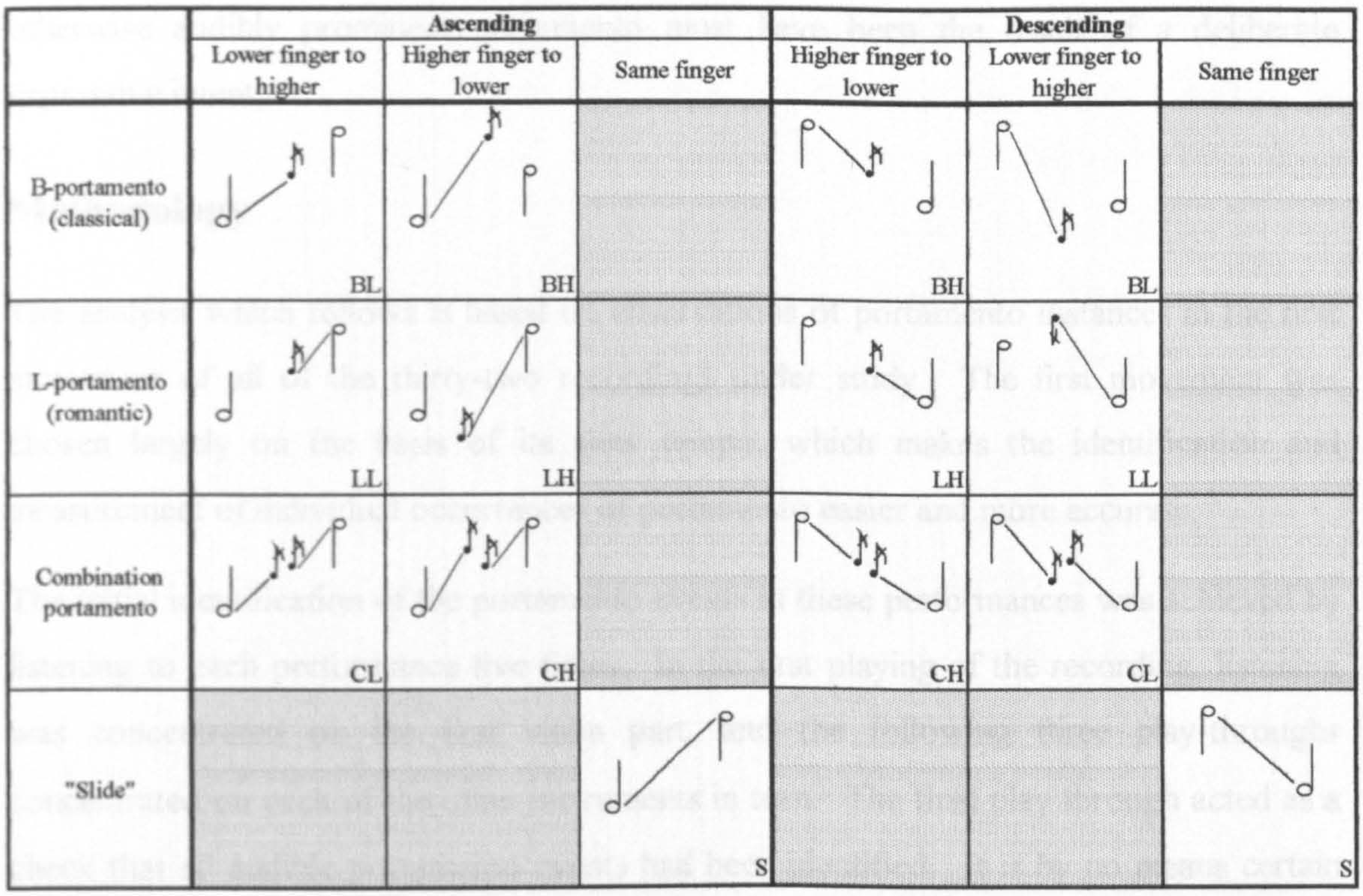


Fig. 7.1 – Theoretical typology of portamento

A further important distinction is that drawn by Flesch between sliding which is an unavoidable by-product of a shift between positions and sliding which is introduced as a deliberate expressive device:

> *The first type of gliding [intentional], according to individual taste and feeling, may be carried out more slowly or more rapidly; the more unobtrusively, however, the second type of gliding [compulsory] occurs, the better. Hence, a fundamental difference exists between technical and emotional gliding, a difference which, unfortunately, is all too infrequently taken into account.* (Flesch, 1924: 28)

The techniques used to make technical gliding more unobtrusive will include rapidity of execution and lightening of bow pressure during the slide. In the analysis which follows, a fairly arbitrary distinction is made on the basis of portamento duration. However, it is likely that during the early part of the century, when portamento of all kinds was more common and acceptable, there may have been less concern to make the 'technical' portamento less obtrusive, and audible slides as a by-product of position shifts may have been more acceptable. It is therefore perhaps dangerous to assert that a long or otherwise audibly prominent portamento must have been the result of a deliberate expressive intent.

Methodology

The analysis which follows is based on observations of portamento instances in the first movement of all of the thirty-two recordings under study. The first movement was chosen largely on the basis of its slow tempo, which makes the identification and measurement of individual occurrences of portamento easier and more accurate.

The initial identification of the portamento events in these performances was achieved by listening to each performance five times. In the first playing of the recording, listening was concentrated on the first violin part, and the following three play-throughs concentrated on each of the other instruments in turn. The final play through acted as a check that all audible portamento events had been identified. It is by no means certain that all portamento events were identified in this way, and there are some instances where the portamento was only recognized during slow playback while measuring other previously identified portamenti. This particularly applies to portamento in the two inner voices, especially when either the texture is relatively dense or the recording quality does not permit the easy differentiation of the individual parts.

The portamento events so identified were then measured using the Sound Designer II package, by repeatedly playing back at slow speed and placing the start and end of the slide on the waveform display. The duration of the slide was thus established in milliseconds, and this measurement was found to be accurate to within ten milliseconds in most cases on repeated tests.

An attempt was also made during this slow playback to identify the type of the portamento. In some cases the break in the pitch was obvious, making identification of the portamento as B- or L- indisputable; in other cases, and again especially in older recordings, it was not possible to determine whether the pitch break or intermediate note was definitely absent or whether it just could not be distinguished on the recording. Many portamenti have therefore been left unclassified and as an indeterminate type. Only unambiguous cases were classified as belonging to one specific portamento type.

As the measurement involved playing back at reduced tempo, and therefore reduced pitch, it follows that the higher the pitch of the event the more accurate the measurements and the classification. For accuracy of measurement, obviously the slower the speed of playback the better; however, the level of tempo reduction applied to high pitch events would render the low pitch events virtually inaudible, and therefore less than optimal levels of tempo reduction had to be applied to these low pitch events.

The raw data thus collected and subjected to analysis are therefore less than perfect, but in the event were sufficiently good to allow many statistically significant deductions to be made. The recorded data included the following information on each identified portamento event:

- its location (bar/beat)
- the instrumental part in which it occurred
- the interval traversed (in semitones)
- its duration (in milliseconds)
- its type

These raw data are summarised in the table in Fig. 7.2, which shows for each performance the count of portamento instances, their average duration (in milliseconds), and the average interval (in semitones) which they traverse. These figures are broken down by type of portamento (S = slide, B = B-portamento, L = L-portamento, C = combination portamento, ? = indeterminate type), and by whether the portamento is ascending or descending; totals are given for ascending and descending portamenti, and for all portamenti. The absence of columns for ascending combination portamenti and for descending L-portamenti is due to their absence from the performances studied.

		Ascending...					*Descending...*					*All*
Quartet	*Type*	*?*	*S*	*B*	*L*	*Total*	*?*	*S*	*B*	*C*	*Total*	*Total*
Amadeus	Count	0	4	1	0	5	0	7	2	0	9	14
	Avg duration		96.5	157.0		108.6		88.6	136.0		99.1	102.5
	Avg interval		4.5	4.0		4.4		1.9	8.5		3.3	3.7
Budapest	Count	0	0	1	0	1	0	4	4	0	8	9
	Avg duration			154.0		154.0		59.0	158.0		108.5	113.6
	Avg interval			6.0		6.0		1.0	6.5		3.8	4.0
Budapest 1941	Count	1	4	4	0	9	2	5	5	0	12	21
	Avg duration	98.0	111.8	99.0		104.6	96.5	88.0	171.2		124.1	115.7
	Avg interval	4.0	1.8	6.5		4.1	7.0	1.0	7.2		4.6	4.4
Budapest 1943	Count	1	2	3	0	6	0	5	7	0	12	18
	Avg duration	96.0	30.5	123.3		87.8		70.6	145.3		114.2	105.4
	Avg interval	4.0	1.0	4.7		3.3		1.0	9.0		5.7	4.9
Bulgarian	Count	0	3	7	0	10	0	2	0	0	2	12
	Avg duration		214.7	179.6		190.1		78.5			78.5	171.5
	Avg interval		4.0	3.9		3.9		1.0			1.0	3.4
Busch	Count	20	5	4	0	29	27	7	5	1	40	69
	Avg duration	88.5	121.2	156.5		103.5	88.3	78.3	147.8	230.0	97.5	100.0
	Avg interval	3.7	1.8	9.0		4.1	4.0	1.0	5.4	17.0	4.0	4.0
Calvet	Count	0	6	2	0	8	2	22	11	0	35	43
	Avg duration		95.5	112.5		99.8	139.5	85.8	178.5		118.0	114.6
	Avg interval		1.2	12.0		3.9	3.0	1.1	7.6		3.3	3.4
Capet	Count	25	1	1	1	28	5	0	1	0	6	34
	Avg duration	158.4	209.0	113.0	262.0	162.3	153.0		325.0		181.7	165.7
	Avg interval	3.4	4.0	6.0	3.0	3.5	4.2		7.0		4.7	3.7
Fine Arts	Count	9	4	3	0	16	6	2	1	0	9	25
	Avg duration	39.2	79.8	130.0		66.4	40.2	55.0	66.0		46.3	59.2
	Avg interval	3.1	2.0	6.3		3.4	3.8	1.0	7.0		3.6	3.5
Gewandhaus	Count	4	17	19	0	40	5	11	9	0	25	65
	Avg duration	126.0	124.9	155.2		139.4	155.0	81.2	141.2		117.6	131.0
	Avg interval	4.0	3.1	6.1		4.6	7.0	2.6	7.4		5.2	4.9
Hollywood	Count	1	10	0	1	12	0	14	0	0	14	26
	Avg duration	82.0	93.2		177.0	99.3		75.4			75.4	86.4
	Avg interval	6.0	1.5		6.0	2.3		1.0			1.0	1.6
Hungarian 1953	Count	0	1	0	0	1	0	2	2	0	4	5
	Avg duration		66.0			66.0		62.5	113.0		87.8	83.4
	Avg interval		1.0			1.0		1.5	7.0		4.3	3.6
Hungarian 1965	Count	0	0	0	0	0	0	8	1	0	9	9
	Avg duration							51.9	136.0		61.2	61.2
	Avg interval							1.0	17.0		2.8	2.8
Italiano	Count	0	0	4	0	4	0	0	1	0	1	5
	Avg duration			61.0		61.0			61.0		61.0	61.0
	Avg interval			5.3		5.3			7.0		7.0	5.6
Léner 1924	Count	2	10	16	0	28	2	16	4	0	22	50
	Avg duration	80.0	109.6	153.4		132.5	62.5	82.1	113.3		86.0	112.1
	Avg interval	4.5	3.6	7.0		5.6	3.5	1.9	9.5		3.5	4.7
Léner 1933	Count	14	2	9	1	26	7	8	2	0	17	43
	Avg duration	94.1	98.5	105.6	146.0	100.4	74.1	87.8	107.5		84.5	94.1
	Avg interval	4.7	4.0	6.0	2.0	5.0	5.9	1.1	6.0		3.6	4.5

		Ascending...					*Descending...*					*All*
Quartet	*Type*	*?*	*S*	*B*	*L*	*Total*	*?*	*S*	*B*	*C*	*Total*	*Total*
Lindsay	Count	10	1	6	0	17	6	4	1	0	11	28
	Avg duration	104.9	52.0	140.0		114.2	84.7	85.8	64.0		83.2	102.0
	Avg interval	3.2	1.0	6.3		4.2	3.5	1.5	17.0		4.0	4.1
London	Count	3	13	15	0	31	1	14	8	0	23	54
	Avg duration	82.0	106.5	108.7		105.2	105.0	77.6	133.0		98.0	102.1
	Avg interval	4.3	3.2	6.9		5.1	4.0	1.6	7.5		3.7	4.5
Medici	Count	8	3	9	0	20	2	5	4	0	11	31
	Avg duration	86.9	71.7	154.7		115.1	81.5	82.4	87.8		84.2	104.1
	Avg interval	4.0	2.0	7.1		5.1	10.0	2.2	5.8		4.9	5.0
Mosaïques	Count	0	1	6	0	7	0	4	3	0	7	14
	Avg duration		73.0	153.5		142.0		61.5	124.7		88.6	115.3
	Avg interval		1.0	8.0		7.0		1.0	10.3		5.0	6.0
New Budapest	Count	6	0	4	0	10	1	2	1	0	4	14
	Avg duration	106.3		176.0		134.2	99.0	56.5	67.0		69.8	115.8
	Avg interval	4.0		5.3		4.5	7.0	1.0	7.0		4.0	4.4
Orford	Count	2	1	3	0	6	1	6	3	0	10	16
	Avg duration	124.0	148.0	155.7		143.8	151.0	75.7	179.3		114.3	125.4
	Avg interval	4.0	1.0	7.7		5.3	4.0	1.5	7.0		3.4	4.1
Pascal	Count	0	4	0	0	4	1	9	0	0	10	14
	Avg duration		97.5			97.5	93.0	90.7			90.9	92.8
	Avg interval		2.5			2.5	7.0	3.3			3.7	3.4
Petersen	Count	3	5	3	0	11	2	6	2	0	10	21
	Avg duration	66.0	54.4	93.3		68.2	52.0	49.5	87.5		57.6	63.1
	Avg interval	3.7	1.2	5.3		3.0	6.5	1.0	8.5		3.6	3.3
Prazak	Count	13	0	6	0	19	1	3	1	0	5	24
	Avg duration	88.2		152.2		108.4	64.0	53.7	162.0		77.4	101.9
	Avg interval	4.4		5.0		4.6	1.0	3.0	12.0		4.4	4.5
Rosé	Count	1	21	6	0	28	1	4	2	0	7	35
	Avg duration	93.0	155.1	138.8		149.4	148.0	132.8	142.5		137.7	147.1
	Avg interval	7.0	3.6	8.3		4.8	2.0	3.8	14.5		6.6	5.1
Schneiderhan	Count	2	0	0	0	2	1	2	0	0	3	5
	Avg duration	42.0				42.0	67.0	69.5			68.7	58.0
	Avg interval	6.0				6.0	7.0	1.5			3.3	4.4
Smetana	Count	0	6	2	0	8	0	4	2	0	6	14
	Avg duration		41.7	79.0		51.0		46.3	96.0		62.8	56.1
	Avg interval		1.0	5.5		2.1		1.3	6.0		2.8	2.4
Talich	Count	0	0	1	0	1	0	1	0	0	1	2
	Avg duration			111.0		111.0		52.0			52.0	81.5
	Avg interval			6.0		6.0		1.0			1.0	3.5
Végh	Count	1	1	1	0	3	2	1	2	0	5	8
	Avg duration	95.0	52.0	162.0		103.0	92.5	55.0	139.5		103.8	103.5
	Avg interval	1.0	1.0	6.0		2.7	2.0	1.0	7.0		3.8	3.4
Vlach	Count	1	0	4	0	5	1	3	4	0	8	13
	Avg duration	44.0		123.8		107.8	61.0	83.7	116.0		97.0	101.2
	Avg interval	4.0		4.3		4.2	1.0	1.0	7.5		4.3	4.2
Yale	Count	0	4	1	0	5	0	2	0	0	2	7
	Avg duration		44.0	139.0		63.0		58.0			58.0	61.6
	Avg interval		2.0	6.0		2.8		1.0			1.0	2.3

Fig. 7.2 – Table of data relating to portamento instances in the first movement of Op. 131, by performance. Durations are expressed in milliseconds, intervals in semitones.

Findings

Absolute incidence

A plot of the number of instances of portamento in each performance of the first movement by year (Fig. 7.3) demonstrates clearly the expected trend in which the extremely common practice of portamento between 1920 and 1940 suffers a sudden and dramatic decline after 1940. It is immediately apparent, for instance, that all of the pre-war performances have more instances of portamento than any of the later performances. The position of the London Quartet is somewhat misleading, as only the first eighty-two bars are present in their recording. Extrapolating from their count for the first eighty-two bars (fifty-four), one would have expected an overall total of seventy-nine for the whole movement, which would put them ahead of the Busch Quartet, which otherwise has the highest total (sixty-nine).

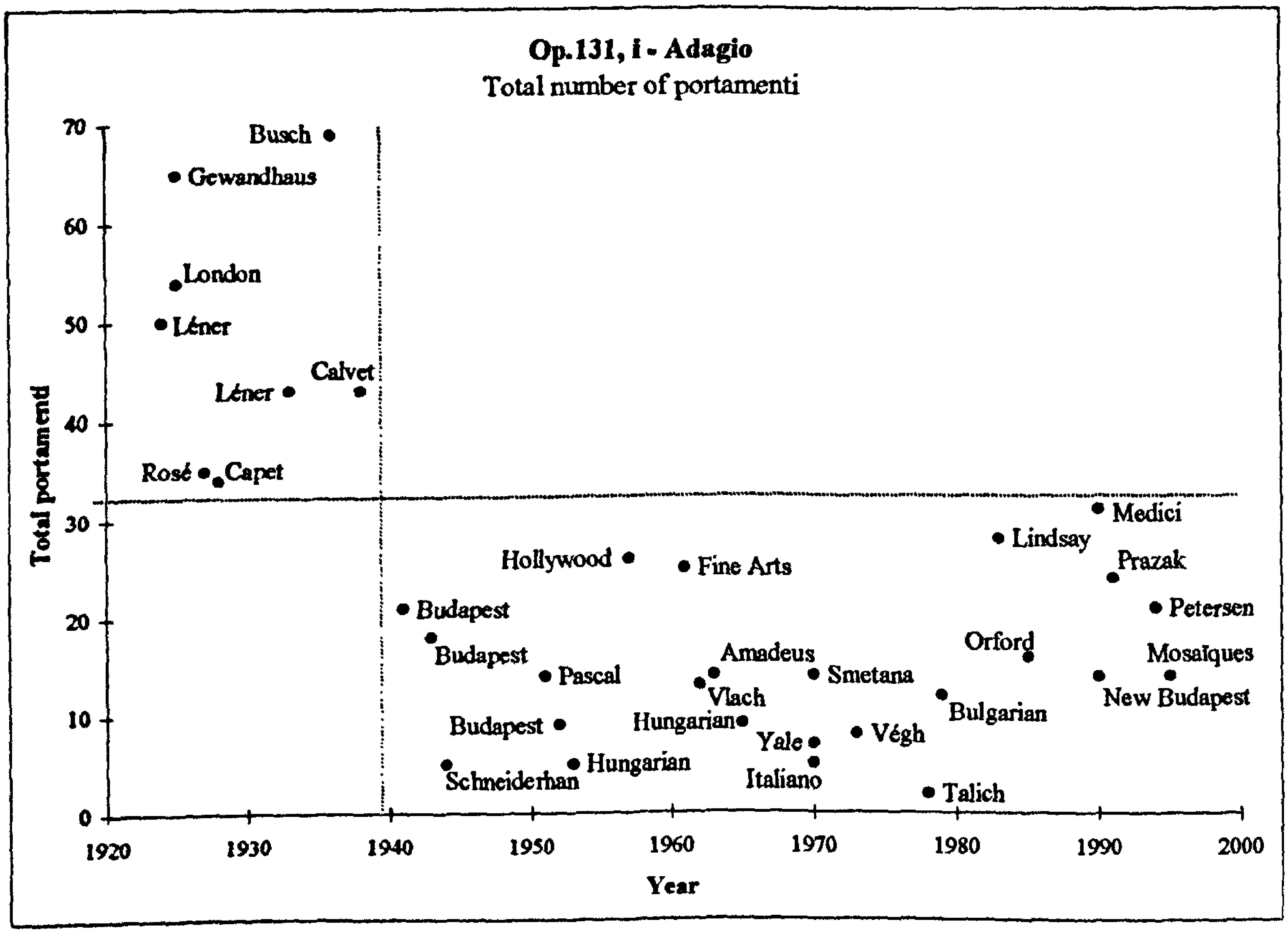


Fig. 7.3 – Total number of portamenti in the first movement of Op. 131 by quartet and year.

While these figures seem very high, it is salutary to reflect that the movement as a whole offers opportunities for 1155 instances of portamento. This figure is based on the number of pitch changes in individual parts which are not separated by marked rests (slurs and other phrase markings are ignored, as there are a number of instances in the actual performances of portamenti spanning breaks between slurs). This means that even the extrapolated total of seventy-nine for the London Quartet represents a 'density', or realisation of opportunity, of only 7%. While it would obviously be ludicrous to suggest that a performance could exhibit portamento at every opportunity (or in other words that an audible shift of position occurs between every pair of consecutive notes), this figure of 7% still seems likely to be a small proportion of the position changes which would normally be taken.

There is also considerable variation in the incidence of portamento in the pre-war performances, in spite of their collective tendency to have a greater 'portamento density' than the later performances, with the Busch and (extrapolated) London Quartets having more than twice as many instances as the Capet and Rosé Quartets. The reaction against portamento is sudden and decisive in a number of quartets, especially the Schneiderhan, Hungarian, Italiano and Talich Quartets, although a number of post-war quartets, for example the Hollywood and Fine Arts, still show a significant number. Indeed, the Hollywood Quartet has the highest incidence in the period between 1940 and 1980, which contradicts the assertion of its cellist, Eleanor Aller, quoted above, that they avoided portamento in Beethoven.

From the late 1970s there seems to have been an increased readiness to accept portamento as a legitimate expressive device, with the Lindsay and Medici Quartets, for example, approaching the incidence seen in some of the pre-war quartets. This pattern fits in well with Galamian's observation, made in 1962 and quoted above, that there had been an over-reaction against portamento and his plea that the device should not be rejected altogether, as well as with the Guarneri Quartet's acceptance (in 1987) of portamento as a legitimate and useful expressive device, also quoted above.

Incidence between instruments

Fig. 7.4 shows the distribution of portamento events between the instrumental parts for each performance, expressed as a percentage of the total number for the performance.

These percentages are not significant for performances where the total of portamento events is less than ten; but considering the remaining performances it emerges that in the majority of performances the first violin has more portamento events than any other instrument. This is perhaps not surprising in that the first violin part is usually considered as contributing most to the expressive inflexion of the quartet; it certainly does not indicate a random distribution, as it is in fact the second violin that has most opportunities for portamento.[1]

	v1	v2	va	vc	Total
Amadeus	79%	7%	7%	7%	14
Budapest 1941	29%	24%	19%	29%	21
Budapest 1943	39%	28%	11%	22%	18
Budapest 1952	78%	0%	0%	22%	9
Bulgarian	17%	8%	8%	67%	12
Busch	54%	20%	13%	13%	69
Calvet	58%	16%	21%	5%	43
Capet	44%	24%	12%	21%	34
Fine Arts	40%	20%	16%	24%	25
Gewandhaus	25%	32%	14%	29%	65
Hollywood	58%	15%	19%	8%	26
Hungarian 1953	40%	40%	0%	20%	5
Hungarian 1965	89%	11%	0%	0%	9
Italiano	60%	20%	0%	20%	5
Léner 1924	46%	8%	28%	18%	50
Léner 1933	47%	7%	9%	37%	43
Lindsay	21%	25%	4%	50%	28
London	28%	24%	20%	28%	54
Medici	42%	35%	0%	23%	31
Mosaïques	50%	29%	7%	14%	14
New Budapest	14%	21%	14%	50%	14
Orford	38%	6%	19%	38%	16
Pascal	43%	21%	36%	0%	14
Petersen	67%	14%	0%	19%	21
Prazak	33%	25%	8%	33%	24
Rosé	40%	20%	17%	23%	35
Schneiderhan	20%	20%	20%	40%	5
Smetana	64%	14%	14%	7%	14
Talich	100%	0%	0%	0%	2
Végh	50%	13%	0%	38%	8
Vlach	54%	15%	8%	23%	13
Yale	29%	29%	14%	29%	7

Fig. 7.4 – Distribution of portamento events in the first movement of Op. 131 between instruments

[1] The numbers of portamento opportunities are: first violin 319 (28%), second violin 375 (32%), viola 246 (21%), and cello 215 (19%)

The exceptions to this rule are the Bulgarian, Lindsay and New Budapest Quartets, where the cello has most portamento (in spite of having least opportunity), and the Gewandhaus Quartet, where the second violin has most.

In nearly all performances it is the viola part which abstains most from portamento. The exceptions here are the Léner Quartet (in both the 1924 and 1933 performances), whose second violinist almost totally eschews portamento, in contrast to his colleagues, and the Calvet, Pascal, Hollywood, Yale and Orford Quartets. Some caution must be attached to these findings, as it is frequently more difficult to detect unobtrusive portamenti in the inner parts, especially in older recordings; on the other hand this has not prevented some very high instances of portamento in the second violin part from being identified (e.g. in the performance of the Gewandhaus Quartet).

Ascending and descending portamenti

Flesch observes that ascending portamenti are more commonly found than descending: 'one reason ascending *portamenti* are far more frequently used is because the heightening of expression, in most cases, is accompanied by a parallel heightening of the tonal pitch' (Flesch, 1924: 33). Pochon, referring specifically to string quartet performance, also supports this observation.[2]

This pedagogical preference for ascending portamenti is largely borne out by the evidence of the performances in question. The table in Fig. 7.5 gives the percentages of ascending and descending portamenti in each performance. Again ignoring performances with fewer than ten portamento events, only nine performances have fewer than 50% of their portamento events ascending (Amadeus, Budapest 1941, Budapest 1943, Busch, Calvet, Hollywood, Orford, Pascal and Vlach). In the case of the Busch Quartet, this does not reflect an avoidance of ascending portamenti so much as a partiality for descending portamenti as well as ascending; with the Calvet and Hollywood Quartets, the figures are somewhat distorted by a penchant of their respective first violinists for relatively short single semitone downward slides.

However, some quartets which don't use much portamento at all seem to eschew ascending portamento altogether (for example, the Budapest Quartet in 1952 with eight

[2] 'General rule: a *portamento* (*glissando*) will be all right in an ascending movement, but is preferably avoided in descending.' (Pochon, 1924: 46)

out of nine descending, the Hungarian Quartet in 1953 with four out of five descending, and the Hungarian Quartet again in 1965 with all nine portamenti descending.)

It may well be that this movement in particular attracts more descending portamenti than others would, and that downward portamentos, with their connotations of sighing, may be considered particularly appropriate to its inherent pathos.

	Ascending	Descending	Total
Amadeus	36%	64%	14
Budapest 1941	43%	57%	21
Budapest 1943	33%	67%	18
Budapest 1952	11%	89%	9
Bulgarian	83%	17%	12
Busch	42%	58%	69
Calvet	19%	81%	43
Capet	82%	18%	34
Fine Arts	64%	36%	25
Gewandhaus	62%	38%	65
Hollywood	46%	54%	26
Hungarian 1953	20%	80%	5
Hungarian 1965	0%	100%	9
Italiano	80%	20%	5
Léner 1924	56%	44%	50
Léner 1933	60%	40%	43
Lindsay	61%	39%	28
London	57%	43%	54
Medici	65%	35%	31
Mosaïques	50%	50%	14
New Budapest	71%	29%	14
Orford	38%	63%	16
Pascal	29%	71%	14
Petersen	52%	48%	21
Prazak	79%	21%	24
Rosé	80%	20%	35
Schneiderhan	40%	60%	5
Smetana	57%	43%	14
Talich	50%	50%	2
Végh	38%	63%	8
Vlach	38%	62%	13
Yale	71%	29%	7

Fig. 7.5 – Proportions of ascending and descending portamenti in the first movement of Op. 131

Portamento types

A discussion of the use of the various types of portamento defined above must be subject to the caveat that in many cases, especially in early recordings, it has been impossible to determine precisely which type of portamento is being employed. It is probable, for example, that the indeterminate portamento events are more likely to be slides than B- or L- portamenti, as the audibility of the intermediate note is often the main indicator of the latter types. However, in all except six performances it has been possible to attribute the majority of portamento events to one of the defined types, and it is therefore worth attempting some general conclusions.

As can be seen from the data in Fig. 7.2, both the L-portamento and the combination portamento are extremely rare. The combination portamento is represented by only one incontestable example, in the Busch Quartet, while the L-portamento appears once in each of the Capet, Léner (1933) and Hollywood performances. The vast majority of portamento events are either B-portamenti or slides.

Fig. 7.6 shows B-portamenti and slides as a percentage of all portamento events for the performances in question. With the exception of the Rosé Quartet, which show a marked preference for slides, all the pre-war performances have fairly even numbers of B-portamenti and slides. There is more variation in the post-war performances, with a preponderance of B-portamenti in the performances of the Italiano, Mosaïques, New Budapest, Prazak and Vlach Quartets, and of slides in the Amadeus, Hollywood, Hungarian (1965), Pascal, Petersen, Smetana and Yale Quartets.

	B-portamenti	Slides	Total of B-portamenti and slides
Amadeus	21%	79%	14
Budapest 1941	43%	43%	18
Budapest 1943	56%	39%	17
Budapest 1952	56%	44%	9
Bulgarian	58%	42%	12
Busch	13%	17%	21
Calvet	30%	65%	41
Capet	6%	3%	3
Fine Arts	16%	24%	10
Gewandhaus	43%	43%	56
Hollywood	0%	92%	24
Hungarian 1953	40%	60%	5
Hungarian 1965	11%	89%	9
Italiano	100%	0%	5
Léner 1924	40%	52%	46
Léner 1933	26%	23%	21
Lindsay	25%	18%	12
London	43%	50%	50
Medici	42%	26%	21
Mosaïques	64%	36%	14
New Budapest	36%	14%	7
Orford	38%	44%	13
Pascal	0%	93%	13
Petersen	24%	52%	16
Prazak	29%	13%	10
Rosé	23%	71%	33
Schneiderhan	0%	40%	2
Smetana	29%	71%	14
Talich	50%	50%	2
Végh	38%	25%	5
Vlach	62%	23%	11
Yale	14%	86%	7

Fig. 7.6 – B- portamenti and slides in the first movement of Op. 131 expressed as a percentage of all portamento events for the performance

Duration

The duration of the slide, from the point of departure to the point of arrival, is one of the most significant aspects of portamento style. Together with bow pressure, it has the most effect on the audibility of the slide, and control of these two elements largely determines whether the portamento is heard as an expressive device or not. The durations of the portamenti measured in these performances range from 12 to 331 milliseconds. The shorter of these portamenti are almost impossible to hear in playbacks of the recordings at normal speed, while the longer cannot be ignored and are obviously intended as explicit expressive nuances.

It is useful to make an empirical distinction between short portamenti (less than 60 milliseconds), medium length portamenti (between 60 and 150 milliseconds) and long portamenti (more than 150 milliseconds). These arbitrary cut-off points seem consistent with the observed data, as many performances seem to have portamenti in only one or two of these categories, and where they have portamenti in more than one category there are often differences in their characteristics (e.g. type or interval traversed).

It may be helpful to consider the short portamenti as the equivalent of the 'technical gliding' identified by Flesch, where the portamento is the unintentional by-product of a position shift. A performance ethos in which portamento was an accepted and common expressive device is likely to pay less attention to the concealment of such 'technical gliding', and this may account for the large numbers of such short portamenti observed in some of the earlier performances.

The medium and long portamenti must reflect a deliberate expressive intent in the vast majority of instances, the distinction being one between an unobtrusive nuance and a device laden with expressive significance.

A chart showing the average duration of the portamenti in each performance against year is shown in Fig. 7.7. The same overall trend is apparent as in the chart of absolute incidence of portamento, with a long average duration in the early part of the century, significantly shortening in the middle of the century, and then increasing again.

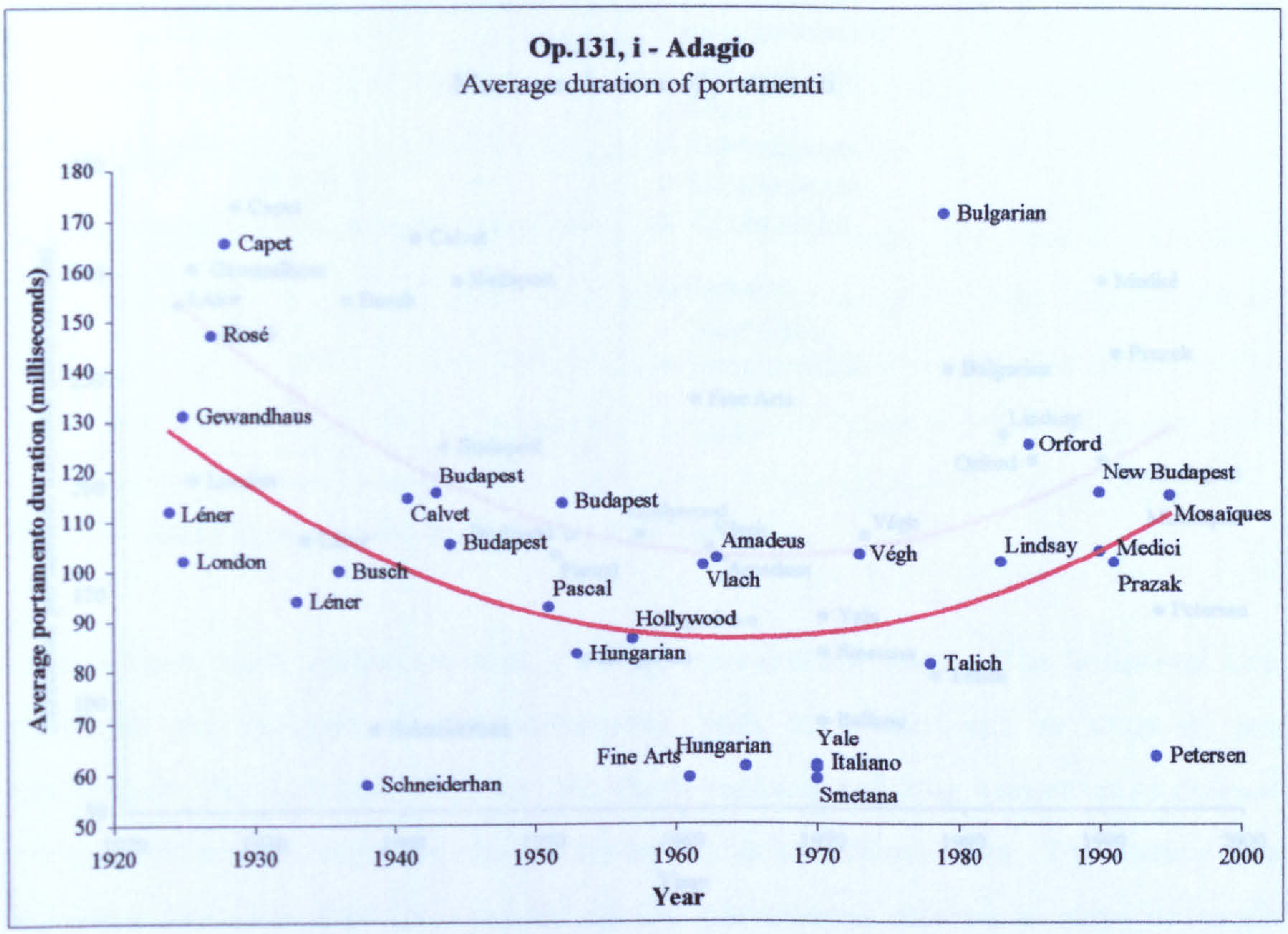


Fig. 7.7 – Average duration of portamento in the first movement of Op. 131 by performance and year

The reduction in average length between 1940 and 1980 reflects the reduction in the number of instances, and suggests that not only were portamenti avoided in this period, but also that they were largely restricted to 'technical gliding' and kept as unobtrusive as possible. However, with the partial revival of portamento from the 1970s onwards, the average length becomes comparable again with that of the pre-war performances. In other words, while the portamento revival has only been partial in terms of the frequency of its use as an expressive device, in terms of duration and obviousness of effect it comes close to many of the pre-war performances.

This picture is reinforced if we look at the *maximum* duration of portamento instead of the average (Fig. 7.8). It is apparent from this that a number of quartets from the 1980s onwards have not been afraid to indulge in portamenti which are just as extended and obtrusive as those of the pre-war quartets.

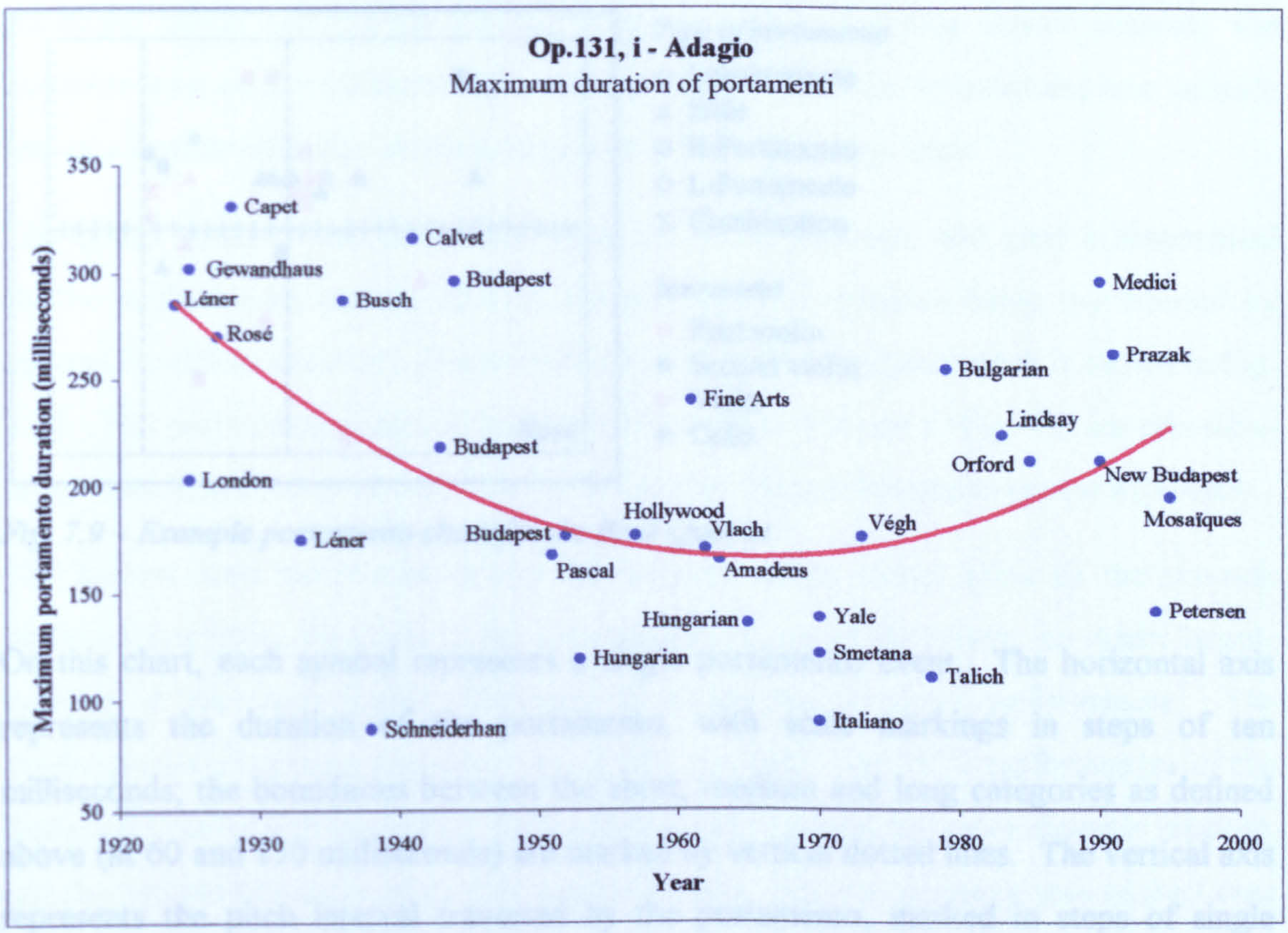


Fig. 7.8 – Maximum duration of portamento in the first movement of Op. 131 by performance and year

Individual Quartet Styles

This general survey has demonstrated that despite some very obvious overall trends there is also a great deal of disparity between individual quartets in all aspects of the use of portamento as an expressive device. In this section an attempt is made to characterize the individual portamento styles of each quartet, and to compare and contrast these styles.

In order to assist in this comparison, a chart has been devised which attempts to illustrate for a single performance as many aspects of portamento style as possible. An example of this chart (for the Rosé Quartet) is given in Fig. 7.9.

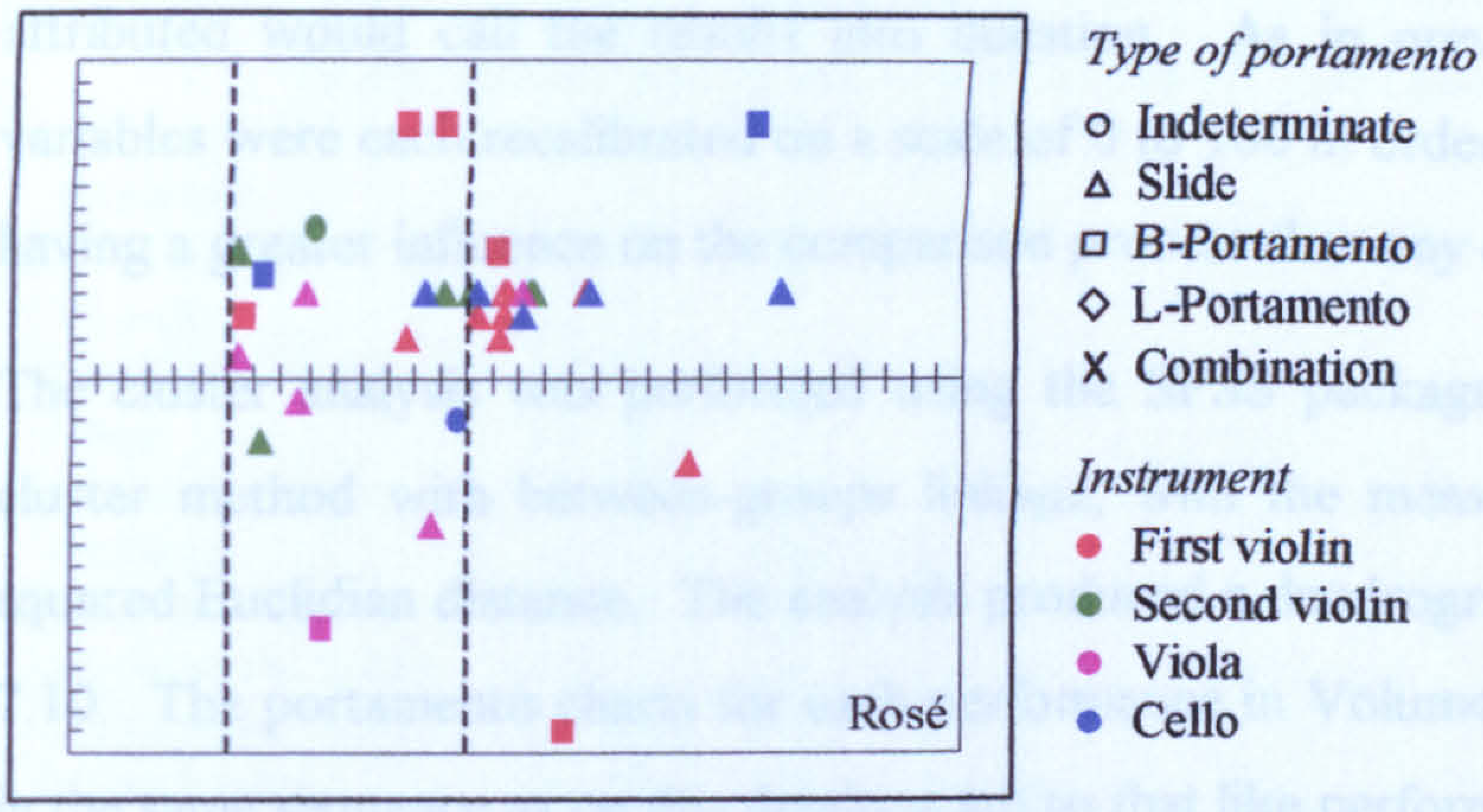


Fig. 7.9 – Example portamento chart for the Rosé Quartet

On this chart, each symbol represents a single portamento event. The horizontal axis represents the duration of the portamento, with scale markings in steps of ten milliseconds; the boundaries between the short, medium and long categories as defined above (at 60 and 150 milliseconds) are marked by vertical dotted lines. The vertical axis represents the pitch interval traversed by the portamento, marked in steps of single semitones, starting from the intersection with the horizontal axis; symbols above the horizontal axis represent ascending portamenti, while those below represent descending portamenti. The type of portamento is indicated by the shape of the symbol, and the instrument in which it occurs by the colour of the symbol, as detailed in the legend to Fig. 7.9.

A complete set of these charts for all performances is given in Volume 2, Fig. 7.1. The order in which they appear in this figure is determined by the results of the cluster analysis described below.

Cluster analysis

A cluster analysis was performed on the portamento data for each performance in order to determine whether any stylistic groupings could be established. The variables taken into account were the number of ascending portamenti, the number of descending portamenti, the average pitch interval for both ascending and descending portamenti, the maximum and average duration, and the portamento counts for each of the four instruments. The type of portamento was excluded from this analysis, as the number of indeterminate type portamenti, and the uncertainty as to the type to which they should be attributed would call the results into question. As in previous cluster analyses, the variables were each recalibrated on a scale of 0 to 100 in order to avoid any one variable having a greater influence on the comparison process than any other.

The cluster analysis was performed using the SPSS package, and used a hierarchical cluster method with between-groups linkage, with the measure being the interval by squared Euclidian distance. The analysis produced a dendrogram which is shown in Fig. 7.10. The portamento charts for each performance in Volume 2, Fig. 7.1 are presented in the same sequence as on this dendrogram so that like performances appear adjacently.

The highest level bifurcation in this dendrogram rather neatly splits all the pre-war performances (from the Rosé to the Gewandhaus) from all the others, no doubt largely because of the much higher frequency of portamento in these performances. The dendrogram also groups together very closely the 1941 and 1952 performances of the Budapest Quartet (although their 1943 performance is somewhat more distantly related), and the two performances of the Hungarian Quartet. The two performances of the Léner Quartet are moderately closely related, but this should be seen within the context of the greater disparity shown by all the pre-war performances than the later ones.

Looking a little more closely at the dendrogram, an initial self-contained group emerges from the first nine performances (Vlach, Amadeus, Végh, Pascal, Orford, New Budapest, Budapest (1941 and 1952) and Mosaïques). These performances are all characterized by a moderate number of portamenti, concentrated on the medium length category but with a smattering of both short and long, and by a fairly wide range of pitch intervals, both ascending and descending.

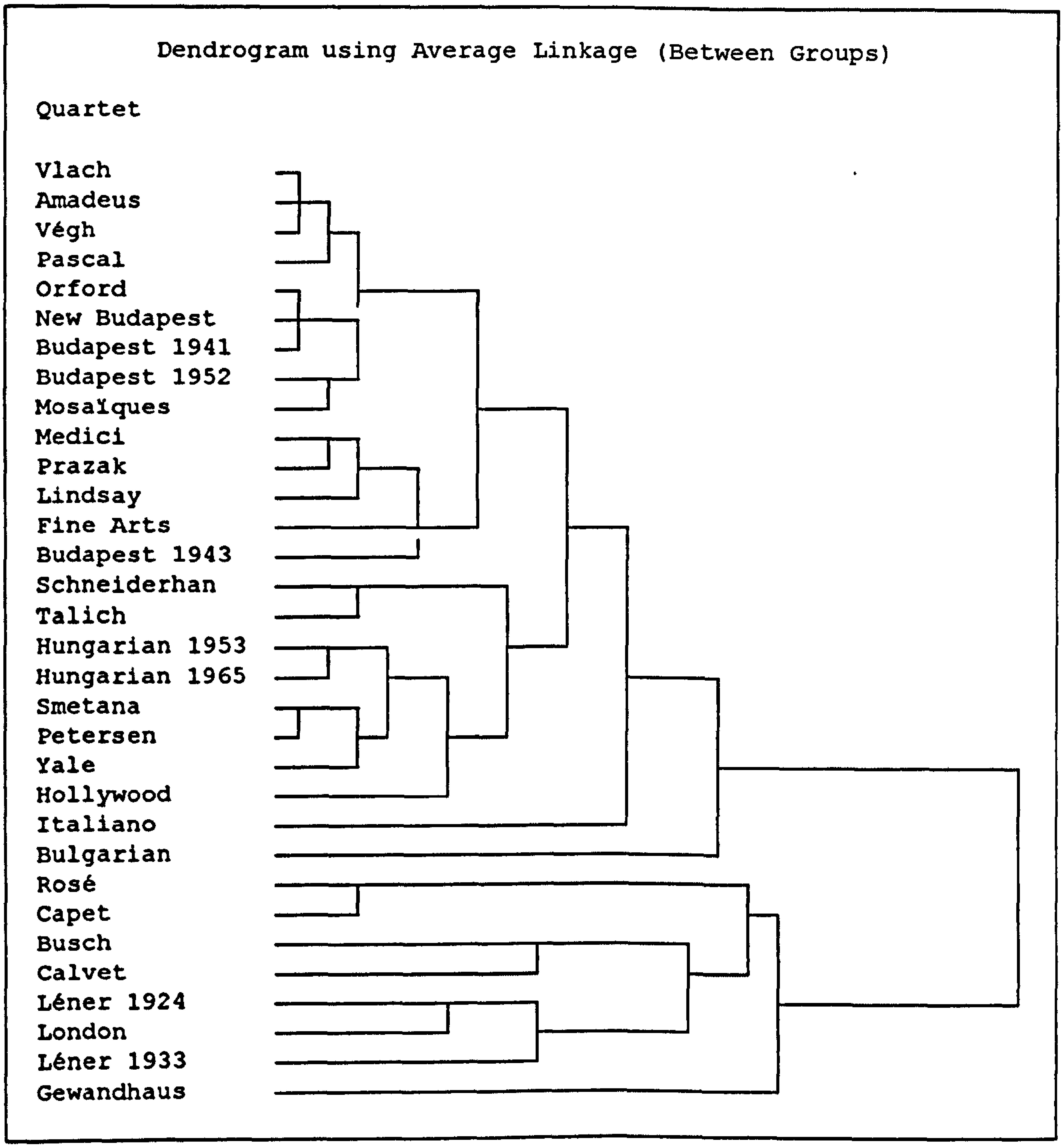


Fig. 7.10 – Dendrogram from the cluster analysis of portamento characteristics in the first movement of Op.131

However, even within this group which appears very homogeneous in the dendrogram, there are a number of individual fingerprints. For example, the Pascal and Budapest Quartets show a predilection for single semitone downward slides, mostly in the first violin, while the New Budapest's cellist frequently marks ascending intervals of four semitones with a portamento. The Vlach and Amadeus Quartets, while having a very similar overall profile, are distinguished by the former's preference for B-portamenti and the latter's for slides. The 1952 performance of the Budapest Quartet is distinguished from their 1941 performance (and, for that matter, their 1943 performance) by the absence of portamenti in the second violin and viola. It is worth noting that the second violinist for the 1941 and 1943 performances was Alexander Schneider; by 1952 he had been replaced by Jac Gorodetzky.

The next main group to emerge comprises the Medici, Prazak, Lindsay, Fine Arts and Budapest (1943) Quartets. They differ from the first group mainly in the increased number of portamenti they employ and in the variability of their duration, including examples at both the short and long ends of the range. With the exception of the Budapest 1943 performance, they share a preference for ascending over descending portamenti. They also all share a relatively even distribution of portamenti between the first and second violins and the cello, with only rare occurrences in the viola. An apparent preference for B-portamenti over slides in this group is probably real, as only the Prazak and Lindsay Quartets have significant numbers of indeterminate type portamenti. The group contains the post-war performances which are readiest to employ portamento as an expressive device, with relatively high numbers overall, a number of very long portamenti, and a large proportion of B-portamenti which can give rise to prominent intermediate notes. It is interesting that the Medici Quartet, which as we have seen in previous chapters are very averse to disrupting tempo for expressive effect, have no such qualms when it comes to introducing portamento.

The next group is made up of just the Schneiderhan and Talich Quartets, and is characterized by the almost complete avoidance of portamento. The few occurrences that do appear tend to be short in duration.

A fourth group comprises both performances of the Hungarian Quartet and those by the Smetana, Petersen and Yale Quartets. The moderate numbers of portamento events in these performances are all in either the short or medium duration categories. The Hungarian Quartet's performances show a marked preference for descending portamenti: indeed, all but one occurrence in the 1965 performance is a single semitone downward slide. The other quartets in the group exhibit both ascending and descending portamenti.

The next three performances in the dendrogram all stand alone with little relationship to any other performance. The Hollywood Quartet is characterized by a preponderance of single semitone slides, both ascending and descending, and of varying duration. The few ascending portamenti covering a larger pitch interval include one of the only three examples of L-portamento (or 'Romantic' portamento) encountered in this study. This pattern is at odds with the assertion of the quartet's cellist, Eleanor Aller, that they avoided portamento in Beethoven (quoted above).

The Italiano Quartet also stands on its own, with a total of five B-portamenti, all of intervals of four or more semitones and of short or medium duration, and all except one ascending. It is in fact the only performance with no single semitone portamenti.

The third isolated quartet is the Bulgarian, with a strong concentration on medium to long ascending B-portamenti covering a pitch interval of four semitones, and mostly in the cello. The placement of these portamenti in their musical context is of particular interest, as will be discussed in the next chapter.

While the remaining (pre-war) performances are separated as a group from the others, they show considerable variation between themselves. The Rosé and Capet are closely associated on the dendrogram, probably largely because they contain some of the longest portamenti in terms of duration, and have only one portamento between them in the short duration category. They also eschew descending single semitone slides, unlike the other pre-war performances.

The Busch Quartet exhibits some of the most varied and wide-ranging characteristics of any quartet, with examples of all durations, intervals, instruments and types (including the only definite example of a combination portamento observed). Within this range there is a large number of descending semitone portamenti; if these are discounted, then ascending and descending portamenti are relatively evenly distributed.

The Calvet Quartet differs from the Busch mainly in its tendency to avoid ascending portamenti, but it has a similar concentration of descending semitone portamenti. Slides are virtually restricted to single semitone intervals; larger intervals attract B-portamenti almost exclusively. The predominance of single semitone descending slides in these two performances contributes to a sense of pathos wholly appropriate to this movement.

The charts of the two performances by the Léner Quartet and that by the London Quartet all present a 'tiered' appearance, with a concentration on ascending intervals of twelve (i.e. an octave) and four semitones, and on descending intervals of one semitone.

The ascending octave portamenti are only rarely encountered in other performances, and in many cases span a break between two separate slurred phrases. It is difficult to determine whether this is intended as an artful way of joining the two phrases, or whether it is the result of habit in making such relatively large position shifts. The 1933 performance of the Léner Quartet differs from the 1924 performance mostly in the duration of the portamenti, as the duration range has shifted from the longer end of the spectrum to the shorter end. In 1933, the few portamenti that extend into the long duration category do so by only twenty or thirty milliseconds; the later performance also presents a somewhat 'cleaner' appearance in the reduction of ascending octave portamenti from five in 1924 to two in 1933. In both performances, the second violinist is relatively more abstemious than his counterparts in the other pre-war performances.

Finally, the Gewandhaus Quartet stands apart from the remaining pre-war performances. There is a concentration on ascending four-semitone portamenti similar to that of the previous group, but there is also a curious and unusual concentration on descending two-semitone portamenti, and only one example of a single semitone descending. This performance also has a large number of long portamenti, many of them spanning wide pitch intervals. In these respects, it can be seen as the most indulgent of all the performances in terms of portamento, as it was also in terms of tempo fluctuation.

While this comparison of performances by cluster analysis has reinforced the obvious differences between the pre-war and later performances, it offers no support for any other kind of tradition based on geography or pedagogy. The performances by Czech quartets (Prazak, Smetana, Talich and Vlach) all fall within different groupings. As far as the Hungarian quartets are concerned, while the Végh and New Budapest are in the same group, the Hungarian and Léner are widely separated, as are the 'New World' quartets (Fine Arts, Hollywood, Orford and Yale). Indeed, the Rosé and Capet Quartets, often considered as prime exponents of the Austrian and French traditions respectively, are very closely related in their approach to portamento. Even the clear differentiation between the pre-war and later performances hides some major differences in approach between each of the pre-war performances. In summary, it would seem that portamento is subject to the same variety of approach between individual quartets as are matters of tempo, albeit this variety is placed in a context of an overall trend for a reduction in portamento after 1940 and a partial resumption from the 1980s onward.

Chapter 8: Portamento in the Musical Context

Distribution of portamento events in the score

The preceding chapter has presented a detailed analysis of a number of aspects of style in the execution of portamento, and has attempted to identify historical trends and stylistic groupings. However, it has completely avoided discussion of what is probably the most important aspect of a quartet's approach to the use of portamento. This is the musical context in which the portamento is applied, or in other words the way in which portamento is employed as a device to alter the expressive moulding and shaping of a musical phrase.

Flesch is the most cogent of a number of commentators in urging that portamento should be employed in sympathy with the musical content of the piece:

> *The portamento should not be employed indifferently, but rather must have the closest interconnection with the musical content of the work which is to be performed. Every true artist should possess sufficient self-control to forego a beautifully sounding – and, oh, so seductive a portamento! – when it does not conform to the emotional content of a work [...] The [teacher] should make the structure and the emotional content of the work clear to the pupil, and in case a doubt regarding the portamento arises, should present it to the pupil as a matter of conscience whether he had really experienced the need of heightened expression at the place in question, or whether he had succumbed to the sensual tonal charm inherent in it; or, again, whether, perhaps, the portamento was due to the wish to reach another position in a comfortable way (i.e., a technical lack). In the case of every musically unfounded, and merely 'beautiful'-sounding connection of distant intervals, it is the teacher's duty relentlessly to reveal the disguised 'straining after effect.'* (Flesch, 1924: 30)

If performers had taken Flesch's admonitions to heart one might justifiably expect there to be some measure of consistency in the location of portamento events between performances. In the case of the thirty-two performances of the first movement of Op. 131 under study this is emphatically not the case. Taking all observed portamento events together, the 748 identified events occur in 302 different locations in the score; of these there are 156 locations where only one performance has a portamento event.

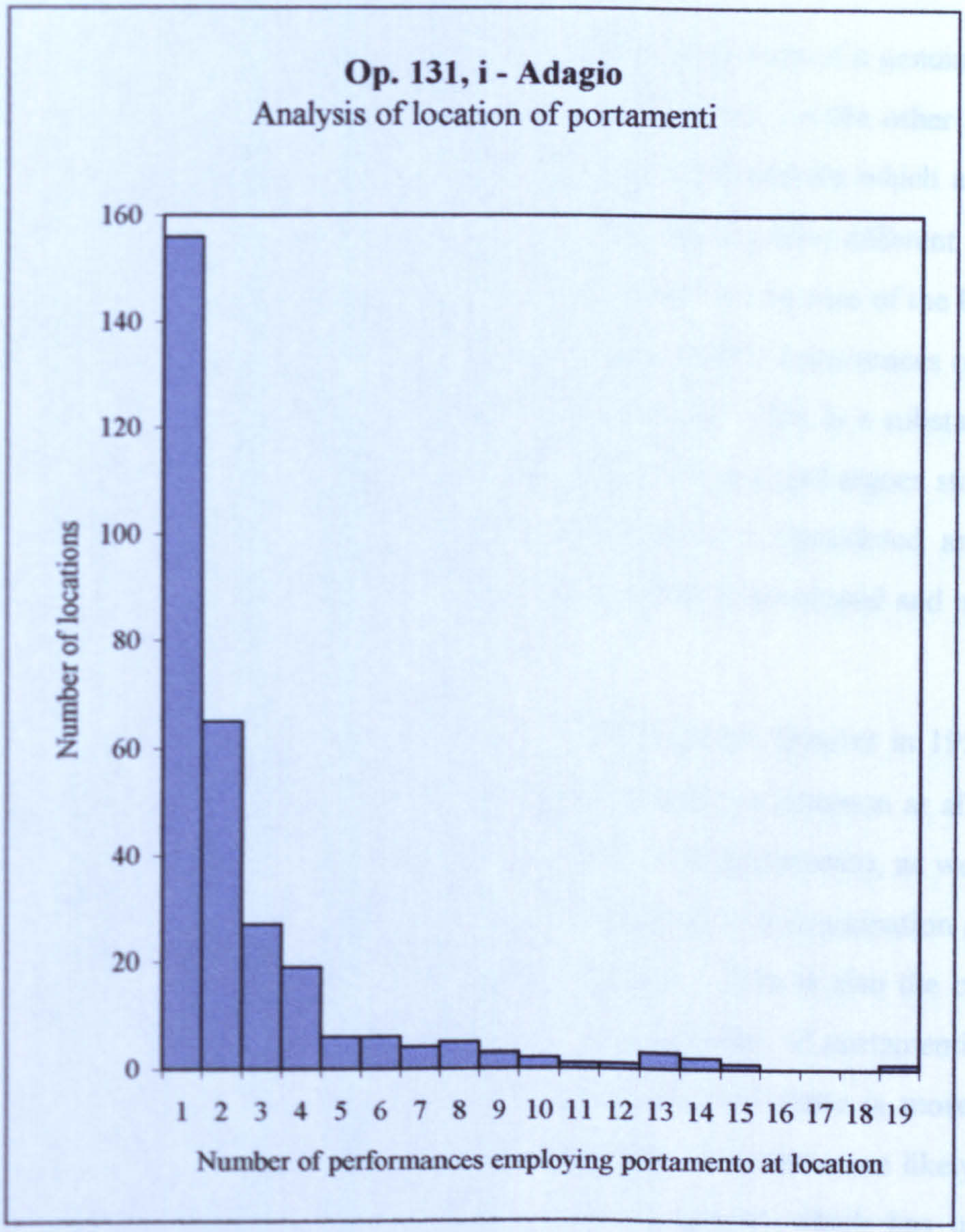


Fig. 8.1 – Bar chart showing number of locations against portamento count at the location in the thirty-two performances

Fig 8.1 illustrates this lack of consistency between performances in a graphic manner. It shows the number of locations in the score against the number of performances in which a portamento event occurs at the location. For example, there are 156 locations in the score which have a portamento in only one of the thirty-two performances; and there is only one location which has a portamento in nineteen of the performances. It is apparent from this bar chart that there are very few locations in the score which have portamento events in more than three or four of the thirty-two performances.

This inconsistency between performances could be a reflection of a genuine randomness and lack of planning in deciding when to apply portamento; on the other hand, it could result from differences in premeditated 'schemes' of portamento which are an integral part of an individual quartet's interpretation. The evidence from different performances of the same quartet should be instructive in this respect. In the case of the Léner Quartet their 1924 and 1933 performances have forty-three and fifty occurrences of portamento respectively, of which eighteen are in common locations. This is a substantially higher degree of consistency than in any other pair of performances, and argues strongly that to a large extent the use of portamento is the result of a considered and consistent interpretation (partly embodied in a fixed fingering pattern) developed and maintained by the Léner Quartet.

On the other hand, the two performances of the Hungarian Quartet in 1953 and 1965 (five and nine occurrences respectively) have no locations in common at all. However, this need not indicate a randomness in the application of portamento, as we have noted major discrepancies between the Hungarian Quartet in its 1953 incarnation and its 1965 incarnation in many other aspects of performance style. This is also the case in other aspects of portamento style. For example, with one exception, all portamenti in the 1965 performance are downward semitone slides, while in 1953 there is more variability, including two 'B' portamenti and one ascending slide. It is far more likely, therefore, that we are seeing here two performances from a quartet which has undergone a fundamental change in style (probably related to the change in personnel) than the results of spontaneity or lack of pre-meditation in the application of portamento.

The situation with the three performances of the Budapest Quartet is rather more complicated. The 1941, 1943 and 1952 have twenty-one, eighteen and nine occurrences of portamento respectively. Of these, four are at locations common to all three performances, nine are common to the 1941 and 1943 performances, and five are common to the 1943 and 1952 performances. This is suggestive of a gradually decreasing use of portamento, in keeping with the general trend of the time, but with a consistent subset of core locations which are maintained throughout.

While it is not conclusive, the evidence from multiple performances by the same quartet therefore tends to support the view that portamento is not entirely random or spontaneous, but does form part of a consciously prepared and developed interpretation.

Portamento 'hot spots'

In spite of the overall impression of randomness on the placement of portamento events described above, there is a small number of locations (eleven) where ten or more performances have a portamento, and analysis of these locations reveals some interesting facets of performance style. [Note: for the remainder of this chapter, portamento events are identified in the format '26/1 v1', indicating the first crotchet in bar 26 in the first violin part.]

Five of these locations are in similar musical contexts in the main subject of the fugue (22/1vc (twelve performances), 47/1 va (thirteen), 50/1 vc (fifteen), 51/1 vc (thirteen) and 52/1 vc (ten)). The portamento spans the initial upward interval of a major third in this subject, as illustrated in Ex. 8.1. This example is the first instance of the subject in the first violin part, although there are actually no portamento events in the performances studied in this particular instance.

Ex. 8.1 – First movement, start of first violin part

Attention having been drawn to this subject by the fact that it is marked by a portamento by ten or more quartets in five locations, the remaining twenty-two locations of this upward third in similar musical contexts were further investigated. This total of twenty-seven locations includes all cases where the theme is in the same note values as illustrated, but excludes a number of cases in diminution or augmentation. A table of all twenty-seven occurrences, and the number of performances which mark them with a portamento, is given below.

v1		v2		va		vc	
1/1	0	5/1	0	9/1	2	13/1	7
21/1	4	10/1	0	35/1	3	22/1	12
23/1	4	46/1	3	47/1	13	24/1	6
26/1	4	48/1	2	49/1	4	27/1	6
63/3	1	94/1+	1	93/1	1	50/1	15
99/1	7	110/1+	3			51/1	13
112/1*	2					52/1	10
						53/1	6
						111/1	9

* in this instance the first note of the interval is at the end of a phrase mark, and the second at the beginning of the next (i.e. the portamento spans a break between slurs or phrase marks)
+ in these instances, the first note is a quaver rather than a crotchet

It is apparent from this table that it is not uncommon to mark this phrase with portamento in a number of other places in the movement where it occurs. The effect of portamento on this first interval of the main expressive phrase in the entire movement is to announce it as containing significant emotional content, and the difference in feeling between performances which use this device and those which do not is palpable. This can be readily heard by comparing the passage from bar 20 to bar 24 as played by the Rosé Quartet, which marks all four occurrences of this figure with quite prominent portamenti, and as played by the Calvet Quartet, which avoids portamento on these figures (even though there are a couple of other relatively discreet instances in other locations in the passage). [The Rosé's performance of this passage is on track 24 of the accompanying CD, the Calvet's on track 25.]

The table below gives the total number of portamento events in the context of the initial upward third interval of the first subject, the total number of portamenti in the whole performance, and the number of portamenti on the first upward third as a percentage of the total. It is sorted in descending order of occurrences on the first upward third.

Quartet	*Portamenti on first note of first subject*	*Total portamenti*	*First subject as %age of total*
Capet	15	34	44%
Rosé	15	36	40%
Gewandhaus	12	65	18%
London	12	54	22%
Léner 1933	11	43	26%
Bulgarian	9	12	75%
Prazak	9	24	38%
Léner 1924	8	50	16%
Lindsay	7	28	25%
New Budapest	7	14	50%
Busch	6	69	9%
Fine Arts	5	25	20%
Amadeus	4	14	29%
Budapest 1941	4	21	19%
Medici	4	31	13%
Budapest 1943	3	18	17%
Petersen	3	21	14%
Hollywood	1	26	4%
Schneiderhan	1	5	20%
Vlach	1	13	8%
Yale	1	7	14%
Budapest 1952	0	9	0%
Calvet	0	43	0%
Hungarian 1953	0	5	0%
Hungarian 1965	0	9	0%
Italiano	0	5	0%
Mosaïques	0	14	0%
Orford	0	16	0%
Pascal	0	14	0%
Smetana	0	14	0%
Talich	0	2	0%
Végh	0	8	0%

A number of significant stylistic distinctions emerge from this table. Firstly, most of the performances with high absolute incidences of portamento in this context are pre-war, although not exclusively, and two pre-war performances (Busch and Calvet) are excluded. This would perhaps be expected simply because of the higher incidence of portamento overall. However, some quartets with a high or medium level of overall portamenti tend to avoid portamento in this context, in some cases completely; these include the Calvet, Busch and Hollywood Quartets, and to a lesser extent the Orford, Smetana, Pascal, Mosaïques and Vlach Quartets.

In contrast to these quartets, some display an opposite tendency to concentrate their use of portamenti on this figure to the exclusion of other contexts. This is most marked in the case of the Bulgarian Quartet, which has only three portamento events in other contexts, all of them shorter in duration and less prominent than any of the portamenti in the context of the first subject (one of these three is another rising third in a different context, the other two are very short single semitone downward slides). Other quartets with a similar, although less pronounced, tendency include the New Budapest, Prazak and Lindsay Quartets.

There is therefore a significant disparity in a large number of performances under study in the approach to applying portamento in the main subject of the movement, with a number of quartets falling into one of the extreme camps of almost total avoidance or of concentration to the exclusion of other musical contexts. These extreme differences must reflect positive and deliberate interpretative stances, and as we have now come to expect they do not align themselves to period or national school.

A second common context (with thirteen occurrences) is on the final quaver in the first violin part in bar 26 (see Ex. 8.2).

Ex. 8.2 – First movement, first violin part, bars 25 - 27

It is perhaps not surprising that this large downward interval which spans an 11th is often marked with portamento (including the only definite example of a combination portamento identified, in the performance of the Busch Quartet). All editions show the slur as finishing on the bottom note of this interval, with a break before a new phrase starting on the *sforzando* downbeat of the following bar. This presumably indicates Beethoven's intention not to break the legato, but save the break to anticipate the *sforzando* that occurs in all four instruments on the first beat in the new bar. This phrase mark over the interval in question will also act as an encouragement to employ portamento to bridge the great distance without breaking the legato. Indeed it is physically impossible to avoid some kind of slide, however disguised, without breaking the legato.

The third location (and the one with the maximum number of occurrences, nineteen) is in the first violin part at 35/2. This is an upward diminished fifth in a *crescendo* phrase, and is technically possible to play without any form of slide (see Ex. 8.3). It is likely that many violinists would prefer to play the C sharp with the third finger, keeping the entire phrase on the E string, to optimise tone and / or vibrato, and this would make a position shift between the F double sharp and the C sharp inevitable; however, if this is the case, then the duration and prominence given to the portamento in many performances suggests that a virtue has been made out of necessity, and there is certainly little evidence of any attempt to hide the slide.

Ex. 8.3 – First movement, first violin part, bars 34 - 36

The relevant data for the portamento instances at this point are shown in the following table:

Quartet	*Type*	*Duration (milliseconds)*
Budapest 1941	B	119
Budapest 1943	B	119
Budapest 1952	B	154
Busch	B	171
Capet	B	113
Gewandhaus	B	179
Italiano	B	38
Léner 1924	B	223
Léner 1933	B	162
London	B	142
Medici	B	142
Mosaïques	B	142
New Budapest	B	160
Petersen	B	142
Prazak	B	52
Rosé	B	163
Smetana	B	114
Végh	B	162
Vlach	B	143

The portamento in this location has a similar effect to those in the rising third at the start of the main subject, discussed above. It comes at the end of a series of descending crotchet sequences covering the preceding seven bars which has the effect of winding down the emotional tension, and marks the start of a new phrase which leads to a new *rinforzando* climax which coincides with a resumption of the main subject by the viola. It is noteworthy that all three of the Budapest Quartet performances and both of those by the Léner Quartet include marked portamenti at this point. Of those quartets with a high overall incidence of portamento, the Calvet Quartet is again conspicuous by its absence here.

The fourth location, accounting for fourteen occurrences, is in the first violin at 110/2, and consists of a rising fifth starting from an off-beat quaver to the second beat of the bar. It comes after six bars where this figuration occurs frequently in the second violin and viola parts, but is the only such occurrence in the first violin, and marks the approach to the main climax of the whole movement (at bar 113). (Ex. 8.4).

Ex. 8.4 – First movement, first violin, bars 109 - 110

The table below gives the data for portamenti at this location. Again, the portamenti are predominantly of the B type, although the Hollywood Quartet mark it with one of the only three L portamenti identified.

Quartet	*Type*	*Duration*
Amadeus	S	52
Busch	?	108
Capet	?	77
Fine Arts	B	240
Hollywood	L	177
Léner 1924	?	111
Léner 1933	B	142
Medici	B	296
Orford	B	198
Petersen	B	69
Prazak	B	262
Talich	B	111
Vlach	B	134
Yale	B	139

Of the pre-war quartets, again the Calvet Quartet is noticeably absent, although the Rosé and Gewandhaus Quartets are also missing. The London Quartet's absence can be explained by the fact that this passage is cut from their recording. However, it is the presence of a number of post-war quartets here which is of most interest, three of whom (Fine Arts, Medici and Prazak) have longer and more prominent portamenti than any other performance, all well in excess of 200 milliseconds.

The final three locations where ten or more performances have an instance of portamento share a rather different common characteristic from those considered hitherto. These are at 71/3 v1 (ten occurrences), 78/3 vc (fourteen) and 80/3 v2 (eleven), and are illustrated in Ex. 8.5.

Ex. 8.5 – First movement, first violin, bars 71 – 72; cello, bars 78-79; second violin, bars 80 - 81

In each of these instances the starting note is at the end of the preceding phrase (the slur is present only in the third instance at bar 80, but the first note is clearly a logical conclusion to the preceding phrases in the other two instances as well), and is followed by a new ascending phrase which starts a fifth below. In each case, therefore, the portamento is used to join the two separate phrases, and lends a pathetic quality, emphasising the downward motion between the individual phrases rather than the smaller ascending motion within the phrase itself.[1] In each case, it is technically possible to play these phrases without sliding, and we must take the portamento instances that have been observed as deliberately expressive.

The observed portamenti at these three locations are listed in the table below, with their type and duration (in milliseconds); the performances are grouped into those that observe the portamento at 71/3 and 78/3, those at 78/3 and 80/3, those at 71/3 and 80/3, those at 78/3 only and those at 80/3 only (there are no performances which have portamenti in all three locations).

[1] Brown quotes a number of instances from the notation of pieces by Mozart and Beethoven and from nineteenth century manuals of vocal technique of this device of 'eliding' the end of one phrase into the beginning of the next for expressive effect (Brown, 1999: 146)

Quartet	71/3 Type	71/3 Duration	78/3 Type	78/3 Duration	80/3 Type	80/3 Duration
Budapest 1941	B	218	B	145		
Budapest 1943	B	296	B	32		
Budapest 1952	B	177	B	162		
Calvet	B	233	B	316		
Léner 1924	B	64	B	122		
Léner 1933	?	113	?	84		
Orford	B	169	B	212		
Végh	B	102	B	177		
London			B	81	B	101
Mosaïques			B	136	B	104
Amadeus	S	166			B	110
Busch	B	93			B	235
Gewandhaus			S	186		
Lindsay			?	90		
Schneiderhan			?	67		
Vlach			B	110		
Capet					?	133
Fine Arts					B	66
Hungarian					B	107
Medici					B	81
New Budapest					B	67
Petersen					B	56
Smetana					B	122

It is noticeable that all except two of the instances where the type is identifiable are B portamenti, and that most of them are of relatively long duration, suggesting again that they are positive expressive devices (as is immediately apparent from listening to them). The most favoured approach of those quartets, which have portamenti in these three locations at all, is to use portamento at 71/3 and 78/3. This group includes all three performances of the Budapest Quartet and both of the Léner. It also includes the Calvet Quartet, which uses very long duration portamenti here, including the longest of all performances in these three locations. This is especially significant in view of the Calvet Quartet's absence in any of the other common locations involving ascending intervals.

Of those quartets which have a marked preference for the common locations where the interval is ascending, the Rosé is absent and the Capet is represented by only one example. The absence of the London Quartet is explained by the fact that this passage is omitted from their recording. In noting this marked contrast between the Calvet Quartet and the other pre-war quartets, one is tempted to suggest the influence of a 'French' school; however this certainly does not apply to the Capet Quartet, whose performance in respect of portamento, as in so many other respects, is remarkably close to that of the Rosé. The difference can be sampled by comparing, again, the performances of bars 70 – 79 by the Calvet Quartet [CD track 26] and the Rosé Quartet [CD track 27].

Other locations

The 'hot spots' analysed above account for just eleven of the 301 locations in the score of the first movement where a portamento has been observed in any of the performances under study. The remaining 290 locations, whose choice seems at first glance to be far more random in nature, can also provide some insight into portamento style.

The 'hot spots', as we have seen above, are all at significant points in the phrase structure which perhaps predispose them for expressive embellishment; they also all encompass intervals of at least a third, and often more. The remaining locations include 151 where the interval covered is only one or two semitones. The movement offers many scale-like passages where a slide of one or two semitones can be inserted to add expression to the whole phrase, but which could be applied to any one of a number of possible intervals in the same scale passage without significantly altering the overall effect. It is thus likely that we are looking at a use of portamento which, rather than emphasizing a crucial point in the phrase structure, is intended to add an expressive nuance to the phrase as a whole. By their very nature, these locations are likely to span smaller intervals than the major events in the phrase.

This phenomenon is illustrated in Fig. 8.2, which plots the average interval of portamento locations against the number of times they occur in the performances under study. It is clear from this chart that, broadly speaking, the larger the interval at a given point in the score, the more likely it is to be selected for treatment with portamento. Conversely, specific locations where the interval is smaller are less likely to attract attention. However, the *absolute* number of locations in the score where an interval of one or two semitones involves a portamento in at least one performance is much greater than the number of larger interval locations involving portamento.

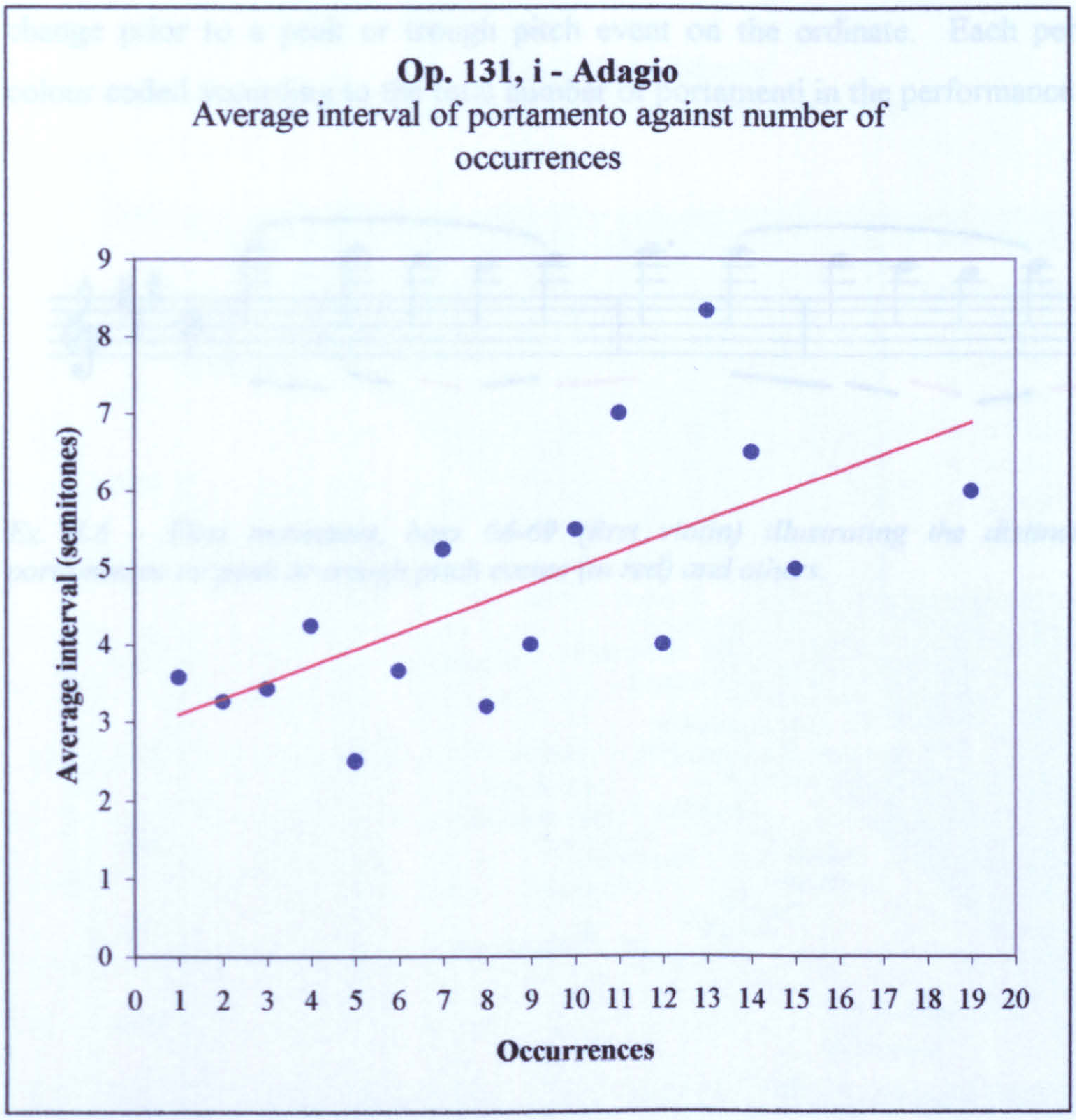


Fig. 8.2 – Scatter diagram showing the average interval (in semitones) of specific locations marked by portamento against the number of times the location is marked by portamento in the performances under study

Another way of examining these data is to consider the relationship of the placement of the portamento to the pitch shape of the phrase, and specifically to determine whether in any one performance a portamento tends to be used to mark the arrival at a pitch peak or trough, or whether it tends to be embedded in passages where pitch movement is continually ascending or descending. The distinction between portamento events on peak or trough pitch events and others is shown in a hypothetical example from the first movement in Ex. 8.6. The chart in Fig. 8.3 presents an analysis of these data. Each performance is plotted with the percentage of its portamento events which occur at peak or trough pitch events on the abscissa and the percentage which occur at one pitch change prior to a peak or trough pitch event on the ordinate. Each performance is colour coded according to the total number of portamenti in the performance as a whole.

Ex. 8.6 – First movement, bars 66-69 (first violin) illustrating the distinction between portamentos on peak or trough pitch events (in red) and others.

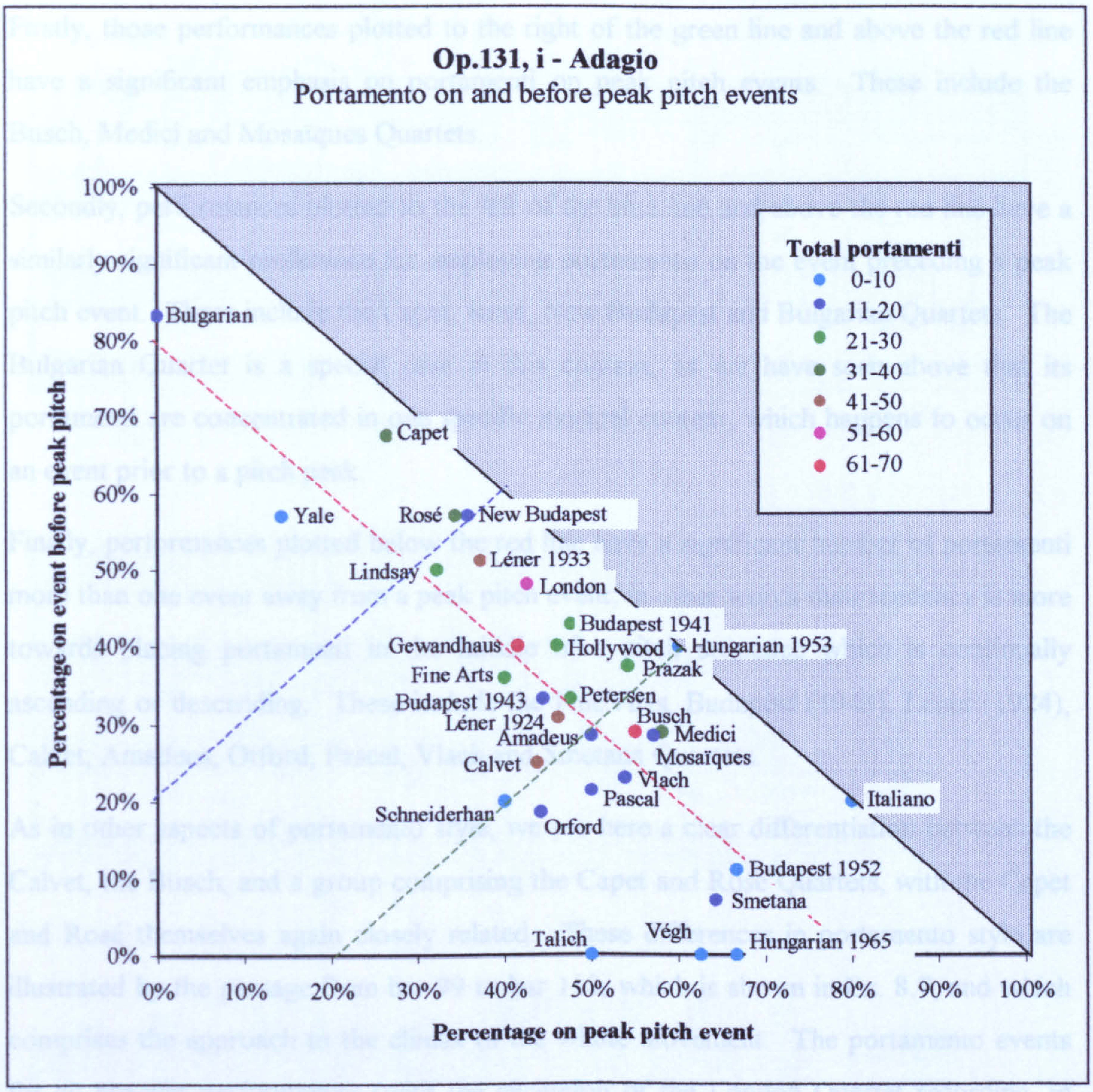


Fig. 8.3 – Performances plotted according to the percentage of their portamento events which fall on a peak or trough pitch event and the percentage that fall on a pitch change prior to a peak or trough pitch event

The dotted area on the chart is the 'out of bounds' area (i.e. where the sum of the percentages would be greater than 100). The green and blue dotted lines enclose a 20% tolerance area where portamenti are equally distributed between peak events and events preceding peak events, and the red dotted line defines an area in which at least 80% of portamenti are on either a peak event or an event prior to a peak event.

Discounting those performances with fewer than eleven portamento events, where the sample size will not bear this type of interpretation, a number of conclusions emerge.

Firstly, those performances plotted to the right of the green line and above the red line have a significant emphasis on portamenti on peak pitch events. These include the Busch, Medici and Mosaïques Quartets.

Secondly, performances plotted to the left of the blue line and above the red line have a similarly significant preference for employing portamento on the event preceding a peak pitch event. These include the Capet, Rosé, New Budapest and Bulgarian Quartets. The Bulgarian Quartet is a special case in this context, as we have seen above that its portamenti are concentrated in one specific musical context, which happens to occur on an event prior to a pitch peak.

Finally, performances plotted below the red line have a significant number of portamenti more than one event away from a peak pitch event; in other words their tendency is more towards placing portamenti in the middle of a pitch sequence which is continually ascending or descending. These include the Fine Arts, Budapest (1943), Léner (1924), Calvet, Amadeus, Orford, Pascal, Vlach and Smetana Quartets.

As in other aspects of portamento style, we see here a clear differentiation between the Calvet, the Busch, and a group comprising the Capet and Rosé Quartets, with the Capet and Rosé themselves again closely related. These differences in portamento style are illustrated by the passage from bar 99 to bar 113, which is shown in Ex. 8.7, and which comprises the approach to the climax of the whole movement. The portamento events for all pre-war performances (with the exception of the London Quartet recording, in which this passage has been cut) are shown by a colour code, and the duration of the portamento, classified into short, medium and long, is indicated by the thickness of the portamento line. Two recent performances are also included to illustrate the extent to which portamento is applied in some more recent recordings. These are from the performances by the Medici and the New Budapest Quartets. These performances of this passage are also included on the accompanying CD, in tracks 28 – 36. As a contrasting example, the performance of the Schneiderhan Quartet, with no portamenti, is also included in track 37.

Ex. 8.7 – First movement, bars 99 - 113

There are only two portamento events in the Calvet Quartet's performance of this passage, which is a lower density than any other pre-war quartet, especially considering the high number of portamenti in total in their performance. This is in contrast to the other pre-war performances, which mark the increased tension of this passage with a corresponding increase in portamento density. One of the two locations in question (110/4 v1) is not shared with any other performance, and the other (105/2 v2) is shared with only one other.

The tendency of the Busch Quartet to mark peak or trough pitch events is illustrated at three points in the inner parts where a large downward interval arrives on a low note (105/2 v2, 107/2.5 va and 108/3 v2).

This passage also illustrates well the suggestion made above that slides of one or two semitones within a sequence of ascending or descending pitch changes can produce a similar expressive effect almost regardless of which specific event they are applied to. Consider, for example, the downward slides of the Busch Quartet at 101/3 v1, 104/3 v1 and 105/4 v1, the Capet Quartet at 103/3 v1, and the Léner Quartet (1933) at 103/4 v1.

As a final note to this chapter, it is worth drawing attention to the fact that Flesch's interdiction against consecutive portamenti is ignored by a number of quartets, as the table below makes clear. Indeed, the Busch and Gewandhaus Quartets are each guilty of three offences in this regard, including a number of prominent long duration portamenti. The instance in the Busch Quartet's performance in bar 82 is illustrated in track 38 of the accompanying CD.

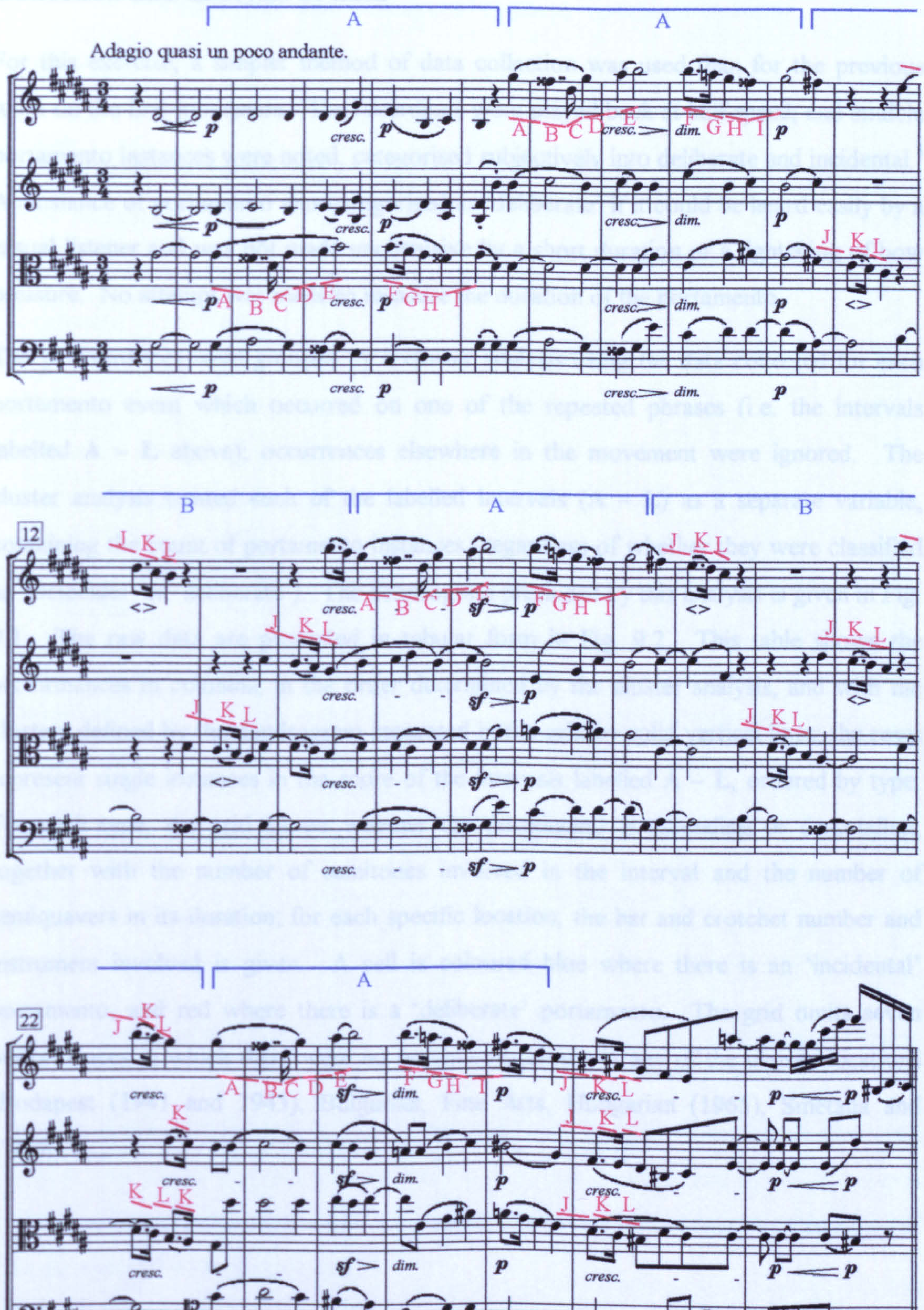
Quartet	*Inst.*	*Bar/beat*	*Asc/Desc*	*Semitones*	*Type*	*Duration*
Busch	v1	64/1	A	1	S	116
	v1	64/3	D	3	?	136
Busch	v1	82/3	D	7	B	130
	v1	82/4	A	2	?	255
Busch	va	9/1	A	4	?	66
	va	9/3	A	1	?	58
Calvet	v1	1/3	A	1	S	85
	v1	2/1	D	4	B	104
Gewandhaus	v1	82/4	A	2	S	73
	v1	83/2	A	3	B	93
Gewandhaus	va	32/2	A	5	?	52
	va	32/3	D	4	S	70
Gewandhaus	vc	78/3	D	7	S	186
	vc	78/4	A	2	S	102
London	v2	69/3	D	1	S	67
	v2	69/4	A	1	S	131
London	vc	78/3	D	7	B	81
	vc	78/4	A	2	S	78
Medici	v2	34/2	A	1	S	84
	v2	34/3	A	7	B	162
Rosé	va	46/4	D	12	B	96
	va	47/1	A	4	S	89

Chapter 9: Portamento in the Sixth Movement

Introduction

The sixth movement, *Adagio quasi un poco andante*, offers an excellent context within which to explore systematic differences in style regarding the placement of portamento in relation to phrase structure. It is a short, 28-bar movement in a slow tempo, and with a simple *AABABA* formal structure. Each element of the structure consists of a four-bar phrase. The *A* component phrase occurs four times, first in the viola and subsequently in the first violin, and while there are small (but significant) harmonic variations between the occurrences, they all have virtually identical pitch and rhythmic shape. The *B* component phrase is in itself made up of short descending scalic figures in which a dotted rhythm provides the dominant character, these figures occurring several times in each of the *B* sections, distributed between the two violin and the viola parts.

Within the short span of the movement there is therefore a number of phrase segments which are repeated several times, all of them offering possibilities for portamento. The multiple occurrence of these figures makes it possible to test for consistency in a quartet's approach to the use of portamento and to assay some generalisations about differences in approach between quartets. Ex. 9.1 includes the whole of the sixth movement, with the *AABABA* structure identified. Phrase *A* contains nine intervals, labelled **A – I** in the example; the descending figure that makes up Phrase *B* contains three intervals, labelled **J – L** in the example. Intervals **F, H, J** and **K** span a semitone in some instances and a whole tone in others; nevertheless they clearly perform the same role in the phrase structure. In the movement as a whole, there are four occurrences of intervals **A – I**, eleven of **J**, fourteen of **K**, and fourteen of **L**.



Ex. 9.1 – Sixth movement

Collection and analysis of data

For this exercise, a simpler method of data collection was used than for the previous work on the first movement. The recordings were played back at half speed, and audible portamento instances were noted, categorised subjectively into deliberate and incidental.[1] An instance of portamento was categorised as 'deliberate' if it could be heard easily by a casual listener and was not made unobtrusive by a short duration or a lightening of bow pressure. No attempt was made to measure the duration of the portamento.

The performances were grouped by a cluster analysis using the data collected for each portamento event which occurred on one of the repeated phrases (i.e. the intervals labelled **A – L** above); occurrences elsewhere in the movement were ignored. The cluster analysis treated each of the labelled intervals (**A – L**) as a separate variable, containing the count of portamento instances (regardless of whether they were classified as 'incidental' or 'deliberate'). The dendrogram produced by this analysis is given in Fig. 9.1. The raw data are presented in tabular form in Fig. 9.2. This table shows the performances in columns, in the order determined by the cluster analysis, and with the clusters defined by the dendrogram separated in the grid by solid vertical lines; the rows represent single instances in the score of the intervals labelled **A – L**, ordered by type. For each type, the grid shows whether the portamento is ascending or descending, together with the number of semitones involved in the interval and the number of semiquavers in its duration; for each specific location, the bar and crotchet number and instrument involved is given. A cell is coloured blue where there is an 'incidental' portamento, and red where there is a 'deliberate' portamento. The grid omits seven performances in which there were no portamento events at any of the chosen locations (Budapest (1941 and 1943), Bulgarian, Fine Arts, Hungarian (1965), Smetana and Talich).

[1] The performances were recorded onto PC hard disk with the Cool Edit 2000 package, and the package's *stretch* facility was used to double the duration without affecting pitch. In this way the performance could be played back at half the original speed.

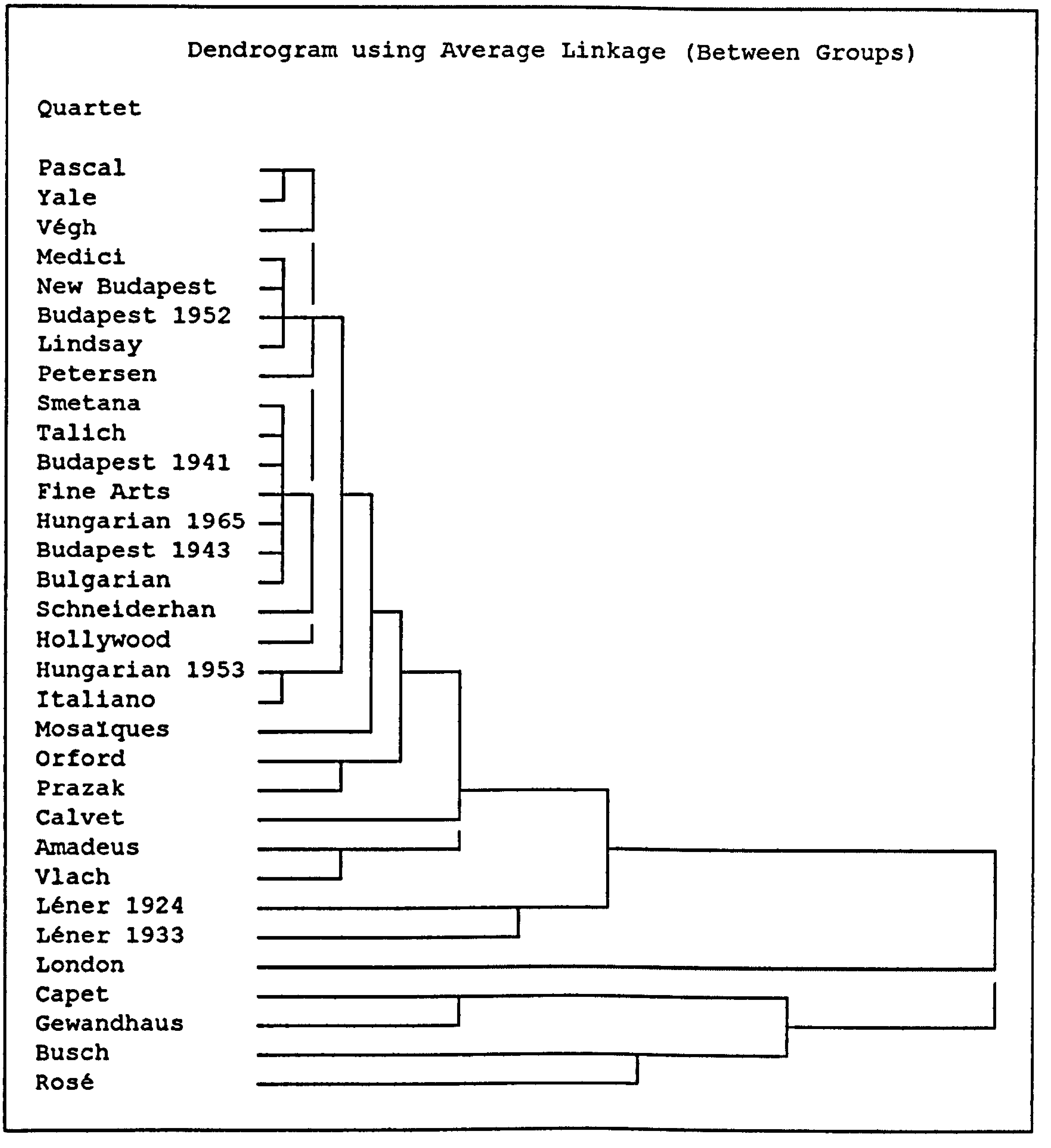


Fig. 9.1 – Dendrogram from the cluster analysis of portamento instances in the sixth movement

The first cluster to emerge from the cluster analysis contains the Pascal, Yale and Végh Quartets. As can be seen from the grid in Fig. 9.2, it is characterized by the occasional occurrence of an 'incidental' portamento on the downward dotted quaver to semiquaver interval represented by types **F** and **K**.

A second cluster, comprising the Medici, New Budapest, Budapest (1952) and Lindsay performances, is defined by the use of an 'incidental' portamento at the first occurrence of interval **E**. This is the upward interval which marks the end of the first phrase, as well as the climax, of the first *A* section in the movement, and the presence of portamento here is perhaps intended to reinforce the feeling of arrival at this significant point.

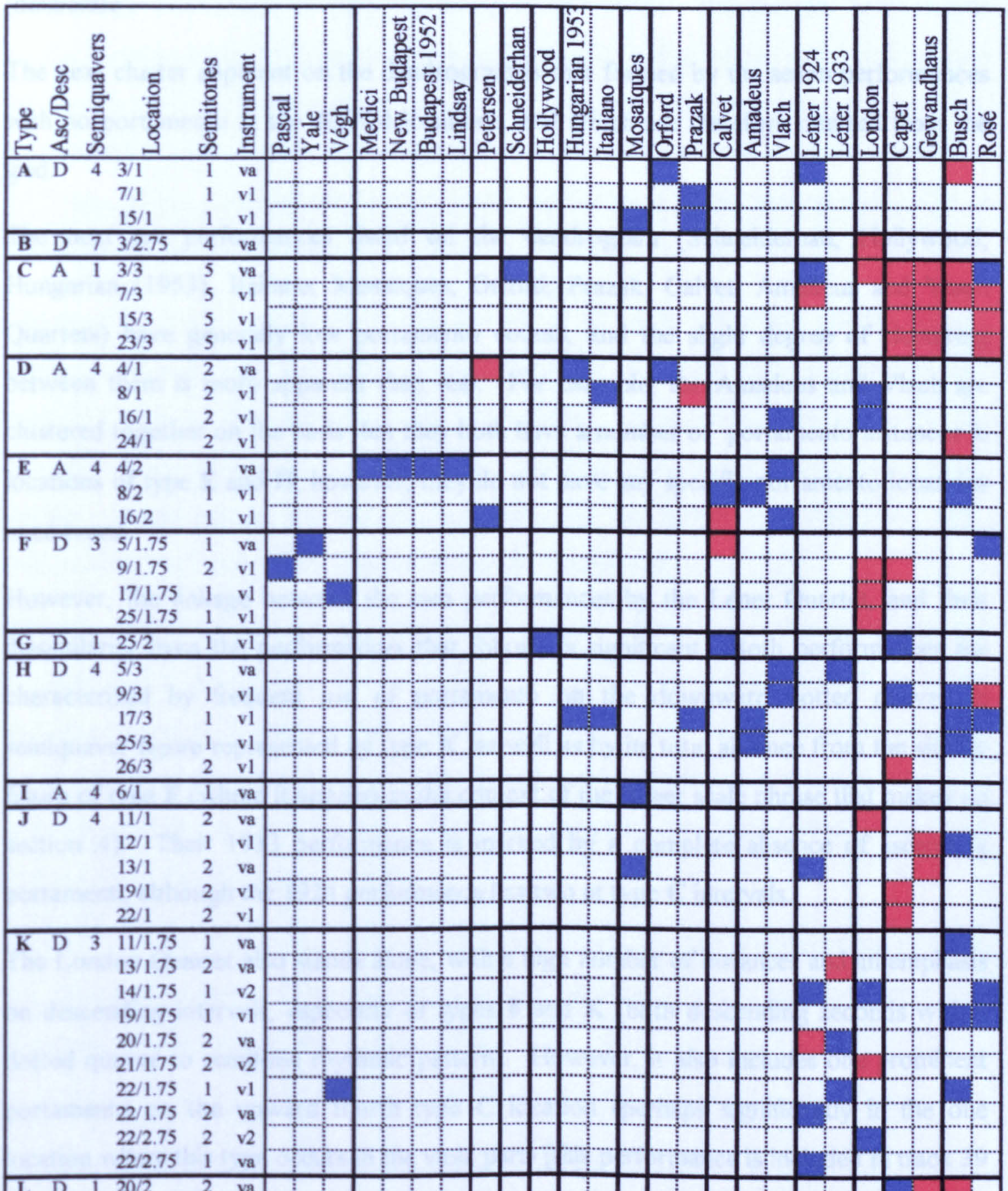


Fig. 9.2 – Grid of portamento instances at location types A - L in the sixth movement, omitting locations and quartets where no portamento was observed.

The Petersen Quartet stands alone, and is represented by two portamento instances, both in ascending contexts, and one of them sufficiently pronounced to be classified as 'deliberate'.

The next cluster apparent on the dendrogram is that formed by the seven performances with no portamento at the defined locations, and which are therefore omitted from the grid.

The next ten performances listed on the dendrogram (Schneiderhan, Hollywood, Hungarian (1953), Italiano, Mosaïques, Orford, Prazak, Calvet, Amadeus and Vlach Quartets) have generally low portamento counts, and the slight degree of clustering between them is more apparent than real. For example, the Amadeus and Vlach are clustered together on the basis that they both have a number of portamento instances in locations of type **E** and **H**; however, they do not have any specific portamento locations in common.

However, the linkage between the two performances by the Léner Quartet, and their dissimilarity from the performances that follow, is significant. Both performances are characterized by frequent use of portamento on the downward dotted quaver to semiquaver figure represented by type **K**, as well as by its total absence from the similar figure of type **F** (where it appears in the context of the larger scale phrase that makes up section *A*). Their 1933 performance is marked by a complete absence of ascending portamenti, although the 1924 performance has two at type **C** intervals.

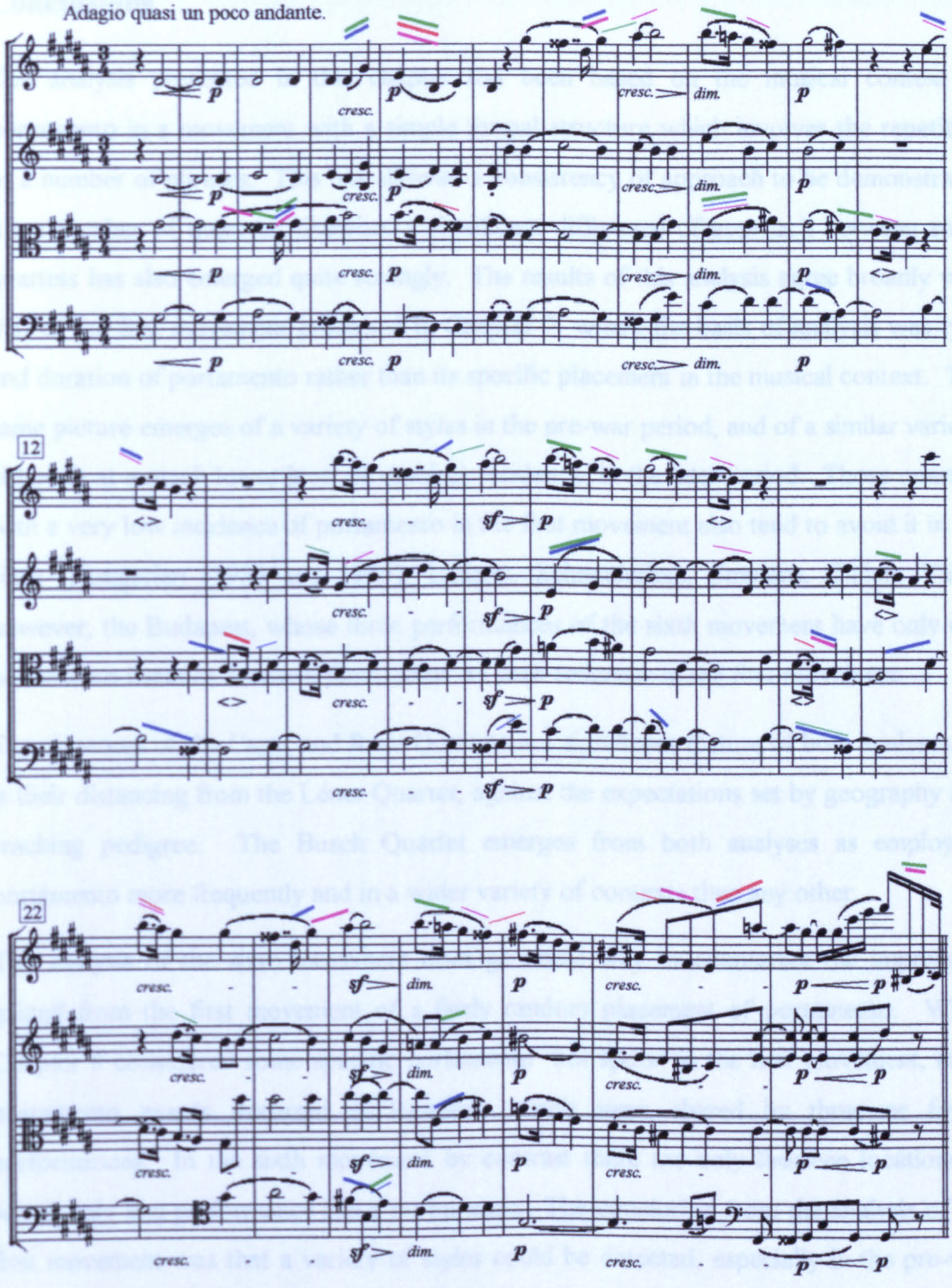
The London Quartet also stands alone, with a high number of instances and an emphasis on descending intervals, especially of types **F** and **K** (both descending seconds with a dotted quaver to semitone rhythmic pattern). However, it also includes one prominent portamento on the upward fourth type **C** location (perhaps significantly in the one location where this type occurs in the viola part) [this performance is included in track 39 of the accompanying CD].

In the next main cluster, formed by the Capet and Gewandhaus Quartets, every opportunity for ascending portamento afforded by type **C** intervals is exploited, and in all cases by 'deliberate' portamenti. They also completely avoid portamento at the type **K** locations so favoured by the Léner and London, preferring instead to mark the descending crotchet figure **J** which generally immediately precedes the **K** figure. This preference is the more striking in that in most instances the J figure is not encompassed within a slur (suggesting that the legato could be broken, which would make a portamento impossible), whereas the **K** figure always is. The contrast between this cluster and that formed by the two Léner performances is emphasized in the dendrogram by the fact that the highest level of separation in the tree structure occurs between them. It can also be plainly heard in the performances of the movement by the Léner Quartet in 1933 and by the Gewandhaus Quartet [these are included in the accompanying CD as tracks 40 and 41 respectively].

The type **C** location spans the largest interval of all types (ascending fourth) and the shortest time span (one semitone). The employment of a 'deliberate' portamento here imparts a very specific character to the performance, and is far more intrusive than the descending second of type **K**, which occurs within a more extended descending scalic phrase. It may not be too fanciful to characterize the former as a disruptive 'sob', whereas the latter rather evokes a gentle sigh of resignation.

The Busch and Rosé Quartets form a final cluster. They share with the Capet and Gewandhaus a predilection for portamento on type **C** locations, although to a less pronounced extent; but they prefer to locate portamenti in the downward scalar passages on the dotted semiquaver figure **K** rather than **J**, a characteristic they share with the two performances by the Léner Quartet. The performance by the Busch Quartet is included in track 42 of the accompanying CD.

As an aid to listening to the four performances included on the accompanying CD, Ex. 9.2 shows all instances of portamento detected, including those in locations other than those singled out for analysis as types **A** – **L**.



Ex. 9.2 – Sixth movement, with portamento instances marked for performances included on accompanying CD

Conclusions

The analysis presented in this chapter has been based on the musical context of portamento in a movement with a simple formal structure which involves the repetition of a number of phrases. This has allowed a consistency of approach to be demonstrated for a number of quartets; likewise, a significant difference of approach between some quartets has also emerged quite strongly. The results of this analysis agree broadly with that of the first movement presented in Chapter 7, where the basis of analysis was type and duration of portamento rather than its specific placement in the musical context. The same picture emerges of a variety of styles in the pre-war period, and of a similar variety, although at a much lower level of absolute incidence, in the later period. Those quartets with a very low incidence of portamento in the first movement also tend to avoid it in the sixth (Hungarian (1953 and 1965), Italiano, Schneiderhan, Smetana, Talich, Yale); however, the Budapest, whose three performances of the sixth movement have only one portamento instance between them, show no such reticence in the first movement.

The closeness of the Capet and Rosé Quartets is a significant feature of both analyses, as is their distancing from the Léner Quartet, against the expectations set by geography and teaching pedigree. The Busch Quartet emerges from both analyses as employing portamento more frequently and in a wider variety of contexts than any other.

The analysis of the sixth movement does go some way to counteract the impression gained from the first movement of a fairly random placement of portamento. While Chapter 8 considered some specific portamento 'hot spots' in the first movement, most portamento events occurred in locations which were shared by three or fewer performances. In the sixth movement by contrast there are only fourteen locations in which only one performance has a portamento. The conclusion from the analysis of the first movement was that a variety of styles could be detected, especially in the pre-war period, based solely on preference for portamento type, duration and direction; the more constrained formal structure of the sixth movement, and the resultant concentration of portamento events within repeated phrase structures, has allowed this conclusion to be extended to the musical context of portamento. In other words, there is significant evidence that a number of quartets have articulated a consciously distinct conception of the movement by deliberate interpretative decisions on the use of portamento as an expressive device.

Chapter 10: Vibrato

Background

The change between the two world wars from a relatively vibrato-free style of string playing to one in which a virtually continuous vibrato is accepted as a normal component of string tone production is one of the best documented and widely understood historical changes in string playing style. For virtually the whole of the nineteenth century, minimal use of vibrato seems to have been the norm, with numerous commentators, such as Spohr, recommending its use purely as an ornamental feature. Some evidence has been adduced that this may have been a reaction to an earlier period between around 1780 and 1820 in which vibrato was more frequently employed (Brown, 1999: 528), but it is clear that its use for the rest of the nineteenth century and into the early twentieth was sparing.

The rise of vibrato as an essential element of tone production is commonly associated with Fritz Kreisler, and originated in the Franco-Belgian school, being developed particularly by Ysaÿe. This was in marked contradistinction to the German school, as exemplified by Joachim, who disdained its use almost completely. As late as 1921, Auer could still write:

> *the vibrato is an effect, an embellishment; it can lend a touch of divine pathos to the climax of a phrase or the course of a passage, but only if the player has cultivated a delicate sense of proportion in the use of it.* (Auer, 1921: 22-3)

But by 1938 prevailing taste had changed to the extent that the eminent viola player Lionel Tertis could state quite prescriptively:

> *The vital fact about vibrato is that it should be continuous; there must be no break in it whatsoever, especially at the moment of proceeding from one note to another.* (Tertis, 1938: 147-8)

The new fashion of continuous vibrato was not universally accepted however. Writing in around 1940, Schoenberg complained of 'the goat-like bleating used by many instrumentalists to curry favour with the public' (Schoenberg, 1975: 346), contrasting the sparing and considered application of vibrato by artists such as Casals.

Of especial interest in the context of the present study is Lucien Capet's approach to vibrato, which he wrote about in some length in his *La Technique Supérieure de l'Archet*. An adherent of the nineteenth century vibrato-less tradition, he castigated use of left-hand vibrato to conceal inferior technique, and advocated in almost theological terms the spiritual qualities of a vibrato-free style:

> *L'absence de vibrato de la main gauche dans certains passages de la vie musicale d'une oeuvre devient un moyen de découvrir les beautés abstraites mais ineffables d'un art supérieur à tous points de vue. C'est comme une sorte de vision sur l'Au-delà qui nous permet d'apprécier à leur juste valeur, toutes les manifestations inférieures qui se réalisent par le moyen du vibrato de la main gauche. Ce dernier, dont la plupart des violonistes abusent, ferme le plus souvent la porte aux aspirations supérieures et nous empêche de constater les réalités sublimes, pour nous plonger dans le domaine d'une illusion inférieure.*[1] (Capet, 1916: 30)

In contrast to this abuse of left-hand vibrato, Capet developed a kind of right-hand vibrato, which was achieved by a rhythmic rolling of the bow from one side to the other between the thumb and middle finger, and which he termed the *coup d'archet roulé*.

> *Par l'intermédiaire de ce coup d'archet on a, à sa disposition une sorte de Vibrato de l'archet qui est une excessive sensibilité dans le sens de la pénétration, et dans bien des cas on obtient de très intéressants effets en suprimant le Vibrato de la main gauche tout en conservant une sonorité très émouvante.*[2] (: 23)

Many quartet players tend to emphasize the need for variety in vibrato. Michael Tree of the Guarneri Quartet opines that '[vibrato is] a tool that should constantly be adjusted to the demands of the music, and not just poured over everything like maple syrup over a stack of hotcakes' (Blum, 1987: 37-8).[3] Other members of the Quartet go on to discuss

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[1] 'The absence of left hand vibrato in certain passages of the musical life of a work becomes a means of revealing the abstract but ineffable beauties of an art which is superior from all points of view. It is like a kind of vision of the Hereafter which allows us to appreciate at their real value all the inferior executions which are achieved by means of left hand vibrato. The latter, which is abused by most violinists, so often closes the door to higher aspirations and hinders us from discovering the sublime realities, to immerse us in the world of an inferior illusion.' [author's translation]

[2] 'Through the agency of this bow stroke one has at one's disposition a kind of *Vibrato* of the bow which is extremely sensitive from the point of view of control, and one often obtains some very interesting effects by suppressing left hand Vibrato while maintaining a very affecting sonority.' [author's translation]

[3] See also Gertler, 1951: 22 - 'The quartet player...must be capable of producing the most diverse variations of tone-colour with his vibrato: contrary to the ideas of some of the foremost

various nuances of vibrato, including not just pitch width and rate, but also the differences produced by the use of the finger, the wrist and the arm.

Most quartets also advocate that the vibrato should be consistent between the different instruments, a view strongly put forward by Alfred Pochon, second violinist of the Flonzaley Quartet and author of a two-volume manual of quartet playing (Pochon, 1924:14). A contrary view is provided by Colin Hampton, cellist of the Griller Quartet:

> *It takes a long time to match colors – I won't say vibratos necessarily, because they can be different. If somebody has a melody and the others play with the same vibrato, the effect can be nauseating. The others should back off a little bit, be less important.* (Hampton, 2000: 69)

Hampton is here clearly considering simultaneous vibrato in multiple instruments. Consistency in vibrato between separate occurrences of the same phrase or theme is not necessarily subject to the same constraints. Rudolf Kolisch, in conversation with Berthold Türke, implies that vibrato should normally be consistent between instruments, but also allows that the same theme can be played differently (in respect of vibrato) on subsequent appearances in different instruments:

> *Die Erscheinung des Vibrato kann nicht völlig unkontrolliert sein. Wenn es um akkordische Erscheinungen sich handelt, muss eine gewisse Uniformität erreicht werden. Aber auch sonst: Es ist nicht angänglich, dass ein Spieler, wenn er dasselbe Thema vorträgt, es ganz anders spielt, was das Vibrato betrifft.*[4] (Kolisch, 1983: 59)

Previous investigations

The earliest scientific studies of string vibrato were carried out by Carl Seashore and his team at the University of Iowa in the 1930s. This pioneering work remained unparalleled until very recent years. Two studies by members of Seashore's team made in the early 1930s are of particular interest (Hollinshead, 1932 and Reger, 1932a and 1932b). These studies were based on a 'phonophotographic' representation of recordings of a number of violinists. Hollinshead studied recordings by eleven violinists including von Vescey,

quartet-players, who never vary their vibrato, using always the same, very often a rapid one, which gives their tone a standardized quality.'

[4] 'The appearance of vibrato cannot be completely uncontrolled. In harmonic passages a strict uniformity must be maintained. Nevertheless, it is not improper for a player, when he has the same theme, to play it completely differently as far as vibrato is concerned.' [author's translation]

Kreisler, Elman, Prihoda, Heifetz and Seidl, in a variety of repertoire. His principal findings were that the average vibrato rate for the eleven violinists varied from 6.2 to 7.7 cps (cycles per second), and that the mean pitch extent of the vibrato varied between .17 of a tone (= 34 cents) and .36 of a tone (= 72 cents).

Reger's studies, which included viola and cello recordings as well as violin, confirmed Hollinshead's findings, establishing an average rate for violinists of 6.92 cps, but a slightly slower rate of 6.28 for cellists. The difference is of dubious statistical significance, but if real could be due to the greater use of the forearm in cello vibrato giving rise to a slower rate for purely mechanical reasons. More significantly, Reger found that the vibrato rate remained constant in the same player over time, based on repeated recordings of a number of string teachers over a period of four months. He also found that, at least in the string teachers recorded specially for the study, there was no difference in vibrato rate whether the player was performing scales or pieces of music. His findings on pitch extent also confirmed Hollinshead's study, with an average of .24, .28 and .22 of a tone for violinists, violists and cellists respectively. The pitch extent did not appear to be correlated with rate, or with the nature of the bow attack or release, although there was some correlation with dynamic: passages marked *ff* on average were played with vibrato that was on average .13 of a tone wider than those passages marked *pp*.

These findings of Hollinshead and Reger all suggest that the rate and extent of vibrato is inherently part of an individually developed personal technique, and is relatively unaffected by considerations of musical context or expression.

More recently, the availability of sophisticated software packages for frequency analysis has allowed some researchers to study vibrato in a far more in-depth fashion. As an example, Johnson has examined two performances of the first two bars of the aria *Erbarme dich* from Bach's St Matthew Passion in order to draw detailed comparisons and contrasts in the use of vibrato and expressive intonation (Johnson, 1999).

Scope of the Current Study

It is clear from the brief survey above that a number of different approaches to the use of vibrato have been, and are being, advocated both by string players in general and quartet players in particular. The current study attempts to exploit the capability of some of the analytical software now available to investigate how individual quartets have used vibrato, both individually and corporately, both as a technique for tone production and as an expressive device. To do so, it focuses on the first sixteen bars of the first movement of Op. 131, comprising the first statement of the four-bar fugue subject in each instrument. This passage was chosen for a number of reasons. They include the practical considerations that the slow tempo and sparser textures made the measurement of vibrato rate and width an easier task, with less ambiguity in measured results, and the fact that the individual note durations were sufficiently long to allow a reliable measurement of a regular vibrato rate. Perhaps more importantly, the passage consists of four virtually identical phrases, occurring in each of the four instruments. This allows comparisons to be made between the four individuals in the quartet and some conclusions to be drawn about the consistency (or otherwise) of approach between the quartet's members.

The passage is illustrated in Ex. 10.1. The notes comprising the fugue subject are shown in red; each of these was subject to individual measurement of vibrato rate and width.

Ex. 10.1 – First movement, bars 1-16

Methodology

The passage was recorded in *.wav* format and subjected to analysis using the *SPAN* (Spectrum Analysis) program. This consists of a number of scripts developed for various forms of spectrum analysis, and uses the Signal Processing Toolbox of the *matlab* product.[5]

The process involved firstly creating a spectrogram of each occurrence of the fugue subject. An example of such a spectrogram (for the first occurrence of the fugue subject in the performance by the Amadeus Quartet) is shown in Fig. 10.1.

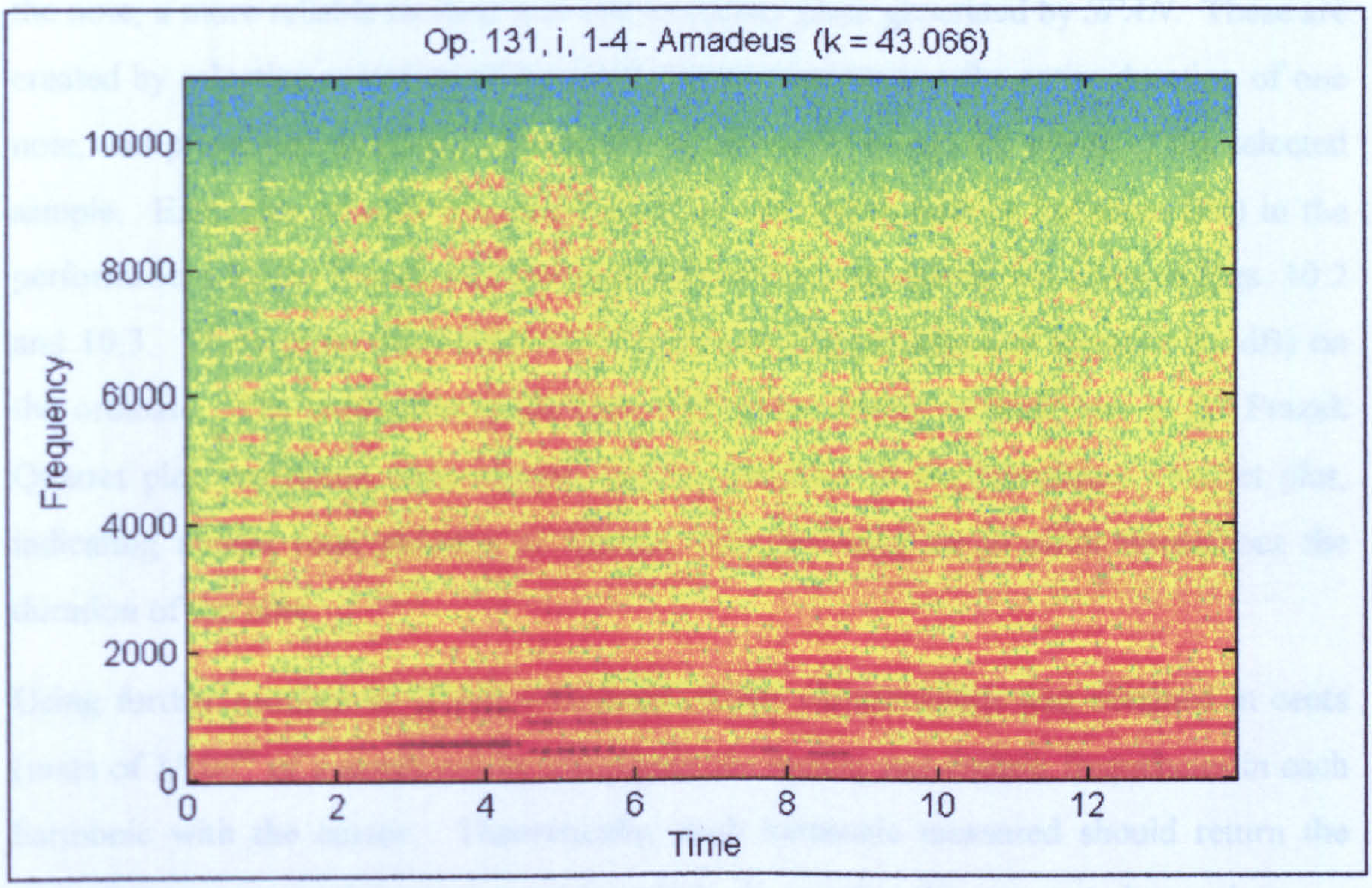


Fig. 10.1 – Spectrogram of the Amadeus Quartet performance of bars 1-4 of the first movement

This spectrogram shows time (in seconds) on the abscissa and pitch (in Hz) on the ordinate. Colour indicates dynamic, with red indicating a high dynamic. The vertical divisions between each note in the phrase are clearly visible in the spectrogram; the parallel horizontal lines indicate the fundamental of the note being played and a series of harmonics. The vibrato also shows clearly as a wavy line in each of the harmonics, from which it is possible to measure both vibrato rate and width.

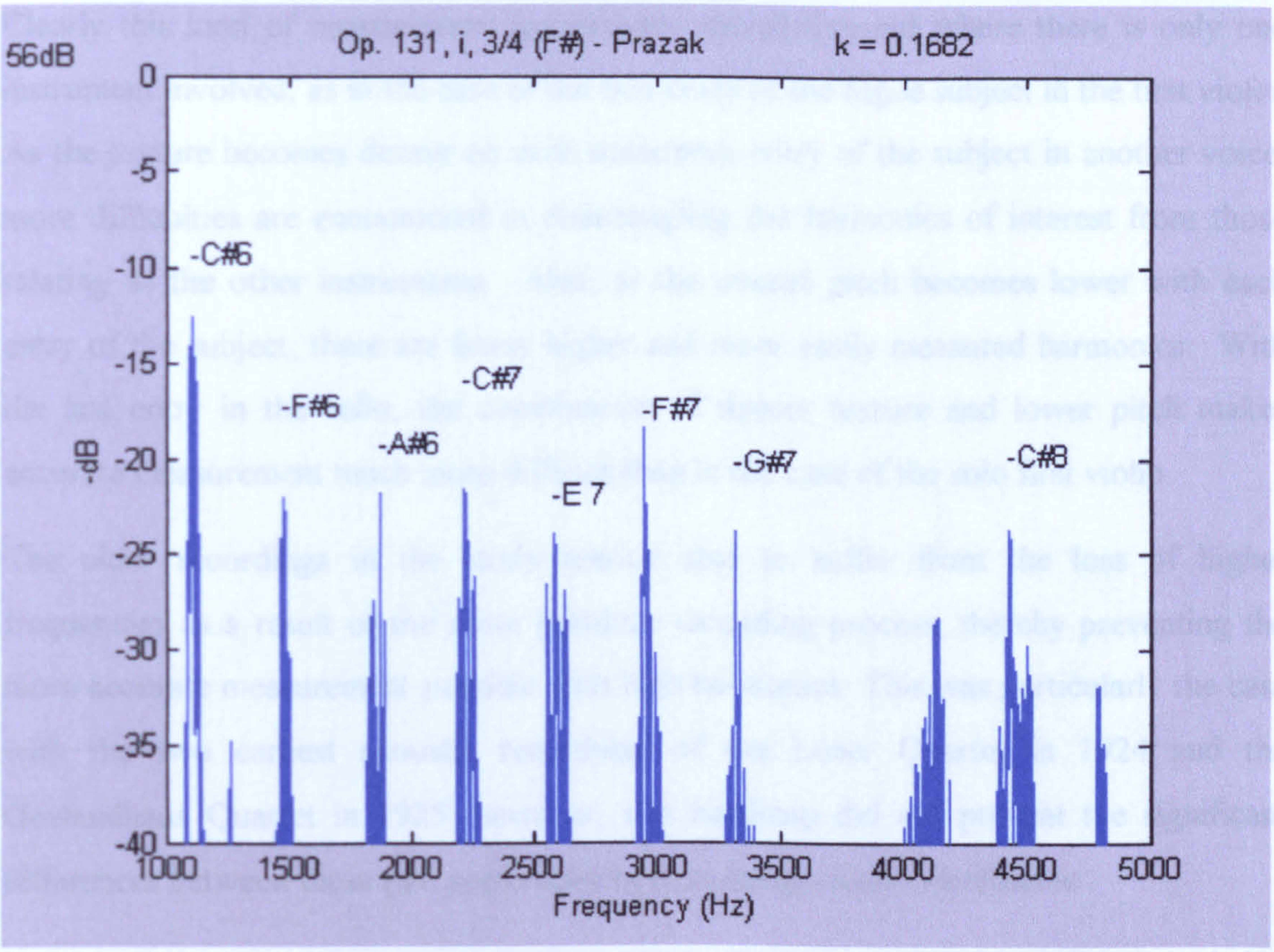
Vibrato rate for each note was measured by zooming in on the note in the spectrogram, and applying the 'vibrato-period' routine in *SPAN*. This calculates vibrato rate in cycles

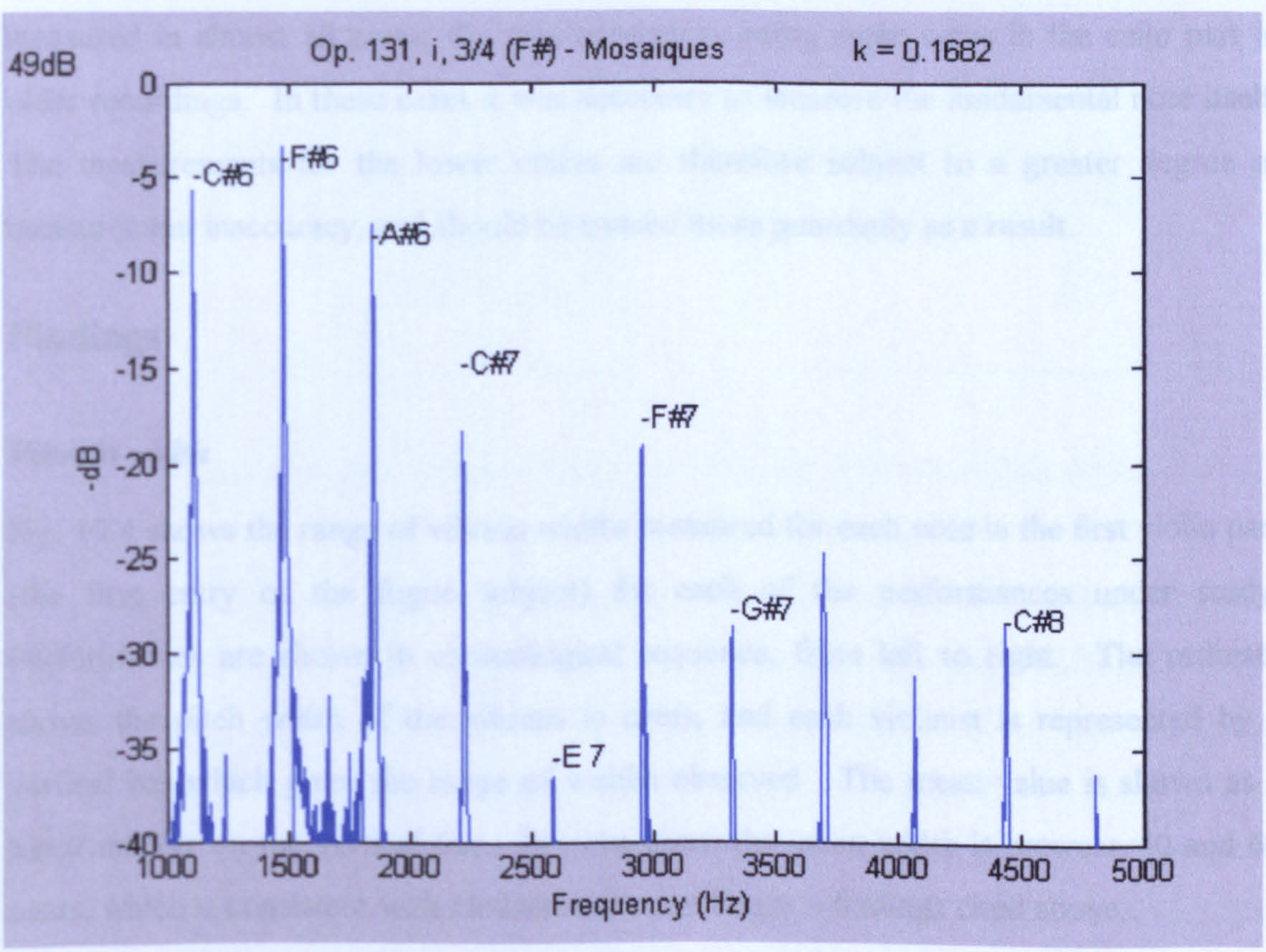
[5] Grateful thanks are expressed to Peter Johnson, of Birmingham Conservatoire, who provided access to the SPAN routines and assistance in their use.

per second based on identifying the start and end points of the note with the cursor and dividing the duration calculated from these points by the number of vibrato cycles which are identified visually on the chart.

While it would clearly be possible to make some sort of measure of vibrato width from these charts, by observing the highest and lowest frequencies of one of the harmonics of the note, a more reliable method is to use frequency plots generated by *SPAN*. These are created by selecting a section of the spectrogram representing the entire duration of one note, and present an analysis of frequency and dynamic across the whole of the selected sample. Examples of such frequency plots for the fourth beat of bar three (F#) in the performances by the Prazak and Mosaïques Quartets respectively are given in Figs. 10.2 and 10.3. These plots show frequency (in Hz) on the abscissa and dynamic (in dB) on the ordinate. The harmonics of the base note show clearly as thick bars in the Prazak Quartet plot, indicating wide vibrato, and as thin lines in the Mosaïques Quartet plot, indicating almost total absence of vibrato, with no variation in pitch throughout the duration of the note.

Using further routines in *SPAN*, a measure of the vibrato width was obtained in cents (units of 1/100th of a semitone) by identifying the lowest and highest frequencies in each harmonic with the cursor. Theoretically, each harmonic measured should return the same frequency spread (as expressed in cents). In practice this was not always the case, partly due to the greater accuracy of measurement possible at higher frequencies, and partly also possibly because of dynamic tail-off at higher frequencies. Wherever possible, at least four harmonics were measured, and the average value used in further analysis.





Figs. 10.2 and 10.3 - FFT frequency plot for the Prazak and Mosaïques Quartet performances of beat 3/4of the first movement (F#)

Clearly this kind of measurement is relatively straightforward where there is only one instrument involved, as in the case of the first entry of the fugue subject in the first violin. As the texture becomes denser on each successive entry of the subject in another voice, more difficulties are encountered in disentangling the harmonics of interest from those relating to the other instruments. Also, as the overall pitch becomes lower with each entry of the subject, there are fewer higher and more easily measured harmonics. With the last entry in the cello, the combination of denser texture and lower pitch makes accurate measurement much more difficult than in the case of the solo first violin.

The older recordings in the study tended also to suffer from the loss of higher frequencies as a result of the more primitive recording process, thereby preventing the more accurate measurement possible with high harmonics. This was particularly the case with the two earliest acoustic recordings of the Léner Quartet in 1924 and the Gewandhaus Quartet in 1925; however, this handicap did not prevent the significant differences between these two performances from being clearly identifiable.

Indeed, it was possible to identify harmonics which were unique to the note being measured in almost all cases, the only exceptions being some notes in the cello part in older recordings. In these cases it was necessary to measure the fundamental note itself. The measurements for the lower voices are therefore subject to a greater degree of measurement inaccuracy, and should be treated more guardedly as a result.

Findings

Vibrato width

Fig. 10.4 shows the range of vibrato widths measured for each note in the first violin part (the first entry of the fugue subject) for each of the performances under study. Performances are shown in chronological sequence, from left to right. The ordinate shows the pitch width of the vibrato in cents, and each violinist is represented by a vertical bar which gives the range of widths observed. The mean value is shown as a black marker on the vertical line. In most cases the mean width is between 40 and 60 cents, which is consistent with Hollinshead's and Reger's findings cited above.

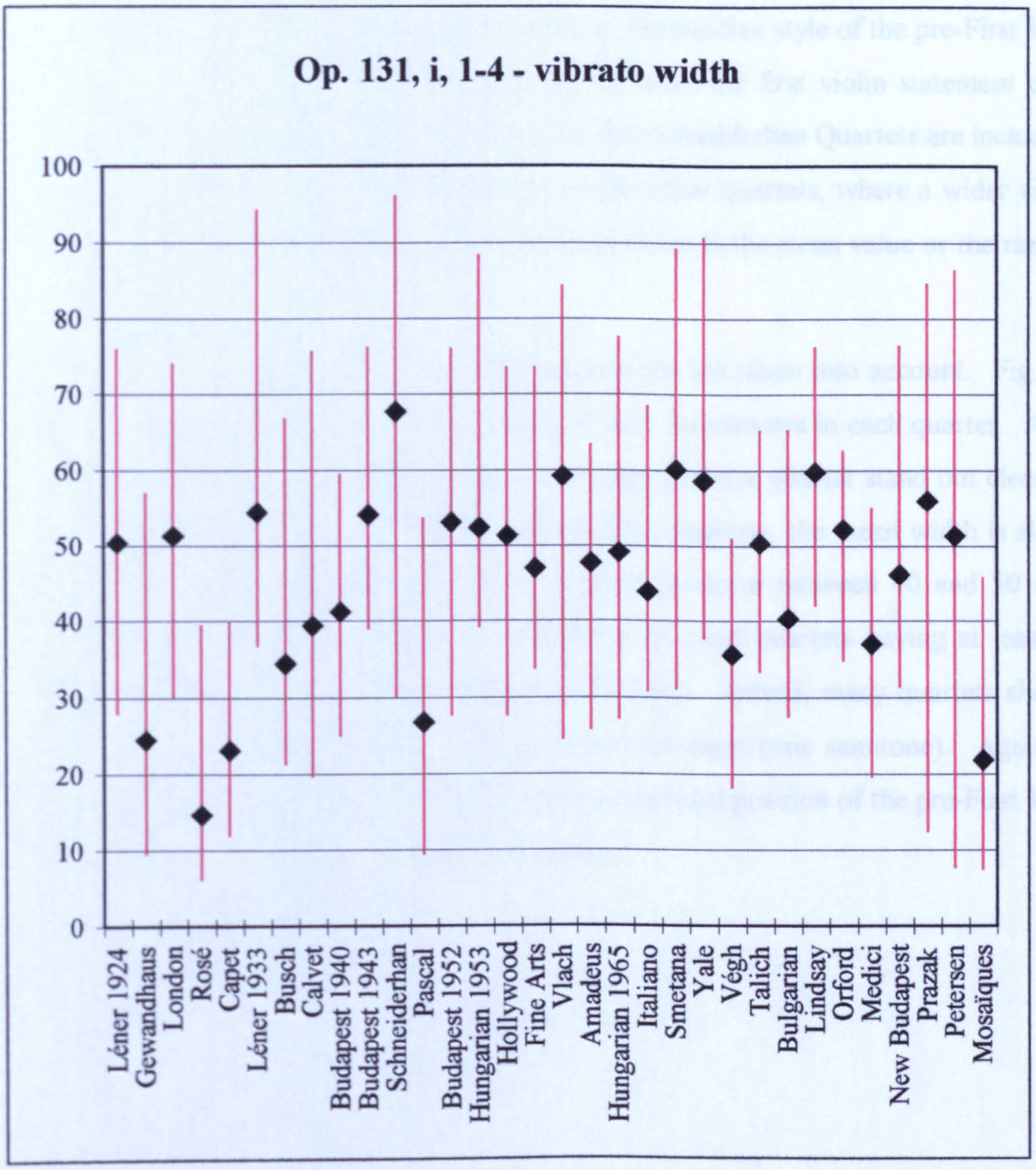


Fig. 10.4 – Range and mean values for vibrato width (in cents) for first violin, bars 1-4

The clearest exceptions are the Gewandhaus, Rosé, Capet and Mosaïques Quartets, where the mean width is around 20 cents. These four quartets comprise the only three in the study to have been founded before the First World War and the only quartet to adopt a consciously historical performance practice. Very few examples have a width of lower than 10 cents, but this slight amount of pitch variation over the duration of the note is almost inevitable, and is still heard quite clearly as *senza vibrato*. This is a very clear reflection of the historical shift in the use of vibrato discussed above. The only other first violinist who approaches these values is the Jacques Dumont of the Pascal Quartet. As an illustration of the contrast between the almost vibrato-free style of the pre-First World War quartets and the wide vibrato encountered later, the first violin statement of the fugue subject in the performances by the Rosé and Schneiderhan Quartets are included in the accompanying CD as tracks 43 and 44. In the other quartets, where a wider vibrato is employed, there is no apparent historical trend either in the mean value or the range of values displayed.

This picture is confirmed when the other instruments are taken into account. Fig. 10.5 shows all vibrato width measurements from all four instruments in each quartet. Again, the three early quartets and the period performance practice quartet stand out clearly by virtue of their much narrower vibrato. In the other quartets, the mean width is slightly lower than that for the first violin alone, tending to occur between 40 and 50 cents. However the range in most cases is extended, with most quartets having at least one value as low as 20 and one value as high as 80 cents. Indeed, many quartets show at least one vibrato approaching or even reaching 100 cents (one semitone). Again, the absence of any historical trend, other than the exceptional position of the pre-First World War and period performance quartets, is apparent.

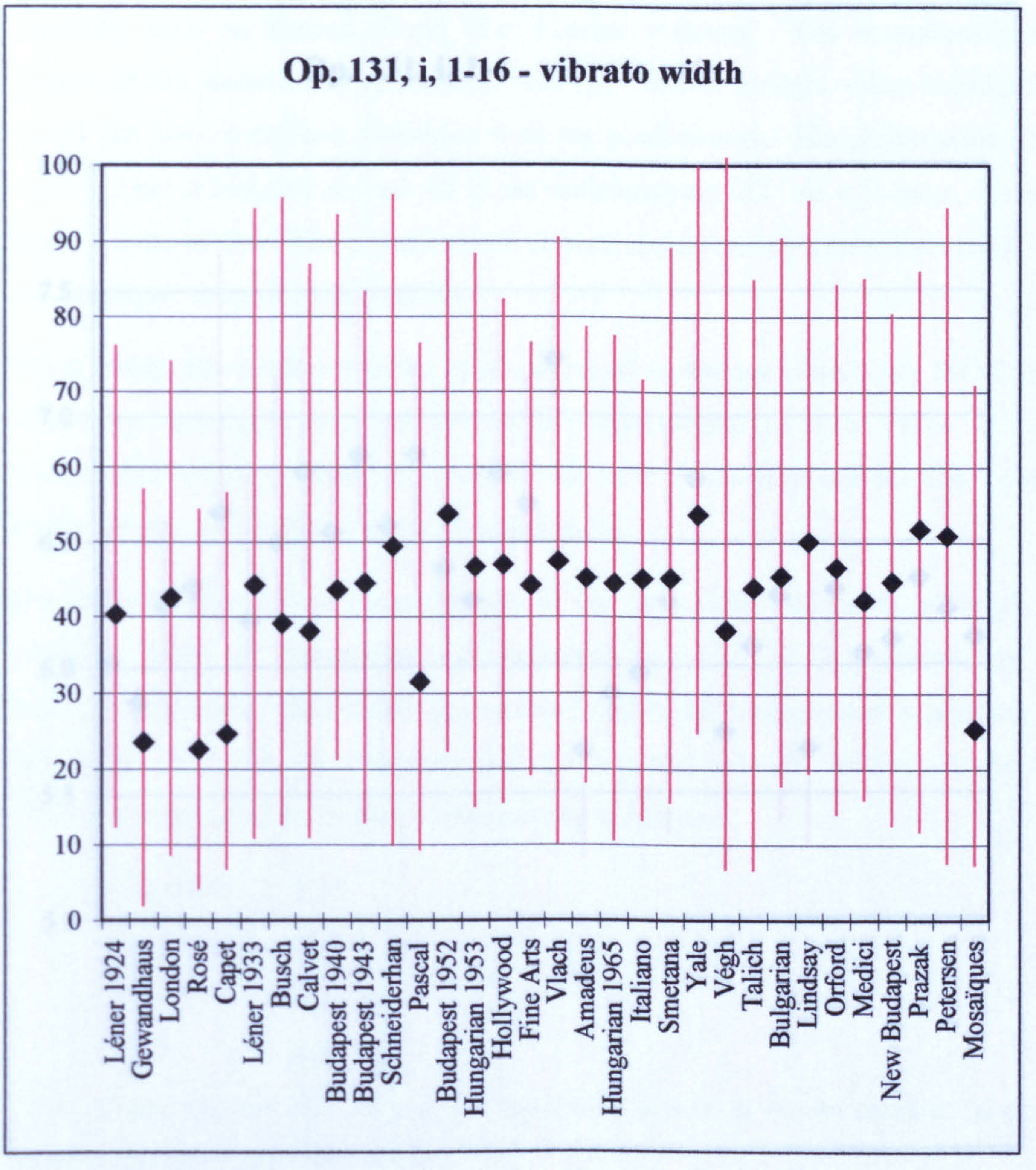


Fig. 10.5 – Range and mean values for vibrato width (in cents) for all instruments, bars 1-16 (statement of fugue subject only)

Vibrato rate

A similar representation of vibrato rate for the first violin only is given in Fig. 10.6, where the range of values and the mean value (expressed in cycles per second) is shown for each quartet.

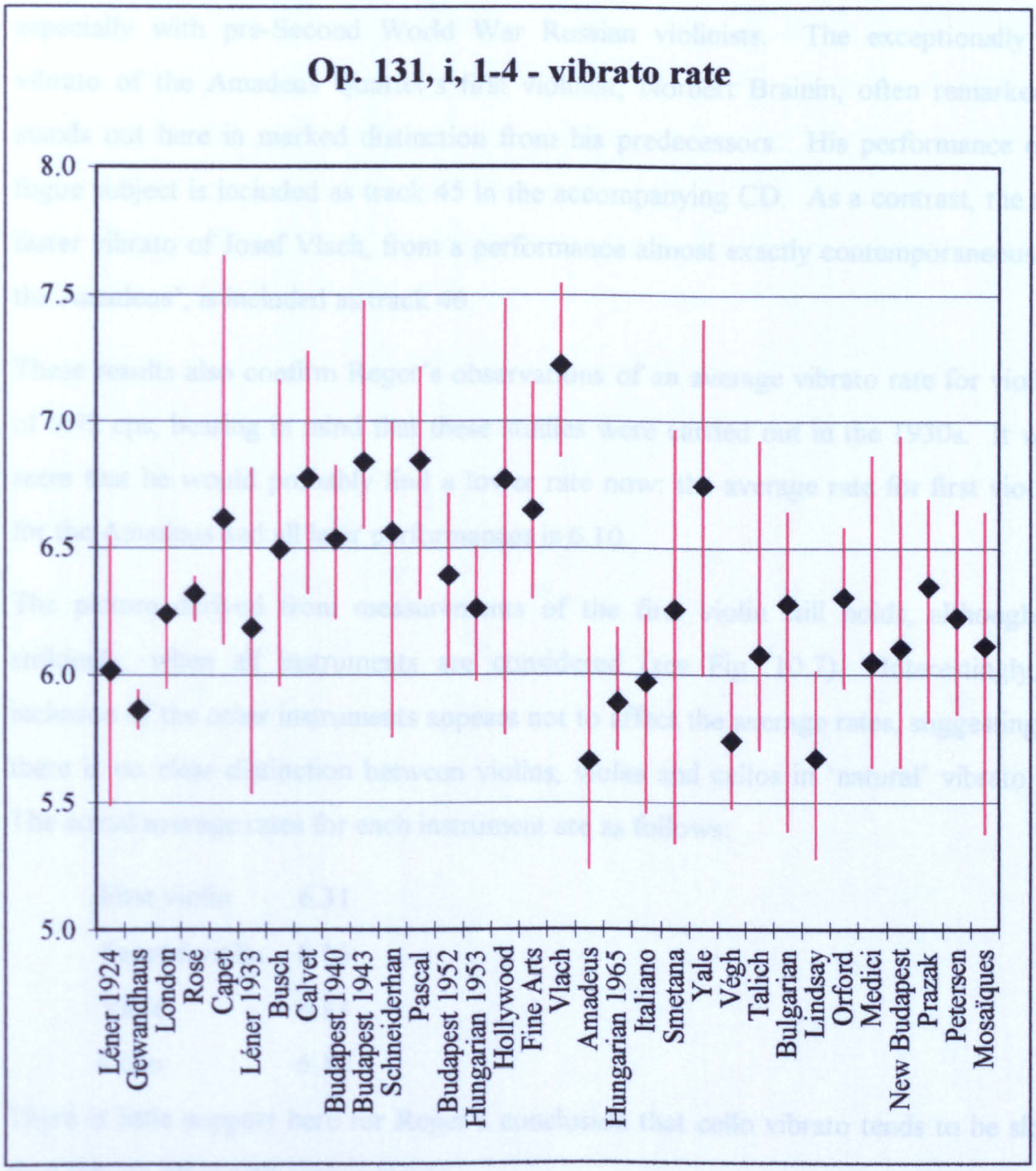


Fig. 10.6 – Range and mean values for vibrato rate (in cps) for first violin, bars 1-4

When considering rate rather than width, the three pre-First World War quartets do not stand out in the same way, although it should be noted that in these quartets there were far fewer notes in which vibrato was detectable at all. Lucien Capet shows the highest rate of any violinist, and this perhaps is a reflection of his idiosyncratic approach to vibrato as described above. However, there is a very clear and very different trend in evidence here, with a generally far faster rate prevalent in the period from the 1930s to the early 1960s, and a generally much slower rate thereafter. This is not entirely unexpected, and conforms to received wisdom about the 'nervy' vibrato associated especially with pre-Second World War Russian violinists. The exceptionally slow vibrato of the Amadeus Quartet's first violinist, Norbert Brainin, often remarked on, stands out here in marked distinction from his predecessors. His performance of the fugue subject is included as track 45 in the accompanying CD. As a contrast, the much faster vibrato of Josef Vlach, from a performance almost exactly contemporaneous with the Amadeus', is included as track 46.

These results also confirm Reger's observations of an average vibrato rate for violinists of 6.92 cps, bearing in mind that these studies were carried out in the 1930s. It would seem that he would probably find a lower rate now: the average rate for first violinists for the Amadeus and all later performances is 6.10.

The picture derived from measurements of the first violin still holds, although less strikingly, when all instruments are considered (see Fig. 10.7). Interestingly, the inclusion of the other instruments appears not to affect the average rates, suggesting that there is no clear distinction between violins, violas and cellos in 'natural' vibrato rate. The actual average rates for each instrument are as follows:

First violin	6.31
Second violin	6.16
Viola	6.13
Cello	6.18

There is little support here for Reger's conclusion that cello vibrato tends to be slower than that on other string instruments.

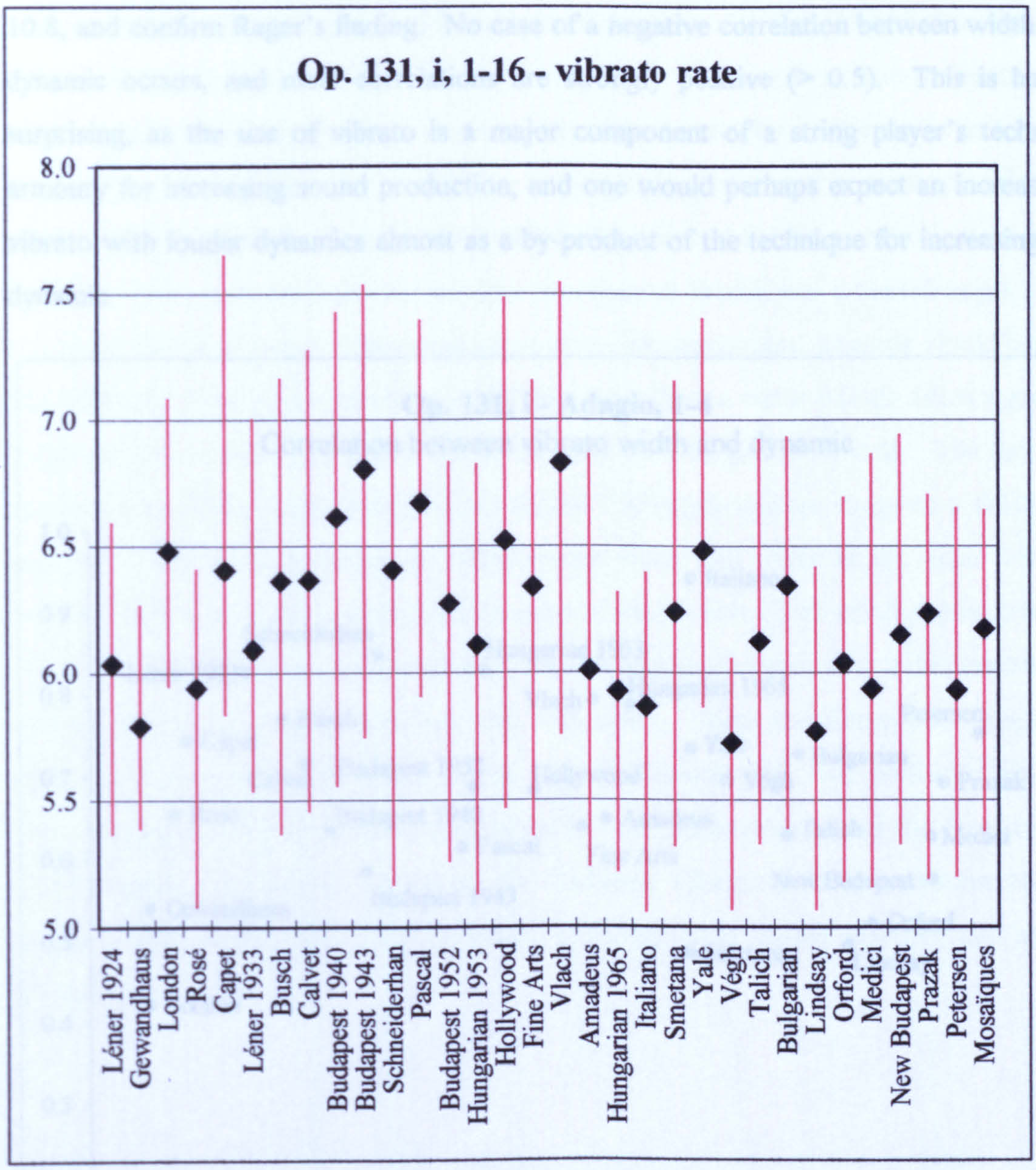


Fig. 10.7 – Range and mean values for vibrato rate (in cps) for all instruments, bars 1-16 (statement of fugue subject only)

In order to test Reger's finding, in the study cited above, that vibrato width tended to increase with dynamic, measures were taken of the highest dynamic in each note of the first violin statement of the fugue subject (bars 1-4). The measurements were taken using the *Dynamics* routine of the *SPAN* software, and the peak reading taken for each note measured. To neutralise the effect of the different units of measurement for dynamic and vibrato width, the figures for each were recalibrated to a scale of 0 – 100, and a correlation coefficient calculated for each quartet. The results are plotted in Fig.

10.8, and confirm Reger's finding. No case of a negative correlation between width and dynamic occurs, and most correlations are strongly positive (> 0.5). This is hardly surprising, as the use of vibrato is a major component of a string player's technical armoury for increasing sound production, and one would perhaps expect an increase of vibrato with louder dynamics almost as a by-product of the technique for increasing the dynamic.

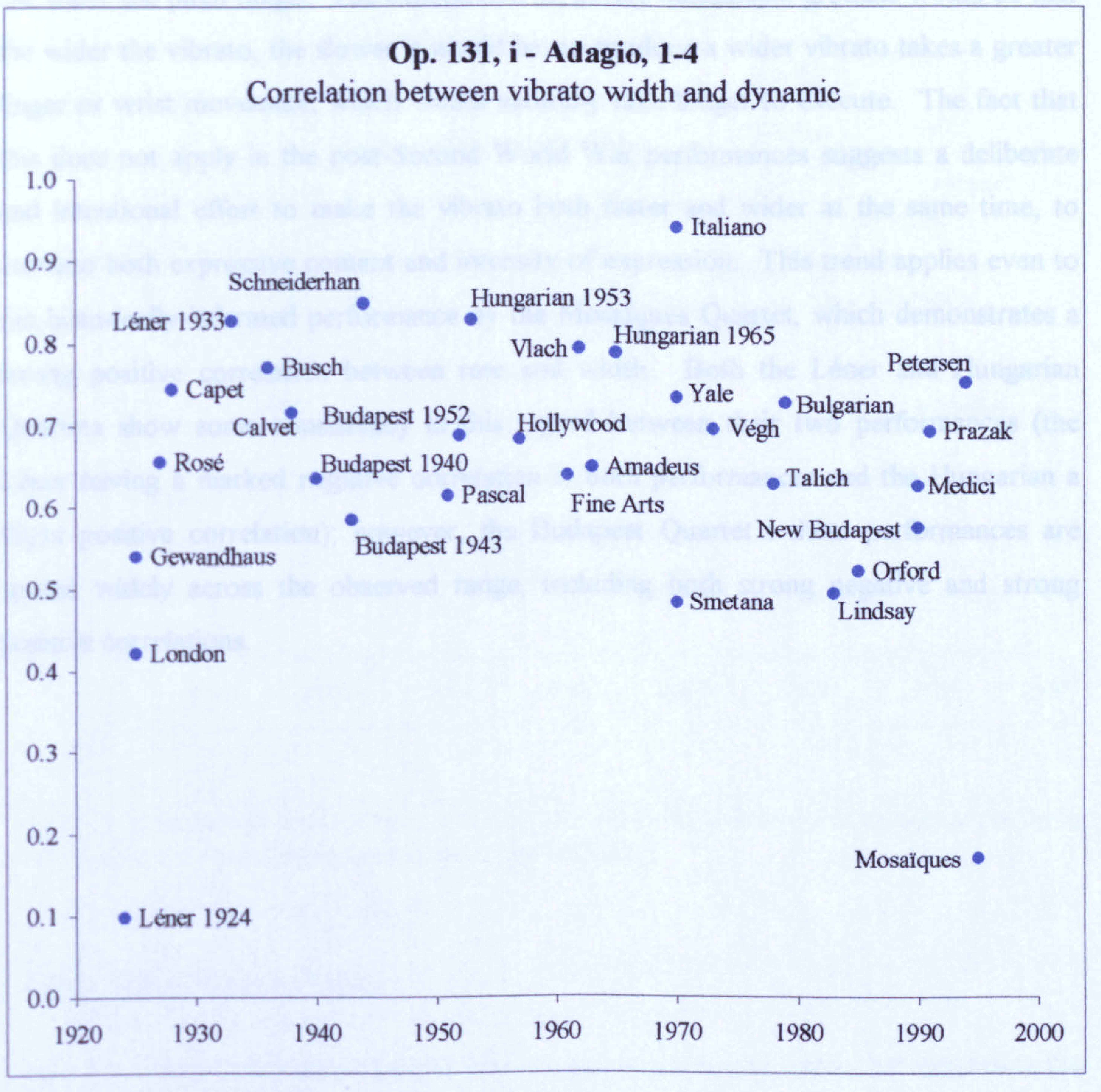


Fig. 10.8 – Correlation between dynamic and vibrato width in the first violin statement of the fugue subject, bars 1-4 (correlation factor plotted against year)

A more surprising result is observed when vibrato rate is compared with vibrato width. Fig. 10.9 shows the correlation of width and rate, again for the first violin statement of the fugue subject, omitting the performances of the three pre-First World War Quartets (Gewandhaus, Capet and Rosé), where the vibrato is slight or even non-existent. This demonstrates a clear trend from a strong negative correlation in the early part of the period to a strong positive correlation in the later part: on the evidence of these performances, before the Second World War it was normal for the vibrato to slow down as it got wider in pitch range, whereas after the Second World War it tended to get faster the wider the pitch range. The expectation on purely mechanical grounds would be that the wider the vibrato, the slower it would be: to produce a wider vibrato takes a greater finger or wrist movement, which would naturally take longer to execute. The fact that this does not apply in the post-Second World War performances suggests a deliberate and intentional effort to make the vibrato both faster and wider at the same time, to increase both expressive content and intensity of expression. This trend applies even to the historically-informed performance by the Mosaïques Quartet, which demonstrates a strong positive correlation between rate and width. Both the Léner and Hungarian Quartets show some consistency in this regard between their two performances (the Léner having a marked negative correlation in both performances and the Hungarian a slight positive correlation); however, the Budapest Quartet's three performances are spread widely across the observed range, including both strong negative and strong positive correlations.

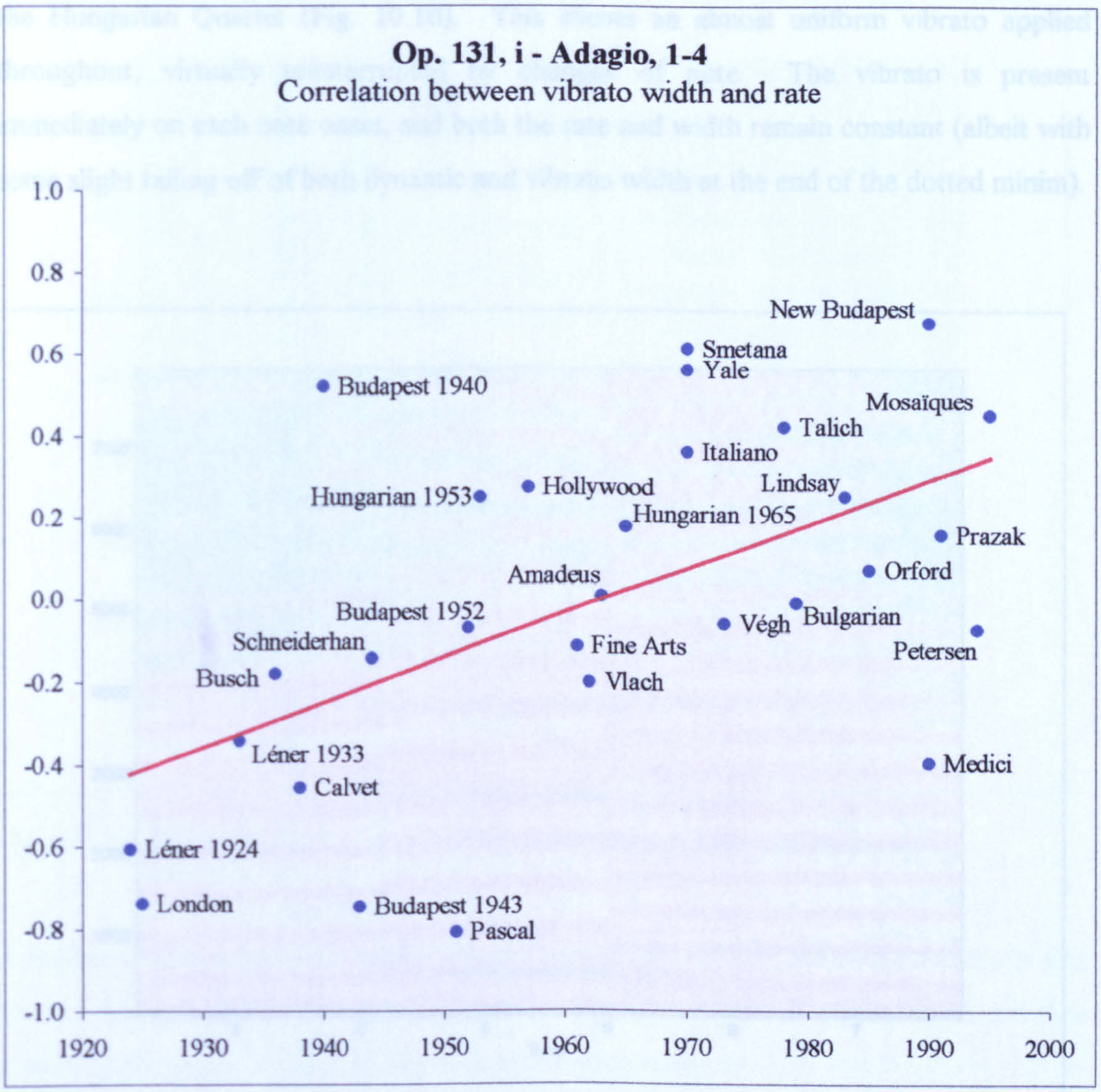


Fig. 10.9 – Correlation between vibrato width and rate in the first violin statement of the fugue subject, bars 1-4 (correlation factor plotted against year)

Individual characteristics

There are clearly many other factors beyond average rate and width that determine the characteristics of an individual player's vibrato, most of which arise from *variation* in the rate and width over the duration of the note.

The variety of approach to vibrato can be illustrated by examining in more detail, by means of spectrograms, four separate performances of the two minims and the dotted minim in bars 1-2. The first example is of Zoltán Székely, in the 1965 performance by the Hungarian Quartet (Fig. 10.10). This shows an almost uniform vibrato applied throughout, virtually uninterrupted by changes of note. The vibrato is present immediately on each note onset, and both the rate and width remain constant (albeit with some slight tailing off of both dynamic and vibrato width at the end of the dotted minim).

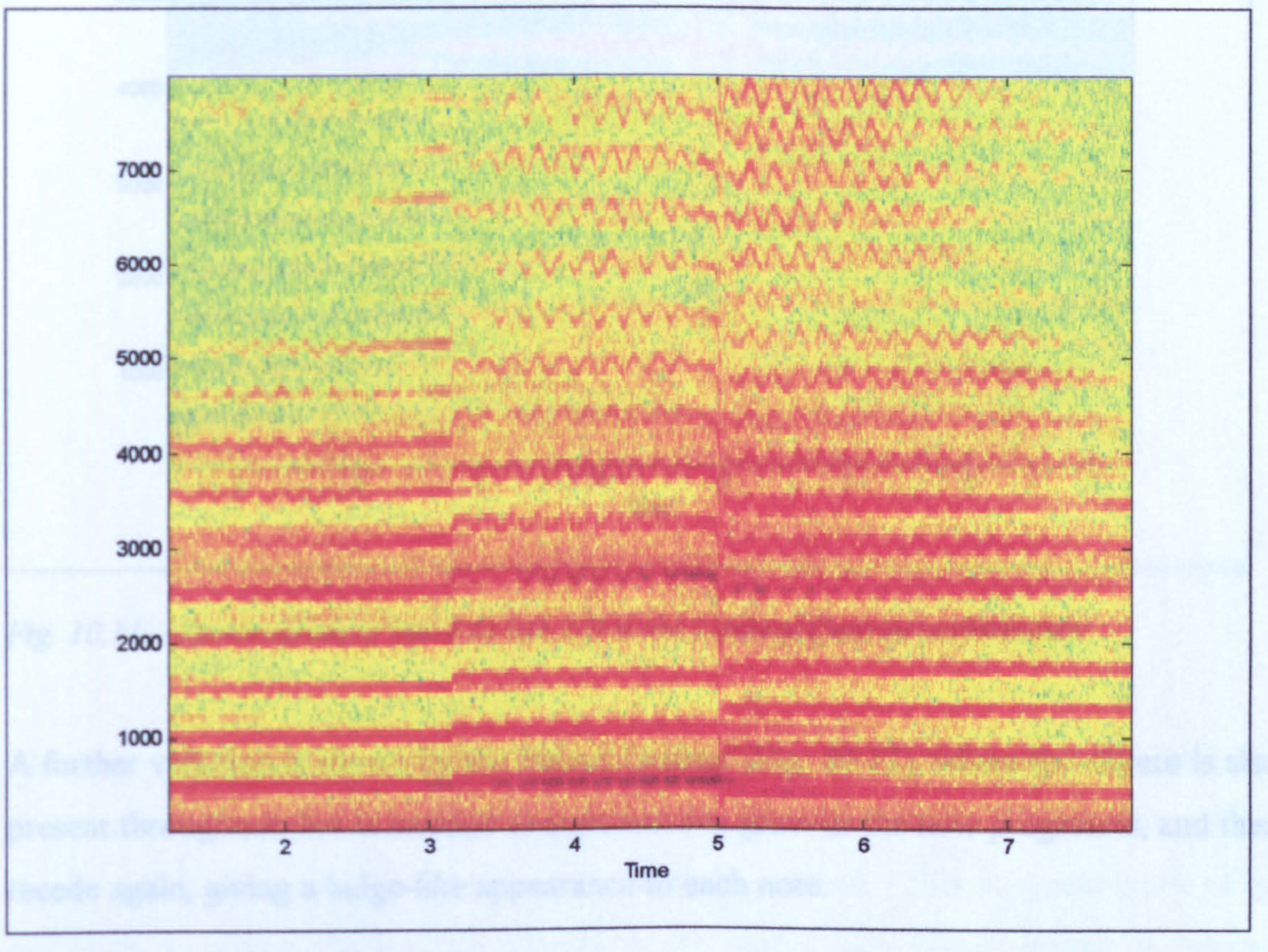


Fig. 10.10 – Spectrogram of bar 1 to bar 2/3 in the 1965 Hungarian Quartet performance

The second example is from the Lindsay Quartet's recording (Fig. 10.11). Here, while the vibrato is also constant throughout, it is more inclined to grow in width with increasing dynamic, and to narrow again as the dynamic recedes.

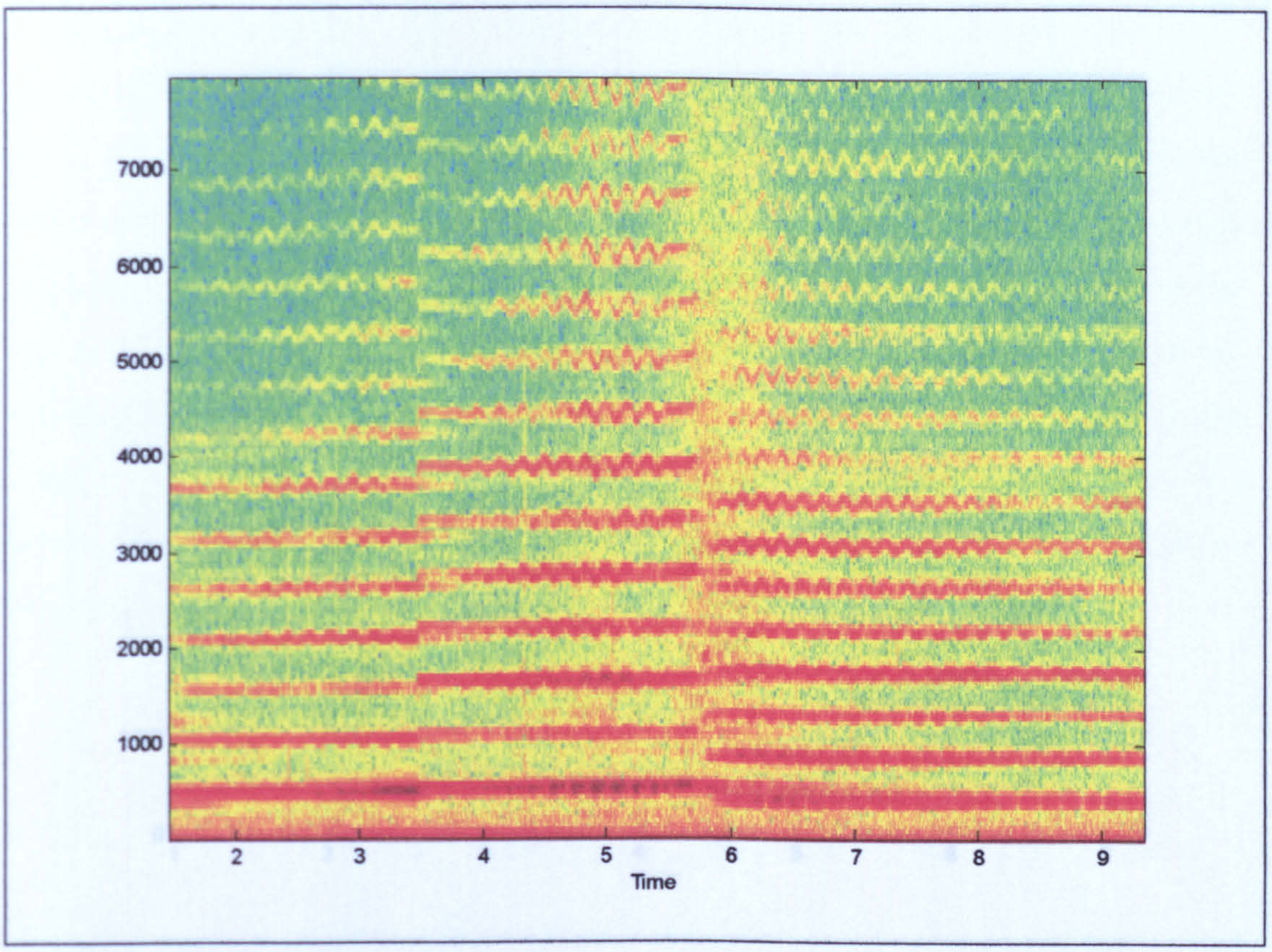


Fig. 10.11 – Spectrogram of bar 1 to bar 2/3 in the Lindsay Quartet performance

A further variation is shown by the Prazak Quartet (Fig. 10.12), where the vibrato is also present throughout, but is inclined to start narrow, grow as the note progresses, and then recede again, giving a bulge-like appearance to each note.

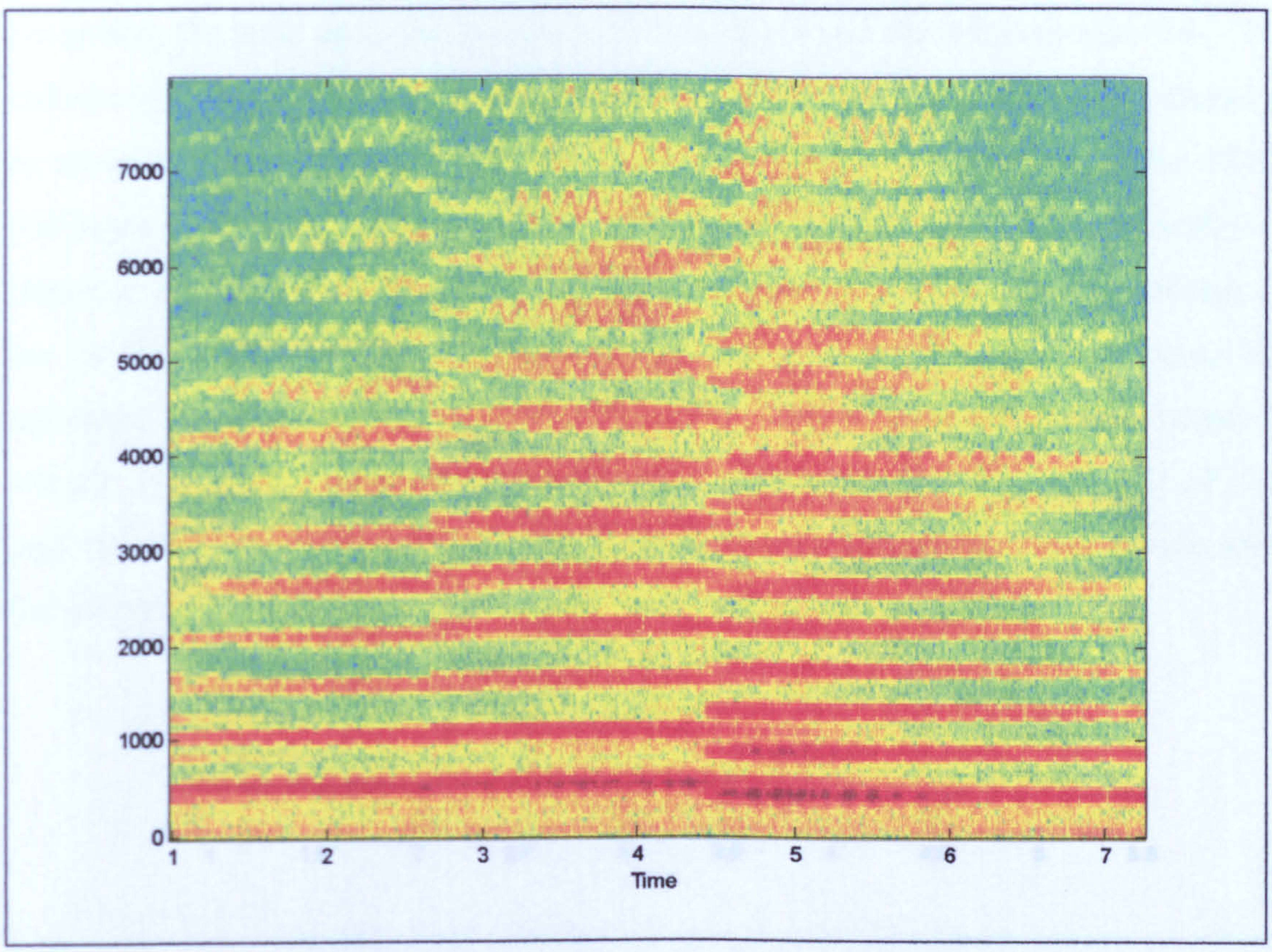


Fig. 10.12 – Spectrogram of bar 1 to bar 2/3 in the Prazak Quartet performance

The final example, from the Mosaïques Quartet (Fig. 10.13), differs from the previous three in that the vibrato is not present at all at the start of the note. Rather, the pitch of the note is firmly established before any vibrato is applied. This is symptomatic of an approach in which vibrato-free playing is the norm, and where vibrato is applied occasionally as a decorative or special expressive device. It is also relevant in this context that in the statement of the fugue subject (comprising some twelve notes), vibrato is detectable in only one other note in this performance.

In the first three of these examples, vibrato is accepted as a normal component of violin tone production, and is constantly present. It may be varied in width for expressive purposes, but in this context any absence of vibrato would stand out as a deliberate special effect (to be used, for example, in the 'Heiliger Dankgesang' section of Beethoven's Op. 132 quartet). With the Mosaïques we see a style in which vibrato-less playing is the norm, and in which any application of vibrato is for deliberate expressive or decorative purposes.

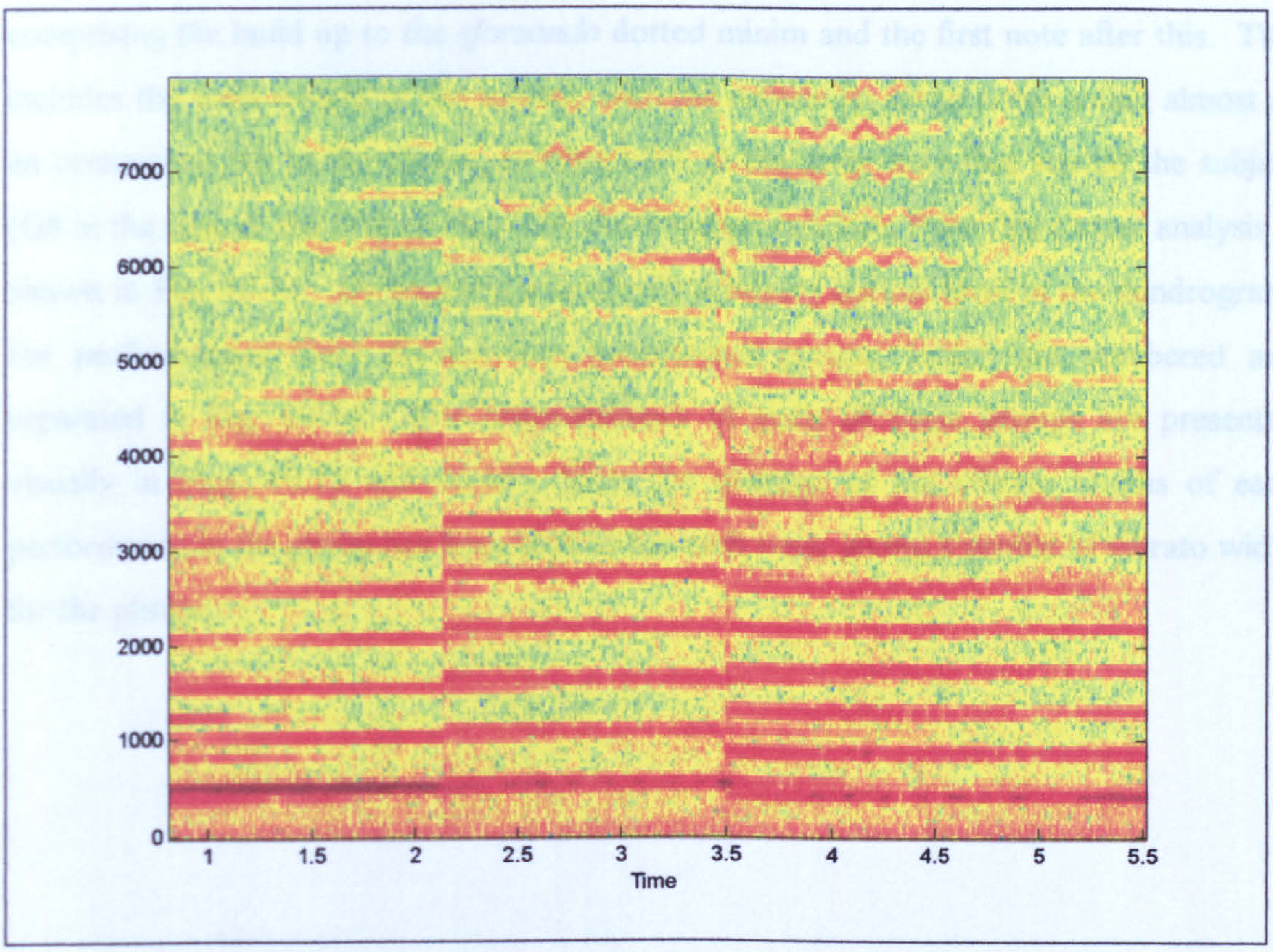
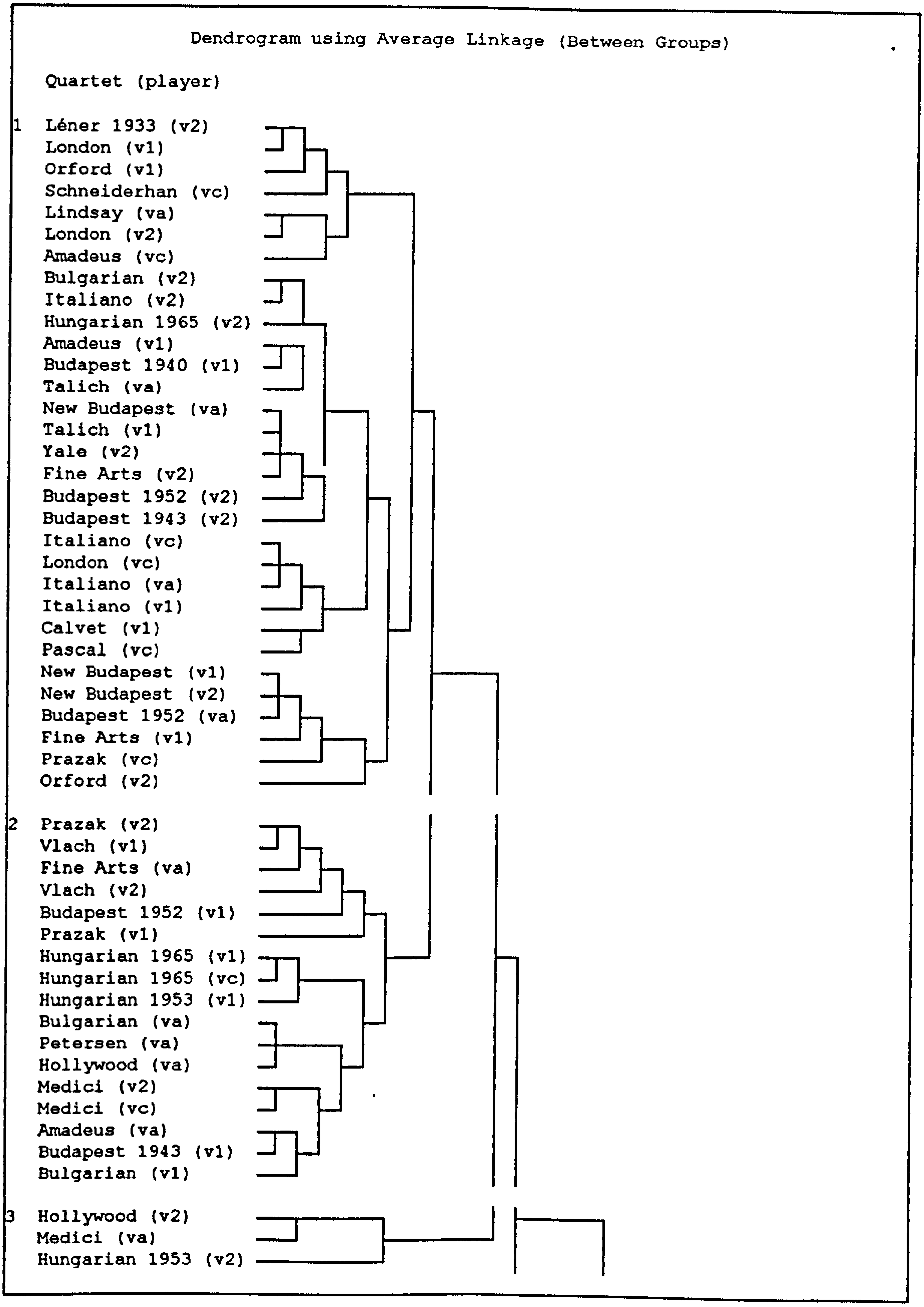


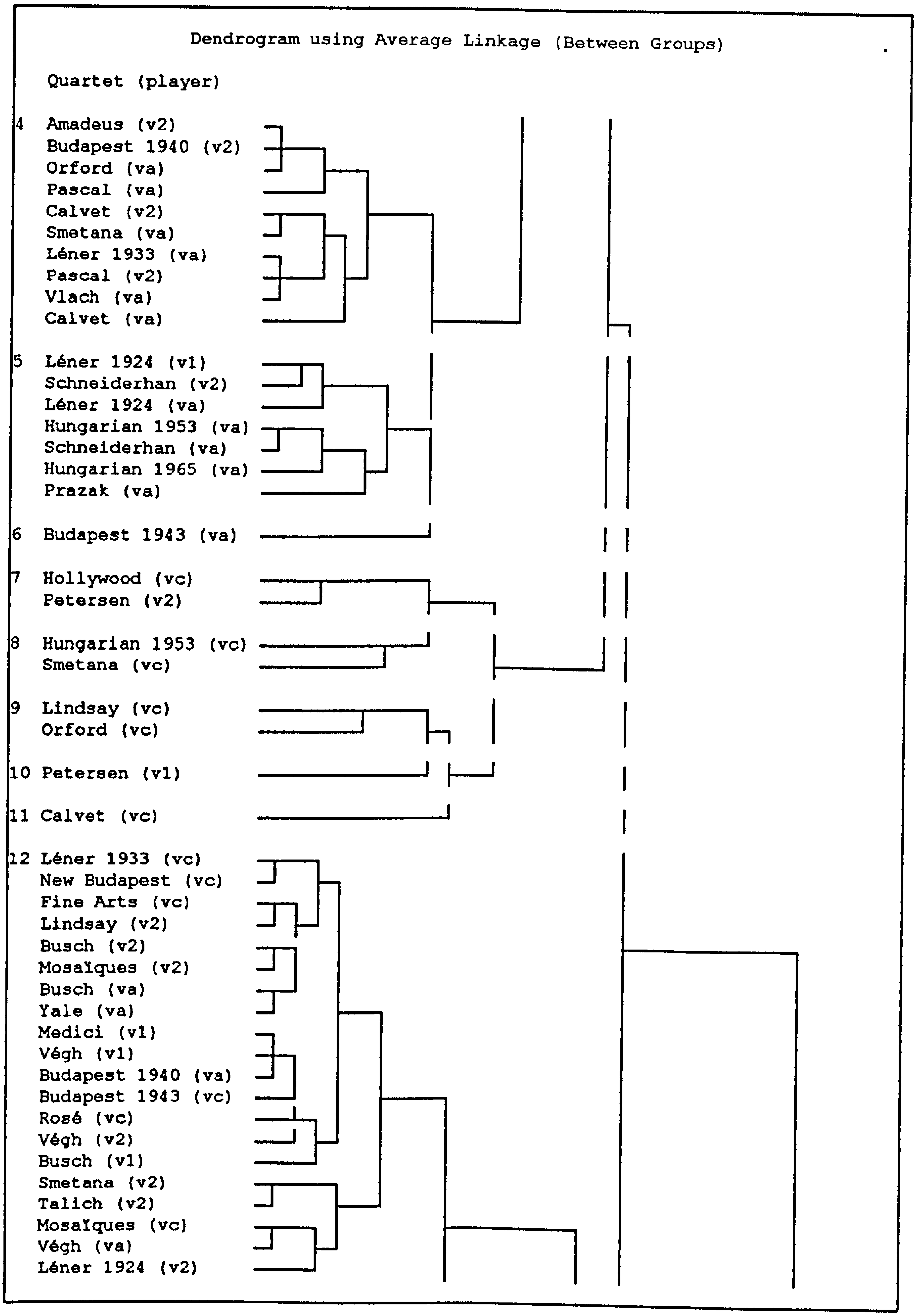
Fig. 10.13 – Spectrogram of bar 1 to bar 2/3 in the Mosaïques Quartet performance

The contribution of vibrato to phrase shaping

Hitherto vibrato has been considered in terms of averages, and an attempt made to elucidate systematic differences in vibrato use between quartets and players. However, it is the variation in the rate and width of vibrato applied over a musical phrase which allows it to contribute to expressive phrase shaping. We therefore now turn to a comparison of this variation over the phrase (in this case the fugue subject) between players and quartets. The technique applied was to take the vibrato width values for each note of the phrase as the variables applying to each performance of the fugue subject (treating the occurrences in each instrument as equivalent), and to subject these to cluster analysis.

Initially, all twelve notes of the subject were included as variables in the analysis. However, no clear groupings emerged from this analysis, leading to the conclusion that there are effectively as many ways to vary vibrato over the whole subject as there are players. A second attempt was then made, limited to the first five notes of the subject, comprising the build up to the *sforzando* dotted minim and the first note after this. This includes the main weight of the subject, with the remaining seven notes acting almost as an ornamental tail to the phrase, arriving back at the same note that started the subject (G# in the case of the first violin.) The dendrogram resulting from this cluster analysis is shown in Fig. 10.14. By applying a relatively arbitrary cut-off level in the dendrogram, the performances were divided into twenty-one groups, which are numbered and separated in Fig. 10.14. The characteristics of each of these groups are presented visually in Figs. 10.15 and 10.16. Here the average of the vibrato widths of each performance in the group has been plotted for each note, giving a profile of vibrato width for the phrase.


Dendrogram using Average Linkage (Between Groups)
Quartet (player)
1
Léner 1933 (v2)
London (v1)
Orford (v1)
Schneiderhan (vc)
Lindsay (va)
London (v2)
Amadeus (vc)
Bulgarian (v2)
Italiano (v2)
Hungarian 1965 (v2)
Amadeus (v1)
Budapest 1940 (v1)
Talich (va)
New Budapest (va)
Talich (v1)
Yale (v2)
Fine Arts (v2)
Budapest 1952 (v2)
Budapest 1943 (v2)
Italiano (vc)
London (vc)
Italiano (va)
Italiano (v1)
Calvet (v1)
Pascal (vc)
New Budapest (v1)
New Budapest (v2)
Budapest 1952 (va)
Fine Arts (v1)
Prazak (vc)
Orford (v2)
2
Prazak (v2)
Vlach (v1)
Fine Arts (va)
Vlach (v2)
Budapest 1952 (v1)
Prazak (v1)
Hungarian 1965 (v1)
Hungarian 1965 (vc)
Hungarian 1953 (v1)
Bulgarian (va)
Petersen (va)
Hollywood (va)
Medici (v2)
Medici (vc)
Amadeus (va)
Budapest 1943 (v1)
Bulgarian (v1)
3
Hollywood (v2)
Medici (va)
Hungarian 1953 (v2)


Dendrogram using Average Linkage (Between Groups)
Quartet (player)
4 Amadeus (v2)
Budapest 1940 (v2)
Orford (va)
Pascal (va)
Calvet (v2)
Smetana (va)
Léner 1933 (va)
Pascal (v2)
Vlach (va)
Calvet (va)
5 Léner 1924 (v1)
Schneiderhan (v2)
Léner 1924 (va)
Hungarian 1953 (va)
Schneiderhan (va)
Hungarian 1965 (va)
Prazak (va)
6 Budapest 1943 (va)
7 Hollywood (vc)
Petersen (v2)
8 Hungarian 1953 (vc)
Smetana (vc)
9 Lindsay (vc)
Orford (vc)
10 Petersen (v1)
11 Calvet (vc)
12 Léner 1933 (vc)
New Budapest (vc)
Fine Arts (vc)
Lindsay (v2)
Busch (v2)
Mosaïques (v2)
Busch (va)
Yale (va)
Medici (v1)
Végh (v1)
Budapest 1940 (va)
Budapest 1943 (vc)
Rosé (vc)
Végh (v2)
Busch (v1)
Smetana (v2)
Talich (v2)
Mosaïques (vc)
Végh (va)
Léner 1924 (v2)

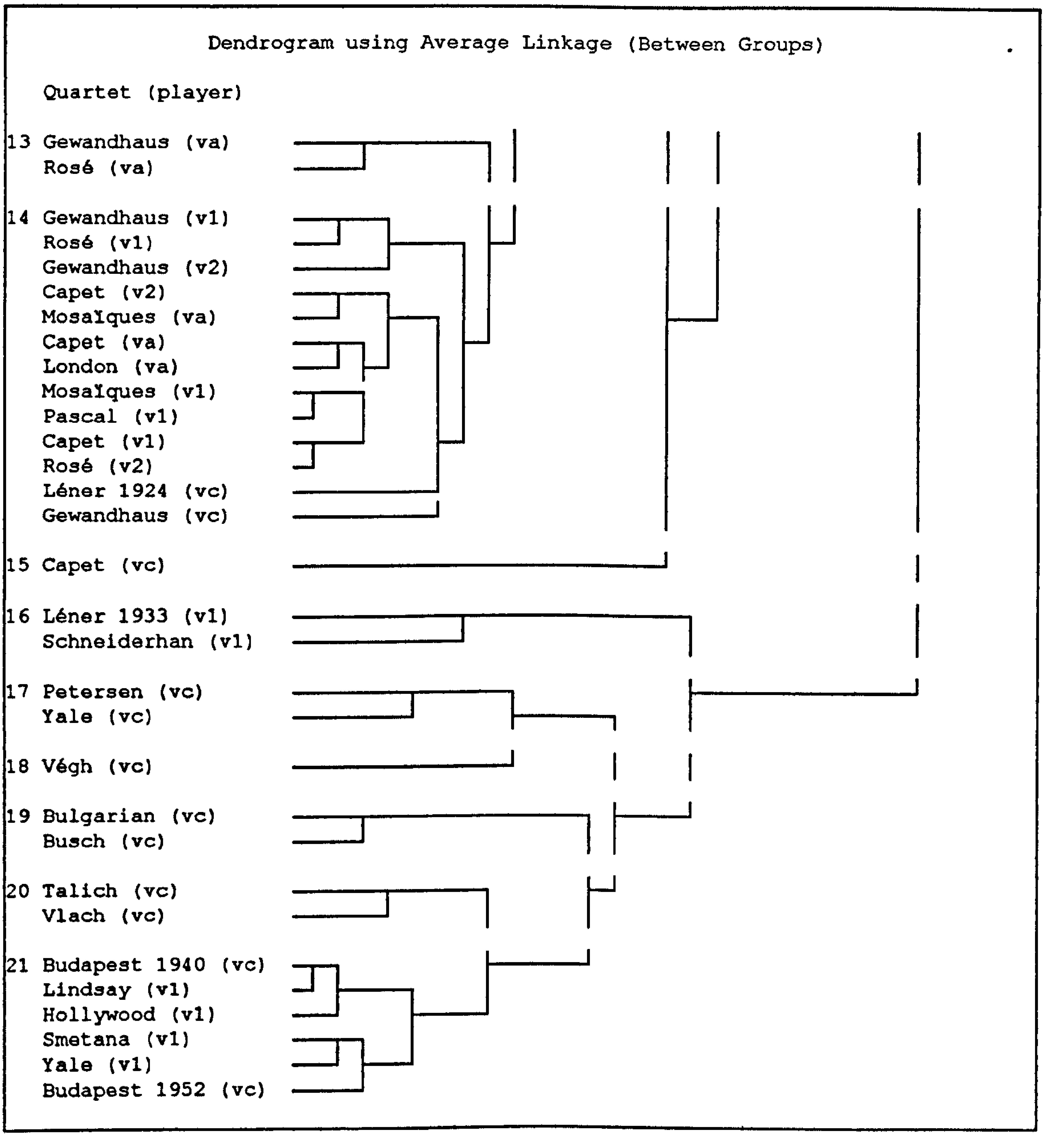


Fig. 10.14 – Dendrogram from the cluster analysis of vibrato width in the first five notes of the fugue subject in the first movement of Op.131, bars 1-16

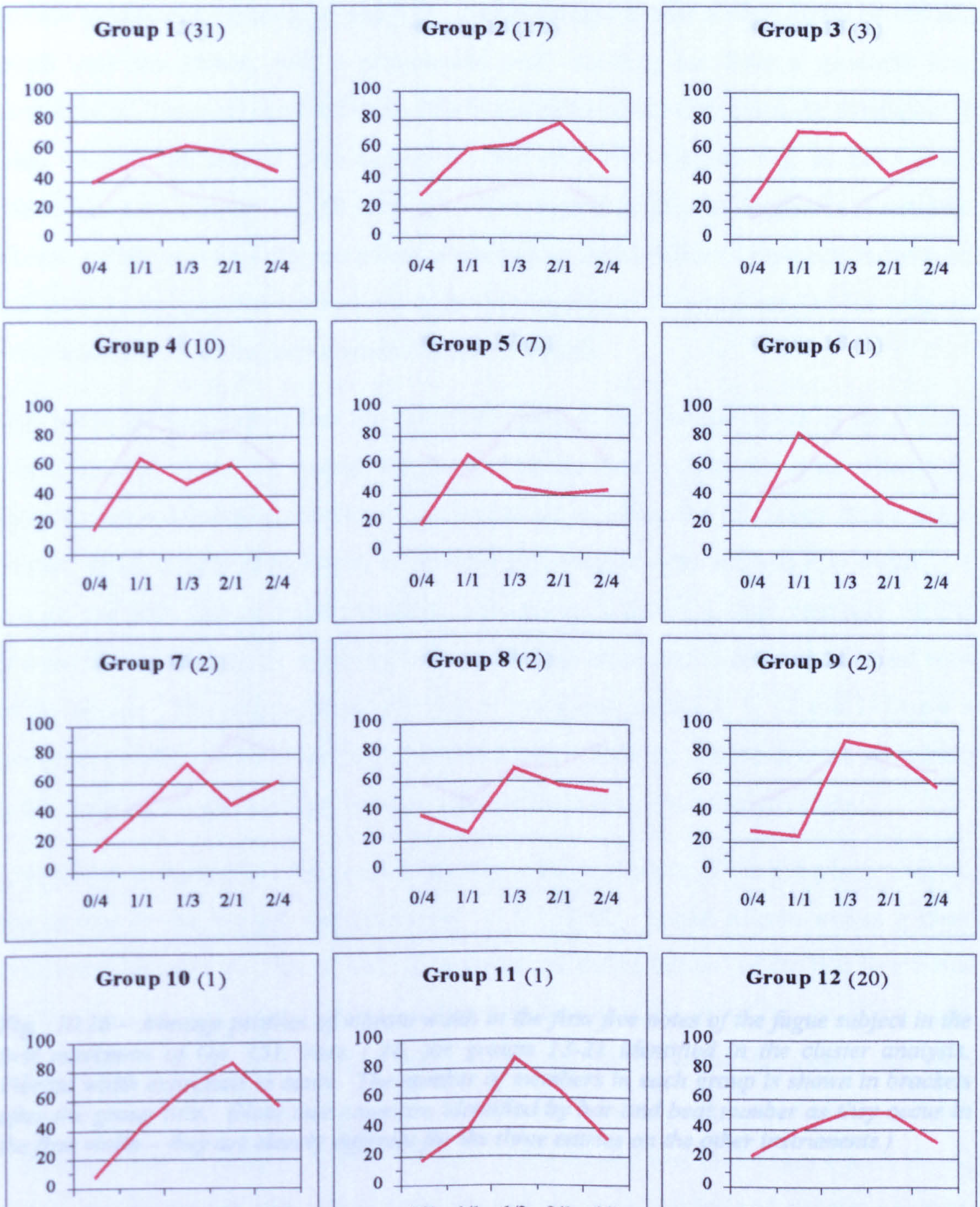


Fig. 10.15 – Average profiles of vibrato width in the first five notes of the fugue subject in the first movement of Op. 131, bars 1-16, for groups 1-12 identified in the cluster analysis. Vibrato width expressed in cents. The number of members in each group is shown in brackets after the group title. (Note that notes are identified by bar and beat number as they occur in the first violin – they are clearly different for the three entries on the other instruments.)

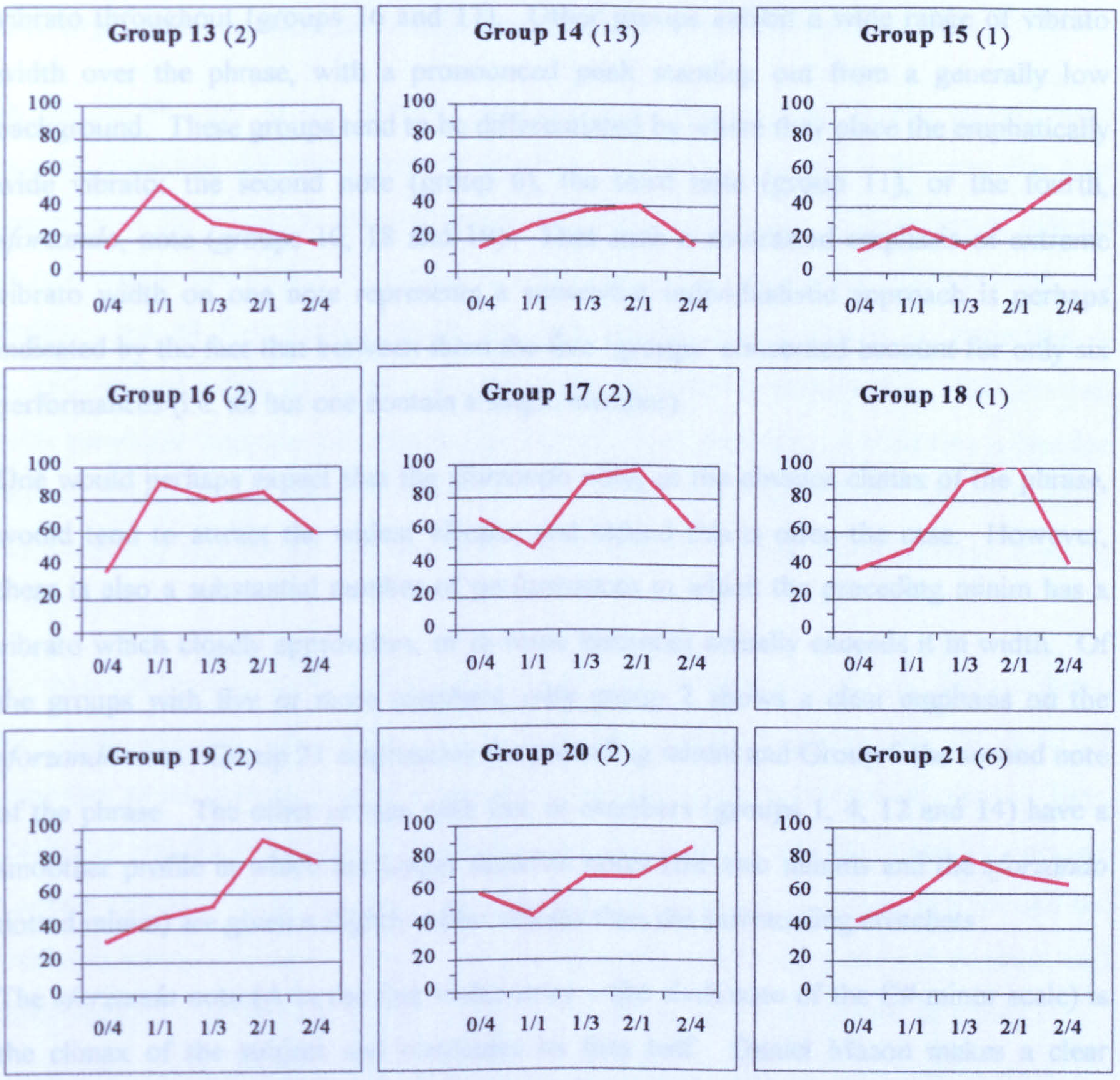


Fig. 10.16 – Average profiles of vibrato width in the first five notes of the fugue subject in the first movement of Op. 131, bars 1-16, for groups 13-21 identified in the cluster analysis. Vibrato width expressed in cents. The number of members in each group is shown in brackets after the group title. (Note that notes are identified by bar and beat number as they occur in the first violin – they are clearly different for the three entries on the other instruments.)

A cursory glance at these twenty-one profiles is enough to show that the variety of approaches to the shaping of the phrase is extremely wide. Overall, groups 1 – 11 are characterized by moderate vibrato width, with differing amounts of variation, groups 12 – 15 by generally low vibrato width, and groups 16 – 21 by generally high vibrato width. Some performances show moderate vibrato width throughout with little variation (group 1); some have narrow vibrato throughout either with little variation (group 14) or a slight tendency to peak on the second note (group 13); and some show a generally wide vibrato throughout (groups 16 and 17). Other groups exhibit a wide range of vibrato width over the phrase, with a pronounced peak standing out from a generally low background. These groups tend to be differentiated by where they place the emphatically wide vibrato: the second note (group 6), the third note (group 11), or the fourth, *sforzando*, note (groups 10, 18 and 19). That such a contrasted emphasis of extreme vibrato width on one note represents a somewhat individualistic approach is perhaps indicated by the fact that between them the five 'groups' concerned account for only six performances (i.e. all but one contain a single member).

One would perhaps expect that the *sforzando* note, as the obvious climax of the phrase, would tend to attract the widest vibrato, and indeed this is often the case. However, there is also a substantial number of performances in which the preceding minim has a vibrato which closely approaches, or in some instances actually exceeds it in width. Of the groups with five or more members, only group 2 shows a clear emphasis on the *sforzando* note. Group 21 emphasizes the preceding minim and Group 5 the second note of the phrase. The other groups with five or members (groups 1, 4, 12 and 14) have a smoother profile in which the longer duration notes (the two minims and the *sforzando* dotted minim) are given a slightly wider vibrato than the surrounding crotchets.

The *sforzando* note (A in the first violin entry – the sixth note of the C# minor scale) is the climax of the subject and concludes its first half. Daniel Mason makes a clear distinction between the 'fiat of will, an impassioned call to action' of the first four notes of the fugue subject and the 'compliant' motive that is made up of the remaining eight notes (Mason, 1947: 240). The effect of widening the vibrato in the second and third notes, leading up to the *sforzando*, is to create a sense of expectancy and to some extent prepare for the A, while a narrower vibrato in the second and third notes causes the A, played *sforzando* and with wide vibrato, to make a more sudden and shocking impact. An example of the first approach, with wider vibrato in the second and third notes preparing for the *sforzando*, played by Jenö Léner in the 1933 performance by the Léner Quartet, is given in the accompanying CD [track 47]; an example of the second approach, played by Zoltán Székely in the 1953 performance by the Hungarian Quartet, is given in track 48.

Intra-quartet consistency: individual and corporate approaches

In the introduction to this chapter, contradictory opinions from quartet players were quoted regarding the importance of adopting a common approach between the four members of the quartet to the application of vibrato to a phrase. This variety of opinion is reflected in the variety of approach evidenced in the recordings. One quartet, the Italiano, has all four instruments in the same cluster group (group 1), suggesting a considered and deliberate attempt at consistency between the instruments. This fits well with anecdotal evidence concerning the quartet's concentration on achieving a blended sound.[6] Their second violinist, Elisa Pegreffi, stated: 'On vibrato, each listened to each; we were four and yet we had the same sort of vibrato – it just came like that' (Potter, 1996: 6).

Six quartets have three of the four instruments in the same cluster group. Two of these, the Capet and the Gewandhaus, have three instruments in group 14: this is to be expected, as the defining characteristic of this group is the near absence of vibrato. Two, the Busch and the Végh, have three instruments in group 12, and the remaining two, the London and New Budapest have three instruments in group 1. These two groups are similar in having a 'rounded' profile with a slight peak on the third and fourth notes, and differ mainly in the absolute width of the vibrato (around 20 cents greater in group 1).

At the opposite extreme, ten performances have all four instruments in different groups, indicating either indifference, or a positive attempt to vary the approach. These include both performances by the Hungarian Quartet, and two of the performances (1940 and 1943) by the Budapest Quartet. The others are those by the Hollywood, Léner (1933), Lindsay, Petersen, Smetana and Yale Quartets.

In order to focus more clearly on the issue of consistency between all four instruments of the quartet, a single measure of consistency was developed, consisting of the average of the correlation factors determined between each pair of instruments. In other words, a correlation factor was determined for each of the six pairs (v1/v2, v1/va, v1/vc, v2/va, v2/vc and va/vc), and the mean of these six correlation factors taken to give a single

[6] In this instance the consistency is between the four players in separate occurrences of the same phrase, rather than the achievement of a blended vibrato by, for example, ensuring that the vibrato is synchronised between all four instruments simultaneously. Nevertheless, the similarity in profile between each occurrence argues for a unity of approach.

measure of 'intra-quartet consistency'. The results are shown in Fig. 10.17. This again shows the Italiano as among the most consistent quartets, and also suggests a slight historical trend towards greater consistency. This trend is echoed by two of the quartets which are represented by multiple performances: the later performances of both the Léner and Hungarian Quartets both exhibit greater consistency than the earlier. However, rather than being symptomatic of a general historical trend, this may just be evidence of 'practice making perfect' – of long experience of rehearsing and performing leading to a convergence of approach. By contrast, the three performances of the other quartet with multiple performances – the Budapest – show similar (moderately high) levels of consistency.

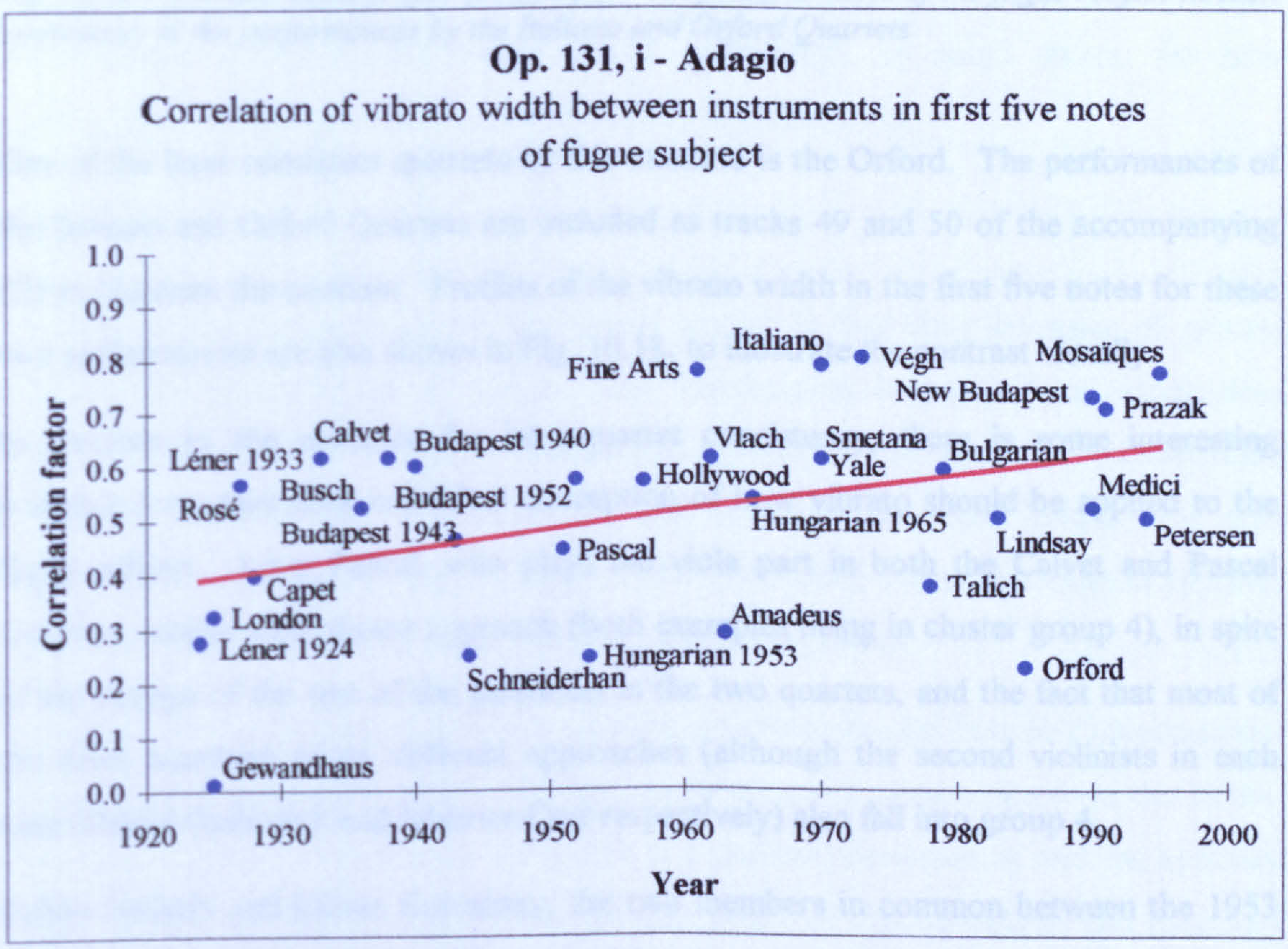


Fig. 10.17 – Intra-quartet consistency in vibrato width in the first five notes of the fugue subject. The measure shown is the mean of the six correlation factor scores between each pair of instruments.

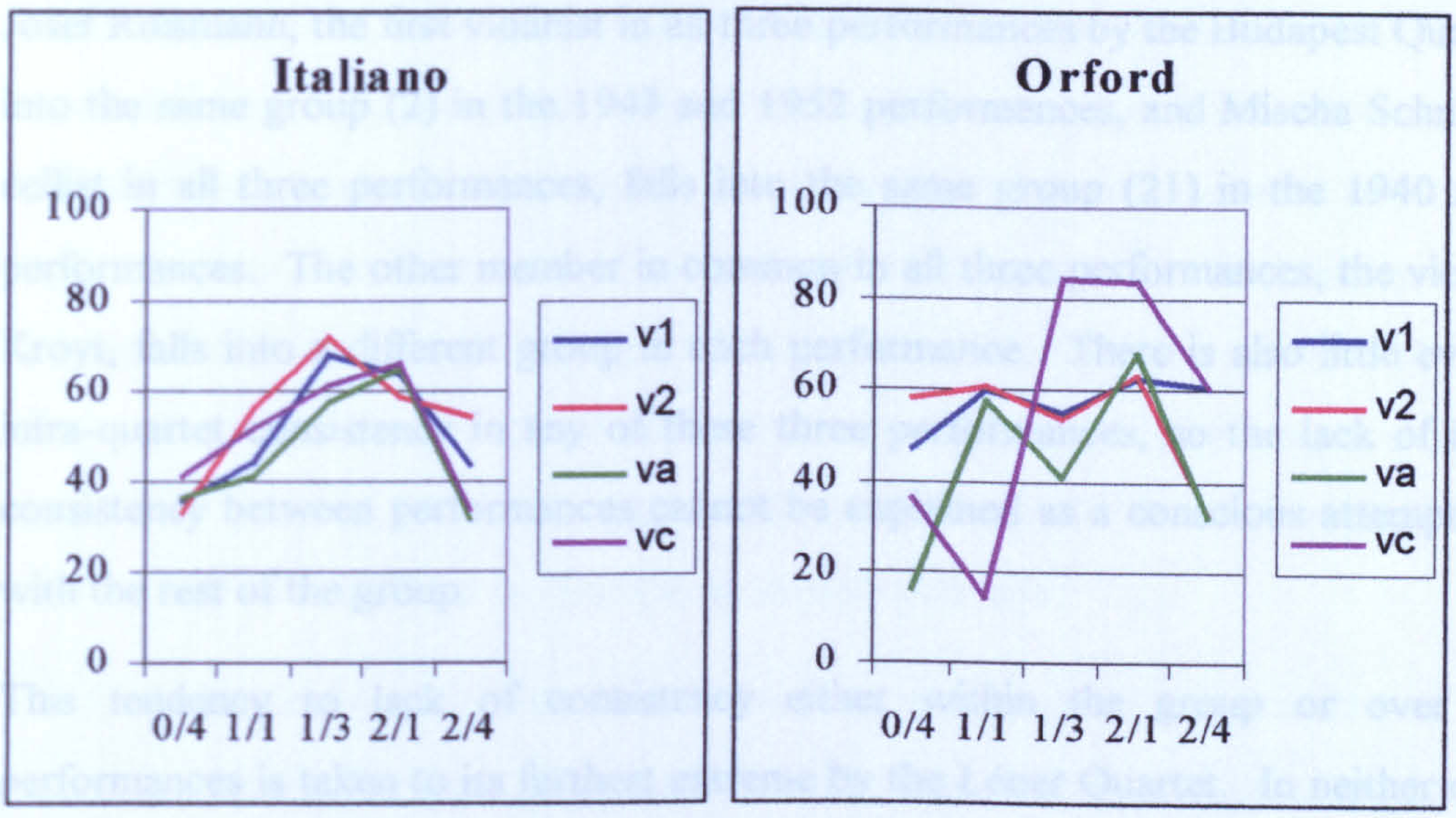


Fig. 10.18 – Vibrato width profile (in cents) for the first five notes of the fugue subject in each instrument, in the performances by the Italiano and Orford Quartets

One of the least consistent quartets by this measure is the Orford. The performances of the Italiano and Orford Quartets are included as tracks 49 and 50 of the accompanying CD to illustrate the contrast. Profiles of the vibrato width in the first five notes for these two performances are also shown in Fig. 10.18, to illustrate the contrast visually.

In contrast to the evidence for intra-quartet consistency, there is some interesting evidence for a persistent individual conception of how vibrato should be applied to the fugue subject. Léon Pascal, who plays the viola part in both the Calvet and Pascal Quartets, retains a consistent approach (both examples being in cluster group 4), in spite of the change of the rest of the personnel in the two quartets, and the fact that most of the other members adopt different approaches (although the second violinists in each case (Daniel Guilevitch and Maurice Crut respectively) also fall into group 4.

Zoltán Székely and Dénes Koromzay, the two members in common between the 1953 and 1965 incarnations of the Hungarian Quartet, also retain their specific, although different, approaches in the two performances (Székely in group 2 and Koromzay in group 5). This is the more striking in that the other two members in 1953 each fall into completely different groups, and the only the cellist in the 1965 performance shares his approach with any other member (he falls into group 2 with Székely.)

Josef Roismann, the first violinist in all three performances by the Budapest Quartet, falls into the same group (2) in the 1943 and 1952 performances, and Mischa Schneider, the cellist in all three performances, falls into the same group (21) in the 1940 and 1952 performances. The other member in common in all three performances, the violist Boris Kroyt, falls into a different group in each performance. There is also little evidence of intra-quartet consistency in any of these three performances, so the lack of individual consistency between performances cannot be explained as a conscious attempt to blend with the rest of the group.

This tendency to lack of consistency either within the group or over multiple performances is taken to its furthest extreme by the Léner Quartet. In neither of its two performances does any player share membership of the same cluster group with any other, and although the personnel remained unchanged, no individual performer belongs to the same group in both performances – although, as noted above, the later performance exhibits greater overall consistency than the earlier.

Conclusions

As with the case of portamento, one would expect to find clear evidence of general historical trends in the use of vibrato. The development from an almost vibrato-free playing style to one in which continuous vibrato is the norm is demonstrated unequivocally, with the three quartets formed before the First World War (the Gewandhaus, Capet and Rosé) and the historically informed Mosaïques Quartet applying vibrato sparingly only to notes carrying great expressive import.

A number of less expected historical developments also emerge from this investigation. The first is the apparently sudden and dramatic decrease in vibrato rate from the 1960s. One may question the extent to which this is a general phenomenon, and the apparent trend may at least partly be caused by the prevalence of Franco-Belgian and Russian / American players in the sample prior to 1960, both schools being associated with a faster and more 'nervy' vibrato. This alternative interpretation is given added weight by the fact that the fastest vibrato in the period after 1960 is exhibited by the Yale Quartet, the only American quartet in the sample for this period.

A second observed historical trend is towards increasing correlation between vibrato width and rate, suggesting that early in the period it was the width of the vibrato that carried the expressive load, with the rate being determined by natural and mechanical factors (a greater wrist movement takes longer to execute), but that later, an increase in rate was deliberately applied along with an increase in width to maximise the expressive effect. It should also be observed that the slower overall rates observed after 1960 would also provide an easier opportunity to increase the rate for expressive effect, whereas it is more difficult to increase an already fast rate.

The final historical trend observed is the increase in intra-quartet consistency of approach over time. While this trend is by no means universal, it does provide some evidence for the increased importance of a unified and corporate approach to interpretation and technique in the history of twentieth century quartet playing – or, to express it with reference to a different set of values, a loss of individualism.

Despite these overall trends, the evidence discussed in this chapter demonstrates a huge variety of approach to vibrato which is not associated with any historical trend or geographical school. This variety is demonstrated in very many aspects of individual and corporate performance. They include how vibrato is applied to individual notes, how it is applied to the shaping of a phrase, how consistent an individual performer is between performances, to what extent he modifies his approach for consistency with other members of the group, and to what extent the group adopts a consistent approach, both between the members and over multiple performances. There is evidence both for a highly individual approach to vibrato which is inseparable from the individual player's technique or stylistic personality, and for the deliberate cultivation of a corporate use of vibrato to present a unified quartet style.

Chapter 11: Conclusions

Each work of art has only one true rendition. (Schenker, 2000: 77)

The idea of the 'ideal' or even in any strict sense the 'authoritative' performance is an illusory one. The music is not totally present, the idea of the composer is not fully expressed, in any single performance, actual or even conceivable, but rather in the sum of all possible performances. (Sessions, 1971: 85)

At the start of this study some widely accepted generalizations were discussed concerning the role of tradition (the passing on of practice and wisdom either formally, from teacher to pupil, or informally through influence and imitation) and of historical trends in the formation of interpretations of musical compositions, which in turn one would expect to be reflected in actual performances of a specific work. Of course, these two influences theoretically work towards contradictory ends: the first in maintaining a particular and possibly geographically isolated mode of playing through succeeding generations of performers; the second in overturning inherited concepts and wisdom through the acceptance of geographically widespread and potentially revolutionary changes in fashion.

At various points in the preceding analysis we have seen that the performances under study tend not to support many of these generalizations, and we are now in a position to assess the overall extent to which the measured characteristics of these performances support or contradict them.

Tradition and the preservation of distinct styles of playing

The analysis in Chapter 2 of the teacher / pupil relationships in the quartets under study identified three closely related groupings: a Czech group consisting of the Smetana, Vlach, Talich and Prazak quartets; a 'Hungarian' group consisting of the Hungarian (both formations), the Lindsay and the New Budapest quartets; and a close pairing of the Amadeus and Petersen quartets. If these separate traditions really exist, one would expect to see a greater level of similarity between the performances in each of these groups than between the members of each group and other quartets. In practice, this is far from being the case.

The Czech group includes the two quartets most closely related from the point of view of pedagogical heritage, namely the Smetana and Vlach. These two quartets show widely differing approaches in most of the characteristics measured by this study, and are at opposite extremes, for example, in the question of marking section boundaries by tempo modification: the Smetana avoids tempo modification almost completely, while the Vlach marks section boundaries extensively both by slowing down at the end of the section and by adopting differing basic tempi for each section. All four quartets in the Czech group fall into different categories for almost all of the performance characteristics measured in this study: choice of basic tempo; extent of rubato or bar-to-bar tempo variation; approach to the articulation of *sforzando* markings; the use and context of portamento and vibrato. The only characteristic which shows some similarity within the group is the articulation of dotted rhythms, where all four quartets demonstrate a preference for playing the rhythm as notated (although only the Smetana carries this approach forward to double-dotted rhythms, the other three tending to 'under-dot' in these contexts.)

The same disparity of practice is largely evident in the 'Hungarian' group, with the only similarity across the whole group being the 'as-notated' articulation of both dotted and doubled-dotted rhythms. The 1965 performance of the Hungarian Quartet displays similarities with the Lindsay in the approach to bar-to-bar tempo variation (rubato); however, in this respect the 1965 Hungarian performance is at variance with the 1953 performance. This difference between the two Hungarian performances has previously been attributed to the presence in the earlier performance of Palotai and his insistence on the strict maintenance of Beethoven's tempi. In other words, the deeply held convictions of one individual in the quartet carry far more influence than any shared teaching inheritance.

With the pairing of the Amadeus and Petersen quartets a very similar picture emerges, again with the only similarity being in the adherence to articulation of dotted rhythms as notated. They display differences in choice of tempo, section boundary observation (no tempo change with the Amadeus, exaggerated phrase-final lengthening with the Petersen), bar-to-bar tempo variation, use of portamento, approach to vibrato, and articulation of *sforzando* markings (the Amadeus tend to prolong the *sforzando* note, the Petersen both to delay the attack on the *sforzando* note and to prolong the note).

The only evidence for the influence of shared teaching heritage, at least in the performance characteristics measured in this study, is a literal approach to the articulation of dotted rhythms. Since this is also very similar in all three of the groups singled out for examination, it hardly amounts to a manifestation of distinct traditions handed down from one generation to another.

Some slight evidence was adduced in an earlier chapter for a tendency for the American quartets included in the study to exhibit a generally faster or more 'nervy' vibrato than their European counterparts. If there is any underlying reality to this observation, it does not owe anything to shared teaching traditions, and may reflect any one of a number of other conditions, such as the need to produce a fuller and more penetrating sound in the larger halls more common in American quartet performance history: public performance of string quartets in America was late in starting compared to Europe, and has been largely confined to public concert halls and similar spaces. There has been little or no tradition of performing quartets in more intimate or private surroundings, as there was in Europe.

It may be argued, of course, that the absence of any real evidence for geographical or teacher-related traditions is due to the set of performance characteristics chosen for measurement in this study, and that a different picture may have emerged had other aspects of performance style been included. It is possible notionally to arrange a variety of performance characteristics along a continuum from 'technique' at one end to 'interpretation' at the other. Those characteristics which are related more to the technique of sound production are intrinsically more likely to be learned from a teacher at an early age and to remain with the performer for life, while those that concern the approach to the performance of a specific composition are more likely to be decided on an individual basis, even if some learned general principles are brought into play. One attempt at ordering some performance characteristics along this continuum is shown below, with those characteristics which are measured in this study being marked with an asterisk.

Technique

Bow hold

Left-hand technique

Use of bow division to produce variety of tone

Use of point-of-contact (sul tasto / sul ponticello)

Other aspects of right-hand technique

*Vibrato

*Portamento (technique of shifting position)

Approach to tenuto or detached notes

Approach to staccato notes

Dynamic contrast

*Rhythmic articulation

Accuracy of ensemble

*Tempo fluctuation

*Choice of tempo

Proportionality of tempo

Interpretation

While this ordering is subjective and tentative, and there may be some argument about the relative positions of some of categories listed (and no doubt further categories could be suggested), few would disagree that most of the characteristics measured in this study are at the 'interpretation' end of the spectrum. However, one might at least have expected to see some evidence of the effect of taught technique in the vibrato and portamento characteristics measured.

Historical trends and changes in fashion

If there is little or no evidence in the performances studied for taught or geographical traditions, some historical trends at least are apparent. However, many of the trends expected from other surveys are clearly absent from the performances under study. Before discussing the absence of expected trends, however, those trends that can be deduced from the evidence are summarized.

Firstly, and completely as expected, there is a severe reduction in the amount of portamento employed, with all performances after 1940 demonstrating many fewer instances than any pre-1940 performance. The reaction against portamento appears to have been strongest in the years up to 1980, with the only performances exhibiting very little portamento (in one case, absolutely none) occurring between 1940 and 1980. Thereafter there seems to have been a partial renaissance. However, a large variety of practice is apparent at all periods in terms of type of portamento employed, its duration and its preferred placing in the musical context.

Secondly, and also very much as expected, there are clear trends in the use of vibrato. There is an obvious differentiation between the three quartets formed prior to the First World War, which employ little or no vibrato, and all the later ones, where vibrato is present as a more or less constant aspect of tone production. The only exception to this is the Mosaïques Quartet, and here this is clearly the result of a deliberate attempt to emulate the approach to vibrato of an earlier epoch. Other aspects of the use of vibrato also appear to be subject to some change over time: for example, there is a tendency for the average vibrato rate to become slower after the 1960s; and for a less 'interventionist' approach in the earlier part of the period, where vibrato rate is slower the greater the pitch width, followed by a more 'intensively expressive' approach in the later part, where rate intensifies with pitch width. As discussed previously, the latter trend suggests that initially vibrato was employed purely as an aspect of tone production, and the natural mechanical tendency for the rate to slow down to accommodate the greater movement required for a wider pitch range was accepted as natural; later, vibrato seems to have been used in a more discriminating manner as a means of intensifying the expression at certain points, and this mechanical tendency was deliberately overridden in order to maximize expressivity by increasing both pitch width and rate.

This obvious and widely observed change in attitudes to vibrato clearly bears no relation to the learning experiences of the players concerned, and is often in direct contradiction to the playing methods and sensibilities of their teachers. As Auer was quoted as observing in an earlier chapter, he was unable to prevent his students from adopting such bad habits in spite of all his endeavours.

In other respects vibrato is treated with great variability throughout the period, as was noticed above in connection with portamento. The use of different amounts of vibrato to help shape specific phrases was shown to vary greatly between quartets, and while certain patterns and groupings of performances emerged, no overall historical trend is discernible.

One other apparent change over time is evident from the study of vibrato, and this is for later quartets to show increasing concern for a common approach between all four members. This is apparent, for example, in the shaping by means of varying vibrato width of the subject of the fugue that opens the first movement in all four instruments. This growth of emphasis on corporate homogeneity is apparent in other respects as well, such as the rhythmic articulation of *sforzando* events, where a choice either to deliberately delay or anticipate the onset of the *sforzando* note, and to prolong it, is more often consistent between quartet members in later performances. However, this apparent trend toward increasing conformity is by no means universal. To the extent that it is present, it must owe a considerable amount to the corresponding change towards stable quartet membership and the increased dedication of later quartets to quartet performance to the exclusion of other forms of musical activity.

Turning to tempo and timing related aspects of performance, the evidence for historical trends is much more meager. One can point to a clear trend for double-dotted rhythms to be articulated with much less concern for the notated rhythm prior to the Second World War (when they were frequently under-dotted), and for an increased concern for executing both dotted and double-dotted rhythms as notated afterwards. This is particularly the case for the period of the 1950s and 1960s, when there was also a tendency for general bar-to-bar tempo variation (i.e. rubato) to be reduced; interestingly this is also the period of the greatest austerity in the use of portamento, and taken together these trends perhaps reflect (temporarily) the prevalence of objectivist and constructivist ideals and the post-war reaction against subjective self-indulgence that also found expression in the Darmstadt movement.

Dotted rhythms apart, there is virtually no evidence from the performances studied of any clear historical trend in matters of tempo or timing variation, with the possible exception of a tendency to take the start of the fourth movement (andante, ma non troppo e molto cantabile) at a slower tempo after 1960 than before. There is no other support for any systematic change over the period under study in the basic tempi chosen for each movement, in the extent and manner of demarcating section boundaries by tempo change, or in the degree or musical context of bar-to-bar tempo variation (rubato). The claim by Bowen that the practice of changing tempo to differentiate movement sections, and specifically slowing down for the second subject in a sonata form movement, is old-fashioned, is decisively not borne out by the evidence presented here (Bowen, 1999: 445-6). In every case, the picture that emerges is one of wide variety of practice at all times. This is very much in contradiction to the expectations engendered both by anecdotal evidence and by studies of other repertoire, where such trends have been demonstrated for standard works from the orchestral and solo piano repertoire.

One should not exaggerate here the lack of observable historical trends. It would be impossible to mistake a performance from the period before 1940 for one from the period after 1950. But the point remains that, of the performance characteristics analysed in this study, the only reliable criterion would be the difference in the use of portamento; similarly the only clear indicator of a performance by a pre-First World War quartet would be a strikingly more sparing application of vibrato. Other apparent indicators must either be aspects of playing not analysed here (such as varied tone production brought about by differing right-hand technique or the use of gut strings), or be by-products of the recording process, and in particular the limited ability of acoustic and early electric recording to capture the full frequency range and hence timbre of the instruments.

Repeated performances by the 'same' quartet

The performances under study offer three opportunities to assess the extent to which the 'same' quartet adheres to a fixed interpretation or changes and develops over time. Of the three quartets represented by multiple performances only the Léner has the same personnel in both performances; the Budapest had a change of second violinist for the last (1952) of their three performances, and the Hungarian had two changes of personnel (second violin and cello) between their 1953 and 1965 performances: hence the quotation marks on 'same' in the heading above.

The two performances by the Léner Quartet demonstrate a very similar approach to portamento. In other respects they are very different: the basic tempi for each movement are different, the approach to section demarcation is different, and the earlier performance displays less flexibility in tempo variation than the later.

The three performances of the Budapest share a predilection for generally fast tempi, and again there is marked similarity in the approach to portamento. In other respects, such as section demarcation and bar-to-bar tempo variability there are significant differences between the performances, with the 1943 and 1952 performances generally showing more flexibility than the 1940 performance. The fact that in both the Léner and Budapest quartets the approach to portamento tends to be consistent between performances perhaps suggests that it is learned by the individual player along with the music itself, and is unlikely to be changed over time. In so far as it reflects a pattern of fingering, and hence position shifts, this is perhaps only to be expected.

In the case of the Hungarian Quartet, both performances again demonstrate a generally similar approach to portamento, although the specific instances are different in each performance. Both Szekely and Koromzay (the two players common to both formations) show very similar approaches to vibrato in both performances – this was also noted for the violist Léon Pascal, whose use of vibrato is very similar in both the Calvet and Pascal Quartet performances, despite the entirely different approach taken by his colleagues in each quartet. The preferred use of vibrato is possibly also a highly personal development which is resistant to change and external circumstances. The two Hungarian performances also both show a preference for tempi on the fast side, but here the similarities end. The earlier performance is much more metronomically focused, and demonstrates very little bar-to-bar tempo variability, whereas the later performance has much more rubato; the two performances also fall into different categories in terms of section demarcation.

With all three of these quartets, it is noticeable that the later performances tend to show greater flexibility of tempo than the earlier performances. It is tempting to conclude that long experience within a stable group, and the resulting familiarity both with the performing habits of other members and the group's approach to specific works, allow the ensemble to indulge in greater expressive flexibility with less risk of 'accidents'. It is certainly the experience of a number of quartets of long standing that they develop a greater sense of freedom of expression over time.[1] However, in each of these three cases there are other specific factors which may also account for this general 'loosening up'.

In the case of the Léner Quartet, the first performance was recorded acoustically and the second electrically. While the use of microphones for the electrical recording allowed the quartet to sit in a relatively normal formation, acoustic recording conditions imposed much more artificial constraints. A photograph of the Léner Quartet in one such recording session shows the two violins in front, with the violist and cellist behind on a raised dais, all four facing forward. This disposition was obviously intended to maximize the opportunity for the recording horn to pick up the sounds of all four instruments, but must surely have prevented most of the visual communication which takes place between quartet members and on which deviations from the regular and metronomic largely depend. On the other hand, the performance of the Gewandhaus Quartet, also recorded acoustically, shows a remarkable degree of rhythmic freedom: unfortunately there is no evidence of the seating arrangement used for this recording.

The middle performance of the Budapest Quartet (1943) was recorded during a live concert at the Library of Congress, and the greater spontaneity engendered by the occasion and the lack of any opportunity for retakes or editing, may well have contributed to its greater freedom of tempo flexibility.

Finally the cellist of the earlier formation of the Hungarian Quartet, Vilmos Palotai, is recorded as possessing a pedantic insistence on maintaining Beethoven's marked tempi and on the role of the cellist in establishing a firm and regular rhythmic foundation for the quartet as a whole. His absence in the later performance must have acted somewhat as

[1] Arnold Steinhardt of the Guarneri Quartet describes this phenomenon thus: 'Through the many rehearsals and concerts of that first year, I began to notice a change in our playing. It was more a feeling at first. By the time the quartet arrived in Europe in the summer of 1965 for our first concerts there, we had begun to relax with each other during the most problematic ensemble passages. A natural by-product of ensemble difficulty is a certain tightness and stiffness. It is so hard to play together that a young quartet, instinctively, will avoid any freedom or individuality that rocks the boat. Their first performances tend to be well played, synchronized, and bland. In those problem areas we were no different from other quartets, but once our ensemble playing was in order, we each began to feel more freedom onstage… As we got to know each other's playing styles, we became more confident, even daring. Problem passages could now surge forward and then hesitate at the end if we so desired, and still we'd be together.' (Steinhardt, 1998: 123) While this quote relates specifically to marked changes in the very early development of the quartet's style, it is reasonable to assume that the process of 'loosening up' continues throughout an ensemble's existence, albeit at a decreasing rate.

the removal of a straitjacket and allowed a greater flexibility of tempo, which the first violinist, Zoltan Székely, shows every sign of having relished.

Diversity – the primary characteristic

In contrast to the limited evidence for geographic schools, teaching traditions and historical trends exemplified by the performances under study, the overriding impression is one of great diversity and variety of interpretation at all times. Even the relatively small subset of performance characteristics covered by this study give rise to numerous options requiring decisions to be made; it is clear that radically different answers were arrived at by the quartets in question. These decisions include the choice of basic tempo for each movement, and whether these should be subservient to some kind of schematic preference for pushing tempi to extremes (both slow and fast) or not; whether to mark the sections of a movement, and if so, how (e.g. by slowing down at the end, and / or by adopting a slightly different tempo which might be felt to be more in sympathy with the character of the new section); to what extent to allow the basic tempo to be varied for expressive purposes (including questions of whether to emphasize specific events by anticipating or delaying them metrically, whether rhythms should be articulated exactly as notated or whether any expressive deviation from exact tempo should be employed); where and how often portamento should be employed, how prolonged and clearly expressive it should be, what type should be employed, and whether it is most effective when applied to smaller or larger intervals and to ascending or descending passages, and the specific context within the musical phrase where it should be applied; how vibrato should be applied, and to what extent its rate and width should be varied in order to express the performer's conception of the musical phrase; to what extent the player should be constrained by the approach of other members of the group in many of these decisions, and to what extent he should feel free to express his own view in the context of the other three.

The answers to all of these questions demonstrated in the performances under study are varied to the extent that no two performances, even by the same quartet, are comparable in all respects. The diversity inherent in these quartet performances appears to be much stronger than has been observed in other genres, and confounds the clear historical trends which have been discovered by other surveys and studies in different repertoire.

We must now search for explanations as to why this should be the case. Before proposing any such specific explanations, however, a brief review of the positions taken by a number of performance theorists may be helpful to provide a context for the special conditions of quartet performance which will be discussed below.

How interpretations are formed

A number of authors have propounded the somewhat narrow and restrictive view that the primary goal of a performance must be to articulate a formal analysis of the composition. In the extreme case, as suggested by the quotation from Schenker at the heading of this chapter, this view would admit of only one correct analysis of a composition, and therefore of only one 'correct' performance. As a corollary to this view, it must be possible to conclude that a performance is demonstrably invalid, if it articulates an analysis of the piece that is also demonstrably wrong. Most authors sympathetic to this view of performance, such as Wallace Berry (e.g., Berry, 1989), take a somewhat softer line, allowing for differences in performance, which however must be sanctioned by a corresponding difference in the formal analysis which is capable of rational explanation.

In a thoughtful survey and critique of a number of authors espousing this approach, Lester draws the following conclusions:[2]

> *...the reality of performance forces one to realise that choices must be made among alternative approaches to any given issue – at least for a particular rendition. Making choices among various possibilities is an important part of any sort of interpretation, both in analysis and in performance. But in contrast to the way in which analytical decisions are often regarded, performance decisions suggest that many (though certainly not all) possible choices are not so much 'right' or 'wrong' as simply different, leading to varying perspectives.* (Lester, 1995: 211)

Clearly, few performers would accept the responsibilities placed on them by a narrow analysis-based prescriptive approach to the realization of a performance, which would

[2] See also Clarke, among a number of other authors who recognize the limits to the importance of structure to expression in performance: 'Musical structure is undoubtedly an important component in what motivates and shapes expression, but it is only one element in a wide-ranging network of relationships... This raises a question about the limits of the notion of structure in music, and whether "characterisation" is viable as a concept. More than that, it suggests that the crucial term...is *meaning*, and that when a performer "characterises" a piece in performance, he or she is constructing meaning through expression' (Clarke, 2002: 68)

include rigorous formal analysis (or at least the consultation of published analyses) before attempting to play the piece, and constant reference to such analyses (even if only implicitly and perhaps to some extent subconsciously) as incompatible performance options presented themselves in rehearsal.[3] If they did, the huge variety of performance decisions evidenced by the performances included in this study just could not arise.

Godlovitch takes a somewhat different line, stressing that a musical work's notation massively underdetermines performance; in other words that there is a huge variety of aspects of realized, 'sounded' performance for which the notated score can provide no definitive prescription. Whereas the 'performance articulates analysis' theorists would look to formal analysis to supplement the notated score and to guide choices between performance options, Godlovitch sees the underdeterminacy of the score as licence for the performer to assert his personality. He even goes so far as to suggest that a measure of the exceptional performance is the degree to which it breaks previously experienced norms.[4]

Godlovitch, in his implicit rejection of the peformance approach based on analysis, leaves open the question of what methods and principles are brought to bear by the performer to find a convincing way to address the underdeterminacy of the notated score, and his model is ultimately unsatisfying as a basis for evaluating and comparing different performances. Levinson (1993) throws a different light on the relationship of performance to formal analysis in drawing a logical distinction between critical interpretation (CI, in his abbreviation) and performative interpretation (PI). Critical interpretation involves rational and verbal explanation of a composition, and includes the slightly narrower function of formal analysis, whereas performative interpretation is 'a considered way of playing a piece of music, involving highly specific determinations of all the defining features of the piece as given by the score and its associated conventions of reading' (Levinson, 1993: 36). A PI is in other words a conscious set of choices by the performer which determine how his performance will be realized; in arriving at his PI,

[3] cf Brendel: 'I don't sit down and analyse a piece of music in one way or the other; instead I want first to familiarize myself with the piece, so that *it* tells *me* how it is composed.' (Brendel, 2002: 41)

[4] 'A performance is an exceptional instance of a work only if it involves actively making creatively novel instances' (Godlovitch, 1998: 89). This is clearly overstated – a performance may surely also be exceptional in terms of its success in articulating considered performance

the performer may well have taken account of his (or someone else's) CI, and may well have undertaken or consulted a formal analysis, but this is not necessary to the creation of a PI. Similarly, it is never possible to deduce a CI from a PI (although individual PIs may be more or less consistent with any given CI.) Finally, it is also important to recognize that the PI is in itself a mental construct, and distinct from any specific instantiation (i.e. an actual performance), which may be a more or less perfect realization of the PI.

This account addresses Godlovitch's apparent lack of interest in the reasons for performance differences, but is far less prescriptive than the narrow 'performance must reflect analysis' view, and implicitly allows for a far wider range of influences in the formation of the PI, including decisions based on experimentation in rehearsal, and personal taste. It also implies that PIs held by the same performer may change over time without automatically requiring either the old or the new PI to be 'wrong' in any way – in other words, it allows for the evolution of a way of performing and for variation between performances which is clearly an observable feature of actual performances. Such discussions usually implicitly relate to contexts where there is only one individual performer involved: different considerations arise in the case of ensembles, as Levinson himself recognizes:

> *The gap between CI and PI is perhaps particularly evident in the sphere of chamber music, as opposed to symphonies or solo sonatas, where readings can be ascribed to single individuals. Is it plausible to think that, say, the Juilliard Quartet's reading of Beethoven's C sharp minor Quartet automatically embodies a critical conception of the work shared equally by all quartet members? Of course there may be such a group conception, but need we assume there is? No, and it is likely that each member has a critical take on the music which differs somewhat from those of his colleagues in either content or depth. What they do of necessity have in common, as a serious performing entity, is a PI they have co-operatively worked out, and which is their statement, so to speak, of how the piece should sound. They agree on a performative reading that does most justice to the piece as they each view it, but this may cover varying conceptions of its meaning and structure, all of which are compatible with the PI jointly endorsed.* (Levinson, 1993: 41-4)

options, whether the options taken are original or are familiar, either from previous performances by the same performer, or from other performances.

Levinson's main purpose is to draw firm distinctions and contrasts between the nature of critical and performative interpretation, and the example from chamber music certainly serves this end. However, he pays less attention to the mechanisms involved in forming the PI itself, which as suggested above, is itself a mental construct and therefore resides in the mind of an individual. In the above passage he touches on some of the issues involved in ensemble performance, but probably overestimates the likelihood that each member of the ensemble may hold the same PI of a piece. On the contrary, it would seem virtually impossible for all four members of a quartet to hold precisely the same PI of a piece in all its particulars. In order to perform at all, they must clearly arrive at some form of 'co-operatively worked out' PI, and it is the mechanics and dynamics involved in this working out that we turn to now.

Decision making and democracy

Quartet players themselves clearly recognize the difficulty of arriving at a common 'PI'. Abram Loft, violist of the Fine Arts Quartet in the performance included in this study, acknowledges both the variability of quartet performance and the importance of the input of ideas from all members of the group:

> *At one extreme stands the player convinced he or she knows exactly how the music should go... At the other end of the scale is the player who has no firm idea about the music.... Between these two extremes stand those members who have a concept of the work that recognizes at least a small range of possible ways to interpret the music. Such players realize that the ensemble's way with the composition must inevitably change with the passage of time, no matter what the carefully considered decisions of the moment may be. As you might expect, my sentiments are with this middle echelon of players. Fortunate, say I, is the ensemble that can avoid (or root out) both the adamant defender of his truth and the drudge who lacks either the insight or the will to espouse any viewpoint.* (Loft, 2003: 181)

Accommodating, incorporating, and deciding between the potentially conflicting views of the four members of the quartet is clearly vital to the formation of an agreed 'way of performing' a specific work. Indeed this is probably more vital in the context of the string quartet than in any other form of chamber ensemble. A group of four individuals offers greater scope for disagreement and conflict than any other: there are sufficient members for differing views to be frequently present, there are not too many members to discourage individuals from airing their views, and the even number of members raises the ever-present possibility that a majority decision cannot be reached.[5] The natural tendency of the majority to dominate may not be available in some instances simply because there is no majority. It is assuredly no accident that the ensemble that offers the greatest scope for the expression of divergent opinions and the most difficulty in resolving them also gives rise to the greatest variety in actual performance. The social dynamics of the group provide an inbuilt resistance to blandness, uniformity, routine or the unthinking acceptance of tradition or example: successful quartets deliver performances which are clearly the outcome of insight, argument and incessant experimentation; less successful quartets simply fold.

Of the quartets included in this study, we have already seen the importance placed by the Amadeus Quartet on encouraging argument and the avoidance of compromise; we have also seen the elaborate lengths taken by some quartets to institutionalize the resolution of conflict (for example, the Budapest Quartet's technique of randomly allocating each piece to one member, who then held the casting vote on all questions relating to performance options). For earlier quartets, such as the Rosé, the first violinist often held a position of authority, with the ensemble being named after them, and the other membership being far from constant. In these quartets the authority of the first violinist ('primarius') would have been relied on to resolve conflicts. More recently, quartets have less often been named after their first violinists, and claim to espouse democratic principles. However, the need for leadership in given situations still apparently gives the first violinist a special position. Murnighan and Conlon (1991), in a study of twenty professional British string quartets, found that most successful quartets recognized the leadership role of the first violinist, whereas those which theoretically espoused a truly democratic approach tended to be less successful.

These authors also found that the strategy adopted for handling conflict was important to the group's success. Avoidance of conflict or compromise was generally associated with less successful groups; strategies adopted by more successful groups included 'cooling off', granting the decision to the member with the lead, playing rather than talking, and recognizing the positive aspects of tension (Murnighan and Conlon, 1991: 177-178).

[5] For further discussion of the unique extent to which groups of four provide grounds for conflict and stalemate, see Young and Colman, 1979: 13.

These successful strategies all had the effect of allowing conflict to continue without being disruptive.[6]

Communication is equally important in performance as it is in rehearsal, although perforce it is clearly of a different nature. While there is clearly no place for experimenting with different interpretative strategies in performance, small chamber ensembles are reliant on numerous tricks of visual and aural communication which they must be alive to and react to if the performance is to carry a sense of purposeful freshness.[7] John Dalley, of the Guarneri Quartet describes clearly the increasingly intuitive nature of such 'in-performance' communication: 'There's a certain body language that each of us has when he plays. You get to know that about your colleagues and react accordingly. Over the years a great deal of it becomes intuitive' (Blum, 1986: 14). Important though such communication is in the creation of a performance which sounds alert and spontaneous, there are clearly limits to the kind of performance decisions that can be made in the heat of the moment. As Rink states: 'even though an interpretation will vary with the occasion, performers *must* commit themselves to a particular inferred "meaning" in a given performance if the playing is to have any sense of

[6] These conclusions are borne out by Rounds' observations of the rehearsals and performances if the Lafayette Quartet: 'Pam [Highbaugh, cellist] and her colleagues have learned how to identify subtle musical problems and to patiently demonstrate solutions, whether by playing alternatives, by singing, or by offering extra-musical translations. But musicians do not take great pleasure in the labor of consulting and restating... To them, speech is an inferior means of communication, much rather play a piece than talk about it.' (Rounds, 1999: 67).

[7] This is described eloquently by Schutz in the following passage from a paper which concentrates on the sharing of 'inner time' as one of the defining characteristics of musical relationships, whether between performer and listener, or between performers: 'Both [performers – Schutz here assumes a duo context] share not only the inner *durée* in which the content of the music played actualizes itself; each, simultaneously, shares in vivid present the Other's stream of consciousness in immediacy. This is possible because making music together occurs in a true face-to-face relationship – inasmuch as the participants are sharing not only a section of time but also a sector of space. The Other's facial expressions, his gestures in handling his instrument, in short all the activities of performing, gear into the outer world and can be grasped by the partner in immediacy. Even if performed without communicative intent, these activities are interpreted by him as indications of what the Other is going to do and therefore as suggestions or even commands for his own behaviour. Any chamber musician knows how disturbing an arrangement that prevents the coperformers from seeing each other can be...' Schutz continues by contrasting this state of affairs with larger ensembles, or contexts in which there are clear leaders: 'Such a close face-to-face relationship can be established in immediacy only among a small number of coperformers. Where a larger number of executants is required, one of them – a song leader, concert master, or continuo player – has to assume the leadership, that is, to establish with each of the performers the contact which they are unable to find with one another in immediacy. Or a nonexecutant, the conductor, has to assume this function. He does so by action in the outer world, and his evocative gestures into which he translates the musical events going on in inner time, replace for each performer the immediate grasping of the expressive activities of all his coperformers.' (Schutz, 1964: 176)

conviction. Weighing up options on the concert platform is simply not viable.' (Rink, 1999: 217)

For those quartets which explicitly aim for spontaneity in live performance, and consciously avoid 'giving the same performance every time', this poses a dilemma about the amount and type of rehearsal that is appropriate and those aspects which are 'out of bounds' for tinkering with in performance. Too much rehearsal could result in the over-development of a performance strategy and act as an inhibitor of any in-performance deviation from a clear plan (Goodman, 2002: 158). Peter Cropper, first violinist of the Lindsay Quartet, states: 'We don't rehearse a performance, we rehearse the music, so that when we're performing we're free to do what we want to do... We never play it the same.'[8] This is clearly a risky strategy, and depends to a great extent on the trust established between members over a long period of time, and on sensitivity to and the ability to react immediately to every nuance of the live performance. Here again, the quartet ensemble satisfies these preconditions to a far greater extent than other genres, and this must also help to account for variability in performance (although it could be argued that this is less likely to be the case for performances recorded in a studio for commercial release.)

Some of the studies quoted above have been carried out primarily with sociological ends in mind, as studies of social dynamics in small work groups (of which string quartets present an extreme example), rather than for any specifically musical purpose. Similarly motivated studies of the relationship between conductors and their orchestras serve to highlight the contrast between co-operative chamber music making and directed orchestral playing which has been noted above as a primary cause of the variability observed in quartet performance as opposed to orchestral performance. Atik (1994) describes different styles of leadership in a study of orchestral conductors: while some conductors exercised a 'transactional' style of leadership which consisted of the relaying of instructions, others developed a 'transformational' style which enabled orchestra members to participate more co-operatively in the realization of the performance. But these were merely different means to the same end: the shaping and achievement of a performance in accordance with the conductor's intention. Faulkner (1973) emphasizes

[8] Personal interview with the author, July 2000

the importance to orchestral players of clear and persuasive communication from the conductor, and their willingness to follow the conductor's interpretation, whether or not they agree with it, if such communication is present.

In conditions where conductors move regularly and frequently between orchestras, the style of leadership is likely to be transactional rather than transformational (a stage which takes longer to achieve and is built on the development of relationships). This means that the performance is more likely to be limited to the execution of the conductor's most obvious directives, and to a large extent precludes the potential for spontaneous effects which give rise to what is recognized as inspirational music making. There are of course exceptions where a conductor's long association with an orchestra allows such special qualities to develop, but for the most part this must account for the increasing uniformity of orchestral performances documented in a number of historical studies.

Last words

If one accepts, with Sessions, that great works are illuminated by variety rather than uniformity of interpretation in performance, it is clear that the string quartet repertoire is currently in a healthy state – probably healthier than that of many other genres of music making today. It is perhaps less in need of the kind of research attempted in this study than these other genres, especially if one agrees with Bowen on the real purpose and benefit of research into historical performance practice:

> *The final goal of performance analysis…is not simply to understand the styles and traditions of different periods and repertoires. The goal, at least as far as the performers are concerned, is to demonstrate how the conventions of style and tradition make a space for further expressive freedom… The aim, then, is not to limit possibilities but to create new ones. This new research will make performers aware of other levels of expression and will enable them to master not only new accents (new sounds) but new languages (and new meanings).* (Bowen, 1996: 35).

Abram Loft, as a practising quartet performer (in the Fine Arts Quartet), states this view as eloquently as any other:

> *I doubt that any ensemble wants to sound exactly like another. Musicians are not stamped out in a cookie-cutter machine. Carried to the nth degree, slavish imitation would mean that we would need just one string quartet, piano trio, chamber orchestra, and so on. The ensemble should approach every work in its repertoire in terms of its own understanding of the given composition. Only that individuality of perspective, attuned always to the special requirements of the music at hand, can justify the existence of an ensemble and keep its performance vital and fresh.* (Loft, 2003: 207)

Change, variety and diversity are the lifeblood of quartet performance. They arise from the nature of the repertoire, the social dynamics of the group, and the constant quest for improvement and perfection with which nearly all quartet players are endowed. This study has attempted to demonstrate that such variety is inherent in, and perhaps unique to, the string quartet. It may also go some way towards explaining why, at least to this author, listening to performances of the string quartet repertoire provides, to a far greater degree than other genres, an endless source of inspiration, challenge and involvement. It has perhaps also taken a small step towards addressing a gap in performance research noted by Eric Clarke as follows: '...performance research has mostly adopted a thoroughly individualistic view of the performer and his or her mind. The social context of performers (including co-performers, the audience and the influence of teachers and mentors, as well as recordings and performances by others, social attitudes to performance and performance "fashions") is of paramount importance but as yet is poorly understood in any explicit manner.' (Clarke, 2002: 68)

The final words may be confidently left with Arnold Steinhardt of the Guarneri Quartet:

> *The string quartet by its very nature selects those musicians who have the temperament and ability to probe as a team into the music's essence. Each player must be willing to take whatever time is necessary to examine and discuss the big ideas of an epic Schubert quartet, as well as the intimate world of little gestures that lives alongside, not unlike the cosmologist who looks out at the far reaches of the universe and at the same time into the microworld of particle physics. And 'the deep difficulty of excellence,' as Spinoza put it, only gets deeper with time. Each added day of experience and understanding pushes the goals of performance further along. The quartet player's work is the stuff of high emotion laced with a powerful intellectual component.* (Steinhardt, 1998: 223)